SOCIAL SUSTAINABILITY AND STAKEHOLDER-ASSOCIATED CHALLENGES OF URBAN HOUSING DEMOLITION IN CHINA

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CERTIFICATE OF ORIGINALITY

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ABSTRACT

As a consequence of the Chinese government's ambitious construction modernization program, urban housing demolition (UHD) has been widely carried out in China to release existing built-up land for urban redevelopment. With multiple strategic considerations, UHD has made a significant contribution to the economic growth, infrastructure development, and housing conditions of Chinese cities. However, despite its benefits, UHD has had a profound negative impact on the social fabric of modern China. Over 20% of urban residents have had their living conditions and economic status severely affected by having to relocate due to UHD (Beijing Cailiang Law Firm, 2015). In China, due to sharp conflicts of interest among different stakeholder groups, UHD has been criticized as negatively impacting social sustainability through perceived social unfairness, mass protests and even violent resistance.

Since previous studies have found that stakeholders play a critical role in determining the degree of social sustainability, in order to mitigate negative social sustainability issues it is necessary to first investigate the implications of UHD on social sustainability from a stakeholder perspective. The stakeholder-associated challenges should then be effectively addressed to mitigate the negative impact of stakeholder conflicts on performance and social sustainability.

Accordingly, this study focuses on the following stakeholder-oriented research questions: 1) From the perspective of stakeholders, what are the conceptual implications of the social sustainability of UHD? 2) How can practitioners quantitatively evaluate the social

sustainability of UHD based on the key interests and wellbeing of stakeholders? 3) How can practitioners quantify and deal with stakeholder conflicts in UHD? 4) How can practitioners address the adverse impacts associated with the key stakeholders in UHD?

To answer the first question, the conceptual implications of social sustainability were analyzed based on a literature review and empirical investigations of key stakeholders in UHD. The results show that social sustainability should be defined based on the wellbeing and key interests of stakeholders.

To answer the second question, an assessment system based on cluster analysis was established to quantitatively measure the social sustainability of UHD. The overall social sustainability of UHD projects in Shanghai is then assessed to demonstrate the practical value of this assessment system. The results showed that health and safety, social equality, and adherence to the law were the most critical dimensions that determined the social sustainability of UHD in Shanghai. It was also found that to enhance social sustainability, existing housing demolition practices should be modified to reduce their negative impact on the daily lives of residents living near demolition sites.

To address the third research question, a quantitative model is proposed to evaluate, analyze, and mitigate stakeholder conflicts in UHD on the basis of stakeholder salience theory and Pawlak's conflict theory. In the model, the key concerns and attitudes of different stakeholder groups could be captured based on empirical investigations. To determine the relative importance of each stakeholder group, key stakeholder characteristics are demonstrated and

quantified via salience analysis. Subsequently, the conflicts of interest among different stakeholders were calculated using Pawlak's conflict analysis. With the help of the model, an action scheme is designed to mitigate stakeholder conflicts and maximize project benefits. A UHD project in Wenzhou was used to demonstrate the application of the conflict analysis model. The robustness and effectiveness of this model is tested using sensitivity analysis and scenario comparison. The results indicate that this model could be effectively adopted in real UHD projects to balance the interests of stakeholders and reduce stakeholder conflicts.

Existing laws and policies tend to treat the adverse impact of stakeholders as social risks. Accordingly, to answer the fourth research question, these detrimental stakeholder impacts are investigated from the perspective of social risk management. Social network analysis is employed to link stakeholders and their negative impacts in UHD. On the basis of network analysis, critical social risks and the corresponding stakeholders are identified. Social security schemes, efficient financial management, multi-dimensional impact assessments, policy analyses and adherence to laws, as well as public participation are proposed to mitigate social risks during housing demolition. The effectiveness of these solutions is quantified based on a network simulation. These findings can help practitioners mitigate the adverse impacts caused by stakeholders.

Through the aforementioned analyses, this study contributes to the relevant body of knowledge in the following four areas.

First, the study combines social sustainability analysis and stakeholder theory (i.e. assessing

social sustainability based on the wellbeing and key interests of stakeholders, and addressing social sustainability issues by mitigating the adverse impacts of stakeholders), particularly in the area of UHD projects. Given that stakeholders play a significant role in determining the social sustainability of UHD, this study provides valuable suggestions for practitioners to improve their UHD practices.

Second, the study contributes to the body of knowledge on social sustainability evaluation. An assessment system containing 22 indicators has been developed to establish the implications of social sustainability. This system can be used to quantitatively measure the social sustainability performance of UHD projects.

Third, the study contributes to the area of stakeholder conflict analysis. Stakeholder conflicts in UHD projects can be well quantified through the development of a conflict analysis model that can capture stakeholder concerns and attitudes based on empirical investigations. In addition, the model can generate action schemes for practitioners to mitigate stakeholder conflicts and maximize project benefits.

Fourth, this study contributes to the area of social risk management by having developed a network model to analyze social risks in UHD. Compared with previous studies, this model quantified the relative importance of each social risk from a stakeholder perspective. In addition, the interactions among different social risks were examined based on network analysis. As a result, the adverse impacts caused by stakeholders can be controlled.

The results of this study offer valuable guidance for practitioners to measure the social

sustainability of their UHD projects. By addressing stakeholder-associated issues, it can enhance the overall social sustainability of UHD practices in large Chinese cities.

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CHAPTER 1 INTRODUCTION[1]

1.1 Research Background

1.1.1 Urban Redevelopment in China

China has experienced a complete transformation from a planned economy to a market system after the economic reform and opening-up policy that began in 1978. This economic transformation provided new opportunities for urban development and urbanization. The urbanization rate of China reached 56.1% in 2015, which was more than 2.8 fold that of 1979, and more than 771.16 million residents lived in urban areas (China Statistics Bureau, 2016). Despite its remarkable contribution to China's economic growth, this rapid urbanization process gave rise to a few urban issues, including substandard buildings in inner-city areas (Shih, 2010), concentrated poverty (Liu and Wu, 2006), inefficient land use (Tian et al., 2016), uncontrolled urban sprawl, and environmental pollution (Han et al., 2014).

To address these urbanization issues, the central government of China began regulating

[1] Parts of this Chapter have been published in the following papers: Evaluating social sustainability of urban housing demolition in Shanghai, China, Journal of Cleaner Production; Managing Social Risks during the Housing Demolition Stage of Urban Redevelopment Projects- A Stakeholder-oriented Study Using Social Network Analysis, International Journal of Project Management.

urban redevelopment as an effective measure to establish sustainable urban development modes (Xue et al., 2015). Numerous urban redevelopment projects (URPs) such as the URPs in the Dongcheng District of Beijing (Shin, 2009), the "Urban Renewal 365" programs in Shanghai (Shih, 2010), and the redevelopment of urban villages in Guangzhou (Chung and Zhou, 2011), have been carried out with multiple strategic targets.

Laws and policies have been enacted to facilitate this prevalent redevelopment process. For example, the Hong Kong government established the Urban Redevelopment Authority (URA) in 1974 to manage URPs and issued a series of policies such as the "Urban Renewal Strategy" to support urban redevelopment activities. In 2012, the city government of Shenzhen promulgated the "Detailed Rules for the Implementation of Urban Redevelopment in Shenzhen" to provide basic guidance for practitioners to develop URPs in Shenzhen. In 2015, the city government of Shanghai released the "Rules for the Implementation of Urban Renewal in Shanghai" to regulate and promote URPs in this international city.

URPs typically involve the demolition and reconstruction of existing buildings, reuse of built-up lands, and redevelopment of urban areas (Wang et al., 2014; Xue et al., 2015). To encourage private investments, the public-private-partnership mode has been widely adopted in URPs with the private sector playing an increasingly important role in current projects (Leung and Hui, 2005). Owing to the different roles of the government and the private sector, urban redevelopment in China is characterized as a government-backed and market-oriented process with different priorities in different regions (Wu, 2004). Generally speaking, the primary goals of URPs include but are not limited to: 1) updating existing housing and

infrastructures (Peng et al., 2015; Xue et al., 2015), 2) improving the living conditions of urban residents (Xue et al., 2015), 3) promoting economic growth and property market development (Shih, 2010; Alpopi and Manole, 2013), 4) eliminating poverty (Goetz, 2000), and 5) facilitating gentrification and urban modernization (Shih, 2010). At the initial stage, the majority of URPs were residential projects that largely focused on upgrading substandard housing (Xue et al., 2015). More recently, infrastructure projects have become the main focus of URPs (Xue et al., 2015).

1.1.2 Byproduct of Urban Redevelopment: Urban Housing Demolition and Its Detrimental Impacts on Social Sustainability

Housing demolition is an important byproduct of URPs because urban redevelopment typically involves the reconstruction of built-up areas and the reuse of urban space (Talen, 2014; He, 2014). To release land resources for urban redevelopment, an enormous number of urban housing demolition (UHD) projects have been carried out and will continue to occur in the future. From 2011-2013, 345 – 460 million square meters of buildings were demolished every year (China Academic of Building Research, 2014). The majority of these buildings were residential ones. According to a recent analysis, 1.32 – 1.60 billion square meters of housing are predicted to be demolished between 2015 and 2020 (Chen and Hu, 2015). In prior UHD programs, millions of people had to leave their homes and move to new places. The *2014 Annual Report of Urban Housing Demolition in China* (Beijing Cailiang Law Firm, 2015) noted that more than 20% of urban residents had already experienced housing demolition in recent decades. This UHD process in China will persist long into the future

because the *13th Five Year Plan* (the most important economic policy in China) emphasizes the active promotion of urbanization that focuses on developing new towns, optimizing the existing layout of urban spaces and updating the infrastructure-housing system of cities.

To some degree, these UHD programs undoubtedly made a contribution to the economic growth of Chinese cities and improved living conditions for urban residents (Tang, 2007). Meanwhile, housing demolition has also become a primary source of social conflicts in contemporary China (He and Wu, 2005; He, 2014). This has resulted in a large number of social sustainability issues that significantly challenge the harmony and stability of Chinese society. Based on official statistics, Southern Weekend (2003) reported that 26 people lost their lives because of violent conflicts over housing demolition in the first half of 2002. As a result of ineffective policies, the property rights of many relocated residents have not been well protected. Under extreme conditions, relocated households resort to violent resistance against UHD programs, a fact that has threatened the social order of China (Beijing Cailiang Law Firm, 2015). This situation is compounded by the sharp increase in mass incidents related to UHD. In 2010, approximately 180,000 mass incidents occurred in China; more than half of these incidents were caused by housing demolition (Jacobs, 2011). In the last five years, courts at various levels in China have received approximately 800,000 cases of administrative disputes, with more than 40% due to housing demolition (Beijing Cailiang Law Firm, 2016). Social fairness has been significantly challenged due to ineffective policies related to housing demolition and relocation (Hu et al., 2015). The wellbeing and lifestyle of vulnerable groups, such as older adults, can be detrimentally affected after the

implementation of UHD (Keene and Ruel, 2013). The social networks of the communities experiencing large-scale UHD projects are difficult to maintain. Moreover, housing demolition can seriously mitigate the social ties of the members in these communities. Considerable evidence shows that it is time to pay increased attention to the social sustainability of UHD in China.

1.1.3 Impact of Stakeholders and Associated Challenges on Social Sustainability

Previous studies have found that stakeholders and stakeholder-associated challenges play an indispensable role in maintaining and improving the social sustainability of UHD. The concept of social sustainability has an inherently strong linkage with the key stakeholders involved. Scholars such as Herd-Smith and Fewings (2008) demonstrated that social sustainability should be defined as the active engagement of key stakeholders with the aim of enabling projects to meet the needs of current and future generations as well as local communities. Valdes-Vasquez and Klotz (2013) argued that the definition of social sustainability should fully reflect the various perspectives of the key stakeholders in a project. These authors highlighted that social sustainability can be described from different perspectives; however, the interpretations of this concept largely depends on the understanding of stakeholders (Valdes-Vasquez and Klotz, 2013). To improve the social sustainability of projects, corporate social responsibility practices should be integrated with daily business operations (Lamprinidi and Ringland, 2008), a condition that implies the careful consideration of stakeholders' key interests (Kolk, 2003; Olander and Landin, 2005). Following this logic, stakeholder participation in decision-making can effectively enhance

the social sustainability practices of practitioners because the concerns of the key stakeholders can be clearly identified and analyzed (Sierra et al., 2016; Valdes-Vasquez and Klotz, 2013). Yu et al. (2017b) suggested that an evaluation on the social sustainability of UHD should be carried out based on the main interests and wellbeing of the key stakeholders. In summary, a strong and clear relation exists between social sustainability and stakeholders.

Through this close linkage, stakeholder-associated challenges can detrimentally affect the social sustainability of UHD. Conflicts of interests among different stakeholders can easily incur social unfairness that significantly limits the success of UHD projects. For example, Wu and He (2005) argued that the pursuit of economic growth (generally by local governments or property developers) could significantly damage the interests of relocated households and other vulnerable groups. The misunderstandings among different stakeholders can even give rise to mass incidents and violent resistance that threaten the social order of China (Beijing Cailiang Law Firm, 2015). The unreasonable behavior of stakeholders, such as illegal demolition, can incur a series of social risks challenging the stability of Chinese society (Yu et al., 2017a). Accordingly, stakeholder-associated issues play an important role in determining the social sustainability of UHD. If practitioners can successfully handle these challenges and balance the key interests of different stakeholder groups, then the social sustainability of their UHD projects can be significantly improved.

1.2 Problem Statement

Based on the statements in *Section 1.1.3*, a comprehensive investigation into the social

sustainability of UHD, with sufficient consideration given to the key stakeholders, is necessary for improving the current practices of UHD. The primary purpose of achieving social sustainability is to protect the primary interests and wellbeing of the key stakeholders who are strongly linked to UHD activities (Yu et al., 2017b). Therefore, investigating the conceptual implications of social sustainability from the perspective of stakeholders can assist in an enhanced understanding of this multi-attribute concept. An indicator system for measuring social sustainability should be established based on the empirical knowledge of the key stakeholders so that the performance and issues of current UHD practices can be quantitatively assessed.

Furthermore, stakeholder-associated challenges should be examined to identify effective approaches for mitigating the detrimental stakeholder impacts on social sustainability. Stakeholder conflicts have already been criticized as a primary source of social sustainability issues such as violent resistance and mass incidents (He, 2014). The adverse impacts of the key stakeholders on UHD increasingly challenge the social stability and harmony of China (He, 2014; Yu et al., 2017b). Accordingly, addressing these stakeholder-associated challenges can significantly mitigate the social sustainability issues pertaining to UHD.

In response to these considerations, the study's primary research questions were established as follows:

- From the perspective of the key stakeholders, what are the key conceptual implications of social sustainability in UHD programs?

- How can researchers or practitioners measure the social sustainability of UHD on the basis of the key interests or wellbeing of the key stakeholders?

- What are the key concerns of different stakeholder groups in UHD? How can practitioners balance the conflicts of interest among these stakeholder groups?

- In UHD projects, how can practitioners deal with the adverse impacts incurred by the key stakeholders?

1.3 Research Objectives

Given the research problems stated in *Section 1.2*, the overall objectives of this study are *to evaluate the social sustainability of UHD on the basis of the opinions of key stakeholders, investigate the key stakeholder-associated challenges in UHD,* and *propose strategies for mitigating the negative effects of these challenges.*

In terms of social sustainability evaluation, an indicator system based on the empirical knowledge of the key stakeholders should be established to reflect the fundamental interests and wellbeing of these stakeholders in UHD. This indicator system should be easy to apply in real UHD projects. It should be validated via empirical data from exemplar cases.

With regard to stakeholder-associated challenges, this study focused on the issues from two important dimensions, i.e., stakeholder conflicts and the adverse impacts associated with stakeholders. The study on stakeholder conflicts aimed to mitigate stakeholder-associated challenges via controlling the source of stakeholder issues; that is, cutting the conflicts of

interest among stakeholders.

The adverse impacts associated with stakeholders are potential risks that may limit the social sustainability of UHD projects. Previous studies and policies tend to treat detrimental stakeholder impacts as social risks (The State Council of the People's Republic of China, 2011). Accordingly, this study dealt with the adverse impacts incurred by stakeholders from the perspective of social risk management.

Four research objectives were designed to fulfill the purpose of this study.

- **Objective 1** Summarize the conceptual implications of social sustainability based on a literature analysis and the empirical knowledge of key stakeholders in UHD programs.

- **Objective 2** Develop an indicator system for measuring the social sustainability of UHD projects in China with consideration given to the interests and wellbeing of the key stakeholders.

- **Objective 3** Quantitatively analyze the conflicts of interests among the key stakeholders in UHD projects via integrating stakeholder concerns and attitudes; and propose solutions to balance the competing interests of these stakeholders.

- **Objective 4** Model the social risks in UHD projects with consideration given to the impacts of the key stakeholder groups; and identify potential measures for risk mitigation in order to help practitioners control the negative stakeholder impacts on social sustainability.

1.4 Significance and Value

As highlighted in *Section 1.1.2*, the social sustainability issues in UHD increasingly challenge the success of URPs as well as the harmony and stability of Chinese society. A series of studies have been conducted to discuss these social sustainability challenges such as social unfairness and conflicts (e.g., Hu et al., 2015; He, 2014). However, a holistic study grounded in the perspective of key stakeholders has yet to be carried out. In *Section 1.1.3*, the indispensable role of stakeholders in addressing social sustainability issues and improving the social performance of UHD projects is highlighted. Following that argument, this study contributes to the existing body of knowledge by integrating stakeholder analysis with the social sustainability issues of UHD in China. The conceptual implications of the social sustainability of UHD were investigated based on the wellbeing and key interests of stakeholders. As a result of this research, an in-depth and clear understanding of the definition of social sustainability has been achieved. In addition, stakeholder-associated challenges to social sustainability were analyzed to identify potential solutions for mitigating the detrimental stakeholder impacts on UHD. In particular, stakeholder conflicts and associated social risks were examined to offer effective strategies for practitioners to deal with these challenges. As a result, this study provides valuable guidance for practitioners to improve the social sustainability of their future UHD projects.

1.5 Research Process

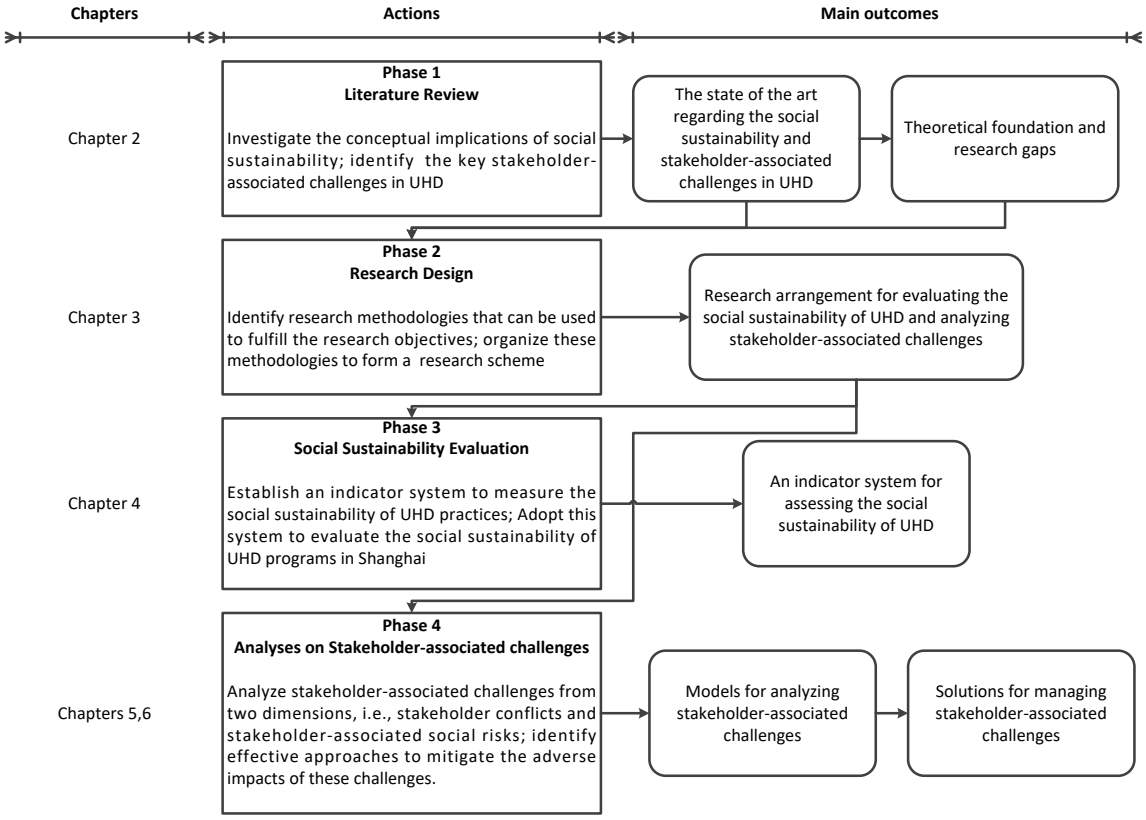

Figure 1.1 Research design

Generally speaking, this study comprises four research phases as presented in Figure 1.1. In *Phase 1*, previous studies regarding the social sustainability and stakeholder-associated challenges in UHD were reviewed to identify the theoretical foundation and the key research gaps in the existing body of knowledge. In *Phase 2*, a research scheme was designed to obtain the research objectives listed in *Section 1.3* and guide the research actions in the following chapters. The methods and the key research processes were described in this phase. In *Phase 3*, an indicator system reflecting the key interests and wellbeing of the key stakeholders in UHD was developed to measure the social sustainability of UHD projects in China. This system was applied to calibrate the overall social sustainability of UHD practices

in Shanghai. Finally, following the research gaps identified in *Phase 1*, a comprehensive analysis on stakeholder-associated challenges in UHD was conducted in *Phase 4* from the aspects of stakeholder conflicts and social risks. Corresponding solutions were proposed to mitigate the adverse effects of these challenges.

1.6 Structure of the Dissertation

This dissertation contains seven chapters. *Chapter 1* offers an overview of the research background pertaining to the social sustainability and stakeholder-associated challenges of UHD in the context of China. It highlights the research value, key problems and research objectives in this dissertation. *Chapter 1* also demonstrates the overall structure of this study.

Chapter 2 conducts a literature analysis relevant to the social sustainability of UHD and the key stakeholder-associated issues challenging existing UHD practices. This section starts by examining the conceptual implications of social sustainability from different academic perspectives, in particular highlighting the significance of the stakeholder perspective. Various definitions of stakeholders are then discussed and clarified to establish a boundary for the study's empirical investigations. Third, tools for social sustainability evaluation and key stakeholder-associated challenges are tested to provide a theoretical foundation for this study. Through these three processes, *Chapter 2* reviews existing literature related to the study and identifies the key research gaps for further improvements.

Chapter 3 displays the research processes and methods used in this study. It demonstrates the logic of the research design and explains how these methods are used to obtain the research

objectives stated in *Chapter 1*. Detailed research schemes are proposed to show the primary analytical tools, types of empirical investigations, processes of data collection, and research validation.

Chapter 4 establishes an indicator system for measuring the social sustainability of UHD in China. The indicators in this system are selected based on the opinions of experts and stakeholders in UHD projects. This indicator system can comprehensively reflect the key interests and wellbeing of the key stakeholders in UHD. The identified indicators are classified into a few categories on the basis of cluster analysis. The consistency of the attitudes of different respondents is evaluated using ANOVA analysis. The social sustainability of UHD in Shanghai is evaluated using this indicator system.

Chapter 5 focuses on the conflicts of interest among different stakeholders in UHD. An analytical model integrating stakeholder salience theory and Pawlak's conflict theory is proposed to quantify the degree of stakeholder conflict in order to identify the critical concerns of these stakeholders. Then, action schemes can be developed to optimize current UHD practices with consideration given to stakeholder conflicts. This model is applied in a real UHD project in Wenzhou. The key stakeholder conflicts in this project are identified and analyzed. An action scheme is developed based on an optimization analysis. The effectiveness and robustness of this scheme are tested via sensitivity analysis and scenario comparison.

Chapter 6 proposes a model based on social network analysis (SNA) to analyze the social

risks in UHD. A risk list is developed based on a literature review and the empirical knowledge of the key stakeholders in UHD. The linkage between social risks and corresponding stakeholders is established. In addition, the interactions among different risk nodes are modeled using SNA. Critical risks and related mitigation strategies are identified based on a comprehensive network analysis and simulation.

Chapter 7 summarizes the main findings of this study in response to the research objectives stated in *Section 1.3*. The critical research objectives are reviewed to show the logic of this study. The limitations during the research processes are likewise listed for improvement in future studies. Finally, future directions in this research area are provided.

1.7 Summary of the Chapter

This chapter offers an overview of this dissertation. First, the research background regarding social sustainability and stakeholder-associated challenges in UHD is discussed to highlight the tendency and significance of the current study. The primary research problems are then identified based on the analysis on the background information. Following these research problems, four research objectives are designed to bridge the research gaps in the existing literature. The research processes and structure of this dissertation are presented to demonstrate how this study can achieve the four objectives. The findings of this dissertation are expected to assist practitioners by improving their understanding of the conceptual implications of social sustainability and enhancing their practices in UHD projects, particularly the practices used to address stakeholder-associated challenges.

CHAPTER 2 LITERATURE REVIEW[2]

2.1 Introduction

This chapter presents a comprehensive review of the key concepts and state of the art related to the research topics of this study. The various definitions of social sustainability and stakeholder that form the theoretical foundation of this research are introduced in *Section 2.2*. Afterward, the primary research topics including social sustainability evaluation, key stakeholders in UHD, stakeholder conflicts as well as stakeholder-associated social risks, are discussed in detail respectively. Through this critical review, the research gaps in these topics are identified to offer directions for further improvements.

2.2 Key Concepts

2.2.1 Social Sustainability

Although the implication of sustainable development varies according to the interests, culture and needs of different areas, the mainstream way of picturing sustainable development is to think of it as a stool with three legs, with each leg representing the

[2] Parts of this Chapter have been published in the following papers: Evaluating social sustainability of urban housing demolition in Shanghai, China, Journal of Cleaner Production; Managing Social Risks during the Housing Demolition Stage of Urban Redevelopment Projects- A Stakeholder-oriented Study Using Social Network Analysis, International Journal of Project Management.

environment, the economy and the society (Scottish Environment Protection Agency, 2002; Torjman, 2000). As an important dimension of sustainable development, social sustainability is drawing increasing attentions both from scholars and practitioners because the ignorance of social considerations frequently leads to failures in sustainability practices (Vallance et al., 2011). However, previous studies fail to offer a generic definition of social sustainability that can be applicable to different scenarios of development (Vallance et al., 2011; Dempsey et al., 2011).

From the stakeholder perspective, scholars such as Herd-Smith and Fewings (2008) argued that social sustainability can be defined as the engagement among different stakeholders to enable projects to meet the needs of the current generation without significantly damaging the wellbeing of future generations. Resonating with this argument, Valdes-Vasquez and Klotz (2013) suggested that the definition of social sustainability should fully reflect the various perspectives of the key stakeholders in a project. Consequently, social sustainability can be regarded as an integration and balance of the key interests of the various stakeholders involved.

Social sustainability can also be demonstrated based on the perspective of the collective function of human society (Bramley and Power, 2009). According to Polese and Stren (2001), social sustainability can be defined as a series of functions that can facilitate the harmonious evolution of civil society, foster an environment beneficial for the compatible cohabitation of social groups with diverse backgrounds, and improve the quality of life for all segments of the population. Yiftachel and Hedgcock (1993) maintained that social sustainability should

offer a long-term, viable setting to enhance human interaction, communication and cultural development. Grounded in these concepts, social sustainability can be pictured as a set of functions (e.g., a platform for human communication) that enable human society to continuously operate and develop.

From the perspective of social impacts, researchers such as Germani et al. (2015) suggested that the core of social sustainability is to evaluate and deal with the social impacts generated from production and product usage, especially the adverse impacts on human society. Consistent with this argument, Gould et al. (2017) suggested that "socially sustainable product development is the processes and practices that lead to products whose lifecycles have a less negative impact on the social system." Social impacts can "alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society" (Interorganizational Committee on Principles and Guidelines for Social Impact Assessment, 1995). Therefore, to enhance social sustainability, a lifecycle viewpoint should be applied to control the adversely social effects of projects (Sierra et al., 2016).

Researchers have similarly investigated social sustainability from the perspective of corporate social responsibility. This kind of definitions typically integrates social impacts with the key interests of stakeholders. To achieve social sustainability, companies should control the environmental and social impacts of their products through the whole lifecycle and enable business operations to meet the basic needs of stakeholders (Lamprinidi and Ringland, 2008; Valdes-Vasquez and Klotz, 2013). Social sustainability requires

organizations to consider not only their profits from daily operations but also their social responsibilities toward stakeholders (Spangenberg, 2016).

Owing to the complexity of social sustainability, scholars such as Dempsey et al. (2011) and Opp (2017) tended to divide social sustainability into a few sub-concepts or sub-dimensions to capture its conceptual implications. For example, Dempsey et al. (2011) defined social sustainability as an active state integrating social equity and community sustainability. Opp (2017) developed a definition of social sustainability comprising four sub-concepts, namely, equal access and opportunity, environmental justice, community and the value of place, and basic human needs. According to Spangenberg (2016), social sustainability could be understood as "the combination of distributional justice (access to resources and education, distribution of income…) and the satisfaction of human needs (identity, health, comprehension…)." In addition, sub-concepts such as social capital (Vallance et al., 2011), social homogeneity (Sachs, 1999), livability (Godschalk, 2004) and community resilience (Magis, 2010) were frequently used by researchers to map the conceptual implications of social sustainability.

Despite the various definitions in previous studies, the primary purpose of social sustainability is to improve the wellbeing of human beings (Torjman, 2000). Grounded in this viewpoint, the social sustainability of UHD should focus on the wellbeing of individuals involved in this process. Therefore, the current study employed a stakeholder perspective to investigate the social sustainability of UHD in the context of China. According to the statement in *Section 1.1.3*, stakeholder-associated challenges have become the primary

source of social sustainability issues in UHD. Consequently, a stakeholder-oriented study can assist in addressing these issues.

2.2.2 Stakeholder Concept

The stakeholder concept was firstly introduced by the Stanford Research Institute in 1963, where stakeholders were defined as groups or individuals whose support could significantly affect the survival and development of enterprises (Freeman, 1984). This earliest definition was proposed based on the perspective of corporate development. In 1984, Freeman (1984) published his famous book, Strategic Management: A stakeholder Approach, in which a broader stakeholder concept was given. He defined stakeholder as "any group or individual who can affect or is affected by the achievement of the firm's objectives (Freeman, 1984)." This definition extended the boundary of the stakeholder concept. With the birth of this profound publication, stakeholder theory was introduced to the domain of strategic management (Yang, 2010).

Theoretical studies on the stakeholder concept have increased drastically in recent years. Donaldson and Preston (1995) noted that around a dozen books and more than 100 articles have attempted to define stakeholder. Friedman and Miles (2006) made a summary of fifty-five definitions comprising "seventy-five texts arranged in chronological order." Despite the variety in these definitions, a few common features of stakeholders can be captured from the previous studies. First, stakeholders should have formal or informal connections with a firm (Friedman and Miles, 2006). Second, stakeholders can affect or be

affected by the firm in a voluntary or involuntary approach (Freeman, 1984). Third, stakeholders naturally have a stake in what the firm does (Post et al., 2002). Fourth, stakeholders can voluntarily or involuntarily bring potential benefits and/or risks to the firm (Donaldson and Preston, 1995).

In the field of project management, Project Management Institute (PMI, 2004) defined stakeholders as individuals or organizations who are actively involved in a project, or whose interests can be influenced as a result of project execution or completion. This definition was in line with that given by Freeman (1984). Newcombe (2003) claimed that stakeholders are groups or individuals who have a stake in a project or have an expectation of the project outcomes. This definition was broader than that proposed by PMI (Yang, 2010). Furthermore, Newcombe (2003) mapped the key stakeholders in construction projects including clients, project managers, designers, subcontractors, suppliers, funding bodies, users and the community at large. Bourne (2005) described project stakeholders as "individuals or groups who have an interest or some aspect of rights or ownership in the project, and who can contribute in the form of knowledge or support, or can impact or be impacted by, the project." Generally speaking, these definitions in the field of project management share the same features summarized in the preceding paragraph. Therefore, the present study used the four features to identify the key stakeholders in UHD.

2.3 State of the Art Pertaining to Research Topics in this Study

2.3.1 Potential Tools for Evaluating the Social Sustainability of UHD

Social sustainability is a typical multi-dimensional concept with complex implications (Enyedi, 2002; Omann and Spangenberg, 2002; Dempsey et al., 2011). As mentioned in *Section 2.2.1*, a generic definition of social sustainability that can be applicable to business operations in various scenarios does not exist (Dempsey et al., 2011; Vallance et al., 2011). Although the desired objective of improving human wellbeing is straightforward and clear, precisely determining which elements should be included in social sustainability is difficult (Torjman, 2000).

To address this issue, many scholars have attempted to utilize evaluation tools such as social impact assessment (SIA) and social life cycle assessment (SLCA) to measure the social sustainability of various economic activities (e.g., Becker, 2001; Dong and Ng, 2015). Social impact assessment refers to the method of "assessing (as in measuring or summarizing) a broad range of impacts (or effects, or consequences) that are likely to be experienced by an equally broad range of social groups as a result of some course of action (Freudenburg, 1986)." The primary steps of SIA typically include (Becker, 2001): design of scenarios, strategy development, impact assessment, ranking of strategies, reduction of negative impacts, reporting, stimulation of implement, and auditing an ex-post assessment. As an extension of environmental life cycle assessment (ELCA), SLCA is also widely applied by scholars to evaluate social sustainability. Similar with ELCA, SLCA also covers four phases,

namely, (1) definition of goal and scope, (2) inventory analysis, (3) impact assessment and (4) interpretation (Benoît, 2010). SIA and SLCA are likely the most widely applied tools in the assessment of social sustainability. A number of international organizations or governments have even developed official standards for conducting SIA and SLCA (e.g., ISO14040/44).

Besides SIA and SLCA, other methods can also be used to evaluate social sustainability. For example, Aspinall et al. (2011) used quality of life assessment to evaluate the social sustainability of tourism development. The authors designed 24 questions on community, family, social life, and personal health and wealth to measure social sustainability. Liu et al. (2013) used the Human Development Index to measure the social sustainability in a coastal area in Liaoning Province, China. The index contained three variables, i.e., GNP per capita, life expectancy at birth and educational level. In a study by Dempsey et al. (2011), social equity and community sustainability were used to measure the level of social sustainability. They argued that in terms of social equity, exclusionary or discriminatory rules hindering individuals from participating in social activities or achieving social resources should be mitigated by political means, while in terms of community sustainability, five factors, namely, social network, participation in collective groups, community stability, sense of place, and safety and security, should be used to calibrate this dimension (Dempsey et al., 2011). Scholars also employed social capital to reflect the status of social sustainability (e.g., Simpson, 2005). Social capital typically includes but is not limited to "trust and reciprocity, strong sense of community, shared vision, and outcomes from participation in local and external networks" (Simpson, 2005). In addition to these general indicators such as quality of

life and the Human Development Index, scholars also established specific indicator systems to evaluate social sustainability. For instance, Rajak and Vinodh (2015) developed an assessment system containing 60 indicators to calibrate the social sustainability of an Indian automotive component manufacturing organization. Landorf (2011) proposed a framework and an indicator system for assessing the social sustainability of historic urban environments in Australia.

Generally speaking, the applications of these social sustainability assessment tools typically require integrating empirical data (e.g., gained via interviews or questionnaires) with social sustainability theories (e.g., stakeholder theory). Among the different theories that can be used to capture the core of social sustainability, this study focused on stakeholder theory, which implies that the degree of social sustainability should be assessed based on the key interests and wellbeing of stakeholders. As mentioned in *Section 1.3*, the definition of social sustainability has an inherently strong linkage with stakeholders (Valdes-Vasquez and Klotz, 2013; Herd-Smith and Fewings, 2008). Following this logic, a series of studies was conducted to assess the social sustainability of different economic activities, on the basis of the viewpoints of stakeholders. For example, based on a questionnaire survey, Dong and Ng (2015) evaluated the social impacts of construction activities in Hong Kong from a stakeholder perspective. Hosseinijou et al. (2014) assessed the social impacts of building material selection through interviews with experts and key stakeholders. By conducting interviews with experts, Carrera and Mack (2010) developed social sustainability indicators for energy technologies based on a stakeholder perspective.

Previous studies have highlighted the importance of the stakeholder principle in social sustainability assessment. However, this principle has yet to be applied to evaluate the social sustainability of UHD. Given the strong linkage between social sustainability and stakeholders, this research gap may lead to an ineffective evaluation on the social sustainability of UHD. More important, general social sustainability indicators such as the Human Development Index cannot effectively respond to the specific characteristics of UHD as well as to the social contexts in China. Accordingly, this study proposed a specific indicator system for UHD programs in China based on the stakeholder perspective.

2.3.2 Critical Stakeholders in UHD

Various stakeholders with different interests are directly or indirectly affected by UHD. Housing demolition has become a primary source of social conflicts and unrest in China because of the sharp conflicts of interests among different stakeholders (He, 2014; Shih, 2010). Therefore, the central government issued the *Regulations on the Expropriation and Compensation of Houses on State Owned Land* (*RECHSOL*) to regulate housing demolition and reduce the adverse impacts of UHD on social stability (The State Council of the People's Republic of China, 2011). This policy clearly stipulates the rights and responsibilities of the key stakeholders, which comprise governments, relocated residents and property developers. In addition to these three stakeholder groups mentioned by *RECHSOL*, demolition crews, nearby residents and the general public are also important stakeholders during the process of housing demolition.

Local governments are responsible for managing and supervising the entire process of housing demolition because existing laws stipulate that the property rights of urban land belong to the state and only governments can delegate the state to exercise these rights (The State Council of the People's Republic of China, 2011; Hu et al., 2015). Prior to initiating URPs, governments must judge whether these projects are in the best interest of the public. If URPs can benefit the general public, then housing demolition will be planned to make room for these projects (The State Council of the People's Republic of China, 2011). Governments should develop a preliminary relocation and compensation scheme, and subsequently negotiate with relocated residents to determine an improved scheme (The State Council of the People's Republic of China, 2011). While relocated residents will have to move to other places, they can receive compensations for their economic losses according to the improved scheme (Hu et al., 2015). Governments can employ demolition crews (typically from professional demolition or construction companies) to complete the relocation and demolition work (The State Council of the People's Republic of China, 2011). It is worth noting that existing laws are starting to constrain the power of demolition companies in UHD owing to violent incidents that have transpired between demolition crews and relocated residents. However, to increase the efficiency of relocation and demolition, mitigating the impacts of demolition companies over a short period is difficult, especially when local governments lack demolition professionals. After demolition, the land for URPs may be delivered to developers for reconstruction. Developers can significantly affect the decision-making of governments because property investments have become the primary

source of financial support for urban redevelopment (Ye, 2011; Li et al., 2014). As a result, they can indirectly affect the implementation of UHD. Housing demolition can influence the daily life, health, and safety of nearby residents as well (Chu, 2008). In a UHD case in Hong Kong, residents of nearby communities formed a coalition to resist the implementation of housing demolition because of the adverse impacts of UHD on their daily lives (Chu, 2008). In other words, nearby residents are important stakeholders in UHD. According to *RECHSOL*, UHD must conform to the interests of the general public. Therefore, the general public can also significantly affect the decision-making of UHD. In a few cases, pressure from public opinion has even forced the government to terminate UHD projects.

In practice, stakeholders in UHD can interact with one another (Tang, 2007). The inter-relationships among them are rather complex. Given their sharp conflicts of interests, the negative behaviors of these key stakeholders have posed a considerable challenge to the social sustainability of UHD. For example, conflicts of interests between local governments and relocated households can result in serious violent incidents that challenge the social stability of China (He, 2014 ;Beijing Cailiang Law Firm, 2015). The statements in *Section 1.3* emphasized the strong linkage between social sustainability and stakeholders. Accordingly, an investigation into the social sustainability of UHD based on a comprehensive stakeholder analysis is urgently needed. In addition, effective strategies should be developed to deal with these stakeholder-associated issues.

2.3.3 Stakeholder Conflicts in UHD

The stakeholders involved in UHD typically have competing claims for project outcomes. The conflicts of interests among stakeholders can easily incur negative behavior such as forced demolition and mass incidents, which increasingly challenge the social sustainability of UHD. Against this backdrop, a series of studies has been conducted to investigate stakeholder conflicts and seek effective means to control the negative impacts of these conflicts.

The majority of these studies focused on analyzing the conflicts of interest among governments, relocated residents and property developers. Grounded in evolutionary game theory, Liu and Yin (2012) analyzed the conflicts between local governments and relocated residents. In their model, the reasonable and unreasonable actions of these stakeholders were investigated within different scenarios. After examining the evolutionary mechanisms of stakeholder conflicts, these researchers found that stakeholder conflicts in UHD were typically caused by forced demolition and unreasonable claims for relocation compensation (Liu and Yin, 2012). Hu (2005) applied game theory to investigate conflicts between local governments and property developers and argued that local governments should exert more effort to supervise the behavior of property developers. In this manner, the interests of the public can be rightly protected. Grounded in the hypothesis of “comparative stakeholders”, Xu and Shi (2012) established a game theory model to analyze potential stakeholder conflicts among governments, property developers, and relocated residents. After simulating the potential actions of these stakeholders, they concluded that governments should be

responsible for balancing the interests of the key stakeholders in UHD (Xu and Shi, 2012). Additionally, Chen and Lai (2013) analyzed the different roles and interests of governments, property developers, and relocated residents in urban redevelopment. They developed a model to optimize the decision-making of developers and governments during the UHD process (Chen and Lai, 2013). Liu (2009) argued that the key methods for handling stakeholder conflicts are balancing the interests of key stakeholders, enhancing communication between these stakeholders, and avoiding violent incidents.

In terms of the source of stakeholder conflicts, previous studies largely focused on the conflicts that stemmed from economic benefits and relocation compensation (e.g., Hu, 2005; Liu and Yin, 2012; Chen and Tian, 2011). For example, in the study conducted by Liu and Yin (2012), the pursuit of economic growth and the claim for high relocation compensation were identified as the key stakeholder concerns that frequently caused conflicts. In his game model, Hu (2005) assumed that each stakeholder group aims to maximize their own economic achievements. Following this basic assumption, stakeholder conflicts could emerge because of the uneven distribution of project benefits (Hu, 2005).

With respect to the adverse impacts of stakeholder conflicts, the majority of scholars focused on social unfairness, mass incidents, violent (or forced) demolition, violent resistance, and legal actions (e.g., Hu, 2005; Liu and Yin, 2012; Chen and Tian, 2011; He, 2014; Peng and Tan, 2009).

In terms of research methods, game theory (e.g., Yang and Zhang, 2012), qualitative analysis

(e.g., He, 2014) and decision-making models (e.g., Chen and Lai, 2013) have been used to analyze stakeholder conflicts and map stakeholder behavior in UHD. Game theory appears to be the most widely used tool in this area.

Despite the significant contribution of previous studies, a few research gaps limit the application of these theories. First, findings achieved from these studies were typically based on theoretical analyses (e.g., game theory based on assumptions), with the majority of findings not validated by empirical data collected from real UHD projects in China. Accordingly, the practical values of these studies remain unknown. Second, previous conflict analyses largely focused on governments, relocated residents and property developers. In practice, other stakeholder groups (e.g., the general public) can also have an impact on UHD. A comprehensive conflict analysis covering the six stakeholder groups identified in *Section 2.3.2* has yet to be conducted. Third, previous studies typically failed to generate action schemes for mitigating stakeholder conflicts and balancing the interests of different stakeholder groups. Practitioners may understand how stakeholder conflicts form and emerge in their projects. However, they cannot achieve effective action schemes to address this challenge. To bridge these gaps, a conflict analysis model based on empirical data should be developed to quantify stakeholder conflicts in real UHD projects. The major interests of the key stakeholders should be comprehensively reflected in this model. In addition, this model should assist practitioners in obtaining effective action schemes to control stakeholder conflicts and balance stakeholder interests. The application of this model should be depicted via real UHD cases.

2.3.4 Social Risks in UHD

"Risk is a constitutive concept of sustainability (Eizenberg and Jabareen, 2017)." Therefore, "social sustainability strives to confront risk while addressing social concerns (Eizenberg and Jabareen, 2017)." PMI defines "project risk" as uncertain events or conditions that may emerge during a project and can have uncertain impacts on the achievement of project objectives (Project Management Institute, 2013). In terms of social risk, researchers mostly focus on stakeholder activities that may exert negative effects on the social outcomes of a project (Shi et al., 2015). Therefore, compared with other types of project risk, social risk extends the focus of project management from traditional project objectives (e.g., time, cost, quality) to social performance (e.g., social stability, stakeholder satisfaction). Scholars such as Kytle and Ruggie (2005) argued that social risks should be dealt with based on the perspective of corporate social responsibility in order to alleviate the environmental and social impacts of business activities. Under different social environments, the focus of social risk management may differ significantly. In China, social risk is typically related to the unexpected outcomes of state interventions (e.g., policies), mass incidents, social conflicts, and destructive impacts of large-scale emergency incidents on social stability or order (Liu et al., 2016). In this context, social risk management has a strong linkage with stakeholder management in most construction projects (Shi et al., 2015) because the majority of these risks are incurred by stakeholder-associated conflicts.

In terms of UHD, the sharp conflicts of interests among different stakeholders result in many social risks that frequently limit the social sustainability of projects. For example, Yang and

Shen (2012) argued that social risks related to UHD can incur social disorder and instability that threaten the harmony of Chinese society. Teng (2013) contended that the interests of vulnerable groups can be detrimentally affected by the social risks generated from UHD. As a result, the critical dimensions of social sustainability such as social fairness are significantly damaged. To reduce social conflicts and improve the social sustainability of UHD, *RECHSOL* stipulates that urban redevelopment programs must carry out comprehensive evaluations on social risks before carrying out any housing-demolition activities (The State Council of the People's Republic of China, 2011). Numerous studies have been conducted to investigate the management of social risks during the housing demolition stage of URPs. Shi et al. (2015) utilized a case study to evaluate the social risks of infrastructure projects and identified unfair compensation and violent incidents as the primary risk factors during housing demolition. The study implies that stakeholder management can help practitioners enhance social risk management in China. In addition to the risks highlighted by Shi et al. (2015), Liu et al. (2016) argued that uncertainties in relocation policies are another source of social risk. Therefore, local governments can play an important role in social risk mitigation. Chen et al. (2012) conducted an empirical study to examine the critical social risks related to housing demolition in Guangzhou. They maintained that information exchange and stakeholder participation can effectively mitigate social risks. On the basis of qualitative analyses, Teng (2013) investigated the key social risks in housing demolition from the viewpoint of vulnerable groups. The researcher argued that existing policies and laws should be modified to enhance social security and properly

protect the interests of relocated residents. Basing on social combustion theory, Yang and Shen (2012) identified key risk factors and developed a risk assessment system containing 36 indicators to evaluate the impact of housing demolition on social stability. In terms of application, Ni (2015) used a fuzzy evaluation to identify critical social risks and then quantified the effects of these risks on the performance of the Binjiang project.

In terms of research methods, previous studies generally measure the importance of social risks based on the likelihood of occurrence and the degree of impact of different risks (e.g., Shi et al., 2015). Fuzzy evaluation is another method widely used to rank social risks in housing demolition (e.g., Ni, 2015). This method largely depends on the knowledge and subjective evaluation of project experts or managers. In addition, social combustion theory has also been applied in social risk management since it was introduced by Niu, Wenyuan (Yang and Shen, 2012). This theory argues that social disorder and unrest incurred by social risks have characteristics similar to those of combustion phenomena. From this perspective, social risks and factors that may incur social risks are classified into three categories similar to the three key elements in the combustion process, namely, burning material, combustion point, and support of combustion. As a result, practitioners can mitigate social risks in a manner similar to how people put out a fire.

Despite the large body of literature, previous studies have largely focused on social risk identification and evaluation without sufficient consideration given to the linkages between risks and stakeholders. Although researchers such as Shi et al. (2015) have recognized the importance of stakeholder management in social risk management, they did not quantify the

impacts of stakeholders in their risk evaluation. The primary purpose of social risk evaluation is to mitigate stakeholder-associated challenges such as social unfairness between different social groups (The State Council of the People's Republic of China, 2011). Stakeholder analysis can help practitioners deal with social risks in the context of China (Teng, 2013; Shi et al., 2015) because the majority of these social risks such as mass incidents are caused by conflicts of interests among different stakeholders. Ward and Chapman (2008) indicated that stakeholders have become the main source of uncertainty in complex engineering projects, where stakeholder entities, their interests, and their interactions at different project phases are the major stakeholder-associated uncertainties. Accordingly, linking social risk management with stakeholder analysis can effectively reduce uncertainties in UHD and control the adverse impacts on social sustainability. Therefore, identifying critical social risks and quantifying their impact based on the stakeholder perspective is crucial to addressing social risks during the housing demolition stage of URPs. This study bridges the abovementioned research gaps.

2.4 Summary of the Chapter

This chapter performs a systematic literature review to clarify the key concepts of social sustainability and stakeholder. With these key concepts analyzed, the implications of social sustainability are tested as the theoretical foundation of the subsequent sustainability evaluation. In addition, the boundary of the empirical investigations can be determined following the definition of stakeholder. The opinions of the key stakeholders in UHD are then examined through empirical surveys in the following chapters.

State of the art pertaining to the research topics of this study including social sustainability evaluation, key stakeholders in UHD, stakeholder conflicts, and stakeholder-associated social risks, are then summarized. This chapter also identifies three research directions based on a review of previous studies. First, an indicator system that comprehensively reflects the wellbeing and key interests of stakeholders should be established to evaluate the social sustainability of UHD. Second, a conflict analysis model should be established to quantify the degree of stakeholder conflict by using empirical data, and propose effective action schemes to improve current UHD practices. Third, the social risks in UHD should be identified and managed based on the stakeholder perspective. The linkages between social risks and the corresponding stakeholders should be thoroughly examined. These identified knowledge gaps resonate with the research objectives of this study.

CHAPTER 3 RESEARCH METHODOLOGY[3]

3.1 Introduction

The objectives of this dissertation have been identified and explained in *Section 1.3*. The state of the art regarding each research topic has been analyzed and captured based on the literature analysis in *Chapter 2*. Research gaps have been identified to clarify the research directions for this study, and the manner in which these gaps are addressed is explained. A research scheme integrating the research methods and the arrangement of key research processes is designed in response to the respective objectives. *Section 3.2* presents the logic of the research design to give the readers an overview; *Section 3.3* provides information regarding the research methods used in this study; *Section 3.4* displays the arrangement of each research objective in detail to clarify how this study can address the respective research objectives.

[3] Parts of this Chapter have been published in the following papers: Evaluating social sustainability of urban housing demolition in Shanghai, China, Journal of Cleaner Production; Managing Social Risks during the Housing Demolition Stage of Urban Redevelopment Projects- A Stakeholder-oriented Study Using Social Network Analysis, International Journal of Project Management.

3.2 Research Design

Table 3.1 Detailed research objectives and their corresponding methods

No.	Detailed research objectives	Data collection	Data analysis
1	Examining the conceptual implications of the social sustainability of UHD	• Literature	• Literature review
2	Establishing an indicator system for evaluating the social sustainability of UHD with consideration given to the key interests and wellbeing of the critical stakeholders; demonstrating how to apply this system in practice	• Interview • Focus group • Questionnaire	• Cluster analysis • Case study
3	Developing a conflict analysis model to quantify and manage the stakeholder conflicts in real UHD projects; proposing action schemes to balance the interests of different stakeholders; validating and consolidating this model via a case study	• Interview • Project document	• Conflict analysis • Stakeholder salience theory • Case study
4	Setting up a model for analyzing and managing the social risks in UHD; linking risks with corresponding stakeholders; identifying critical social risks and searching for potential solutions for risk mitigation	• Literature • Interview	• Literature review • SNA

In this section, a rigorous research design is developed to show the overall logic as well as key research procedures of this study. Creswell (2013) stated that research design should deliver logically organized plans and procedures that can enable researchers to achieve the final research purpose. A research design typically contains four parts: questions to address, data collection methods, tools for data analysis, and overall arrangement of the key research procedures.

The key research questions of this study were identified in *Section 1.2*. Previous studies pertaining to these questions were reviewed in *Chapter 2*. Additionally, research gaps were

identified. Following these research gaps, the research objectives, data collection methods and data analysis tools are summarized in Table 3.1. The research methods included qualitative and quantitative methods. Qualitative methods focus on open-ended issues and typically gather interview, observation, and document data used for textual and conceptual analyses (Shank, 2006; Patton, 2005; Grbich, 2012). The qualitative methods employed in the present study comprised: semi-structured interview, focus group and literature review. Quantitative methods focus on instrument-based questions and typically gather performance and attitude data to carry out statistical analyses and interpretation (Creswell, 2013;Neuman, 2009). The quantitative methods utilized in this study comprised: questionnaire, cluster analysis, stakeholder salience theory, Pawlak's conflict analysis, and SNA. The quantitative and qualitative results generated from this study were used side by side to complement each other. *Section 3.3* illustrates the descriptions for each research method.

Figure 3.1 maps the arrangement of the key research procedures and methods, and covers the four research objectives presented in Table 3.1. The linkages between research actions and methods were visualized, and the outcomes of the key research steps were marked. Accordingly, Figure 3.1 provides an overview of this study. *Section 3.4* discusses the details pertaining to each research procedure.

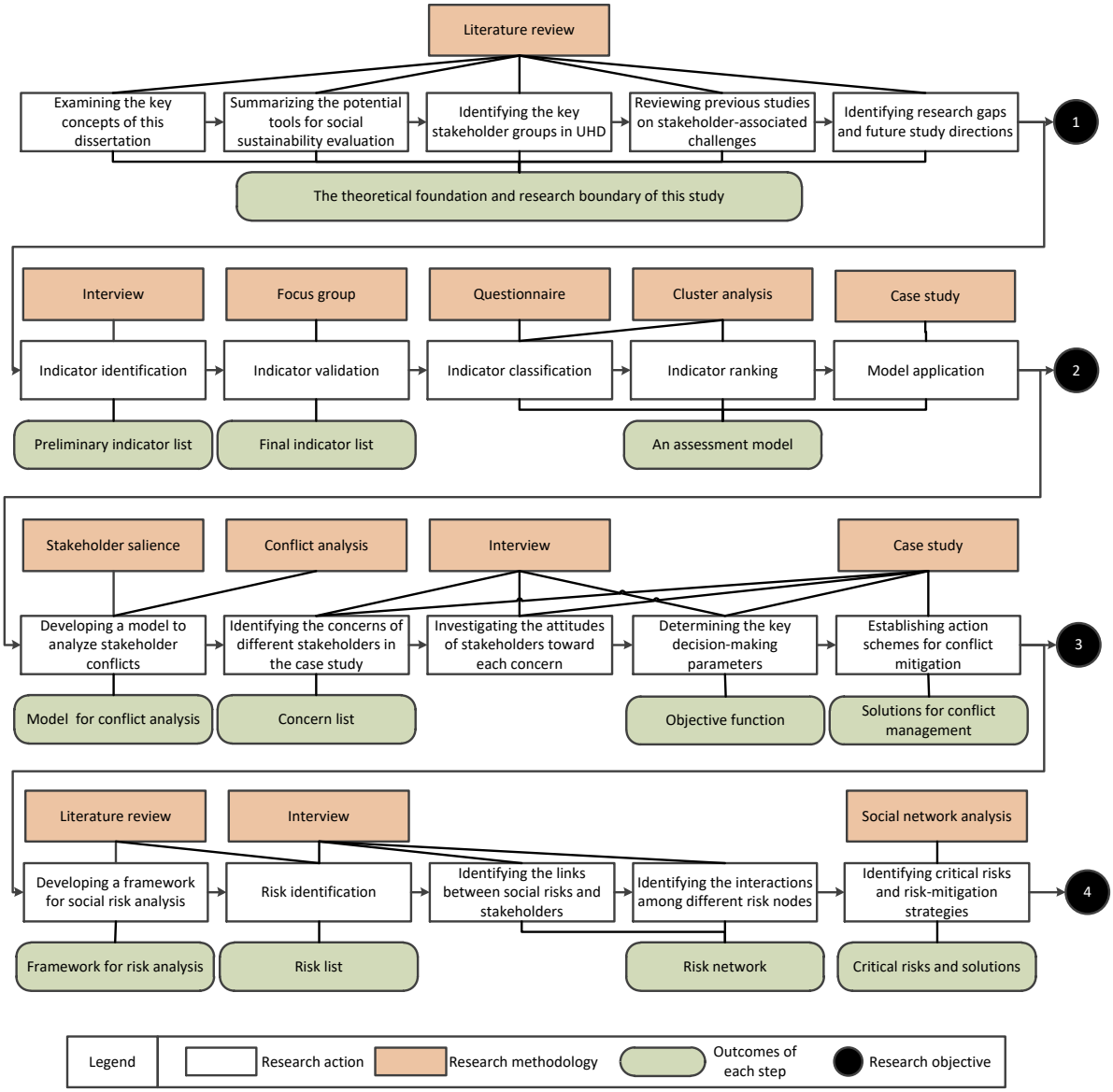

Figure 3.1 Overview of research design

3.3 Research Methods

3.3.1 Data Collection Methods: Questionnaire, Interview, and Focus Group

Questionnaire, interview, and focus group research methods were applied to collect data for this research. Table 3.2 presents a comparison of these methods. Questionnaire is a research method widely used in surveys to measure individuals' attitudes toward certain topics or

subjects (Hoxley, 2008). This instrument can be an effective research tool for quantitative analysis (Oppenheim, 2000). If the sample size is statistically appropriate, then results generated from questionnaires will likely be robust and general (Oppenheim 2000). This study used questionnaire-based surveys to investigate the key stakeholders' attitudes toward social sustainability indicators in UHD (in Objectives 1 to 2).

Table 3.2 Comparison of data collection methods (Babbie, 2015)

Method / Features	Interview	Focus group	Questionnaire
Amount of information	Large	Large	Small
Sample Size	Small	Small	Large
Time span	Moderate	Short	Long
Applicable Scope	➢ Exploratory problem ➢ Pilot study ➢ Qualitative analysis	➢ Exploratory problem ➢ Modifying or improving preliminary findings ➢ Triangulation and validity checking ➢ Qualitative analysis	➢ Well-defined problem ➢ Quantitative analysis
Robustness	Low	Moderate	High
Interactions between researchers and respondents	High	High	Low

Interview is a research method used to collect answers from interviewees who have specific experience or knowledge pertaining to the relevant research topics (Peterson, 1997). According to Table 3.2, interview is appropriate for exploratory problems. This method can be employed to gather a large volume of information within a relatively short period.

Ambiguities can be mitigated via open discussions, and data reliability can be improved through information sharing among participants (Brinkmann, 2014). In the current study, interview was used throughout the entire research process (Objectives 1 to 4) for preliminary exploratory studies.

Focus group is a form of group interview based on the communication between interviewees and researchers (Kitzinger, 1995). This instrument can be used as a quick and convenient tool to collect data simultaneously from several individuals (Kitzinger, 1995; Gibbs, 1997). In focus group, research participants are encouraged to talk to one another in order to exchange and share their opinions. Through effective interactions among participants, knowledge can be extracted from open-ended discussion. Morgan (1996) stated that focus groups could be used as an effective complement to other methods for triangulation and validity checking. In this study, focus group was used to consolidate and validate the findings generated from preliminary data collection and analysis, particularly in Objectives 1 and 2.

3.3.2 Literature Review

Literature review is an essential procedure to capture the state of the art in a research field and provide the theoretical foundation for academic studies (Hu, 2014). This instrument can generate in-depth understanding on a research topic and identify valuable directions for future research (Mok et al., 2015). In *Chapter 2*, this study conducts a critical review covering social sustainability evaluation, the key stakeholders in UHD, stakeholder conflicts, and social risks in UHD, to determine the research directions for the following sections. In

this dissertation, a literature review was carried out to establish a data analysis framework and identify key research items (e.g., identifying the social risks in UHD).

3.3.3 Case Study

Case study is an empirical investigation that captures a contemporary phenomenon within a real life context (Hu, 2014). Typically, multiple sources of data can be utilized to comprehensively describe the picture of the phenomenon in the case. This method can be an effective tool for exploratory study or model validation. Although an exemplar case cannot yield general theories applicable to all the potential conditions, it can provide valuable insights and empirical support for research issues that have not been well analyzed (Yin, 2013). With the development of grounded theory, the study of exemplar cases can be used as an exploratory tool to establish theories in different economic activities (Eisenhardt and Graebner, 2007). In this research, case study was utilized to display the applications of the social sustainability indicators in *Chapter 4* and the conflict analysis model in *Chapter 5*.

3.3.4 Cluster Analysis

Cluster analysis is an effective multivariate statistical analysis method that is widely used in social science (Lorr, 1983). According to He (2015), cluster analysis can be used to group concepts or topics into categories by examining their proximities. Concepts or topics in the same category typically share similar implications or characteristics (Valdes-Vasquez and Klotz, 2013). This method can help researchers reduce dimensionality before performing another multivariate technique. This method can be adapted to classify various cases and

variables (Revelle, 1979). In the current study, cluster analysis was carried out to divide the social sustainability indicators (in Objectives 1 to 2) into categories. This division enables a better understanding of the shared features of the indicators in the same category. As a result, the conceptual implications of social sustainability can be effectively summarized.

3.3.5 Pawlak's Conflict Analysis

Four primary kinds of theories can be used to investigate stakeholder conflicts: (1) game theory (Yang and Zhang, 2012; Xu and Shi, 2012; Hu, 2005; Liu and Yin, 2012); (2) decision-making theory (Chen and Lai, 2013); (3) system theory (Shi et al., 2016); and (4) general theory of conflict analysis (Shi et al., 2016). Game theory is applicable in theoretical analysis but suffers from the lack of empirical support in the field of UHD. Decision-making theory can be used to optimize the strategies of targeted stakeholders in UHD programs. However, as this method typically fails to integrate the opinions of the various stakeholders in UHD, it cannot systematically identify goal conflicts among different stakeholders. For example, Chen and Lai (2013) developed an optimization model to improve decision-making for developers and governments. However, the interests of relocated residents could not be analyzed using this model. In system theory, stakeholders are viewed as subsystems or basic elements of a parent system, and analysis of conflicts should be conducted based on a holistic understanding of the parent system (Blanchard et al., 1990). This method is a typical data-intensive tool requiring a large amount of information related to the parent system. However, due to the lack of a mature database, this method has not been widely adopted in the related fields of UHD.

As noted in *Section 2.3.3*, a conflict analysis model based on empirical data should be established to determine the key interests of the stakeholders in UHD. Compared with the previous three methods, the conflict theory developed by Pawlak was considered more applicable to this study (Pawlak, 1984; Pawlak, 1998; Pawlak, 2005). First, this method can be used to systematically identify the conflicts among the different stakeholders involved in an activity; it can also quantify the degrees of stakeholder conflicts (An et al., 2002; Gao et al., 2008). Second, this method can integrate conflict theory with empirical data that can be easily collected in real projects (e.g., Shi et al., 2016). Finally, with the calculation of conflict degree, this method can provide valuable suggestions for balancing and alleviating stakeholder conflicts. To achieve Objective 3, this study used Pawlak's conflict theory to investigate the conflicts of interest among the key stakeholders in UHD.

3.3.6 Stakeholder Salience

As the competing claims from diverse stakeholders cannot be fulfilled simultaneously, decision-makers should balance the interests of these stakeholders according to their varied attributes (Olander, 2007). Mitchell et al. (1997) established a notable stakeholder analysis model that could effectively identify the key attributes of stakeholders. Researchers in the area of stakeholder management widely adopted this model, which was labeled as stakeholder salience. In this classical model, three key attributes, namely, power, urgency and legitimacy, were used to map the specific characteristics of stakeholders (Mitchell et al., 1997). Decision-makers can group stakeholders into a few categories based on the distribution of the three attributes and determine which stakeholders should receive a high

level of priority in the project (Yang, 2010).

In terms of the definitions of the three attributes, the power of a stakeholder group depends on its ability to mobilize social and political forces and to control the key resources that determine the survival and development of the organization (Yang, 2010; Aaltonen et al., 2015). Urgency refers to "the degree to which stakeholder claims call for immediate attention (Mitchell et al., 1997)." This concept involves two aspects: time sensitivity and criticality. Time sensitivity reflects to what degree the delay in attending to the claim or relationship is unacceptable. Criticality reflects the relative importance of the claim or the relationship. Legitimacy is defined as "a generalized perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions (Mitchell et al., 1997)." Typically, a high-level of legitimacy means that the claim is reasonable or proper.

Stakeholder salience theory is widely used to describe and categorize stakeholders in projects. To integrate the three attributes, scholars such as Olander (2007) developed a "stakeholder index" to reflect the impacts of different stakeholders. The present study employed salience theory in the conflict analysis section (Objective 3) because it can assist decision-makers in understanding the key characteristics of each stakeholder group. Subsequently, decision-makers can effectively assign different levels of priority to the various stakeholder groups.

3.3.7 Social Network Analysis

SNA has become an effective tool for researchers and practitioners to model organization structure and analyze interactions among different individuals or groups since Moreno introduced this concept in 1934 (Moreno, 1960). The theoretical foundation of SNA is based on graph theory, sociological and anthropological theories (Tichy et al., 1979). SNA assumes that network members can interact with one another, and their behavior is largely affected by the relationship pattern embodied in the network structure (Wasserman and Faust, 1994). From this perspective, Mitchell defined SNA as "a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved (Mitchell, 1969)."

SNA is an effective approach used to settle stakeholder-associated issues in the field of construction project management and other research areas (Mok et al., 2015). According to Rowley (1997), SNA can be applied to describe stakeholder environment by mapping the structural characteristics of a stakeholder network and the inter-relationships among different stakeholders. Compared with other research methods, SNA can visualize the complex inter-relationships among multiple stakeholders using socio-grams (Chinowsky et al., 2008). In addition, the impacts of stakeholder behavior and interactions can be quantified based on a network and system perspective (Mok et al., 2015). Hence, SNA can help researchers identify critical stakeholders and practical issues in their studies. Given the advantages mentioned above, SNA has been applied to settle stakeholder-associated issues in different types of construction projects such as school, infrastructure, and mega projects (Mok et al.,

2015). In the current study, SNA was utilized to investigate the social risks in UHD (Objective 4) because it can associate risks with corresponding stakeholders and quantify the interactions among different network nodes. In response to the statements in *Section 2.3.4*, this study could examine the stakeholder-associated social risks in UHD based on a network viewpoint.

3.4 Arrangement for Each Objective

3.4.1 Research Arrangement for Objectives 1 and 2

In response to Objectives 1 and 2, the concepts of social sustainability and the analytical tools for social sustainability evaluation were reviewed in *Sections 2.2.1 and 2.3.1*. Through the literature review, readers can acquire a preliminary understanding of social sustainability and social sustainability evaluation. In this part, an indicator system was established to comprehensively capture the conceptual implications regarding the social sustainability of UHD. Owing to the lack of a database, this section did not cover the conditions of all cities in China but focused only on Shanghai. Shanghai is an advanced and typical city in China that has experienced large-scale housing demolition in recent decades; thus, research pertaining to this city can help address the same issues in other large Chinese cities. As mentioned in *Section 3.3.3*, the studies on exemplar cases can enable researchers to acquire in-depth knowledge from empirical investigations (Yin, 2013). As case study has become an effective and explorative method for theory building (Eisenhardt and Graebner, 2007), it is expected that this study contributes to the current body of knowledge pertaining to the social

sustainability evaluation of UHD.

In terms of the theoretical foundation of this indicator system, a stakeholder perspective was employed, which emphasizes that social sustainability indicators should reflect the key interests of stakeholders and the potential impacts of UHD programs on the stakeholders. Since the core of social sustainability refers to maintaining and improving the well-being of people (Chiu, 2003), stakeholder satisfaction has become a widely applied principle to measure social sustainability. The information input of stakeholders can help identify social sustainability issues because the evaluation of social sustainability is typically related to the value judgment of people (Veldhuizen et al., 2015). In practice, considering the opinions of various stakeholders and enhancing stakeholder engagement is also an effective approach for improving social sustainability (Magee et al., 2013). Therefore, a stakeholder perspective was used in this section. The basic principle of indicator selection is that social sustainability indicators should comprehensively capture the key interests and wellbeing of the key stakeholders. Accordingly, social sustainability can be defined as a state where the interests of some stakeholders are improved without damaging the benefits and well being of other stakeholders.

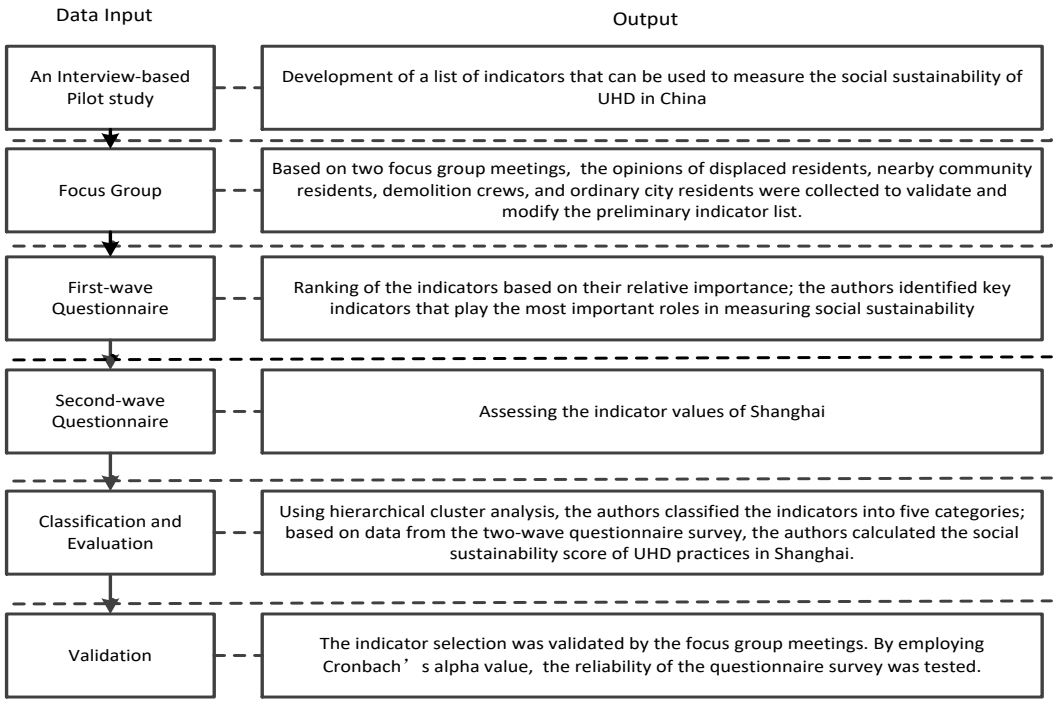

Figure 3.2 Arrangements for Objectives 1 and 2

3.4.1.1 Pilot Study: Indicator Identification

A hybrid research method was utilized in this section (see Figure 3.2). First, a pilot study based on semi-structured interviews was carried out to develop an optional list of indicators for measuring the social sustainability of UHD in Shanghai (see Figure 3.3; following Wang et al., 2010); this step was motivated by the exploratory nature of this research. Given that the selection of social sustainability indicators is typically founded on practical understanding (Littig and Grie$ler, 2005), interviews with practitioners were an effective approach for this research. A snowball sampling technique was used because of the lack of a systematic database of UHD projects in China. The interviewees were targeted based on their knowledge and experience on UHD in Shanghai. All of the interviewees possessed more than five years of professional or research experience in the fields related to UHD. Initial contact was made via telephone and followed up with an e-mail, which included a brief description

of the research purpose and the actual interview content. A total of 45 experts were initially contacted, and 8 claimed that they were not qualified to participate owing to their insufficient knowledge of UHD or experience on UHD. In addition, 16 of the 45 experts demonstrated limited interest and refused to participate in this research. Therefore, the list of interviewees was cut down to 21. Among the 21 interviewees, 11 were industrial professionals (7 property developers and 4 planners), 5 were government officials (2 from planning departments; 3 from housing and construction departments) and 5 were scholars (from 2 famous universities). The interviewees had worked in Shanghai for more than three years. All of them were asked to prepare for their interview by reviewing the UHD projects they had participated in. The key types of interview questions are presented in *Appendixes A and B.* The questions focused on stakeholder identification, the key interests of the stakeholders and the factors that could reflect stakeholder wellbeing. After the pilot study, a list of 22 indicators for measuring the social sustainability of UHD was compiled (see Table 4.1).

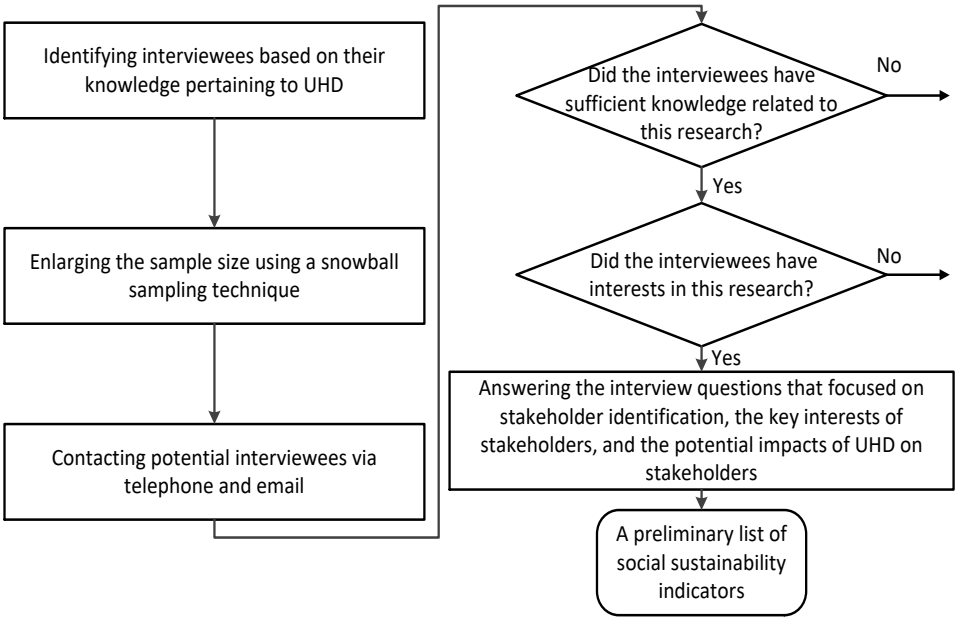

Figure 3.3 Key steps of the pilot study

3.4.1.2 Focus Group: Indicator Validation

In *Section 2.3.2*, six key types of stakeholders were identified, namely, relocated residents (S1), governments (S2), property developers (S3), demolition crews (S4), nearby residents (S5) and the general public (S6). To validate the indicator list, two focus group meetings were conducted to investigate the opinions of the stakeholders who were identified but not involved in the pilot study. In these meetings, 8 demolition crews, 8 relocated residents, 6 residents living near demolition sites and 6 ordinary city residents (the general public) participated in the two focus group meetings. The demolition crews were selected from two local housing demolition companies. All of the crews had at least three years of working experience. The relocated residents were selected from two resettlement communities that were developed in the last two years. All of them had experienced at least one UHD program within the last five years. The nearby residents were selected from two neighborhoods close

to UHD projects in the Yangpu District. The ordinary city residents involved in this study were randomly selected from the urban areas of Shanghai.

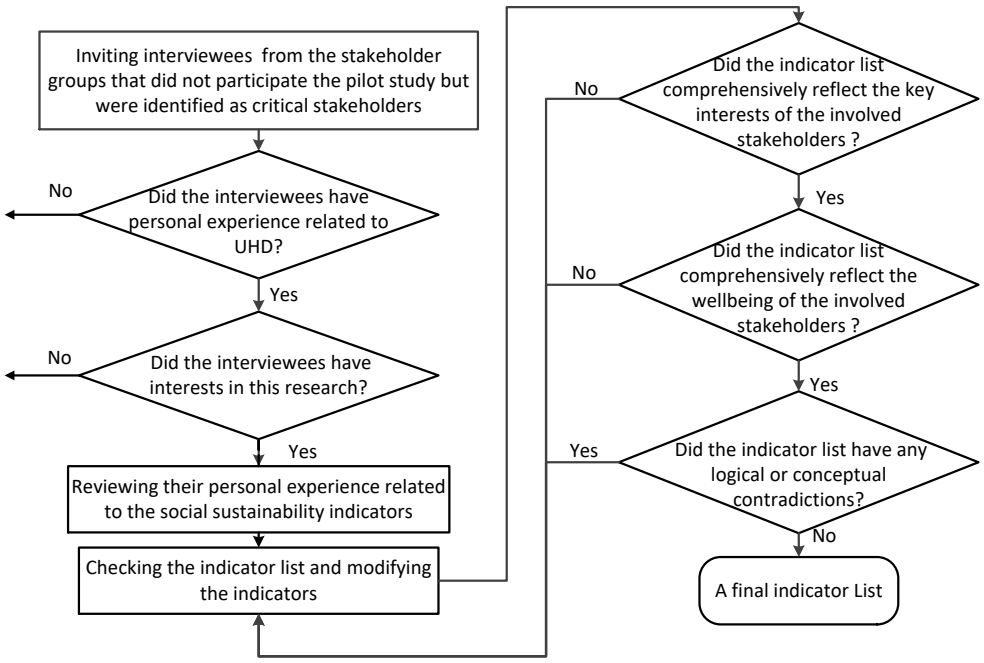

Figure 3.4 Key steps of the focus group

The protocol of the focus group meetings (see Figure 3.4) was consistent with the suggestions of Morgan (1996). First, the indicator list was sent to each participant in the focus group. Stakeholders were interviewed to gather their personal experience associated with these indicators. Subsequently, the participants were encouraged to conduct an open discussion about social sustainability issues concerning UHD in order to assess the robustness of the indicator list. Modifications were made until the interviewees reached an agreement on the indicator list. The key types of questions in the focus group are presented in the supplementary materials (*Appendixes C and D*).

3.4.1.3 Questionnaire Survey: Indicator Evaluation, Classification and Validation

The list of indicators was compiled from the pilot study and validated by the focus group meetings; however, the relative level of importance and the actual values of each indicator of Shanghai were still unknown. A two-wave questionnaire survey (see *Appendixes E to H*) was designed to obtain the unknown information. In this survey, evaluations on the importance level and the assessments on the indicator value were conducted separately with a time interval of four months (02/2015 through 06/2015) to avoid interactions between these two assessments (Podsakoff et al., 2003). In the first-wave of questionnaire, the relative importance of each indicator was rated by respondents using a five-point Likert scale where 5 denoted extremely important, 4 denoted important, 3 denoted less important, 2 denoted unimportant and 1 denoted negligible. In all, 400 questionnaires were distributed via e-mail to the following: 1) project managers or engineers from 3 construction companies and 3 property companies, 2) designers and planners from 3 design institutes and 2 planning institutes, 3) officials from 3 local government departments (planning, housing and construction, and land management departments), and 4) scholars from 5 local universities. All of these respondents were working in Shanghai. The primary consideration for selecting the target samples was that most of these individuals should have working experience and professional knowledge regarding UHD in Shanghai. Yang and Shen (2014) indicated that the depth and the width of stakeholder involvement could significantly influence the final results of decision-making. The key interests of all of the stakeholders should be considered and reflected in the survey (Yang and Shen, 2014). However, determining the importance and values of the indicators based on the judgments of stakeholders with limited professional

knowledge is unreasonable because these stakeholders (i.e., S1, S4, S5, S6) cannot analyze UHD programs from a systematic and holistic perspective. For example, the majority of demolition workers typically did not have any opportunities to resolve social conflicts in UHD programs because their primary work was to complete building demolition activities. Consequently, these demolition crews did not have sufficient knowledge about social conflicts in UHD, such as unfair relocation compensation. In the focus group meetings, many ordinary residents affirmed that their knowledge about UHD was mainly acquired from public media or the Internet. Such kinds of stakeholders were not qualified to evaluate the social sustainability of UHD from a comprehensive perspective. Consequently, these stakeholders (namely, S1, S4, S5, S6) were not involve in the evaluation process. However, their key interests were presented in the questionnaire and validated in the focus group meetings. A total of 156 questionnaires were received from 95 industrial professionals, 31 scholars and 30 government officials (i.e., a response rate of 39%). Based on the mean value of importance, the indicators were ranked to demonstrate their relative importance. The calculation and ranking steps follow the suggestions of Lu and Yuan (2010) and Wang et al. (2010).

In the second-wave questionnaire, the indicator values of Shanghai were evaluated on the basis of another 5-point Likert scale in which 5 implied extremely outstanding, 4 implied outstanding, 3 implied ordinary level, 2 implied low level and 1 implied very poor. In accordance with the protocol of Podsakoff et al. (2003), 156 questionnaires were redistributed to the respondents of the first-wave survey. Overall, 72 questionnaires from 38

professionals, 14 government officers and 20 scholars were collected, which gave a response rate of 46.15%. On the basis of the data obtained from the second-wave survey, hierarchical cluster analysis was conducted to classify the indicators into five categories to examine the internal relations among these indicators. In previous studies, scholars typically employed factor analysis to classify indicators, because this method can generate systematic and valid conclusions. However, factor analysis has strict constraints on data structure. In the current study, the data failed to meet the requirements of Bartlett's test of sphericity (Bartlett, 1954) and Kaiser-Meyer-Olkin (Kaiser, 1970); this deficiency implied that factor analysis was not applicable to this research. Therefore, this method was not applicable to this study. As mentioned in *Section 3.3.4*, cluster analysis is an effective instrument for indicator or concept classification and does not have strict constrictions on the data structure; it was therefore utilized in this section. With indicators in the same category typically having similar characteristics, this analysis could also help explain the implications of different indicators in an efficient way. Finally, by integrating the data collected from the first- and second-wave questionnaires, it was possible to evaluate the social sustainability of UHD practices in Shanghai.

The validation of indicator selection was based on the focus group meetings. In addition, Cronbach's alpha value was used to validate the reliability of the questionnaire survey.

3.4.2 Research Arrangement for Objective 3

3.4.2.1 Research Design for Developing the Conflict Analysis Model

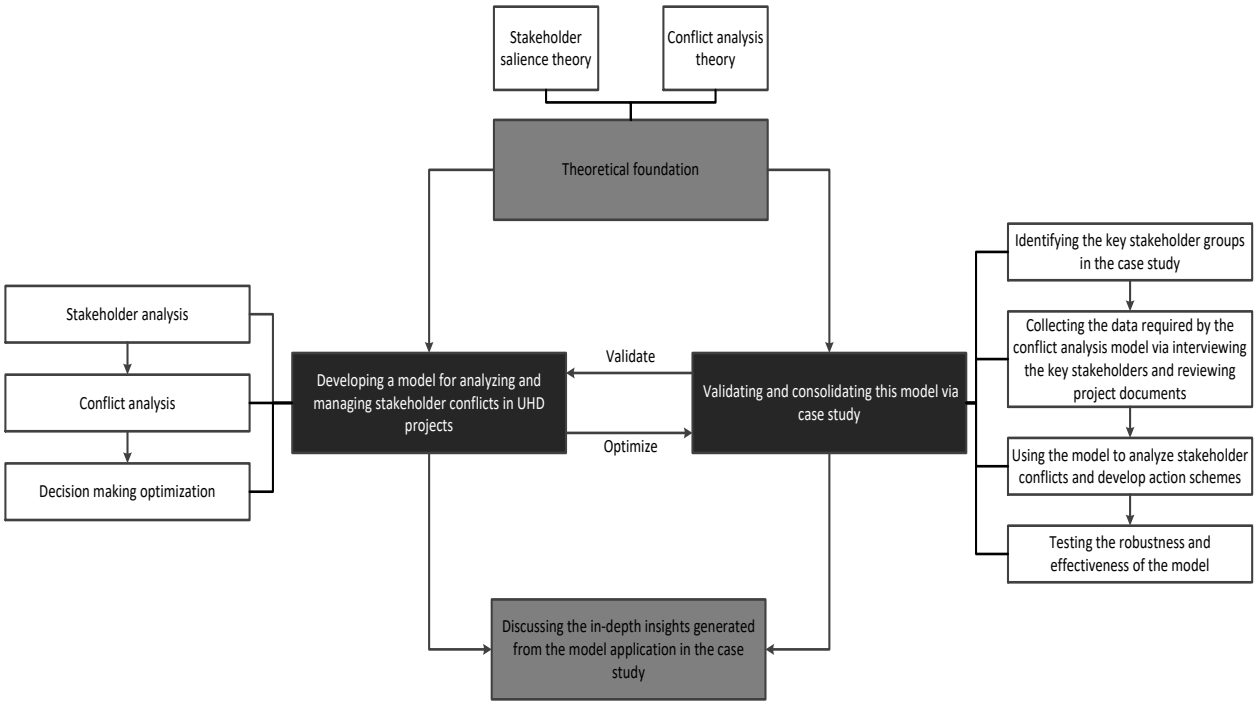

Figure 3.5 Research design for stakeholder conflict analysis

This section develops a model based on the theoretical foundation of stakeholder salience theory and Pawlak's conflict analysis theory to analyze and manage stakeholder conflicts in UHD (see Figure 3.5). The model comprised three key components, namely, stakeholder analysis, conflict analysis and decision-making optimization.

The stakeholder analysis component was based on the stakeholder salience theory improved by Olander (2007). This theory investigated the three traditional stakeholder attributes (i.e., power, urgency, legitimacy) as well as the stakeholder impact (i.e., probability of impact and impact level). Based on examining these stakeholder attributes, the stakeholder analysis can determine the level of priority for each stakeholder group in the UHD project.

The conflicts analysis component was grounded in the conflict model established by Pawlak (1998). In this part, the key concerns of each stakeholder group, the impacts of these concerns, and the stakeholders' attitudes towards these concerns were investigated. The quantification of conflict degree was based on the model developed by Pawlak (1998). Through conflict analysis, the key stakeholder conflicts in a UHD project can be identified and the overall degree of stakeholder conflict can be evaluated.

The decision-making optimization component integrated the results obtained from stakeholder analysis and conflict analysis. The degree of stakeholder conflict and the levels of priority for different stakeholders were fully reflected in this part. Based on the optimization analysis, the model could generate an optimal action scheme for decision-makers to maximize stakeholder benefits and minimize stakeholder conflicts. The development of the model is demonstrated in detail in *Section 5.2*. As the model development was the key deliverable of this study, information pertaining to this task was not repeated in the research design section.

3.4.2.2 Case Study

An actual UHD case in Wenzhou, i.e., the Sanlangqiao project, was studied to consolidate and demonstrate the practical application of the conflict analysis model. The decision-makers used the model to establish an action scheme for resolving stakeholder conflicts in the Sanlangqiao project.

Relevant data were gathered through document analysis and semi-structured interviews. The project documents analyzed in this study included: (1) planning documents such as the

master plan of the Sanlangqiao project and detailed planning schemes; (2) policy documents such as the relocation compensation standard and government regulations; (3) regular reports written by the key participants in the project, (4) decisions made by the government departments, and (5) minutes of the key meetings. All of these materials were highly correlated with this UHD project.

In the interviews, the primary principles of interviewee selection stipulated that all of the interviewees must have had a senior position or played an important role in the project. In general, the key stakeholder groups or participants in the Sanlangqiao project included: Wenzhou Ecological Park (WEP, the developer), Steering Group of Housing Demolition (SGHD, constituted by government departments), demolition and consultant companies (DCC, companies who helped the government design demolition schemes and conduct demolition activities), relocated residents of Sanlangqiao (RR), residents living near the demolished areas (RLNDA), and the general public (GP, i.e., ordinary residents in Wenzhou). All of these key players in the Sanlangqiao project were interviewed to obtain a comprehensive understanding on this project. The interviewee profiles are summarized in Table 3.3. Prior to the actual interviews, interview questions were sent to each interviewee via e-mail and encouraged them to prepare. The interview questions mainly focused on the key stakeholder concerns in the Sanlangqiao project and the key parameters required by the conflict analysis model (i.e., parameters in *Formula 5.12*). *Appendixes I and J* show the key interview questions.

Table 3.3 Profiles of interviewees

Stakeholder type	NO.	Description of interviewees
Developer	WEP1	Project leader, responsible for planning, managing and supervising the overall redevelopment of the Sanlangqiao area.
	WEP2	Head of the development department, responsible for managing and implementing the redevelopment work of the Sanlangqiao area.
	WEP3	Associated head of the development department, responsible for implementing the redevelopment of the Sanlangqiao area.
Government	SGHD1	Group leader, responsible for managing and supervising the housing demolition activities in the Sanlangqiao project
	SGHD2	Deputy director, responsible for developing UHD schemes and managing the implementation of demolition activities
	SGHD3	Section chief, responsible for negotiating and communicating with the relocated residents
Relocated residents	RR1	Homeowner whose home was demolished in the Sanlangqiao project.
	RR2	Homeowner whose home was demolished in the Sanlangqiao project.
	RR3	Homeowner whose home was demolished in the Sanlangqiao project.
Demolition crew	DDC1	Project manager, whose company was responsible for demolishing the houses and cleaning up the construction wastes generated from the UHD.
	DDC2	Leader of the project team, responsible for measuring the floor space of the demolished buildings.
	DDC3	Project manager, whose company was responsible for evaluating the unit price of demolished properties.
	DDC4	Project manager, whose company was responsible for collecting and recording the information regarding the housing demolition activities (e.g., personal information of the relocated residents and schedule information of the relocation activities). In addition, the company assisted the government in negotiating and providing compensation to the relocated residents.
Nearby residents	RLNDA1	Homeowner living near the demolished areas
	RLNDA2	Homeowner living near the demolished areas
	RLNDA3	Tenant living near the demolished areas
The general public	GP1	Ordinary resident who was randomly selected in Wenzhou
	GP2	Ordinary resident who was randomly selected in Wenzhou
	GP3	Ordinary resident who was randomly selected in Wenzhou

First, the attributes of each stakeholder group including power, urgency, legitimacy, the degree of stakeholder impact and the probability of impact were assessed based on the

discussion between the top decision-makers (SGHD1 and WEP1) and the demolition consultant (DDC4) in this project (consistent with Olander, 2007). The level of each attribute was marked on a 5-point Likert scale where 5 denoted extremely high, 4 denoted high, 3 denoted ordinary, 2 denoted low and 1 denoted extremely low. The stakeholders themselves did not directly assess the values of stakeholder attributes because they might overestimate their key attributes.

Subsequently, a comprehensive list covering the critical concerns of the six stakeholder groups was compiled based on the project documents and the opinions of the key stakeholder groups. These concerns could affect the interests of the stakeholders in the Sanlangqiao project.

Third, the stakeholders' attitudes towards these concerns were examined based on the interviews. The format of the interview questions was all phrased as "What is your attitude toward…" followed by the aforementioned concerns. Consistent with the study conducted by Pawlak (1998), the attitudes of these stakeholders were classified into three types, i.e., positive (+1), neutral (0), and negative (-1). For example, if a stakeholder's attitude toward "relocation compensation" was positive, then "relocation compensation" should be increased in the current UHD project, an increase that could benefit the stakeholder. If the stakeholder gave a neutral response, then variations in "relocation compensation" would not significantly affect his/her interests. If the respondent gave a negative response, then an increase in "relocation compensation" would be interpreted as damaging to the interests of the stakeholder.

Fourth, the benefit impacts of these stakeholder concerns were marked on a 5-point Likert scale according to the evaluation of the interviewees. If an interviewee provided a high rating to a concern, then it could significantly affect the benefits of the interviewee. Accordingly, if the decision-makers could support the attitude of this interviewee in this concern, then this interviewee could benefit considerably from the action scheme of the decision-makers.

Finally, the parameters related to the decision-making principles, i.e., the relative importance of each stakeholder group for the decision-makers and the acceptable level of stakeholder conflicts, were determined by the top managers and leaders (SGHD1 and WEP1) in the Sanlangqiao project.

The collected data were used for stakeholder analysis, conflict analysis and decision-making optimization. Through the three processes, an action scheme was generated for the decision-makers to improve their UHD practices in the Sanlangqiao project. The robustness and effectiveness of this action scheme were tested via sensitivity analysis and scenario comparison. Finally, the lessons learnt from the case study were summarized to guide practitioners in applying the conflict analysis model in their UHD projects.

3.4.3 Research Arrangement for Objective 4

Previous studies on social risk management generally follow a classical framework that includes risk identification, evaluation, analysis and response (e.g., Shi et al., 2015; Liu et al., 2016). This classical framework can effectively identify risks and quantify their impacts on project performance. However, in terms of stakeholder-associated risks, it cannot effectively consider stakeholders during the risk evaluation and analysis processes (Yang et al., 2016).

Section 3.3.7 indicates that SNA is an effective approach to analyze and settle stakeholder-associated issues. SNA can link risks with corresponding stakeholders and analyze the interactions among different risks. Researchers such as Yang et al. (2016) and Li et al. (2016) suggested integrating the traditional risk-management framework with SNA to handle stakeholder-associated risks because SNA can analyze risks based on a stakeholder and network basis. Therefore, in the current study, a research framework was developed according to the suggestions of these scholars (see Figure 3.6). SNA has been used to conduct risk analyses such as in green building (Yang and Zou, 2014; Yang et al., 2016) and prefabrication projects (Li et al., 2016); however, it has not been adopted in the area of social risk management. Therefore, the present study extends the application of SNA to social risk analysis.

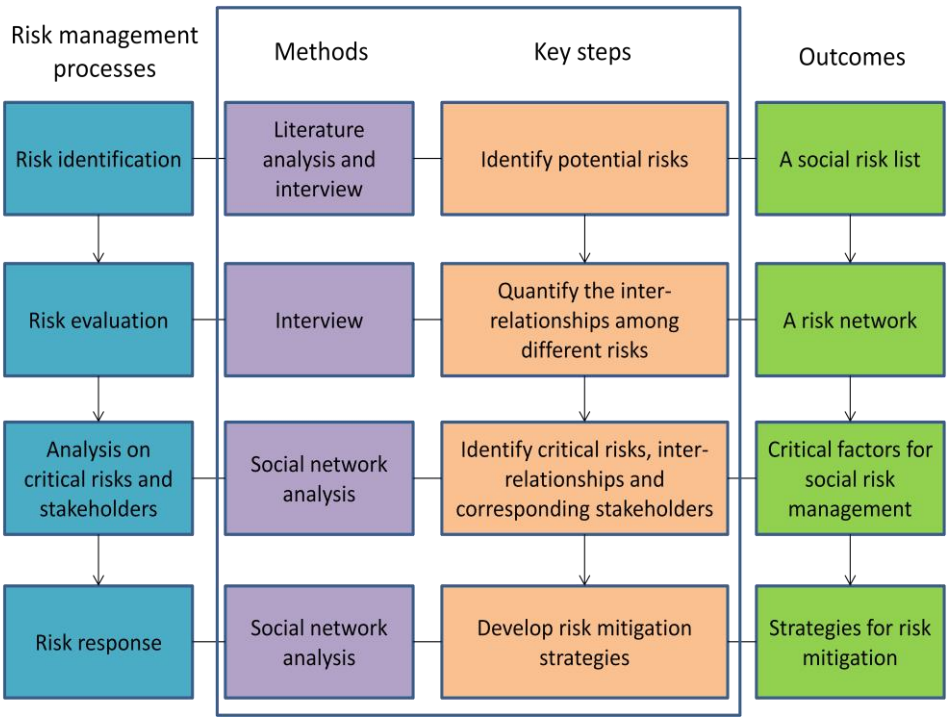

Figure 3.6 Research design for social risk analysis

3.4.3.1 Data collection

Interviews were conducted to collect data pertaining to the social risks in UHD projects. The selection of interviewees also followed a stakeholder-based sampling principle because this study examined social risks on the basis of a stakeholder perspective (Li et al., 2016). The six stakeholder groups identified in *Section 2.3.2* were investigated to avoid biased judgments. To ensure that the data were representative, all interviewees were selected from large cities where large-scale urban redevelopment programs were conducted in the last five years. Shanghai, Shenzhen and Beijing were identified as the most suitable cities because they have developed specific strategies and policies for implementing URPs and UHD. All of the interviewees from S2, S3 and S4 had more than five years of working experience related to UHD, and the majority had senior positions in their organizations. Interviewees from S1 and S5 were residents who experienced UHD after 2012 because the previous policy pertaining to housing demolition was replaced by a new regulation issued in 2011 (The State Council of the People's Republic of China, 2011). The identification of interviewees from S1 to S5 began through a review of exemplar UHD projects launched after 2011. The majority of them were pilot projects in the redevelopment plans of local governments. The key participants or stakeholders in these projects were initially identified as potential interviewees. The S6 interviewees were randomly selected from the urban areas of the three cities. A snowball sampling technique was used to encourage more potential interviewees to participate in the study. Potential interviewees were initially contacted via telephone or email. Those who did not have sufficient knowledge of social risks in housing demolition were excluded. Initially, 80 potential interviewees from the three cities were contacted; 25 of them

did not have any interests in the research and rejected the invitation, and 19 potential participants claimed that they were not qualified to answer the interview questions. As a result, 36 participants were identified as qualified interviewees (each stakeholder group had 6 members), and all of them contributed to this research.

3.4.3.2 Research Processes

The main processes of this research are shown in Figure 3.6. First, social risks related to housing demolition were identified using literature analysis and semi-structured interviews with key stakeholders. Before the interviews were conducted, background information and research content were sent to the interviewees via email so that they could reflect on their previous experience related to housing demolition and prepare for the questions. The interview questions (the key types of questions are summarized in *Appendixes K and L*) largely focused on social risks and corresponding stakeholders related to housing demolition. For example, what are the major risks that may cause social conflicts during the housing demolition stage of URPs?

In the second step in Figure 3.6, the interactions among the identified social risks were quantified based on the empirical knowledge of key stakeholders. For this purpose, face-to-face interviews were conducted to examine the opinions of the interviewees from the six identified stakeholder groups. To minimize ambiguities, verbal explanations were provided for participants when they did not clearly understand an interview question. In SNA, nodes denote social risks identified in the first step in Figure 3.6. Links refer to the effects of social risks on other risks. For example, if a link is present from S_aR_b to S_cR_d, it indicates

that S_aR_b can affect S_cR_d. The interviews required the corresponding stakeholders to evaluate the directions and effects of potential links. For example, if S_aR_b can affect S_cR_d, then stakeholder groups S_a and S_c will be interviewed to assess the linkage between S_aR_b and S_cR_d. Accordingly, this evaluation consisted of three types of questions: 1) Can risk S_aR_b affect S_cR_d during the housing demolition stage of URPs (the direction of the link)?; 2) What is the likelihood of this potential effect (the likelihood of the link)?; and 3) If S_aR_b impacts S_cR_d, to what degree can S_aR_b influence S_cR_d (the degree of influence)? A five-point scale was used to measure the results of the second and third types of questions, similar to studies conducted by Li et al. (2016) and Yang et al. (2016). Here, "1" denotes the lowest level and "5" refers to the highest level. The overall effect of a link (X) can be calculated by multiplying the likelihood of this link with the degree of influence.

In some cases, the related stakeholders could not reach an agreement on the final result of an evaluation on a link ($0 \leq X \leq 25$). In such a situation, the degree of variation ($V=\frac{X_{max}-X_{min}}{25}$, X_{max}=the maximal value of the evaluation, X_{min}=the minimal value of an evaluation) was calculated to judge whether a re-evaluation should be conducted to determine the weight of a link. In practice, V can be used as a simple parameter to measure the degree of variation in statistical samples (Jia et al., 2012). If the degree of variation was acceptable ($V \leq 0.2$), the median of the evaluation results was used to reflect the weight of this link (Jia et al., 2012). If the degree of variation was not acceptable ($V > 0.2$), online meetings with the related stakeholders via WeChat (an online communication software developed by Tencent Company) were organized. Then, a re-evaluation was carried out until an acceptable result

was generated. After two rounds of WeChat-based communication, an acceptable risk network was developed from the investigation.

In the third step in Figure 3.6, the data collected from the first and second steps was imported into NetMiner 4 for risk network visualization and analysis. Six metrics suggested by previous studies (Li et al., 2016; Yang et al., 2016; Yang and Zou, 2014) were used to reflect the key characteristics of the risk network and identify critical risks, links and corresponding stakeholders. These metrics included: network density, network cohesion, nodal degree, betweenness centrality, status centrality, and brokerage. They are widely used in studies pertaining to SNA and can effectively describe the key features of the network, nodes and links.

Finally, potential strategies for social risk mitigation were proposed based on network analysis. This step involved understanding the in-depth implications of critical risks and links in the network. By integrating the findings of the literature analysis, interviews and SNA study, the major risks identified and the rationale of the risk management strategies was discussed. The effectiveness of these strategies based on a network simulation was also evaluated.

3.5 Summary of the Chapter

This chapter displays the overall research design of this dissertation. It aims to offer guidance for the researcher to achieve the key research objectives stated in *Section 1.3*. The data collection methods and data analysis tools are described to show the characteristics of these

instructions. The research methods include: questionnaire, interview, focus group, literature review, case study, cluster analysis, Pawlak's conflict analysis, stakeholder salience theory, and SNA. The arrangement of the research procedures and methods is summarized in *Section 3.4*.

CHAPTER 4 AN INDICATOR SYSTEM FOR EVALUATING THE SOCIAL SUSTAINABILITY OF UHD IN SHANGHAI[4]

4.1 Introduction

The development of an indicator system to evaluate the social sustainability of UHD projects in China, the necessity of which was highlighted in *Section 2.3.1*, should be based on the perspective of the key stakeholders. *Section 3.4.1* developed a detailed research scheme to address this research gap by conducting empirical investigations into the key interests and wellbeing of stakeholders. This chapter presents the results of that investigation, which was carried out in the context of Shanghai. Accordingly, this chapter starts by introducing background information regarding the UHD projects in Shanghai. The social sustainability indicators identified from the pilot study are then presented. With the results of the two-wave questionnaire, these indicators are ranked according to their relative importance and grouped into five categories using hierarchical cluster analysis. Finally, the overall social sustainability of UHD projects in Shanghai is calibrated to show the application of this indicator system. On the basis of the aforementioned analyses, the implications of the critical indicators and the significance of the indicator classification are discussed.

4 The majority of this Chapter has been published in the following paper: Evaluating social sustainability of urban housing demolition in Shanghai, China, Journal of Cleaner Production.

4.2 Housing Demolition in Shanghai

Shanghai is one of the most advanced cities in China that has experienced large-scale urban redevelopment programs. In the early 1980s, Shanghai was planned to be the economic center of China. Therefore, the redevelopment of shantytowns was high on the agenda of urban development. Prior to 1991, the city government carried out a package of redevelopment policies. Twenty-three plots of land were designated for urban redevelopment (Yang and Chang, 2007). China then experienced an economic transition from a planned economy into a market system (Tang, 2007). In Shanghai, new policies for urban redevelopment began to come into force in 1991 (Shih, 2010). One of the central goals of these policies was the "urban renewal project 365," which aimed to redevelop substandard buildings (Yang and Chang, 2007). Since 2000, the redevelopment of city villages has become a primary task of local governments because these villages have negatively affected the city image and economic growth of Shanghai. Given limited land space, UHD has become an important approach to release land resources for urban redevelopment. Between 1991 and 1995, approximately 300,000 households experienced UHD programs (Shanghai City Government, 1996). The majority of them were relocated to new neighborhoods. Between 1996 and 2006, the number of relocated households reached 897,332 (Shanghai Statistics Bureau, 2007). From 2000 to 2010, 60.14 million square meters of housing in Shanghai were demolished, which led to the displacement of more than 646,000 households (Shanghai Statistical Bureau, 2011). From 2011 to 2014, around 102,722 households were relocated because of housing demolition (Shanghai Statistical Bureau, 2015). During the

initial phase of urban redevelopment, UHD projects in Shanghai were driven by the local government with the aim of achieving urban modernization. After 2000, UHD has been driven by the property market owing to economic reforms (Tang, 2007). Current UHD policies stipulate that property developers should not directly participate in UHD programs because business interests may damage public interests. However, the property market still significantly affects the decision-making of governments because property investments have become the primary source of financial support for urban redevelopment (Ye, 2011). In Shanghai, the current implementation of UHD programs must obey the rules in "*Property Law*," "*Detailed Regulations on the Expropriation and Compensation of Houses on State Owned Land in Shanghai (DRECHSOLS)*," "*Land Administration Law of the PRC (LALP)*" and "*Regulations on the Expropriation and Compensation of Houses on State Owned Land (REXHSOL)*."

To some degree, these UHD programs have made a significant contribution to the urban development of Shanghai and improved the living conditions of local residents. However, several social sustainability issues have emerged during this process. Thus far, many studies have been conducted to investigate social issues related to UHD in the specific context of Shanghai. For example, Wu and He (2005) analyzed the unequal allocation of economic interests in UHD practices. The unreasonable pursuit of economic growth seems to damage the key interests of relocated households and other vulnerable groups. From the legal perspective, Shih (2010) argued that housing demolition has become a source of violent incidents and social conflicts in Shanghai. The ineffective law system has resulted in sharp

conflicts among governments, property developers and relocated households (Shih, 2010). However, previous studies regarding Shanghai have not proposed a systematic assessment system to measure the social sustainability of UHD practices. Consequently, the definition of the social sustainability of UHD remains unclear. To address these issues, this study developed a comprehensive assessment system that could be easily applied in UHD projects, particularly in the context of Shanghai.

4.3 Identification, Ranking and Classification of the Social Sustainability Indicators

4.3.1 Indicator Identification

From the pilot study, 22 indicators were identified. These indicators were validated through the focus group meetings. The results are summarized in Table 4.1. The majority of the 22 indicators were fuzzy indicators instead of quantitative indicators because social sustainability is a complex concept with multiple abstract implications (Omann and Spangenberg, 2002). Some important dimensions of social sustainability (e.g., the city's image) were difficult to calculate based on quantitative data (e.g., statistical data). Therefore, previous evaluations on social sustainability typically depended on the fuzzy judgments of experts with professional knowledge (e.g., Rajak and Vinodh, 2015; Singh et al., 2007). Although some fuzzy indicators could be further calibrated via quantitative data (e.g., X15 could be measured by the number of violent incidents), the majority of these quantitative data could not be easily acquired in the context of China due to the lack of a database and the

political sensitivity of UHD. Therefore, the application of a quantitative indicator system could be extremely difficult in practice. As a result, a fuzzy indicator system was more feasible in this study. The implications of these fuzzy indicators are displayed in the third column of Table 4.1. In the last column, how these indicators reflect the wellbeing and interests of stakeholders in UHD are explained.

Table 4.1 List of indicators to measure the social sustainability of UHD in China

NO.	Indicators	Description of each indicator	Key linkages between each indicator and the corresponding stakeholder(s)
X1	Community transportation	To what degree the adverse impacts on community transportation can be controlled.	UHD can influence the transportation system of the nearby communities. For example, some residents living in Zhangwu Road stated that the transportation of demolition waste frequently caused traffic congestion in their communities (FM). These issues can significantly affect the daily life of the nearby residents. For instance, the commute time of these residents can be significantly prolonged (FM). Therefore, governments and demolition crews should take effective means to reduce such impacts on transportation (e.g., setting temporary bus lines for nearby residents).
X2	Community security	To what degree the adverse impacts on community security can be reduced.	Valuable demolition waste products such as steel may attract thieves and incur crimes (PL). In addition, the flow of strangers (e.g., demolition crews) into the community can reduce the sense of security of nearby residents (FM). Consequently, governments and demolition crews should exert efforts toward improving community security during housing demolition (e.g., employing additional security staff during UHD).

Note: FM refers to the focus group meetings, and PL refers to the pilot study.

Table 4.1 (Continued)

NO.	Indicators	Description of each indicator	Key linkages between each indicator and the corresponding stakeholder(s)
X3	Healthy/safe living conditions for nearby residents	To what degree the healthy/safe living conditions of nearby communities can be maintained.	UHD can cause adverse impacts on the health and safety of nearby residents (PL). For example, toxic demolition dusts such as lead can cause lung cancer (PL). Environmental pollutions such as air pollution and noise can incur health issues such as insomnia. In addition, safety issues such as falling objects also challenge the wellbeing of nearby residents. Thus, governments and demolition crews should take effective measures to reduce these adverse impacts. For example, dust control technologies can be applied during UHD. Laws have been released to protect the safety and health of nearby residents.
X4	Availability of public open space	To what degree the adverse impacts on the availability of public open place can be controlled.	Public open space can be occupied during UHD projects. For example, in a demolition project on Siping Road, public spaces were used for storing demolition waste and equipment (FM). Given that an open place provides activity space for nearby residents to talk and share ideas with one another, UHD can adversely influence the social activities of these residents (PL). Governments and demolition crews should take this indicator into consideration when developing UHD plans.
X5	Availability of public facilities	To what degree the adverse impacts on the availability of public facilities (e.g., sport facilities; recreational facilities) can be reduced.	UHD can affect the nearby residents' use of public facilities (PL). For example, in a UHD project on Zhangwu Road, the outdoor sport facilities were closed for safety reasons (FM). Public facilities can improve the residents' quality of life (FM). Therefore, governments and demolition crews should work to ensure that such facilities remain open during UHD. These adverse impacts should at least be controlled to an acceptable level.

Note: FM refers to the focus group meetings, and PL refers to the pilot study.

Table 4.1 (Continued)

NO.	Indicators	Description of each indicator	Key linkages between each indicator and the corresponding stakeholder(s)
X6	Fair remuneration	To what degree the payment for demolition crews and other employees in a UHD project can be reasonable and fair.	Governments and developers should pay a fair salary to demolition crews and other employees in a UHD project. Unfairness can easily incur social dissatisfactions. However, some demolition workers maintained that their wages were docked in some projects because they were temporary workers without formal contracts with their employer (FM). Governments can develop labor laws to protect the benefits of these crews.
X7	Child labor	The percentage of child labor in UHD projects.	The employment of children should be avoided during UHD projects (PL) because it can incur social discontent from the general public and damage the reputation of governments. Some experts in the pilot study argued that labor laws should strictly prohibit the employment of children.
X8	Forced labor	To what degree the work load of demolition crews is reasonable.	Work overload should be avoided during UHD projects because it can damage the health and wellbeing of workers. However, some demolition workers argued that their workloads were sometimes sharply increased to complete the demolition work on schedule (FM). Governments should design a reasonable plan for UHD activities.
X9	Health and safety of employees	To what degree the health and safety of employees can be protected.	The health and safety of demolition crews as well as other employees should be guaranteed during demolition projects (PL). “Zero casualty” is an important indicator to evaluate the performance of government officials in UHD projects. Therefore, governments and demolition crews should pay sufficient attention to the SHE management in UHD.

Note: FM refers to the focus group meetings, and PL refers to the pilot study.

Table 4.1 (Continued)

NO.	Indicators	Description of each indicator	Key linkages between each indicator and the corresponding stakeholder(s)
X10	Working hours	To what degree the working hours of demolition crews and other employees are reasonable.	The working hours of demolition crews and other employees should be reasonable (PL).For example, during the hot summer days in Shanghai, workers should have more rest breaks during the daytime (FM). If not, their health and sense of happiness could be significantly damaged (FM). Governments should develop a reasonable working schedule for these workers.
X11	Equal job opportunities	To what degree individuals with different social backgrounds can obtain equal job opportunities in UHD.	In a demolition project, equal job opportunities should be given to people with different backgrounds and genders (PL). For example, employers should not distinguish between local and nonlocal demolition crews (FM). In addition, the unemployment of relocated households induced by UHD activities should be compensated for in relocation schemes (PL). A high employment rate can contribute to the performance of local governments. Governments can develop social security schemes to maintain the employment rate in UHD areas.
X12	Personal dignity of demolition crews	To what degree the personal dignity of demolition crews can be protected in UHD projects.	Government officials as well as the other stakeholders (e.g., relocated households) should not violate the personal dignity of demolition crews during UHD projects (FM). Personal dignity is very important for the happiness and self-identity of an individual (PL).
X13	Illegal demolition	To what degree the relocation and demolition activities can conform to existing laws and policies.	Illegal demolition activities should be avoided during UHD projects. For example, demolition work should not be carried out without securing administrative approval (PL). Governments and demolition crews should carry out their UHD projects according to the existing laws such as the *Property Law*.

Note: FM refers to the focus group meetings, and PL refers to the pilot study.

Table 4.1 (Continued)

NO.	Indicators	Description of each indicator	Key linkages between each indicator and the corresponding stakeholder(s)
X14	Illegal waste disposal	To what degree illegal waste disposal can be reduced.	Cities such as Shanghai and Shenzhen have developed laws (or regulations) regarding construction waste disposal in order to improve the efficiency of natural resource conservation. Demolition crews should not dispose their demolition waste in an illegal way (PL). For example, demolition waste should not be transported to a waste disposal plant without an operating license (PL). In addition, governments are responsible for supervising the waste disposal during UHD.
X15	Violent incidents	To what degree violent incidents can be controlled during UHD.	Violent incidents among demolition crews, relocated households and governments should be avoided during UHD projects because these incidents can easily incur social dissatisfactions and threaten the social stability of China (PL). The reputation of local governments can be adversely affected as well.
X16	Stakeholder engagement and acceptance of the UHD plan	The degree of stakeholder engagement and acceptance.	Each stakeholder group (especially vulnerable groups) should have effective approaches to express their opinions to the decision makers of UHD (PL). Stakeholder engagement can effectively mitigate social conflicts and social resistance (PL). Based on stakeholder engagement, the UHD plan developed by governments should be accepted by most key stakeholders (PL).
X17	Fair compensation for relocated households	To what degree the compensation standards for different households can be consistent.	In UHD projects, local governments should develop a reasonable compensation standard for relocated residents based on the market value of the property and the potential losses caused by the relocation (PL). Fair compensation should be paid to relocated residents according to this standard (PL). However, some relocated residents complained that, to reduce development costs, in many cases governments/developers sent unfair compensations to them without any option for negotiation (FM).

Note: FM refers to the focus group meetings, and PL refers to the pilot study.

Table 4.1 (Continued)

NO.	Indicators	Description of each indicator	Key linkages between each indicator and the corresponding stakeholder(s)
X18	Personal dignity of relocated households	To what degree the personal dignity of relocated households can be maintained.	The personal dignity of relocated households should be protected in UHD projects because it can affect the happiness and self-identity of these relocated residents (PL). Governments and demolition crews should pay attention to this point when they conduct their UHD activities.
X19	Fair treatment for low-income and minority groups	To what degree low-income and minority groups can achieve the same benefits as stakeholders from high social classes.	The interests of low-income or minority groups should be fairly treated and protected without discrimination (PL). Governments should develop a social security scheme to meet the basic needs of these vulnerable groups (FM).
X20	Preserving social networks	To what degree the social ties in the demolished areas can be maintained.	The social relationships of relocated households should be well preserved because social relationships play an important role in maintaining the wellbeing of these residents (PL). For example, a relocated resident argued that his father felt frustrated after relocating because this old man was unable to spend time with his old friends in his new community (FM). Therefore, the planning departments of local governments should take such kinds of social issues into consideration when developing a master plan.
X21	Preservation of the city's image	To what degree the city's image can be preserved during UHD.	Since UHD projects can change the image of a city, the adverse impacts of this process should be controlled (PL). The image of a city can reflect the shared attitudes and values prevailing in the local society (PL). A positive image can enhance the sense of attachment to this city (PL).
X22	Cultural heritage preservation	To what degree culture heritages can be preserved during UHD.	Cultural heritages near the demolition site should be carefully protected by governments and demolition crews (PL). Cultural heritages record the historical activities and the cultural identity of former generations (PL). They should be preserved for the general public.

Note: FM refers to the focus group meetings, and PL refers to the pilot study.

4.3.2 Relative Importance of Each Indicator

Table 4.2 Primary results of the first-wave questionnaire survey

NO.	Mean	Standard deviation	Rank	NO.	Mean	Standard deviation	Rank
x15	4.740	0.65	1	x11	3.896	0.75	12
x13	4.612	0.77	2	x12	3.773	0.71	13
x9	4.579	0.74	3	x22	3.759	1.01	14
x3	4.490	0.65	4	x1	3.635	0.97	15
x17	4.436	0.90	5	x8	3.526	0.73	16
x19	4.229	0.84	6	x10	3.490	1.51	17
x6	4.197	0.63	7	x5	3.343	1.04	18
x21	4.106	0.94	8	x14	3.275	0.75	19
x18	4.040	0.82	9	x7	3.221	1.32	20
x2	3.988	0.61	10	x4	3.202	1.01	21
x16	3.897	0.88	11	x20	3.019	1.44	22

To identify critical indicators, a ranking list of the indicators was developed (see Table 4.2) by comparing their mean values of importance in the first-wave survey. An indicator was considered to be more important than another if it was associated with a higher mean value. If two or more indicators had the same mean value level, the indicator with a smaller standard deviation was adopted as a more important indicator. This ranking method has been adopted in numerous studies as a simple and effective approach to identify critical indicators in a questionnaire survey (e.g., Lu and Yuan, 2010; Wang et al., 2010). From Table 4.2, it can be seen that: 1) the mean values of all the indicators were larger than 3 (less important), which indicated that none of them were unimportant or negligible factors; 2) there were nine indicators with mean values greater than 4 (important level) that should be regarded as critical indicators for the social sustainability of UHD in Shanghai. These critical factors are:

violent incidents, illegal demolition, health and safety of employees, healthy/safe living conditions, fair compensation for relocated households, fair treatment for low-income and minority groups, fair remuneration, preservation of the city's image, and the personal dignity of relocated households.

4.3.3 Indicator Values of Shanghai and Hierarchical Cluster Analysis

Table 4.3 Primary results of the second-wave questionnaire survey

NO.	Mean	Standard deviation	NO.	Mean	Standard deviation
x1	3.667	1.13	x12	3.300	1.15
x2	4.430	0.79	x13	4.531	1.16
x3	3.641	0.72	x14	3.978	1.03
x4	2.875	1.42	x15	4.853	1.07
x5	3.378	1.32	x16	3.011	1.35
x6	4.325	0.73	x17	4.414	0.81
x7	4.314	1.36	x18	3.778	1.26
x8	4.203	1.23	x19	3.778	1.33
x9	3.364	1.22	x20	2.203	0.88
x10	2.781	1.09	x21	4.497	0.94
x11	3.517	1.08	x22	4.300	1.06

In the second-wave questionnaire, the indicator values of Shanghai were evaluated by adopting a 5-point Likert scale. The mean value and standard deviation of each indicator are presented in Table 4.3, which shows that: 1) the mean values of all of the indicators exceed 2 implying that even the poorest part of Shanghai had already exceeded a low level of social sustainability; 2) three indicators, healthy/safe living conditions, working hours, and preserving social networks, have a mean value of less than the ordinary level of 3 meaning

that they are the poorest ones that require improvement; 3) there were nine indicators (40.91% of all the indicators) with mean values greater than 4, which can be regarded as the excellent parts of Shanghai's previous work.

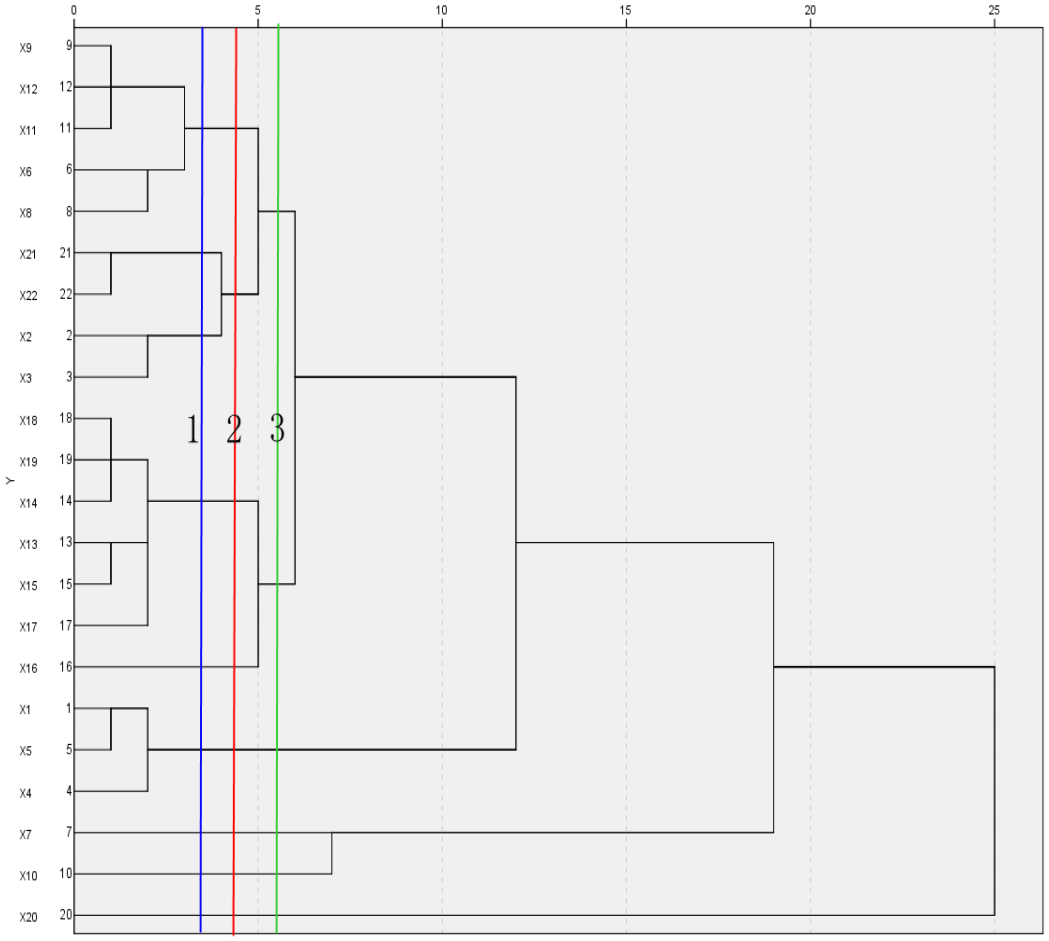

Figure 4.1 Dendragram of the indicators

To investigate the internal relations among the indicators, a hierarchical cluster analysis was subsequently conducted to divide the indicators into five categories. The data collected from the second-wave survey were input into SPSS16.0. The results are shown in Figure 4.1. There were several schemes for indicator classification (e.g., Line1, 2 and 3). Previous studies have defined several principles to judge whether one scheme is better than another.

Firstly, the final classification should be determined on the basis of the characteristics of the research objectives (Revelle, 1979; Rapkin and Luke, 1993). Secondly, the division should also make "theoretical sense while offering a parsimonious and manageable representation of reality (Saint-Arnaud and Bernard, 2003)". To satisfy these two requirements, the implications of the classification are explained in *Section 4.5* along with related literature and UHD practices to support the findings. Finally, each category should not contain too many or too few indicators.

According to the principles noted above, Line 2 was selected as the baseline for classification. As a result, the first category included X6, 8, 9, 11, 12; the second category included X2, 3, 21, 22; the third category included X13, 14, 15, 17, 18, 19; the fourth category included X1, 4, 5. However, four indicators (X7, 10, 16, 20) could not be assigned to any category in the cluster analysis. These indicators were grouped into one category as an autonomous part because each indicator shared the common characteristic of having weak relations with other indicators in the assessment system. If Line 3 were selected, the first cluster would have contained 9 indicators (40.91% of all the indicators), which covered too many components of the assessment system. If Line 4 were adopted as the final scheme for indicator classification, indicators X2, 3, 21, 22 would have been divided into two categories. Each category would only have two factors, which were too few for the assessment system. As a result, Line 2 was considered to be the most suitable choice in this case.

4.3.4 ANOVA-test

Given that the survey's respondents had distinctly different backgrounds, testing the consistency of their understanding about the importance of different indicators might be valuable. Hence, ANOVA analysis was applied, which is a widely adopted tool that can judge whether a significant difference exists among the responses from different groups of experts (Hair et al., 2006). There were two hypotheses in this test:

H0: The evaluations of industry professionals, government officials and industrial professionals on Xi (i=1,2,3,…,22) are consistent.

H1: The evaluations of industry professionals, government officials and industrial professionals on Xi (i=1,2,3,…,22) are not consistent.

According to Hair et al. (2006), when the P-value of ANOVA analysis is less than or equal to 0.01, the difference between different groups is extremely significant; when P is between 0.01 and 0.05, there is a variation; and when P is greater than 0.05, there is no difference. The data in Table 4.4 reveal that respondents with different backgrounds have inconsistent opinions about the importance of health/safe living conditions and preserving social networks. In terms of health/safe living conditions, the mean value of the industrial professionals (reaching 4.375) was lower than the values of the other two groups, implying that industrial practitioners in Shanghai may fail to pay sufficient attention to the living conditions of the residents around their work sites. In UHD projects, sustainable practices such as waste recycling or noise control may incur additional costs that reduce the short-term

profits of these projects. Sustainable practices can improve the living conditions of nearby residents and may increase the welfare of the society in a long term. However, practitioners may have limited incentives to apply these practices because existing policies and business operations cannot enable them to achieve economic profits within project cycle (PL). Accordingly, industrial professionals may pay sufficient attention to this indicator in practice. Meanwhile, scholars from universities exhibited the greatest concern about health/safe living conditions (reaching 4.788), while government officials showed a neutral opinion among all of the respondents (reaching 4.549). In this study, most scholars have research experience in the fields of sustainable development. Therefore, they may have better sustainable awareness and may pay more attentions to community conditions in UHD, compared with government officials and industrial professionals. This may be the reason why scholars had the highest score in this indicator.

In terms of preserving social networks, the mean value of the government officials amounted to 3.567, which was the highest level of the three groups. Meanwhile, the scholars gave this indicator the lowest mean point of 2.696, and the practitioners' mean value was 2.951. In China, relationships in social network are crucial to the promotion of government officials and the efficiency of business operations (Ling and Li, 2012). Therefore, these two groups of respondents paid more attention to social network.

Table 4.4 ANOVA test

NO.	P-Value in survey 1	P-Value in survey 2	NO.	P-Value in survey 1	P-Value in survey 2
x1	0.246	0.437	x12	0.309	0.439
x2	0.549	0.079	x13	0.414	0.605
x3	0.007	0.922	x14	0.639	0.930
x4	0.152	0.675	x15	0.121	0.870
x5	0.435	0.436	x16	0.765	0.622
x6	0.505	0.694	x17	0.591	0.344
x7	0.081	0.296	x18	0.978	0.967
x8	0.806	0.218	x19	0.593	0.462
x9	0.931	0.409	x20	0.047	0.769
x10	0.998	0.350	x21	0.164	0.100
x11	0.935	0.682	x22	0.145	0.295

In the second-wave questionnaire, all of the indicators' P-values were greater than 0.05. Therefore, the evaluation of the respondents in terms of indicator values was consistent and robust. The results implied that respondents generally reached an agreement on the assessment of current social sustainability level in Shanghai.

It is worth noting that the final sustainability score of this study was calculated based on the overall evaluation of all three groups of respondents. The reliability-test in *Section 4.3.6* indicates that the differences among these three groups of respondents are acceptable in this study. Therefore, these differences could not significantly affect the final results of this study.

4.3.5 Social Sustainability of UHD in Shanghai

By integrating the results of the first- and second-wave questionnaires, the social sustainability score of UHD in Shanghai was calculated based on the following processes:

(*Formula 4.1*) $M_i = \sum_k M_{ik}$

(*Formula 4.2*) $W_i = \frac{M_i}{\sum_{j=1}^{5} M_j}$

(*Formula 4.3*) $W_{ik} = \frac{M_{ik}}{M_i}$

(*Formula 4.4*) $NV_{ik} = \frac{V_{ik}}{5}$

(*Formula 4.5*) $NV_i = \sum_k NV_{ik} \cdot W_{ik}$

(*Formula 4.6*) $NV = \sum_{i=1}^{5} NV_i \cdot W_i$

M_{ik} was the mean importance value (in the first- wave survey) of the *k*th indicator in the *i*th category (i=1,2,3,4 or 5); V_{ik} was the mean indicator value (in the second- wave survey) of the *k*th indicator in the *i*th category (i=1,2,3,4 or 5). *Formula 4.2* was used to calculate the weight of each category (W_i). *Formula 4.3* was used to calculate the weight of each indicator in its category (W_{ik}). *Formula 4.4* was used to normalize the indicator values in order to ensure that they fell over a range of 0- 1. *Formula 4.5* was used to calculate the social sustainability score of each category (NV_i). *Formula 4.6* was used to calculate the overall score of social sustainability (NV).

Similar calculation methods have already been adopted in previous studies to evaluate social sustainability (e.g., Dong and Ng, 2015). Based on the calculation, the sustainability score of each category was rescaled into a comparable range of 0-1. The implications of the sustainability score were similar to those of the study conducted by Dong and Ng (2015). In the calculation of the scores of social sustainability, 1 implied extremely outstanding, 0.8

implied outstanding, 0.6 implied ordinary level, 0.4 implied low level and 0.2 implied very poor. The overall score of Shanghai was 0.782 ($0 \leq NV \leq 1$), which indicated that the social sustainability of UHD in Shanghai was quite close to being at an excellent level (0.8).

4.3.6 Validation and Reliability

The validation of indicator selection was based on the findings of the focus group meetings. By integrating the results of the pilot study and the focus group, the opinion of all stakeholders identified in this research was examined. The personal experience and statements of these stakeholders was used to explain the implications of each indicator in Table 4.1.

Moreover, Cronbach's alpha value was used to measure the reliability of the questionnaire survey. The first-wave questionnaire survey obtained 0.705 (i.e., over 0.50), which meant that the data were acceptable at a significance level of 5% (Norusis, 2005). The Cronbach's alpha value used on the second-wave survey obtained quite reliable results with 0.794. Accordingly, the data obtained in this study represent a robust understanding of the respondents in terms of the relative importance of indicators in measuring the social sustainability of UHD in Shanghai.

4.4 Critical Indicators

The analyses of the first-wave questionnaire revealed that the most critical indicators identified in this study mainly reflect three dimensions of social issues during UHD projects: 1) social equality and fair treatment (fair compensation for relocated households, fair

treatment for low-income and minority groups, fair remuneration, personal dignity of relocated households), 2) adherence to the law (violent incidents, illegal demolition, preservation of the city's image), and 3) health and safety (health and safety of employees, healthy/safe living conditions). It is worth noting that a social sustainability indicator can display multiple attributes and be analyzed from different perspectives. For example, relocation compensation can be analyzed from the perspective of economic sustainability because it can influence the transaction costs of urban redevelopment projects. Meanwhile, from the perspective of social fairness, relocation compensation is also an important social issue. This study focused on the social attributes of these indicators. In the following paragraphs, the shared characteristics of these critical indicators are summarized based on their social implications.

4.4.1 Social Equality and Fair Treatment

Social equality and fair treatment are crucial to improving social sustainability (Enyedi, 2002; Bramley et al., 2009). The interests of various stakeholders in UHD projects should be fairly treated and protected without discrimination. This conclusion resonates with the study of Biddulph (2009), which highlighted the maintenance of social justice and fairness during UHD to ensure a stable and harmonious Chinese society. To balance conflicting interests and maintain social fairness, the policy related to UHD in Shanghai (i.e., *DRECHSOLS*) stipulates that public interests must be given priority protection during UHD projects. However, after investigating the allocation of economic interests in previous UHD practices in Shanghai, Wu and He (2005) argued that the pursuit of economic growth can significantly

damage the interests of relocated households and other vulnerable groups. To increase fiscal income, the local government of Shanghai tends to support property development even at the cost of the satisfaction of other stakeholders (Wu and He, 2005). In the latest literature, Shanghai ranked third on a list of various regions' fiscal dependences on land leasing and property development (HuDong Wiki, 2014). In addition, the previous legal system of Shanghai does not have a clear definition of public interest (Tang, 2007). Consequently, in the name of public interest, unfair or unequal treatments became legal and reasonable during previous UHD episodes in Shanghai. The unfairness and inequality of UHD projects are primarily reflected in uneven compensation (Li and Song, 2009; Ho, 2013; Hu et al., 2015) and unfair treatment between different stakeholders (e.g., employment discrimination between local and nonlocal demolition workers; disrespecting the personal dignity of relocated households due to their weak power position in UHD). These issues related to social fairness and equality have become primary challenges to the social sustainability of UHD projects in Shanghai.

4.4.2 Adherence to the Law

In recent years, the central government of China has emphasized that it would govern the country by adopting the principle of "rule by law (He, 2014)." The primary purpose of this mindset is to improve the harmony and stability of the Chinese society. However, illegal acts that are accompanied by serious criticisms from various circles of the Chinese society often occur during UHD projects. Meanwhile, the property rights and other human rights of relocated households have been severely infringed upon (Yang and Zhang, 2012). Some

people have even lost their lives during UHD projects. As one of the most advanced cities in China, Shanghai has paid sufficient attention to reducing illegal behaviors related to UHD projects. According to *DRECHSOLS*, violent incidents or illegal demolition must be strictly avoided during UHD because these incidents can damage the basic human rights of involved stakeholders and result in serious dissatisfaction among the public. Given that the central government has planned to develop Shanghai as an international city and economic center (Tang, 2007), the senior officials in the central government have emphasized maintaining the reputation and city image of Shanghai. Therefore, critical comments from public media on violent incidents or illegal demolition can adversely affect the annual performance assessment of local officials. These negative comments can even result in the demotion of local government leaders (a government official in the pilot study). In addition, a package of laws and policies has been developed to control the adverse impacts of UHD on the city image of Shanghai (e.g., *the Master Plan of the City of Shanghai*). Illegal operations (e.g., illegal demolition waste dumping) that may damage the city's image are strictly prohibited by the law because Shanghai is an important gateway city that symbolizes the prosperity of China (a project manager in the pilot study). In summary, adherence to the law has become an important dimension by which for measuring the social sustainability of UHD projects in Shanghai.

4.4.3 Health and Safety

In previous studies, health and safety were frequently considered as important dimensions for measuring social sustainability (e.g., Dong and Ng, 2015) because even small threats on

health and safety can result in serious social disputes and unrest. For example, in the case of the Hung Hom Estate in Hong Kong, negative impacts on the health of surrounding residents were highlighted by a non-government organization, the Friends of the Earth, as an important reason for terminating the demolition projects (Chu, 2008). Existing research has shown that the demolition of buildings is an important source of various toxic wastes that are significantly correlated with the incidence of serious diseases such as cancer (Lange et al., 1998; Farfel et al., 2005; Johncy et al., 2011). Therefore, waste materials generated during UHD such as debris and dust must be well controlled at a safe level for public health. The building demolition regulations of Shanghai (i.e., *DGJ08-70-2013*) stipulate that sustainable technologies should be adopted to reduce the adverse impacts of UHD on the surrounding environment and safeguard the health of the public. Meanwhile, safety hazards should be effectively dealt with during UHD projects to reduce casualties caused by accidents. In a study conducted by Dong and Ng (2015), safety was identified as the most important indicator to measure the social sustainability of construction projects. Therefore, demolition workers should receive sufficient safety trainings (Cha and Choi, 2007). A safety management system should be developed prior to the demolition work. In Shanghai, regulations such as *DGJ08-70-2013* have identified the safety responsibilities of key stakeholders and clearly demonstrated the safety requirements for site operations (e.g., the "red line" for site layout). Before carrying out any UHD activities, the building demolition regulation (*DGJ08-70-2013*) requires that every demolition project should pass a safety evaluation. In addition, safety risks must be identified and assessed in the master plan to

eliminate potential accidents (a project manager in the pilot study). In summary, practitioners in Shanghai have paid sufficient attentions to the health and safety issues related to UHD.

4.5 Implications of Indicator Classification

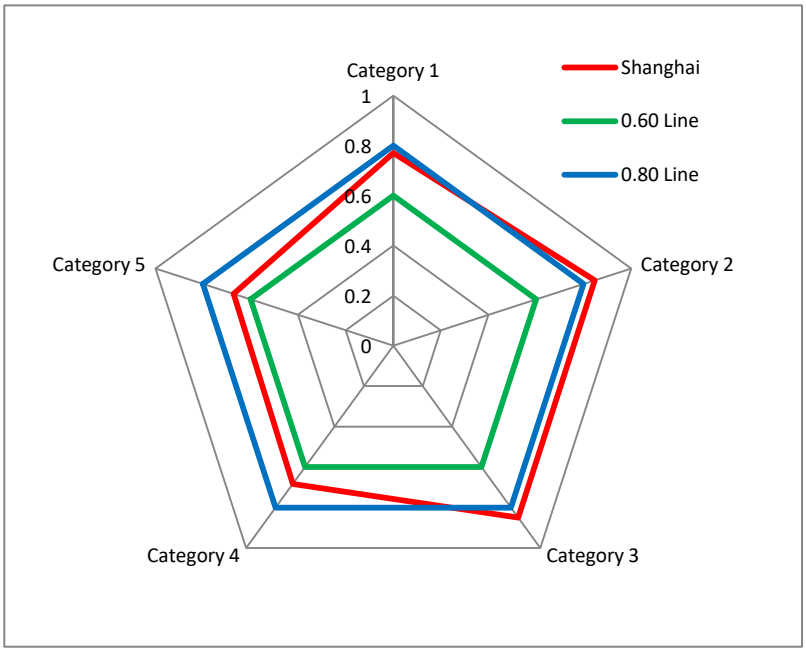

Figure 4.2 Social sustainability score of each category in Shanghai

All of the indicators were classified into five categories based on the findings of the second-wave questionnaire (see *Section 4.3.3*). The social sustainability of Shanghai was evaluated. Figure 4.2 reveals that the values of categories 2 and 3 exceeded 0.8, and the value of category 1 was very close to 0.8. These values indicate that these three aspects attained an excellent level in Shanghai. Meanwhile, the values of categories 4 and 5 failed to reach 0.8 but exceeded 0.6, which implied that these two aspects exceeded the ordinary level but still require further improvements.

4.5.1 Category 1: Job Opportunities and Working Conditions

The indicators in category 1 largely reflected job opportunities and working conditions in UHD projects. Consistent with Chan and Lee (2008) who used the availability of job opportunities as a social sustainability indicator, this study also reveals that job opportunity is a key dimension to measure the social sustainability of UHD. Omann and Spangenberg (2002) highlighted that social problems such as poverty, social exclusion, welfare dependence and psychological issues can be mitigated by increasing the employment rate. Consequently, UHD should not significantly influence the employment of relocated residents. Equitable job opportunities should be provided for demolition crews with different backgrounds. In some real cases, relocated households were relocated to suburban places quite far away from family members' workplaces, forcing these individuals to leave their jobs. In Shanghai, due to the high level of monetary compensation, relocated households are normally provided flexible approaches to select a new home through the housing market. Therefore, the impacts on employment are better controlled in Shanghai than in other large cities in China. UHD regulations in Shanghai (i.e., *DRECHSOLS*) stipulate that unemployment issues caused by UHD must be taken into consideration during the decision-making period. Economic losses associated with UHD-induced unemployment must be compensated for at the relocation stage. In addition, due to the mature labor-law system, the basic rights of employees such as healthy/safe working conditions and a fair salary can be safeguarded in UHD projects in Shanghai. Therefore, the overall performance of Category 1 attained a favorable level in previous UHD activities in Shanghai.

4.5.2 Category 2: Preservation of Community and City

Category 2 mainly illustrated the conservation of community functions and city characteristics during the UHD process. Some scholars have argued that community is a critical dimension to measure the social sustainability of urban development (Bramley et al., 2009; Dempsey et al., 2011). Consequently, during the urban redevelopment process, UHD must not result in any significantly negative impacts on the basic functions of surrounding communities. Given that safety, health and security are basic demands of human beings (Littig and Grie ler, 2005), these indicators are the most essential indicators for measuring the sustainability of a community (Dempsey et al., 2011). According to the survey of this study, these basic functions of communities were well preserved during UHD projects in Shanghai. The central and local governments have paid sufficient attention to the public order and social security of Shanghai because Shanghai is one of the most advanced cities in China. “Compared with other first-tier cities in China, Shanghai has the lowest crime rate (a government official in PL).” Meanwhile, the city characteristics of Shanghai were also conserved properly during UHD projects. According to Fung (2004) and Chan and Lee (2008), heritage and city image should be preserved for future generations because these aspects are a testament to historical changes in time and reflect the historical activities of former generations. During the redevelopment processes in previous decades, the local government considered the preservation of the heritage and city image of Shanghai. For example, the traditional “Shikumen” architectural form was conserved in the Taipingqiao urban redevelopment projects. In addition, public scrutiny also had a significant impact on

the protection of cultural heritages and the city's image. (e.g., the preservation of Xintianidi Shanghai)

4.5.3 Category 3: Operational Efficiency of Laws and Policies

Category 3 generally reflected the operational efficiency of the laws and relocation policies of UHD in Shanghai. After 2007, UHD projects in Shanghai have been carried out based on the rules of *Property Law* (new version from 2007) that emphasize the protection of citizens' lawful properties (Tang, 2007). Compared with the situation prior to 1991, urban-renewal projects in Shanghai are mainly driven by the property market instead of the local government because of economic reforms. Therefore, illegal demolition in the name of government authorization has been significantly mitigated. Nowadays, the power of housing authorities and property developers are strictly constrained by laws and policies because pressure from previous UHD disputes has changed the attitudes of courts and governments toward rapid urbanization (Shih, 2010). As a result, the prevalence of illegal acts has been sharply reduced in recent years in Shanghai. More importantly, due to the reform on compensation policy, relocated residents have flexible options for relocation. Residents can choose among monetary compensation, in-kind compensation or combined compensation (monetary compensation plus a discount price for affordable housing) (Tang, 2007). Relocated residents can buy new homes from the housing market or be resettled via a relocation policy. With the basic interests of relocated households safeguarded, people seem more satisfied with the existing UHD laws and policies.

4.5.4 Category 4: Daily Lives of Nearby Residents

The indicators in category 4 were strongly related to the daily lives of nearby residents in demolished areas. Open spaces can provide buffer zones for entertainment activities and social gatherings (Chiu, 2003), which can help to foster and strengthen social relationships among community members. Public facilities such as schools and hospitals can satisfy the basic demands of nearby residents and facilitate their daily lives (Chan and Lee, 2008). Transportation systems can influence the commute times and transportation costs of nearby people. In Shanghai, the score of category 4 was relatively low compared with the aforementioned categories. In the pilot study, some interviewees argued that public spaces and facilities were frequently occupied or adversely affected during UHD projects due to the limited urban space of Shanghai. In the focus group meetings, a resident living near Zhangwu Road proposed an example to support this viewpoint. This resident complained that the sport facilities in his community were occupied during a UHD project. However, the existing laws and policies in Shanghai generally ignored these issues. Another resident in the focus group meetings stated that a road near his community had been blocked for approximately 20 days due to a UHD project. When this resident reported the issue to the police, he was told that this UHD project was lawful. Although the interests of these two residents were damaged in UHD projects, the existing laws and policies in Shanghai did not effectively protect their interests. Therefore, existing laws and policies must be modified to enhance the performance of the indicators in category 4. For example, if demolition companies that take effective measures to reduce the impact on the daily life of nearby

residents can be provided with economic incentives, then they will pay more attention to this work. It is hoped that the local government of Shanghai will regard category 4 as an opportunity to improve the social sustainability of UHD in the region. Although the indicators in this category were not identified as critical indicators in this study, these indicators reflected the poorest part of the social sustainability of UHD in Shanghai. Consequently, indicators in category 4 must be sufficiently investigated.

4.5.5 Category 5: Autonomous Factors

The indicators in category 5 have weak relations with the other ones in the assessment system because the cluster analysis could not classify these indicators into any other categories. In addition, each indicator in category 5 had limited linkage with other elements in this category. However, this situation does not mean that these indicators cannot affect the social sustainability of UHD projects. For example, the preservation of social networks was identified as a critical factor for social sustainability in many previous studies (e.g., Wu and He, 2005; Keene and Geronimus, 2011) because social networks can enhance the sense of belonging and provide numerous social resources for community residents. In Shanghai, such factors seem to be ignored during the UHD process. Improving autonomous indicators typically requires targeted efforts and the input of resources because of their weak linkages with the entire system. Consequently, during the early phase of urban renewal, if sufficient resources are not available to improve every sustainable indicator, then indicators in category 5 cannot be effectively enhanced in the short term.

4.6 Summary of the Chapter

An assessment system that includes 22 indicators is established based on a hybrid method to evaluate the social sustainability of UHD projects in Shanghai. The implications of these indicators are discussed in Table 4.1, *Section 4.4 and Section 4.5*. With the ranking of these indicators, three critical aspects are identified for measuring the social sustainability of UHD, namely, social equality and fair treatment, adherence to the law, and health and safety. In *Section 4.3.3*, the 22 social sustainability indicators are divided into five categories via hierarchical cluster analysis: job opportunities and working conditions, preservation of community and city, operational efficiency of laws and policies, daily lives of nearby residents, and autonomous factors. The social sustainability score of Shanghai is calculated in *Section 4.3.5*. The implications of the aforementioned analyses are discussed in *Section 4.4*.

CHAPTER 5 A MODEL FOR ANALYZING AND MANAGING STAKEHOLDER CONFLICTS IN UHD PROJECTS[5]

5.1 Introduction

The conflicts of interests among different stakeholders in UHD increasingly challenge the stability of the Chinese society (He, 2014). Mitigating stakeholder conflicts is of utmost importance to improve the social sustainability of UHD. From the literature review for this study it is apparent that there is a need for stakeholder conflicts to be quantitatively analyzed using empirical data from real UHD projects and for the key concerns of each stakeholder group to be carefully examined. In *Section 3.4.2*, a research scheme was designed in response to this argument. In this chapter, a model is established analyzing and managing the stakeholder conflicts in UHD projects. This model contains three parts, i.e., stakeholder analysis, conflict analysis and decision-making optimization. Through the study of a real case in Wenzhou, the practical value of the conflict analysis model is highlighted. Insights generated from the case study are discussed to offer valuable lessons for practitioners.

5.2 Model Development

5.2.1 Stakeholder Analysis Based on Stakeholder Salience Theory

5 The majority of this Chapter has been published in the following paper: An Optimization Model for Managing Stakeholder Conflicts in Urban Redevelopment Projects in China, Journal of Cleaner Production.

In UHD projects, different stakeholders typically have diverse attributes. In practice, the competing claims from these stakeholders cannot be treated equally and satisfied simultaneously. In terms of conflict management, decision-makers have to make tradeoffs between these claims and balance the interests of the key stakeholders based on their varied attributes. To determine the degrees of priority for different stakeholders, an improved stakeholder salience model was used to quantify the impact of the key stakeholders.

In the classical stakeholder salience model, Mitchell et al. (1997) proposed three key attributes to describe the profiles of stakeholders, namely, power, urgency and legitimacy. The implications of these three attributes were explained in *Section 3.3.6*. Stakeholders with different levels of attributes can play varied roles in UHD projects. The overall attribute value of a stakeholder group can be given as $AT=\mu_1 \cdot U_i+\mu_2 \cdot L_i+\mu_3 \cdot P_i$, where μ_i refers to the weight of each attribute($\mu_1+\mu_2+\mu_3=1$), and P_i,U_i and L_i reflect the power, urgency and legitimacy of stakeholder i (Olander, 2007; Li et al., 2015).

In addition to the three traditional attributes, scholars suggested considering the vested interest impact index when determining the degrees of priority of different stakeholders (Olander, 2007; Li et al., 2015; Bourne and Walker, 2005). This index can be measured on a 5-point Likert scale (1 = ‘very low’ and 5 = ‘very high’, Bourne and Walker, 2005). It equals to $VI=\sqrt{\frac{pr \cdot im}{25}}$, where im denotes the level of stakeholder impact and pr denotes the probability of impact. The salience model proposed by Mitchell et al. (1997) focused on the inherent attributes of stakeholders but failed to capture the degree and probability of stakeholder impact. The vested interest impact index can effectively bridge this gap.

Integrating the traditional salience model with the vested interest impact index, the adjusted salience function can be given as follows.

$$(\textit{Formula 5.1})\quad SI_i=\frac{(\mu_1\cdot U_i+\mu_2\cdot L_i+\mu_3\cdot P_i)\cdot VI_i}{5}$$

Scholars such Li et al. (2015) named SI_i as the influencing factor of stakeholder i. This factor must be considered when analyzing stakeholder conflicts and developing conflict solutions.

5.2.2 Conflict Analysis Based on Pawlak's Model

5.2.2.1 Conflicts between Stakeholder Groups

In this section, Pawlak's conflict theory is used to identify and analyze the conflicts of interests among different stakeholders in UHD. The theoretical foundations and mathematical derivations of this conflict model can be found in Pawlak (1984), Pawlak (1998) and Gao et al. (2008). In these studies, the conflict degree was defined as the degree of conflict between different stakeholders on similar concerns. Stakeholder concerns typically reflect the key points that can affect the interests of corresponding stakeholders (e.g., the level of relocation compensation). The attitude of stakeholder i toward concern k can be denoted as $a_{ik}\in\{-1, 0, 1\}$, where -1 reflects a negative attitude, 0 indicates a neutral standpoint, and 1 denotes a positive attitude. The implications of these attitudes were presented in *Section 3.4.2.2*. According to Pawlak (1998) and Li et al. (2015), stakeholder attitude a_{ik} can be calculated using *Formula 5.2*. In practice, individuals within the same stakeholder group can hold different viewpoints pertaining to a concern. Therefore, the voice

of the majority must be captured to reflect the general attitude of this stakeholder group. According to *Formula 5.2*, if over 50% of individuals in stakeholder group i hold an attitude toward a concern, this attitude can then reflect the opinions of the majority. In this formula, a_{ik} is named the Certainty Index (Pawlak, 1998).

(*Formula 5.2*)

$$a_{ik}=\begin{cases}\text{-1, over 50\% of respondents from stakeholder group i show negative attitudes}\\ \text{0,over 50\% of respondents from stakeholder group i show neutral attitudes}\\ \text{+1, over 50\% of respondents from stakeholder group i show positive attitudes}\\ \text{Re-evaluate, none of the three attitudes receive over 50\% of respondents}\end{cases}$$

The conflict between stakeholder groups i and j ($i\neq j$) over concern k can be mapped using *Formula 5.3*. In this formula, if the two stakeholder groups share the same negative or positive attitude toward concern k, then they have a common interest in this concern. If one stakeholder group supports this concern while the other one opposes it, then these two stakeholder groups have conflicting interests in concern k. If one of the two stakeholder groups holds a neutral viewpoint regarding concern k, then they have a neutral relationship in this concern.

(*Formula 5.3*) $$sc(i,j)_k=\begin{cases}1, & \text{if } a_{ik}\cdot a_{jk}=1\text{;alliance}\\ 0, & \text{if } a_{ik}\cdot a_{jk}=0\text{; neutrality}\\ -1, & \text{if } a_{ik}\cdot a_{jk}=-1\text{;conflict}\end{cases}$$

Based on the logic of *Formula 5.3*, Pawlak (1998) proposed a formula to calculate the degree of conflict as the function in *Formula 5.4*. A high value of $sc^*(i,j)_k$ indicates a sharp conflict between stakeholder groups i and j over concern k.

(*Formula 5.4*) $$sc^{*}(i,j)_k=\frac{1-sc(i,j)_k}{2}=\frac{1-a_{ik}\cdot a_{jk}}{2}=\begin{cases}0, & \text{if } a_{ik}\cdot a_{jk}=1\\ 0.5, & \text{if } a_{ik}\cdot a_{jk}=0\\ 1, & \text{if } a_{ik}\cdot a_{jk}=-1\end{cases}$$

5.2.2.2 Conflict between an Action Scheme and Stakeholder Groups

Previous studies generally focused on analyzing the inherent conflicts among different stakeholders without giving sufficient consideration to the important role of a decision-maker. In practice, different action schemes selected by the decision-maker can cause diverse levels of stakeholder conflict. For example, if an action on concern k can satisfy the demands of the majority of the involved stakeholders, then this action will incur a low degree of stakeholder conflict. Suppose there are sn types of stakeholder groups and n stakeholder concerns in a UHD project. The actions on these concerns can incur different levels of stakeholder conflict. In response to the three types of attitudes proposed by Pawlak (1998), the assumption is made that the decision-maker of the UHD project can take three types of actions to influence each stakeholder concern, namely, positive, negative and neutral actions. Positive action indicates that this action will support stakeholder group(s) with positive attitudes toward concern k, i.e. increase the level of concern k; neutral action indicates that this action will not significantly affect the level of concern k; and negative action indicates that this action will support stakeholder group(s) with negative attitudes toward concern k, i.e. reduce the level of concern k. When an action scheme $\vec{D}=(\ ,d_2,\cdots,d_k,\cdots,d_n)$ is enforced, the conflict between this action scheme and stakeholder i over concern k can be quantified using *Formula 5.5* (the derivation of *Formula 5.5* is based on *Formula 5.4*). In *Formula 5.5*, if the actions support the attitude of stakeholder group i, then the degree of conflict associated with i will

be 0. If the actions neither support nor oppose the attitude of stakeholder group i, then the degree of conflict will be 0.5. If the actions oppose the attitude of stakeholder group i, then the degree of conflict will be 1.

$$(\textit{Formula 5.5})\quad sc^{d}(i)_k=\frac{1-a_{ik}\cdot d_k}{2}=\begin{cases}0, & \text{if} \quad a_{ik}\cdot d_k=1\\ 0.5, & \text{if} \quad a_{ik}\cdot d_k=0\\ 1, & \text{if} \quad a_{ik}\cdot d_k=-1\end{cases}$$

As mentioned in *Section 5.2.1*, the influencing factors (stakeholder attributes) of stakeholder groups can modify the impact of stakeholder conflicts in UHD projects. A stakeholder group with a high influencing factor can amplify the impact of the conflicts associated with this group. Accordingly, *Formula 5.5* is integrated with these influencing factors (see *Formula 5.6*).

$$(\textit{Formula 5.6})\quad sc^{d*}(i)_k=SI_i\cdot sc^{d}(i)_k=SI_i\cdot\frac{1-a_{ik}\cdot d_k}{2}=\begin{cases}0, & \text{if} \quad a_{ik}\cdot d_k=1\\ 0.5SI_i, & \text{if} \quad a_{ik}\cdot d_k=0\\ SI_i, & \text{if} \quad a_{ik}\cdot d_k=-1\end{cases}$$

A stakeholder concern can exert diverse levels of impact on different stakeholder groups as well. For example, in a UHD project, the level of relocation compensation can significantly affect the key interests of the relocated residents. However, this concern does not have a major impact on the general public. If the government significantly lowers the compensation standard, the conflict between the relocated residents and the government can be very sharp. Meanwhile, the conflict between the general public and the government may be acceptable. Considering the impacts of a concern on the benefits of different stakeholder groups, *Formula 5.6* is modified to calculate the degree of conflict (see *Formula 5.7*). b_{ik} denotes the benefit impact of concern k on stakeholder i. b_{ik} depends on the preference of different

stakeholders (Mostafa and El-Gohary, 2014). A high b_{ik} value indicates that concern k can significantly affect the benefits of stakeholder group i. This parameter can be assessed on a 5-point Likert scale based on the self-evaluations of corresponding stakeholders (Mostafa and El-Gohary, 2014).

(*Formula 5.7*) $$sc^{d**}(i)_k = SI_i \cdot b_{ik} \cdot \frac{1-a_{ik} \cdot d_k}{2} = \begin{cases} 0, & \text{if } a_{ik} \cdot d_k = 1 \\ 0.5SI_i \cdot b_{ik}, & \text{if } a_{ik} \cdot d_k = 0 \\ SI_i \cdot b_{ik}, & \text{if } a_{ik} \cdot d_k = -1 \end{cases}$$

The total degree of stakeholder conflict incurred by decision scheme $\vec{D}$ can be calibrated using *Formula 5.8*.

(*Formula 5.8*) $$SC_T(\vec{D}) = \sum_{i=1}^{sn} \sum_{k=1}^{n} sc^{d**}(i)_k = \sum_{i=1}^{sn} \sum_{k=1}^{n} (SI_i \cdot b_{ik} \cdot \frac{1-a_{ik} \cdot d_k}{2})$$

5.2.3 Optimization for Conflict Mitigation

Based on the definitions of the three types of stakeholder attitudes (see Pawlak, 1998), the variations in stakeholder benefits when an action scheme is enforced can be calculated. A few rules must be followed according to the propositions given by Pawlak (1998). 1) If stakeholder group i holds a neutral attitude toward concern k, then any actions on this concern do not significantly affect the interests of this stakeholder group. 2) If stakeholder group i holds a positive or negative attitude toward concern k, then a variation in concern k can affect the benefit of stakeholder group i. In such cases, if the attitude of this stakeholder group can be supported by the actions taken by the decision-maker, i.e., $a_{ik} \cdot d_k = 1$, then they can benefit from this decision. If the actions taken by the decision-maker are against their attitude, i.e., $a_{ik} \cdot d_k = -1$, then the benefit of this stakeholder group will be adversely affected.

If the decision-maker does not make any actions to change concern k, then the stakeholder benefit is not affected.

In response to these rules, *Formula 5.9* is proposed to calculate the variations in the benefit of each stakeholder group. B_{ik} denotes the variation in the benefit of stakeholder i, when action d_k (on concern k) is enforced. As mentioned in *Section 5.2.2.2*, b_{ik} denotes the benefit impact of concern k on stakeholder group i. A high b_{ik} value indicates that action d_k can significantly affect the benefit of stakeholder group i. B_{ik} is the net effect of action d_k, which reflects the gap between the added revenue and costs incurred by the variation in concern i.

(*Formula 5.9*) $B_{ik}=d_k \cdot a_{ik} \cdot b_{ik}$

Accordingly, the overall variation in the benefits of stakeholder group i can be calculated using the following formula.

(*Formula 5.10*) $TB_i=\sum_{k=1}^{n} d_k \cdot a_{ik} \cdot b_{ik}$

In practice, the decision-maker typically cannot treat the benefits of different stakeholders in an absolutely equal manner. For example, the existing laws stipulate that UHD must conform to public interests. Therefore, the decision maker must prioritize the general public, and differently weigh the interests of different stakeholders. The net value produced by the action scheme is given by $\sum_{i=1}^{sn} \partial_i TB_i$, where $\sum_{i=1}^{sn} \partial_i=1$and ∂_i reflects the relative importance of stakeholder i for the decision-maker. ∂_i is used to balance the interests of different stakeholder groups. For example, as UHD must conform to public interests, the ∂_i value of

the general public must be higher compared with other stakeholder groups in UHD projects. $\sum_{i=1}^{sn} \partial_i = 1$ implies that ∂_i reflects the relative magnitude of importance. For example, if the general public has a relatively high ∂_i value in the decision-making process, then the other stakeholder groups should have relatively low ∂_i values. The value of ∂_i should be determined based on the main purpose of the project and the preference of the decision-maker. In traditional projects, for instance, the decision-makers aim to maximize the benefit of the developer. Accordingly, the ∂_i value of the developer should be extremely high. However, in UHD projects, the ∂_i value of the general public should be the highest because such projects must conform to the general interests. In summary, the value produced by the action scheme can be given by the following formula.

(*Formula 5.11*) $TB^{*}(\vec{D}) = \sum_{i=1}^{sn} [\partial_i \cdot \sum_{k=1}^{n} (d_k \cdot a_{ik} \cdot b_{ik})]$

Formula 5.11 calculates the stakeholder benefits generated from the action scheme. However, the losses caused by stakeholder conflicts are overlooked. *Formula 5.11* is adjusted to integrate the stakeholder benefits with the costs incurred by stakeholder conflicts. The objective function of the decision-maker is given by *Formula 5.12.*

(Formula 5.12) $\text{Max } TB^{**}(\vec{D}) = TB^{*}(\vec{D}) - \gamma \cdot SC_T(\vec{D})$

$$= \sum_{i=1}^{sn} [\partial_i \cdot \sum_{k=1}^{n} (d_k \cdot a_{ik} \cdot b_{ik})] - \gamma \cdot [\sum_{i=1}^{sn} \sum_{k=1}^{n} sc^{d**}(i)_k]$$

$$= \sum_{i=1}^{sn} [\partial_i \cdot \sum_{k=1}^{n} (d_k \cdot a_{ik} \cdot b_{ik})] - \gamma \cdot [\sum_{i=1}^{sn} \sum_{k=1}^{n} (SI_i \cdot b_{ik} \cdot \frac{1 - a_{ik} \cdot d_k}{2})]$$

$$\text{s.t.:}\ \begin{cases} \sum_{i=1}^{sn}\sum_{k=1}^{n}\left(SI_i \cdot b_{ik} \cdot \frac{1-a_{ik}\cdot d_k}{2}\right) = SC_T\left(\vec{D}\right) \le SC_{max} \\ d_k \in \{-1,0,1\},\ k=1,2,\cdots,n \end{cases}$$

As discussed, $SC_T\left(\vec{D}\right)$ in *Formula 5.8* reflects the total degree of stakeholder conflict incurred by action scheme $\vec{D}$. In *Formula 5.12,* γ denotes the sensitivity of the project to stakeholder conflicts. If γ is given to a high value, then the project is highly sensitive to stakeholder conflicts. $\gamma \cdot SC_T\left(\vec{D}\right)$ indicates the total losses caused by stakeholder conflicts. SC_{max} represents the maximum degree of conflict that can be accepted by the decision-maker. In many cases, stakeholder conflicts such as mass incidents cannot be accepted by the decision-maker because Chinese governments regard social stability as an overwhelming objective. In extreme conditions, the adverse impacts on social stability can be completely accepted by the decision-maker. In such cases, the decision-maker can set $SC_{max} = \sum_{i=1}^{sn}\sum_{k=1}^{n} SI_i \cdot b_{ik}$ ($\sum_{i=1}^{sn}\sum_{k=1}^{n} SI_i \cdot b_{ik}$ is the maximum value that $SC_T\left(\vec{D}\right)$ can reach).

The optimization model in *Formula 5.12* can be solved using the packages in computer software such as Lingo, Lindo, Gurobi, and Cplex. To display the practical implications of this conflict analysis model, the author conducted a case study on the Sanlangqiao project in Wenzhou. In this project, Gurobi (on the Python platform) was utilized to determine the optimal solutions for decision-makers (the computer programs can be found in *Appendix M*). One can select other computer software to solve the optimization model as well.

5.3 Case Study

5.3.1 Background Information

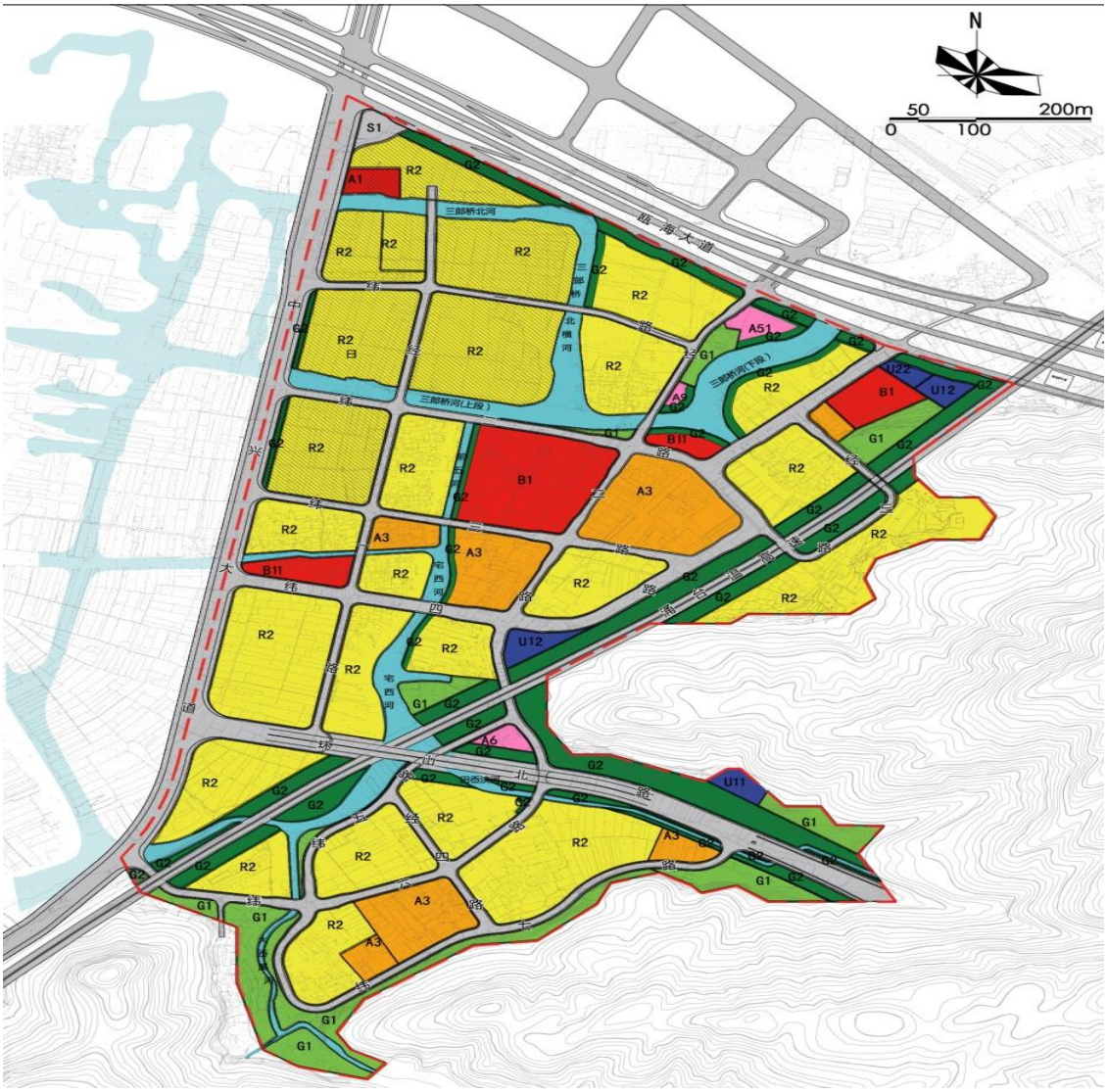

Figure 5.1 Planning area of the Sanlangqiao project (enclosed by red dashed lines)

Sanlangqiao is the largest urban redevelopment project in Wenzhou with the aim of protecting the nearby wetlands and modernizing the ecological functions of the Wenzhou Ecological Park. It covers 1.78 million square meters of planning area and involves a relocation of approximately 1002 households. The permanent resident population of the

Sanlangqiao area reaches 7,896. The majority of the residents are villagers who mostly earn their living from traditional farming or hardware processing. This redevelopment project will significantly affect the daily lives of these local residents. The Sanlangqiao project is located at Zhuangyuan Street near the borders of the Longwan District, the Wenzhou Ecological Park (WEP), and the Ouhai District. Through a profound redevelopment, the Sanlangqiao area will become a new component of the WEP with high-quality residential buildings and public facilities such as hospitals and schools.

Table 5.1 Future land use of the Sanlangqiao project

Land codes	Types of land use in the future	Land codes	Types of land use in the future
A1	Administrative land	G1	Park green space
A3	Education facilities	G2	Green buffer
A6	Social welfare facilities	R2	The two category of residential land
A9	Religious facilities	R3	The three category of residential land
A51	Hospital	U11	Water supply (municipal utilities)
B1	Commercial land	U12	Power supply (municipal utilities)
B11	Retailing	U22	Sanitation facilities (municipal utilities)

The Sanlangqiao project was initiated by the local governments and the WEP at the start of 2016. The total budget of this project was 11.7 billion Yuan, and its expected delivery time is 2022. Figure 5.1 shows the planning area of Sanlangqiao. The types of land use marked in the said figure are further explained in Table 5.1. This project comprises three stages, i.e., planning stage, housing demolition and relocation stage, and reconstruction stage. The housing demolition and relocation stage of this project has been completed. The reconstruction stage started in February 2017. In this case study, the focus was on

stakeholder conflicts at the housing demolition and relocation stage. At the planning stage, the primary stakeholder groups include the local governments and the WEP. To develop the tourist industry and protect the local environment, the Wenzhou City government staunchly supported the development of the ecological park. Given the positive relationship between the local governments and the WEP, a minimal degree of conflict was present at the planning stage. Therefore, this stage was not selected for conflict analysis. As the reconstruction stage had not yet been completed, data pertaining to this stage could not be comprehensively collected. Accordingly, this stage could not be fully analyzed.

Six types of stakeholders are present at the housing demolition and relocation stage. The local governments and the WEP established an administration committee to organize, manage and supervise the major demolition and relocation activities at this stage. Four demolition and consultant companies were employed to measure the demolition area, evaluate the unit price of the demolished properties, relocate the original residents, and clean up the demolition wastes. Relocated residents must leave their original homes and move to other areas. However, they can receive relocation compensation from the governments. In addition, residents who live near the Sanlangqiao project can be affected as well. For example, nearby transportation may be adversely affected due to housing demolition activities. After the relocation and demolition work was completed, lands for urban redevelopment were endorsed to the main developer of this project, i.e., the WEP. The WEP will update the housing and public facilities in this area. As the UHD must conform to public interest, the general public is another important stakeholder group. Table 3.3 lists the results

of the investigation regarding the opinions of these six stakeholder groups.

5.3.2 Attributes of the Key Stakeholder Groups

Table 5.2 Attributes of the six stakeholder groups

Stakeholder groups	Basic attributes			Stakeholder impact		Influencing factor of stakeholder (SI_i)
	Power (P)	Urgency (U)	Legitimacy (L)	Probability of impact (pr)	Impact level (im)	
Relocated residents (S1)	2	5	3	4	3	0.46
Government (S2)	5	5	5	5	5	1
Developer (S3)	4	4	2	3	3	0.4
Demolition crews (S4)	3	3	2	2	3	0.26
Nearby residents (S5)	1	3	2	2	2	0.16
The general public (S6)	3	1	5	1	4	0.24

The attributes of the key stakeholder groups in the Sanlangqiao project are demonstrated in Table 5.2. In this project, the weight of each basic attribute was set to $\frac{1}{3}$, i.e., $\mu_1=\mu_2=\mu_3=\frac{1}{3}$, suggesting that the three attributes were equally important. The table clearly indicates that the local governments have the highest influencing factor compared with the other stakeholders, implying that government officials played the most crucial role in mitigating stakeholder conflicts in this project. In addition, the relocated residents and the developer also have relatively high influencing factors because the key interests of these two stakeholder groups were directly and significantly affected by the UHD.

5.3.3 Stakeholder Concerns and Attitudes

Table 5.3 Key concerns and attitudes of the six stakeholder groups

NO.	Stakeholder concern	Stakeholder attitudes					
		S1	S2	S3	S4	S5	S6
1	Level of relocation compensation	1	0	-1	0	0	0
2	Ratio of in-kind compensation	1	0	-1	0	0	0
3	Time for relocation and demolition	1	-1	-1	-1	-1	-1
4	Availability of public facilities in the Sanlangqiao areas	1	1	1	0	1	1
5	Quality of the resettlement houses	1	1	0	0	0	0
6	Distance between the resettlement community and the Sanlangqiao areas	-1	0	1	0	0	0
7	Effort levels (by the developer, the local governments and the demolition crews) to control the adverse impacts on the local transportation system during the UHD project	1	1	0	-1	1	1
8	Effort levels (by the developer, the local governments and the demolition crews) to protect cultural or historical heritages during the UHD project	0	1	1	-1	1	1
9	Effort levels (by the developer, the local governments and the demolition crews) to manage the safety issues during the UHD project	1	1	0	1	1	1
10	Forced demolition and violent incidents	-1	-1	-1	-1	-1	-1
11	Availability of local job opportunities after the redevelopment	1	1	1	0	1	1
12	Effort levels (by the developer, the government and the demolition crews) to protect the community environment during the UHD project	1	1	0	-1	1	0
13	Availability of economic benefits after the redevelopment	1	1	1	0	1	1
14	Availability of better living conditions after the redevelopment	1	1	1	0	1	1
15	Avoidance of legal disputes	1	1	1	1	1	1
16	Disclosure of the key information related to the UHD scheme and the decision-making	1	1	-1	0	1	1
17	Effort levels (by the developer, the local governments and the demolition crews) to protect the unique local characteristics of Sanlangqiao	0	1	0	-1	1	1
18	Control on project cost	-1	0	1	-1	0	0
19	Degree of public participation	1	-1	-1	0	1	1
20	Occupation of public space during the UHD project	-1	-1	0	0	-1	-1
21	Timely clearance of demolition wastes	1	1	0	1	1	1
22	Level of remuneration for employees in the demolition project	0	0	-1	1	0	0

The key concerns and attitudes of the six stakeholder groups are summarized In Table 5.3 according to the empirical investigation into the Sanlangqiao project. A total of 22 critical stakeholder concerns were identified. The majority of them could significantly affect the key interests of the involved stakeholders.

In addition, the benefit impacts of each concern on different stakeholder groups are listed in Table 5.4. These parameters were assessed based on the preference of each stakeholder group in the Sanlangqiao project.

Table 5.4 Degree of impact of each stakeholder concern

NO.	Stakeholder concern	Degree of impact on Si					
		S1	S2	S3	S4	S5	S6
1	Level of relocation compensation	5	2	3	1	1	1
2	Ratio of in-kind compensation	4	2	3	1	1	1
3	Time for relocation and demolition	3	5	5	4	2	2
4	Availability of public facilities in the Sanlangqiao areas	3	3	3	1	5	2
5	Quality of the resettlement houses	5	2	1	1	1	1
6	Distance between the resettlement community and the Sanlangqiao areas	5	2	3	1	1	1
7	Effort levels (by the developer, the local governments and the demolition crews) to control the adverse impacts on the local transportation system during the UHD project	2	2	1	3	4	2
8	Effort levels (by the developer, the local governments and the demolition crews) to protect cultural or historical heritages during the UHD project	1	3	3	3	4	2
9	Effort levels (by the developer, the local governments and the demolition crews) to manage the safety issues during the UHD project	3	5	1	5	3	2
10	Forced demolition and violent incidents	5	5	2	4	2	2
11	Availability of local job opportunities after the redevelopment	4	4	2	1	4	3
12	Effort levels (by the developer, the government and the demolition crews) to protect the community environment during the UHD project	3	2	1	3	4	2
13	Availability of economic benefits after the redevelopment	5	5	5	1	5	5

Table 5.4 (Continued)

NO.	Stakeholder concern	Degree of impact on Si					
		S1	S2	S3	S4	S5	S6
14	Availability of better living conditions after the redevelopment	4	3	3	1	4	3
15	Avoidance of legal disputes	3	5	4	4	2	2
16	Disclosure of the key information related to the UHD scheme and the decision-making	2	2	4	1	2	2
17	Effort levels (by the developer, the local governments and the demolition crews) to protect the unique local characteristics of Sanlangqiao	1	3	1	3	4	2
18	Control on project cost	3	2	5	4	1	1
19	Degree of public participation	3	4	4	1	2	2
20	Occupation of public space during the UHD project	2	2	1	1	4	2
21	Timely clearance of demolition wastes	2	2	1	3	4	2
22	Level of remuneration for employees in the demolition project	1	1	3	5	1	1

5.3.4 Development of Action Scheme, Sensitivity Analysis and Scenario Comparison

To develop an action scheme, the decision-maker should determine the diverse weights given to different stakeholder groups, i.e., set the ∂_i values for each stakeholder group. In this case study, the decision-makers made their decisions based on three basic principles. The first one stipulated that public interests should be given the highest level of priority. The second principle ensured the protection of the interests of the affected stakeholder groups (relocated residents). The last one specified that the local governments and the developer should not seek their own economic benefits at the cost of the interests of the other stakeholder groups.

Accordingly, the following values of the weight ∂_i are identified: relocated residents (0.15), local governments (0.075), developer (0.075), demolition crews (0.1), nearby residents (0.1),

and the general public (0.5).

5.3.4.1 Optimal Action Scheme and Sensitivity Analysis

The maximum potential degree of stakeholder conflict was lower than 154.94 ($\sum_{i=1}^{sn}\sum_{k=1}^{n} SI_i \cdot b_{ik}$) in this case. The decision-maker set the SC_{max} to 40, which corresponded to the acceptable degree of stakeholder conflict. In addition, the sensitivity of the project to stakeholder conflicts (γ) was set to 1, implying that mitigating stakeholder conflicts was as important as producing project value. The optimal solution was achieved using the Gurobi software. The action scheme is presented in the fourth column of Table 5.5.

Table 5.5 Sensitivity analysis on SC_{max} **(γ=1)**

Stakeholder concern	The optimal action scheme				
	SC_{max}=30	SC_{max}=35	SC_{max}=40	SC_{max}=45	SC_{max}=50
1	1	1	1	1	1
2	1	1	1	1	1
3	-1	-1	-1	-1	-1
4	1	1	1	1	1
5	1	1	1	1	1
6	-1	-1	-1	-1	-1
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
10	-1	-1	-1	-1	-1
11	1	1	1	1	1
12	1	1	1	1	1
13	1	1	1	1	1
14	1	1	1	1	1
15	1	1	1	1	1
16	1	1	1	1	1
17	1	1	1	1	1
18	-1	-1	-1	-1	-1
19	-1	-1	-1	-1	-1
20	-1	-1	-1	-1	-1
21	1	1	1	1	1
22	1	1	1	1	1

The majority of the parameters in *Formula 5.12* could be easily evaluated based on the psychological preference of different stakeholder groups (e.g., stakeholder attitudes) as well as the decision-making principles of the project (e.g., the ∂_i values). However, SC_{max} (the acceptable degree of stakeholder conflict) and γ (the sensitivity of the project to stakeholder conflicts) were difficult to evaluate given the lack of a database regarding stakeholder conflicts. For example, the decision-makers may attempt to avoid mass incidents but they typically do not know the clear threshold of SC_{max} that represents the occurrence of such incidents. To test the robustness of the action scheme, a sensitivity analysis was conducted on SC_{max} and γ. Tables 5.5 and 5.6 show that the optimal action in the Sanlangqiao project was robust. Only one action (the action on Concern 19) was significantly affected by SC_{max} and γ. This outcome demonstrated that the key interests of the six stakeholder groups were well balanced such that the maximization of stakeholder benefits was highly consistent with the mitigation of stakeholder conflicts. Therefore, the three principles for decision-making were considered effective.

Table 5.6 Sensitivity analysis on γ **(SC_{max}=40)**

Stakeholder concern	The optimal action scheme				
	γ=0.6	γ=0.8	γ=1	γ=1.2	γ=1.4
1	1	1	1	1	1
2	1	1	1	1	1
3	-1	-1	-1	-1	-1
4	1	1	1	1	1
5	1	1	1	1	1
6	-1	-1	-1	-1	-1
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
10	-1	-1	-1	-1	-1
11	1	1	1	1	1
12	1	1	1	1	1
13	1	1	1	1	1
14	1	1	1	1	1
15	1	1	1	1	1
16	1	1	1	1	1
17	1	1	1	1	1
18	-1	-1	-1	-1	-1
19	1	-1	-1	-1	-1
20	-1	-1	-1	-1	-1
21	1	1	1	1	1
22	1	1	1	1	1

5.3.4.2 Scenario Comparison

To examine the effectiveness of the action scheme developed in *Section 5.3.4.2*, performance of the scheme was compared against those of other common schemes. Four scenarios were developed based on the previous UHD practices of China. The first one was designed to maximize the benefits to developers. Accordingly, the action scheme was in line with the attitudes of the developer. Before 2011, laws and regulations stipulated that developers could directly initiate a UHD project after obtaining a demolition permit from local governments. Scholars such as Shih (2010) and Tang (2007) revealed that, at that time, property developers

only attempted to maximize their own business benefits and had very limited consideration for the other stakeholders. Therefore, Scenario 1 reflected the UHD practices before 2011 when laws and policies tended to support the benefits to developers. Scenario 2 aimed to maximize the benefits to relocated residents. Therefore, the action scheme in Scenario 2 was consistent with the attitudes of the relocated residents in the Sanlangqiao project. As He (2014) mentioned, laws and policies started to favor relocated residents because of the intense stakeholder conflicts and social unfairness in previous UHD practices. Through collective resistance, relocated residents can gain more compensation from the UHD (He, 2014). Scenario 2 reflected the opinions highlighting the property rights of and benefits to relocated residents. As for Scenario 3, it expressed the mainstream view in the current UHD practices that focuses on public interests. The *RECHSOL* stipulated that the UHD must conform to the interests of the general public. Therefore, Scenario 3 was a common case in practice.

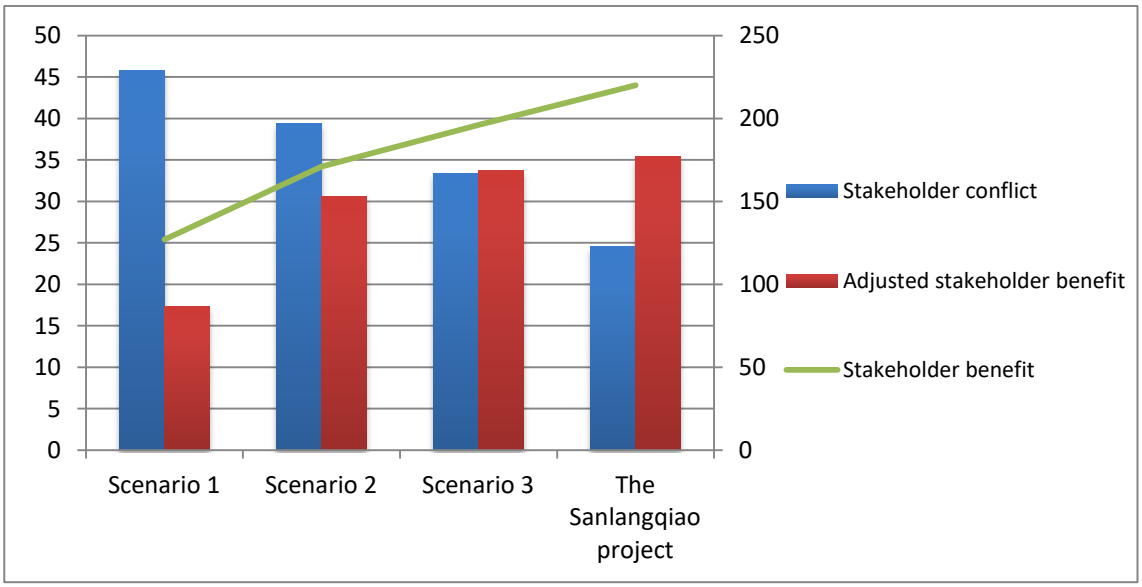

Figure 5.2 Scenario comparision

In Figure 5.2, the action scheme in the Sanlangqiao project is compared with the aforementioned three scenarios, in terms of stakeholder benefits and conflicts. Note that the scheme achieved from the conflict analysis model could produce more stakeholder benefits with fewer stakeholder conflicts. Additionally, Scenario 3 outperformed Scenarios 1 and 2. This finding suggests that the current UHD practices were more effective than the previous ones. However, the model developed in this study appeared to generate better solutions for UHD projects. In this conflict analysis model, the social costs incurred by stakeholder conflicts were highlighted. This model aimed to balance the interests of different stakeholder groups instead of simply maximizing the interests of the general public. The results showed that this decision-making principle might achieve better performance in practice.

5.3.4.2 Practical Value of the Action Scheme

The senior leader in the district government stated that they modified their UHD strategies several times and the final version of their UHD plan was highly consistent with the action scheme developed by this study's conflict analysis model. For example, according to the official standards released by the central government of China, the relocation compensation in the Sanlangqiao project (Concern 1) could be selected within a legal range. At the beginning of this project, the relocation compensation was set to a relatively low level (the lower bound of the legal range) because of the consideration on the project costs. However, this decision generated a severe conflict between the local governments and the relocated residents. The majority of the residents refused to move away and attempted to organize collective resistance. To mitigate stakeholder conflicts and reduce unnecessary social costs,

the governments decided to increase the relocation compensation standard. Consequently, every relocated household received an additional compensation of 30,000 Yuan (the upper bound of the legal range). Another example was the improvement on community transportation (Concern 7). Initially, the local government took no measures to control the adverse impacts of the UHD on the local transportation system. Such effects subsequently incurred strong dissatisfaction among the nearby residents. A young man in the interview complained that he had to get up earlier than before because his commute time was prolonged due to the terrible traffic jam. To address these issues, the local governments added several temporary bus lines during the UHD project. Consequently, the model developed in this study has the potential to help practitioners properly modify their initial UHD plan because it can comprehensively investigate the concerns of stakeholders and their attitudes toward such concerns.

5.4 Lessons Learnt

In this section, the key steps for applying the conflict analysis model were summarized to quantify and manage the stakeholder conflicts in real UHD projects. As shown in Figure 5.3, 10 steps are required to gather data and run this model for conflict analysis. Steps 1 to 5 aim to collect data pertaining to stakeholder attributes, key concerns, the attitudes of stakeholders toward each concern and their preference. Empirical tools such as document analysis, interview, questionnaire and snowball sampling technique can be integrated to facilitate this process (Yu et al., 2017b). Similar to Olander (2007) and Li et al. (2015), the parameters of the conflict analysis model were determined according to the knowledge of the key members

from each stakeholder group. *Formula 5.2* stipulates that over 50% of respondents from the same stakeholder group should reach an agreement on each concern. Therefore, the data must meet this requirement. Otherwise, re-evaluations should be carried out.

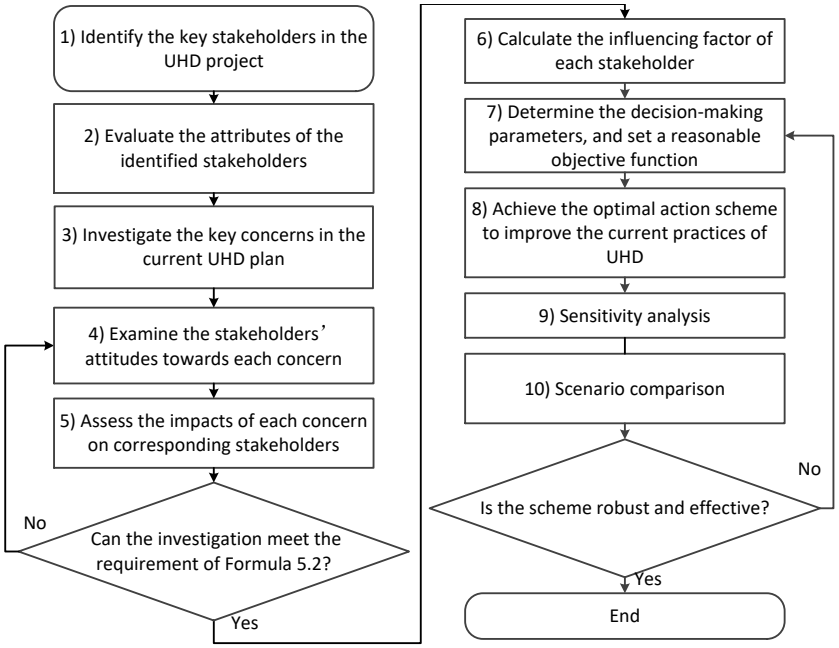

Figure 5.3 Key steps for managing stakeholder conflicts

Step 6 calculates the influencing factor of each stakeholder group based on *Formula 5.1*. In Step 7, the decision-maker should determine the decision-making parameters including ∂_i, γ, and SC_{max} based on the primary objectives and decision-making principles of the project. In Step 8, by using *Formula 5.12* the optimal action scheme can be determined and the directions for enhancing the current practices can be identified. In Step 9, sensitivity analysis should be conducted to evaluate the robustness of the model. Then, scenario comparison should be carried out to assess the effectiveness of the optimal action scheme. If the results are robust and effective, then the conflict analysis will be complete. Otherwise, the decision-makers have to re-evaluate the key decision-making principles and repeat the

conflict analysis.

5.5 Summary of the Chapter

This chapter establishes a conflict analysis model integrating stakeholder salience analysis, conflict quantification, and scheme optimization. The logic of the model development is detailed in *Section 5.2*. The Sanlangqiao project in Wenzhou is examined to display the practical value of this model. Through sensitivity analysis and scenario comparison, the action scheme proposed by the conflict analysis model is proven to be robust and effective. Lessons from the Sanlangqiao project are summarized to provide useful guidance for practitioners in adopting the conflict analysis model in their practices.

CHAPTER 6 MANAGING STAKEHOLDER-ASSOCIATED SOCIAL RISKS IN UHD[6]

6.1 Introduction

"Risk is a constitutive concept of sustainability" (Eizenberg and Jabareen, 2017). Accordingly, "social sustainability strives to confront risk while addressing social concerns" (Eizenberg and Jabareen, 2017). To improve the social sustainability of UHD, stakeholder-associated social risks must draw sufficient attention from practitioners, and be carefully dealt with. In *Section 3.4.3*, a risk management framework is proposed to quantitatively evaluate and manage the social risks in UHD projects based on an SNA model. In this chapter, the results and insights generated from this model are briefly presented and further discussed. It is expected that these findings can assist practitioners in enhancing their UHD practices, particularly in the field of social risk management.

6.2 Identification of Social Risks

Based on the literature analysis and semi-structured interviews in *Section 3.4.3*, 38 social risks were identified (see Table 6.1). To integrate social risks with corresponding stakeholders, the nodes of the risk network were coded into S_aR_b for data processing, where

6 The majority of this Chapter has been published in the following paper: Managing Social Risks during the Housing Demolition Stage of Urban Redevelopment Projects- A Stakeholder-oriented Study Using Social Network Analysis, International Journal of Project Management.

S_a refers to stakeholder (S1 to S6), and R_b denotes social risk (R1 to R38). As a result, 53 nodes are generated with 328 links among these risk nodes. The links in the risk network represents the influence between two social risks. The weights of these links were calculated based on evaluations of key stakeholders in the second step of *Section 3.4.3.2*. Multiplying the likelihood of this link with the degree of influence identifies the weight of a link. This calculation method is consistent with Li et al. (2016), Yang et al. (2016) and Yang and Zou (2014). The identified 38 risks were further classified into 9 risk categories according to the different characteristics of these social risks. The classification is largely based on the interviews and the literature (Ni, 2015; Yang and Shen, 2012; Jiang, 2014; Chen and Yu, 2011). The 9 risk categories contain the following: social unfairness (C1), financial risk (C2), adverse impacts on stakeholders' quality of life (C3), insufficient safety/health/environment management (C4), illegal activities and legal disputes (C5), unreasonable decision-making (C6), a lack of information (C7), insufficient preservation of urban characteristics (C8), and uncertainties in exterior circumstance (C9).

Table 6.1 Social risks and corresponding stakeholders

Risk ID	Stakeholder node	Risk node	Risk name	Source	Category
S1R1	S1	R1	Unfair compensation for housing demolition and relocation	Lin et al., 2012 ; Shi et al., 2015	C1
S2R2	S2	R2	Cost overrun	Ni, 2015	C2
S3R2	S3				
S4R3	S4	R3	Traffic jams and congestion	Chen and Yu, 2011	C3
S5R3	S5				

Table 6.1 (Continued)

Risk ID	Stakeholder node	Risk node	Risk name	Source	Category
S4R4	S4	R4	Environment pollution	Yang and Shen, 2012; Ni, 2015; Chu, 2008	C4
S1R5	S1	R5	Health risk	Schmidt–Soltau, 2003; Rabito et al., 2007; Keene and Geronimus, 2011	C4
S4R5	S4				
S5R5	S5				
S1R6	S1	R6	Violent incidents because of forced demolition	Chen and Yu, 2011	C5
S2R7	S2	R7	Lack of funds	Yang and Shen, 2012	C2
S3R7	S3				
S2R8	S2	R8	Government corruption and adverse impacts on the creditability of governments	Chen and Yu, 2011; Ni, 2015	C5
S2R9	S2	R9	Unreasonable relocation and compensation schemes	Lin et al., 2012; Jiang, 2014; Yang and Shen, 2012; Shi et al., 2015; Liu et al., 2016	C6
S2R10	S2	R10	Schedule risk	Ni, 2015	C6
S3R10	S3				
S2R11	S2	R11	Changes in master plans because of unreasonable decision-making	Interview	C6
S4R12	S4	R12	Technical errors in demolition schemes	Interview	C6
S1R13	S1	R13	Unemployment problem	Teng, 2013; Chen and Yu, 2011; Schmidt–Soltau, 2003	C3
S1R14	S1	R14	Unavailability to public facilities (e.g., school, hospital, public space and so on)	Teng, 2013; Chen et al., 2012; Jiang, 2014; Schmidt–Soltau, 2003	C3
S1R15	S1	R15	Mass incidents	Teng, 2013; Chen and Yu, 2011	C5

Table 6.1 (Continued)

Risk ID	Stakeholder node	Risk node	Risk name	Source	Category
S1R16	S1	R16	Adverse impacts on social support networks (e.g., reducing social relationships)	Teng, 2013; Chen and Yu, 2011; Jiang, 2014; Schmidt–Soltau, 2003	C3
S1R17 S2R17	S1 S2	R17	Legal disputes	He, 2014; Ni, 2015	C5
S1R18 S5R18	S1 S5	R18	Psychological problems	Keene and Geronimus, 2011; Harvey, 2001	C4
S1R19	S1	R19	Insufficient protection for vulnerable groups	Teng, 2013; Yang and Shen, 2012	C1
S2R20	S2	R20	Illegal demolition	Yang and Shen, 2012; Ni, 2015	C5
S4R21	S4	R21	Ineffective waste disposal	Interview	C4
S2R22 S4R22	S2 S4	R22	Insufficient preservation of urban image	Interview	C8
S5R23	S5	R23	Security risk (e.g., a rising crime rate)	Yang and Shen, 2012; Ni, 2015	C5
S4R24	S4	R24	Labor strikes because of unfair remuneration or treatment	Interview	C1
S2R25 S3R25	S2 S3	R25	Uncertainties in housing price	Ni, 2015	C9
S2R26	S2	R26	A lack of information on key stakeholders' interests	Yang and Shen, 2012	C7
S1R27 S2R27	S1 S2	R27	Uncertainties in relocation negotiation because of insufficient information	Yang and Shen, 2012; Ni, 2015	C7
S2R28 S4R28	S2 S4	R28	Insufficient preservation of cultural heritage	Interview	C8

Table 6.1 (Continued)

Risk ID	Stakeholder node	Risk node	Risk name	Source	Category
S2R29	S2	R29	Insufficient information exchange among different stakeholders	Teng, 2013; Chen and Yu, 2011; Yang and Shen, 2012	C7
S2R30 S3R30	S2 S3	R30	A lack of data for decision-making	Interview	C7
S4R31 S5R31	S4 S5	R31	Safety risk	Ni, 2015	C4
S2R32 S3R32	S2 S3	R32	Unreasonable evaluations on housing price	Ni, 2015	C6
S2R33	S2	R33	Variations in policies or compensation standards	Jiang, 2014; Yang and Shen, 2012; Ni, 2015 ;Liu et al., 2016	C9
S6R34	S6	R34	Cultural conflicts	Yang and Shen, 2012	C9
S4R35	S4	R35	Uncertainties in weather and environment	Ni, 2015	C9
S6R36	S6	R36	Negative attitudes of local residents towards urban redevelopment	Yang and Shen, 2012; Ni, 2015; Chu, 2008	C9
S2R37	S2	R37	Unreasonable feasibility studies	Yang and Shen, 2012	C6
S1R38	S1	R38	Homelessness	Schmidt–Soltau, 2003	C3

6.3 Results of SNA

6.3.1 Network Level Analyses

The risk network consists of 53 social risk nodes connected by 328 links. This network is visualized in Figure 6.1 in which the colors and shapes of the nodes represent stakeholder

groups and risk categories, respectively. An arrow from node S_aR_b to S_cR_d indicates that S_aR_b can affect S_cR_d. The thickness of this arrow denotes the level of influence. Social risks with more links are located at a more central position in the network, whereas nodes with fewer connections are placed closer to the border of the figure. Figure 6.1 provides a visual image of the risk structure for the researchers. All risks are connected to the risk network implying that even a small variation in one risk might affect the other risks in the network; therefore, the risk management processes are extremely complex. A large area of yellow nodes occupies the central location of the network map indicating that governments play the most important role in mitigating social risks related to housing demolition. Their interactions account for the majority of existing links. To address the potential conflicts between relocated residents and project developers, a new policy pertaining to UHD (i.e., *RECHSOL*) stipulates that developers should not directly participate in housing demolition. Therefore, governments have become direct participants and are responsible for housing demolition. This development may be the main reason why government-associated risks are located in the central areas of the network.

The network density and cohesion were calculated to quantitatively examine the configuration of the risk network. Network density reflects the overall connectivity of a network (Wasserman and Faust, 1994), while cohesion captures the network complexity by considering the reachability of different nodes (Parise, 2007). Scholars have used these two metrics to measure the overall degree of difficulty in risk management (Li et al., 2016; Yang et al., 2016; Yang and Zou, 2014). A high density or cohesion generally indicates that

practitioners have to deal with more challenges in risk management. The network density is 0.119, and the mean distance between two nodes is 2.714 walks demonstrating that the network is dense, and the nodes are proximate to one another. The network cohesion is 0.609, higher than the density value. This outcome suggests that the structure of the risk network is more complex from the perspective of node approachability.

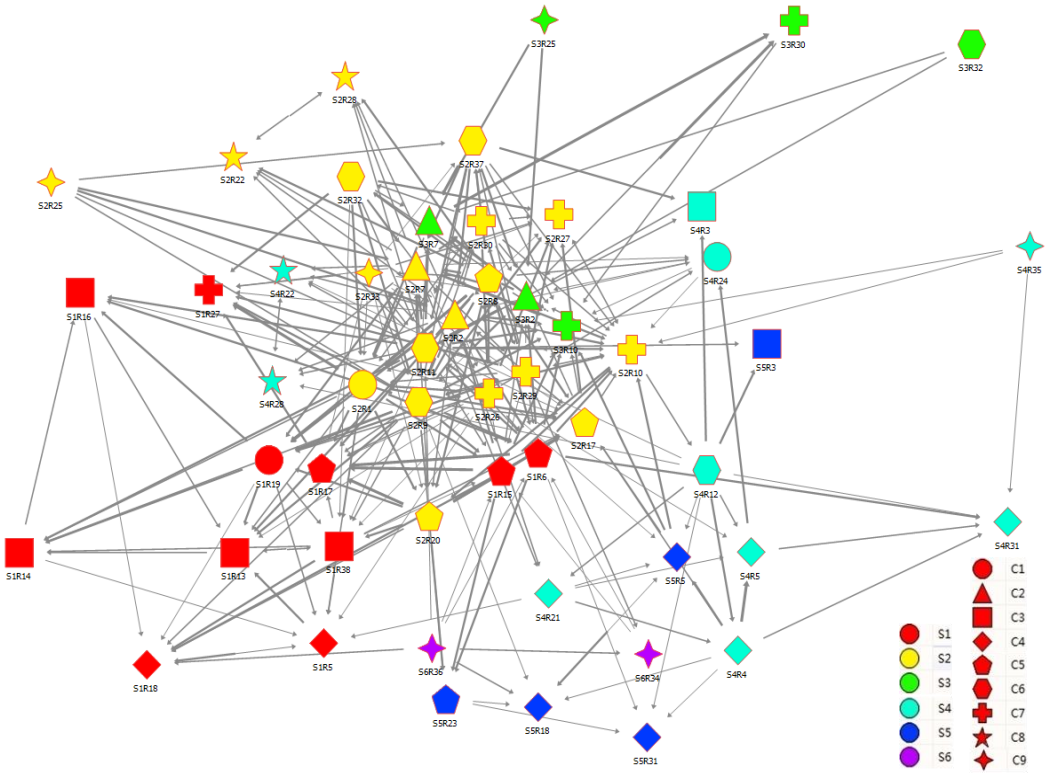

Figure 6.1 Stakeholder-associated social risk network

6.3.2 Node and Link Level Analyses

To identify critical risks during the housing demolition stage of URPs, the direct and propagating effects of individual nodes and their roles in the network were explored by using multiple metrics proposed by previous studies (Yang and Zou, 2014;Li et al., 2016; Yang et al., 2016). First, the status centrality map of the risk network is shown in Figure 6.2. Here, all

of the risks are included, and the overall impact of each risk can be seen. Typically, risks in the central area of the map play more crucial roles in the network (Li et al., 2016). The numerous yellow nodes are in the center of this map implying the important role of governments. In addition, two green nodes are placed in the central area indicating that project developers can still affect the risk network, although the new policy has reduced their degree of involvement in housing demolition. Given that property development has become a primary source of financial support for URPs, developers can indirectly influence the decision-making of other stakeholders by changing their investment strategies in URPs.

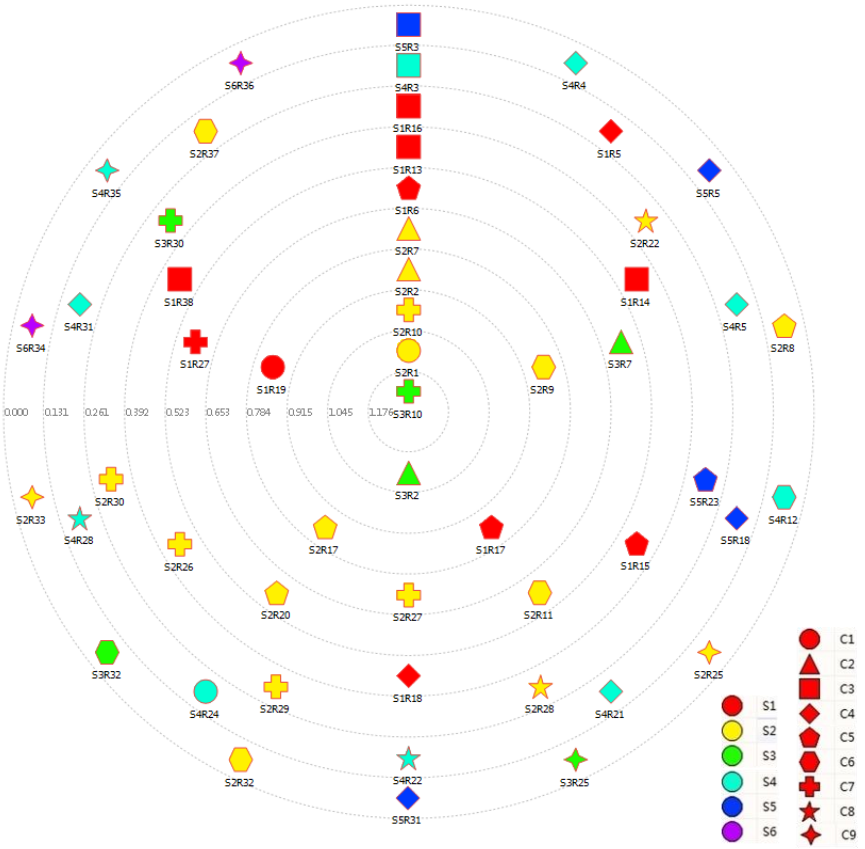

Figure 6.2 Risk locations in the status centrality map

In addition to the status centrality map, three other indicators were calculated, including ego

network size, out-degree and degree difference for the node-level analyses (see Table 6.2). These indicators reflect the characteristics and effects of risk nodes from different perspectives. If a risk can have a large ego network size, then there will be many risks with close relations to this risk. The out-degree reflects the sphere of direct influence, and a risk with a high out-degree can directly affect more neighbors in the network. The degree difference equals the gap between the out-degree and in-degree (Wasserman and Faust, 1994). A risk having a large degree difference can exert stronger impacts on its neighbors than accept influences (Li et al., 2016). In terms of these three metrics, risks with high metric values typically play more important roles in the risk network. The 15 top-ranked risks according to these three metrics are shown in Table 6.2.

Table 6.2 Ranking of critical risks based on status centrality, ego network and nodal degree analyses

RA	RID	Out-status centrality	RID	Ego size	RID	Out degree	RID	Degree difference
1	S2R8	2.4	S2R9	31	S2R9	25	S2R8	21
2	S2R9	2.3	S2R11	31	S2R11	22	S2R29	15
3	S2R2	1.4	S2R2	28	S2R8	21	S2R9	11
4	S1R6	1.2	S2R7	25	S2R29	19	S2R11	11
5	S2R7	1.2	S1R1	22	S2R2	18	S4R12	9
6	S2R11	1.2	S3R2	21	S2R7	17	S2R33	9
7	S2R29	1.0	S1R6	21	S2R26	15	S2R7	8
8	S1R1	0.9	S2R8	21	S1R6	13	S2R26	8
9	S2R32	0.9	S2R29	21	S2R33	11	S2R30	8
10	S2R37	0.9	S2R26	20	S2R30	11	S2R32	8
11	S1R15	0.8	S2R17	18	S1R1	11	S6R36	6
12	S2R26	0.8	S2R10	17	S4R12	10	S2R25	5
13	S2R30	0.8	S3R10	17	S2R32	10	S4R4	4
14	S2R20	0.7	S1R15	17	S2R37	9	S1R6	4
15	S3R2	0.6	S2R20	16	S2R20	8	S2R37	4

Note: RA=Ranking; RID= Risk ID

In this study, brokerage is considered a valuable network metric that exhibits the different functions and abilities of risk nodes in connecting subgroups. The 15 top-ranked risks in the brokerage analysis are shown in Table 6.3. These risk nodes are vital in the risk network because they play an important role in bridging various stakeholder groups (Li et al., 2016).

Table 6.3 Ranking of critical risks based on brokerage analysis

RA	RID	Coordinator	Gatekeeper	Representative	Itinerant	Liaison	Total
1	S2R9	49	16	131	1	24	221
2	S2R2	66	27	68	7	10	178
3	S2R11	40	15	84	4	17	160
4	S2R7	35	16	31	0	12	94
5	S1R1	8	6	50	4	18	86
6	S1R6	1	8	4	14	41	68
7	S3R2	7	26	12	10	9	64
8	S2R26	8	0	49	0	0	57
9	S2R10	16	22	11	2	5	56
10	S2R20	3	0	35	0	0	38
11	S1R15	1	3	5	6	22	37
12	S2R17	12	10	7	0	5	34
13	S1R19	0	33	0	1	0	34
14	S2R29	15	0	18	0	0	33
15	S1R38	6	15	2	1	0	24

Note: RA=Ranking; RID= Risk ID

Finally, the betweenness centrality of different nodes and links were analyzed to show the degree to which a risk or an interaction can control the influences passing through it, i.e., the ability to control influence. The top 15 nodes and links ranked by the betweenness-centrality are displayed in Table 6.4. Removing these risks or interactions from URPs can significantly mitigate the complexity of the risk network.

Table 6.4 Ranking of critical risks and interactions based on betweenness centrality

RA	Interaction ID	Link betweenness centrality	RID	Node betweenness centrality
1	S1R13→S1R38	213.3	S2R2	0.1392
2	S5R5→S2R10	150.2	S2R10	0.1307
3	S1R38→S1R15	143.9	S2R9	0.1051
4	S2R10→S4R12	129.6	S3R2	0.0862
5	S2R17→S2R2	120.1	S1R38	0.0844
6	S1R5→S1R13	117.3	S2R17	0.0689
7	S1R38→S2R17	101.5	S1R15	0.0673
8	S5R18→S5R5	96.6	S1R13	0.0667
9	S2R10→S2R29	94.1	S1R6	0.0667
10	S3R2→S2R9	90.0	S5R5	0.0555
11	S1R15→S2R2	83.9	S2R11	0.0491
12	S2R10→S2R9	76.1	S2R7	0.0466
13	S3R2→S2R7	74.8	S1R1	0.0382
14	S1R16→S1R13	65.5	S2R29	0.0358
15	S2R2→S2R30	62.9	S4R12	0.0330

Note: RA=Ranking; RID= Risk ID

6.4 Critical Risks and Risk-mitigation Strategies

6.4.1 Critical Challenges and Social Risks in UHD

Table 6.5 Identification of critical risks and challenges based on integrating multiple network metrics

Critical risks/ interactions	Associated stakeholder	Primary challenges and description
S5R5→S2R10	Nearby residents	**A lack of social security.** The sources of the links in this challenge are social risks in C3 and C4. These include health problems, homelessness, unemployment problems, and the adverse impacts on social support network. These social risks can adversely affect the basic living conditions of key stakeholders and incur social unrest. The UHD can significantly change the lifestyles and living conditions of relocated residents and nearby households. For example, relocated residents may move to new places far from their workplaces. Sometimes, they have to give up their previous jobs. Therefore, social security schemes that aim to maintain the basic quality of life of these two stakeholder groups must be well designed and implemented.
S1R5→S1R13	Relocated residents	
S1R13→S1R38	Relocated residents	
S1R16→S1R13	Relocated residents	
S1R38→S1R15	Relocated residents	
S1R38→S2R17	Relocated residents	
S5R18→S5R5	Nearby residents	
S2R26	Governments	**Information challenges.** All of the social risks in this challenge belong to C7 (a lack of information). This challenge illustrates the difficulties of carrying out information sharing among different participants and collecting stakeholder-related information for decision-making, during the housing demolition stage of URPs. Although *RECHSOL* stipulates that governments should actively collect the opinions of key stakeholders (The State Council of the People's Republic of China, 2011), this policy does not propose any effective approaches to facilitate information collection. As housing demolition typically affects a wide range of stakeholders, obtaining stakeholder-related information is difficult.
S2R29	Governments	
S2R30	Governments	

Table 6.5 (Continued)

Critical risks/ interactions	Associated stakeholder	Primary challenges and description
S2R2 S3R2 S2R7 S3R2→S2R7 S3R2→S2R9 S2R2→S2R30	Governments Developers Governments Governments Governments Governments	**Challenges to financial management.** The social risks (critical risks and sources of the links) in this challenge belong to C2 (financial risk). Housing demolition requires large amounts of funds to compensate for the economic losses of relocated residents (Ni, 2015). To protect the benefits of vulnerable groups, *RECHSOL* stipulates that governments must raise sufficient funds for relocation compensation before carrying out any demolition activities. Therefore, governments have to achieve a large amount of funds in a relatively short period. In addition, due to the uncertainties in housing price and compensation negotiation, URPs also suffer from cost overruns during the demolition stage (Ni, 2015). These potential risks present a challenge to the financial management of URPs.
S2R11 S2R9 S4R12 S2R37 S2R10→S2R29 S2R10→S4R12 S2R10→S2R9	Governments Governments Demolition crews Governments Governments Governments Governments	**Difficulties in decision-making.** Most social risks in this challenge are caused by unreasonable decisions (C6) made by governments or demolition crews. Housing demolition is a complex process that involves a wide range of stakeholders with various interests (Zhang, 2014). This process can influence the environment, society and economy of a city. Therefore, reasonable decisions must be made in considering the multi-dimensional impacts of housing demolition. However, due to the complexity of housing demolition, it is very difficult for decision-makers to develop reasonable schemes (Zhang, 2014). More importantly, existing policies and laws fail to propose effective decision-making tools to improve decisions related to housing demolition.

Table 6.5 (Continued)

Critical risks/ interactions	Associated stakeholder	Primary challenges and description
S2R17	Governments	**Legal disputes and uncertainties in policies.** Social risks in this challenge are typically induced by illegal actions (C5) or variations in policies (C9). Due to ineffective policies related to UHD, governments and relocated residents can be easily swept into legal disputes (He, 2014). For example, existing policies stipulate that housing demolition must conform to public interests. However, the scope of public interests is not clearly identified in *RECHSOL* or *Property Law*. Therefore, illegal demolition can be carried out in the name of public interests (Shih, 2010). In addition, uncertainties or variations in policies can also give rise to social risks. For example, variations in official compensation standards can incur serious conflicts between governments and relocated residents. Such social risks can adversely affect the performance of UHD and even terminate the implementation of URPs.
S2R20	Governments	
S2R33	Governments	
S2R17→S2R2	Governments	
S1R6	Relocated residents	**Impulsive behaviors of relocated residents.** Given the sharp conflicts of interests among different stakeholders and ineffective policies, the property rights of relocated residents have not been well protected in many cases. Under extreme conditions, relocated households resort to violent resistance against housing demolition (C5), a fact that has threatened the social stability of China (Beijing Cailiang Law Firm, 2015). Such social risks can adversely affect the performance of UHD.
S1R15	Relocated residents	
S1R15→S2R2	Relocated residents	

The critical risks and interactions were identified according to the results of the network analyses in *Section 6.3*, with consideration given to the degree of nodes, ego size, status centrality, brokerage, and betweenness centrality. As the rankings of critical risks based on different SNA metrics can slightly differ, previous studies tended to select 3 to 5 top factors

from each ranking list as critical risks (e.g., Li et al., 2016; Yang et al., 2016). The logic for such choice is that these factors play the most important roles in different dimensions of the risk network. Removal of these nodes and links can reduce the overall complexity of the risk network (Yang and Zou, 2014; Yang et al., 2016; Li et al., 2016). This principle was followed in the present research. In addition, risks that can emerge in more than three ranking lists were also identified as critical risks because they have multiple functions in supporting the risk network and play multiple roles in stakeholder-associated issues. Table 6.5 presents the 15 social risks and 15 interactions that were found to be critical. To deeply understand the implications of these social risks, they were classified into six challenges with brief explanations to show the rationale for such classification. Social risks in the same challenge have similar characteristics and can be similarly addressed.

6.4.2 Solutions to Risk Mitigation

Given these analyses, the author proposed five strategies for mitigating critical risks in UHD (see Figure 6.3). As governments are the driving stakeholder group in Chinese UHD, these strategies are designed largely based on the perspective of governments. The risk management principle followed in this study was that qualified stakeholders who have sufficient abilities and are suitable to control risks, should handle risks. These risk mitigation strategies include: social security schemes, public participation, efficient financial management, multi-dimensional impact assessments, as well as policy analyses and adherence to laws.

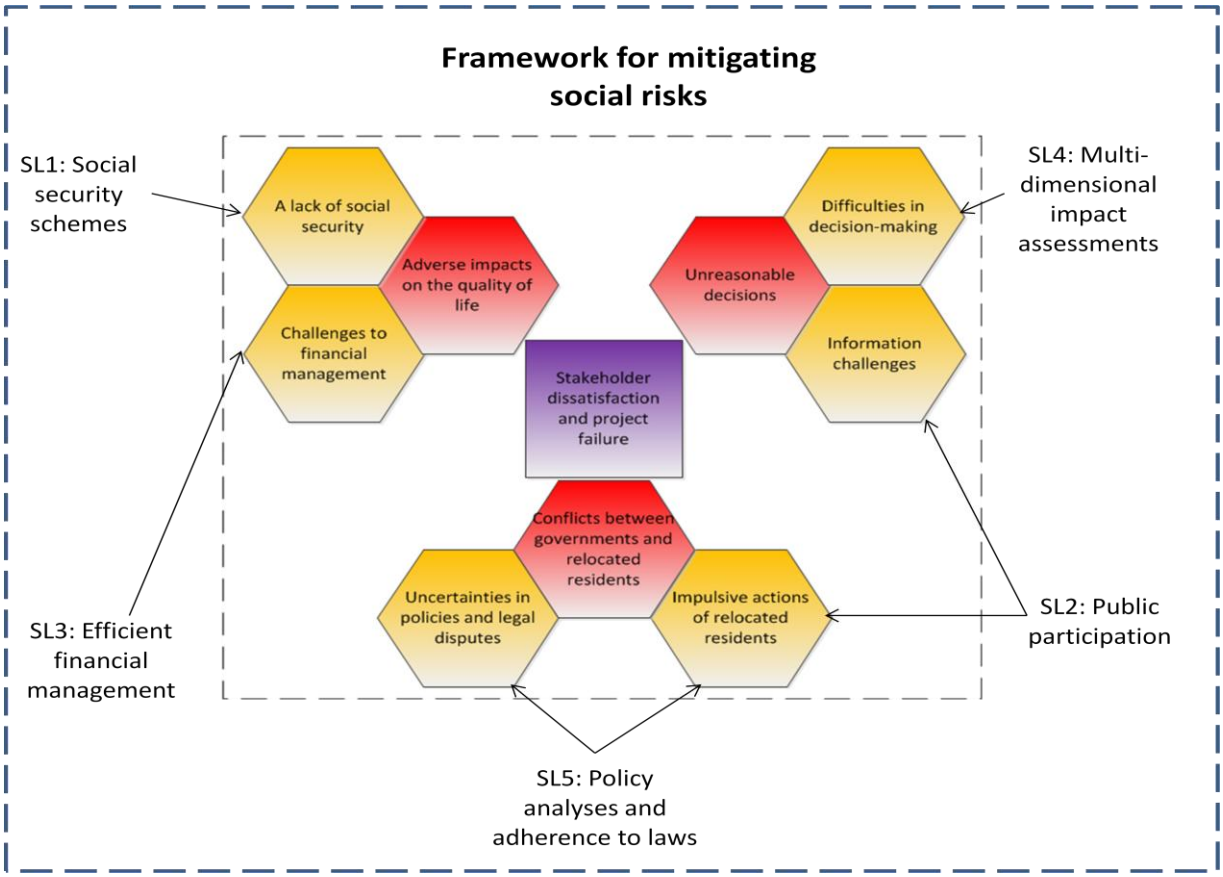

Figure 6.3 Framework for understanding and mitigating social risks

Social security schemes (SL1)

To deal with the first challenge identified in Table 6.5, governments should carefully consider social security issues when developing master plans and project development schemes for UHD. The basic living conditions of vulnerable stakeholder groups including relocated residents and nearby households must be well maintained. Social security schemes for UHD can be designed and carried into operations to facilitate the protection of vulnerable groups. According to Table 6.5, health problems, homelessness, unemployment issues, and potential impact on social support network should be considered in these social security schemes. Effective measures should be identified in these schemes to deal with social

security issues. For example, to reduce the homelessness of relocated residents, governments can plan to provide resettlement housing for low-income residents. To address unemployment issues, governments may organize reemployment-training programs to help vulnerable groups achieve new jobs after moving to other places. In current URPs, large cities such as Shenzhen and Guangzhou have already adopted such measures to mitigate social risks.

Public participation (SL2)

Public participation can eliminate misunderstandings among various stakeholders and improve stakeholder satisfaction (Li et al., 2013). By engaging key stakeholders in decision-making processes, this strategy can mitigate the impulsive actions of key stakeholders because stakeholders can better express their opinions pertaining to UHD and influence final decisions. In addition, by collecting feedback from key stakeholders, governments can acquire more useful information for better decision-making. For example, the expectations on relocation compensation can be acquired to modify preliminary compensation schemes. To facilitate this strategy, multiple participation approaches such as focus group, interview, questionnaire (Li et al., 2014), and internet-based participation platform (Lin et al., 2015) can be used to engage stakeholders in the decision-making processes of UHD. Meanwhile, the degree of engagement should be well distinguished because UHD is a complex process of URPs and many stakeholders do not have sufficient knowledge to make holistic decisions. All of the key stakeholders should have opportunities to express their opinions on UHD. Their key interests should be considered by government

officials. However, final decisions should be made based on the professional knowledge of experts.

Efficient financial management (SL3)

Table 6.5 reveals that the challenges to financial management mainly stem from project financing and cost control. In terms of project financing, governments can encourage private sectors to invest in URPs and reduce their fiscal burden. The public-private-partnership mode has been widely adopted to spread financing pressures among different stakeholders in previous practices (Yang and Chang, 2007). In addition to the public-private-partnership, other financing modes such as build-operate-transfer can be adopted to attract large companies with sufficient funds to participate in urban redevelopment. It is also suggested that governments and developers can cooperate and share project profits with relocated residents and nearby communities in order to mitigate financing risks caused by relocation compensation. In summary, effective financing modes must be selected and executed. In terms of cost control, governments should pay sufficient attention to compensation schemes because relocation compensation accounts for the largest part of project costs at the demolition stage. Governments should carefully study the compensation standard suggested by *RECHSOL*. They can employ professional appraisers to assess the total cost for compensation and then develop a reasonable project budget based on this assessment. In addition, the relocation compensation of UHD is significantly affected by negotiations with relocated residents (Wu and He, 2005; Hu et al., 2015). Governments should also investigate the expectations and opinions of relocated residents. Based on feedback from relocated

residents, the project budget must be modified to reduce potential cost risks.

Multi-dimensional impact assessments (SL4)

During the feasibility study and planning period, multi-dimensional impact assessments (such as social, environment, economic and health impact assessments) can be conducted to mitigate social risks caused by unreasonable decisions. Housing demolition is a complex process of URPs and involves a wide range of stakeholders with diversified interests. This process can significantly affect the society, economy and environment of a city as well as the lifestyles of involved stakeholders. Therefore, the impact of every potential project alternative must be evaluated from multiple dimensions to predict and control the adverse effects of housing demolition. By comparing the impacts of different alternatives, decision-makers can then select a suitable option with a relatively low level of adverse effects. The primary steps of multi-dimensional impact assessments typically include (e.g., Becker, 2001): identification of key objectives (e.g., stakeholder satisfaction), design of scenarios, project alternative development, impact assessment, ranking of alternatives, reduction of negative impact, reporting, stimulation of implement, and alternative selection.

Policy analyses and adherence to laws (SL5)

To reduce Challenges 5 and 6, governments should conduct policy analyses before initiating UHD. According to *RECHSOL* and *Property Law*, URPs plans that conform to the basic requirements of public interests can apply to conduct housing demolition for land access. However, the definition of public interests is not sufficiently clear to provide a strict

boundary for URPs (Shih, 2010). In addition, *RECHSOL* stipulates that housing demolition should not be carried out for business benefits. However, under many conditions, the pursuit of business benefits can contribute to economic development, and economic growth can benefit the general public by eliminating property and improving the quality of life of local residents. Therefore, UHD with the aim to achieve business benefits may also conform to public interests. Contradictions in policies can easily incur "illegal actions". Therefore, governments should carefully study existing policies before initiating UHD. They can employ professional legal advisors to deal with legal disputes and identify potential issues. After policy analyses, governments must check their master plan to ensure that the UHD meet the requirements of the existing policies. Illegal demolition can frequently result in violent resistance from relocated residents (Beijing Cailiang Law Firm 2015), and adherence to laws can help governments avoid violent conflicts and mass incidents. The relocation compensation schemes of UHD should be developed based on the standard suggested by *RECHSOL*. Fair compensation for relocated residents can enhance their satisfaction and reduce impulsive actions.

6.4.3 Effectiveness of Risk-mitigation Solutions

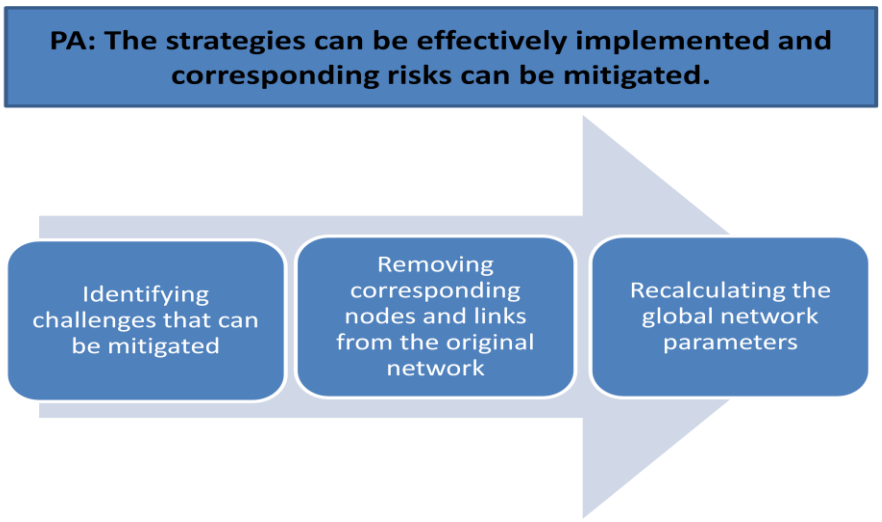

Figure 6.4 Key steps of the evaluation on risk-mitigation solutions

To evaluate the effectiveness of the five risk management strategies, the risk network was simulated and quantified after implementing the aforementioned solutions (see Figure 6.4). The simulation was carried out according to the study conducted by Li et al., 2016. A primary assumption (PA) here is that all of the proposed strategies can be effectively conducted, and corresponding nodes and links can be completely removed from the network. In Table 6.5, the critical risks (nodes and links) identified in *Section 6.4.1* are classified into 6 challenges according to their characteristics and risk categories. In Figure 6.3, it can be seen that these challenges can be alleviated if corresponding strategies are taken. In the simulation, when a strategy was carried out, risks related to this strategy (according to Figure 6.3 and Table 6.5) were removed from the risk network of Figure 6.1 (according to PA). For instance, if SL1 is implemented, then the links and nodes in Challenge 1 will be removed from Figure 6.1 because Figure 6.3 implies that SL1 can be used to deal with Challenge 1. It

indicates that if a reasonable social security scheme is developed and effectively carried out, then the risks caused by a lack of social security can be well controlled. After removing the nodes and links from the original network, the global network parameters in *Section 6.3.1* can be recalculated to evaluate the effectiveness of risk-mitigation strategies. This simulation approach can be employed to measure the effectiveness of a strategy (e.g., SL1) or a strategy profile (e.g., SL1+SL2; SL1+SL2+SL3+SL4+SL5)

This section focused on the overall effectiveness of the five strategies identified in *Section 6.4.2*. If all of these strategies are taken, then all of the nodes and links listed in Table 6.5 will be removed from Figure 6.1. After reshaping the risk network (see Figure 6.5), the two network metrics used in *Section 6.3.1* were recalculated, namely, network density and cohesion, because they reflect the global characteristics of the risk structure. All of the five strategies are assumed to be effectively implemented. As a result, the improved risk network is shown in Figure 6.5. The complexity of the network is significantly reduced versus that in Figure 6.1. The network is less condensed after taking the five risk mitigation strategies. In addition, a few isolated nodes emerged in the figure, indicating that more social risks can be handled individually without constraints from other risks. Network density and cohesion are reduced to 0.050 (-57.98%) and 0.279 (-54.19%), respectively. These simulation results imply that the proposed five solutions can largely mitigate social risks during the housing demolition stage of URPs.

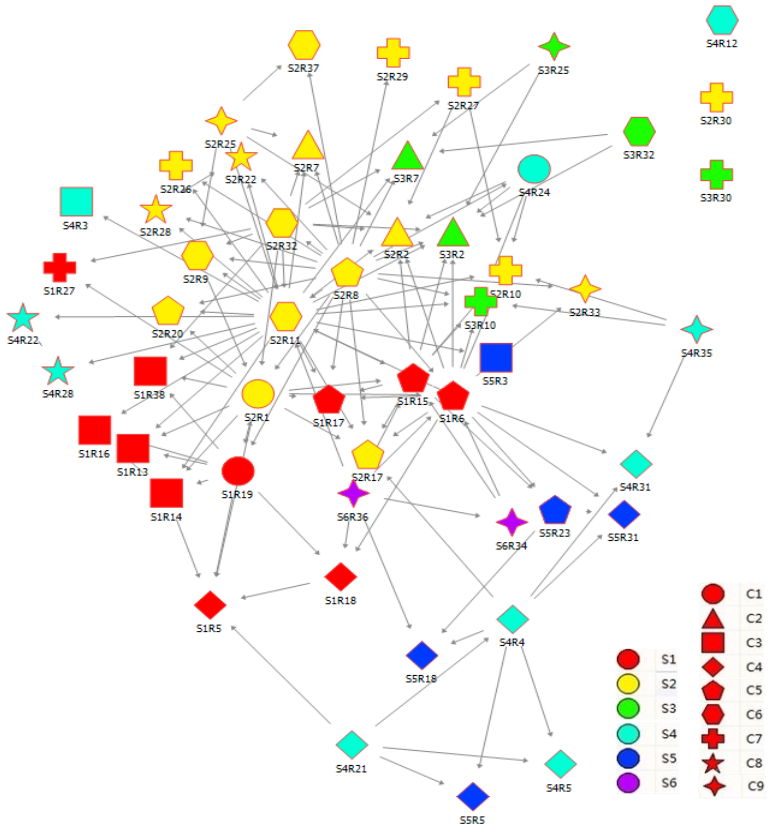

Figure 6.5 Risk network after mitigating critical risks and interactions

6.5 Summary of the Chapter

In this chapter SNA is applied to investigate the underlying network of stakeholder-associated social risks in UHD projects. A risk list containing 38 factors is compiled through a literature analysis and interviews with key stakeholders in UHD. Based on network analyses, critical risks and interactions that have significant impacts on other risks directly or indirectly are identified. Lack of social security, information challenges, challenges to financial management, difficulties in decision-making, uncertainties in policies and legal disputes, and impulsive actions of relocated residents are highlighted as the primary challenges to social risk management. Social security schemes, efficient financial

management, multi-dimensional impact assessments, policy analyses and adherence to laws, and public participation are proposed to mitigate these social risks. The effectiveness of these solutions is tested and quantified via a network simulation. The results show that the strategies can effectively mitigate social risks related to UHD.

CHAPTER 7 CONCLUSION AND FUTURE RESEARCH DIRECTIONS

7.1 Introduction

This chapter summarizes the major findings of this dissertation. To conclude, the key research objectives are reviewed. Through a comprehensive stakeholder-oriented study, the social sustainability and stakeholder-associated challenges of UHD projects in the context of China are examined. In particular, social sustainability evaluation, stakeholder conflicts and stakeholder-associated social risks were investigated. Theoretical and practical contributions of this dissertation are highlighted. Limitations and future research directions are discussed as well.

7.2 Major Findings of this Dissertation

7.2.1 Review of Research Objectives

Despite the significant contribution to the economic growth of China, urban redevelopment faces a series of social sustainability issues such as social unfairness and unrests. As an important byproduct of urban redevelopment, UHD has become a primary source of social conflicts and instability because it generally involves a wide arrangement of stakeholder groups with competing interests. Against this backdrop, improving the social sustainability of UHD will inarguably contribute to the sustainable development of China.

Based on existing literature, *Section 1.1.3* highlights that stakeholders and

stakeholder-associated challenges play irreplaceable roles in determining the social sustainability of UHD. Accordingly, this study answers the following questions: “how to understand the social sustainability of UHD from the perspective of key stakeholders?” and “how to improve the social sustainability of UHD by addressing the key stakeholder-associated challenges?” This dissertation is a stakeholder-oriented study. In this dissertation, Objectives 1 and 2 aimed to answer the first question, while Objectives 3 and 4 aimed to answer the second question. Objective 1 focused on the conceptual implications of social sustainability. Objective 2 attempted to develop an assessment system to quantitatively measure the social sustainability of UHD in China on the basis of stakeholder viewpoint. Objective 3 aimed to deal with stakeholder conflicts in UHD because the conflicts of interest among different stakeholders have become the primary source of social sustainability issues. Objective 4 established a framework to manage the stakeholder-associated social risks in UHD. Consistent with The State Council of the People's Republic of China (2011), Objective 4 attempted to mitigate the adverse stakeholder impacts on the social performance of UHD projects from the perspective of social risk management. Generally speaking, this study focused on the social sustainability and stakeholder-associated challenges of UHD in China.

7.2.2 Conceptual Implications of Social Sustainability: Objective 1

Social sustainability is a complex concept with multiple implications in different conditions. In this study, the definitions of social sustainability were reviewed in Section 2.2.1. Based on previous studies, social sustainability can be defined from the theoretical perspectives such as stakeholder theory, social impacts, social functions, corporate social responsibility and so

on. Due to the significant impact of stakeholders on UHD, this study highlighted that the social sustainability of UHD should be investigated from the perspective of stakeholders.

7.2.3 Evaluation of the Social Sustainability of UHD: Objective 2

Social sustainability is a typical multi-dimensional concept. The lack of a systematic assessment model may lead to single-dimensional improvements that fail to enhance the overall social performance of UHD. In this dissertation, an assessment system to measure the social sustainability of UHD is developed, which contributes to addressing the research gap. First, 22 indicators were identified based on the knowledge of key stakeholders and practitioners in UHD projects. According to the results of empirical investigations, health and safety, social equality, and adherence to the law were identified as the most critical aspects for measuring the social sustainability of UHD projects. The 22 indicators were divided into five categories via hierarchical cluster analysis, namely, job opportunities and working conditions, preservation of community and city, operational efficiency of laws and policies, daily lives of nearby residents, and autonomous factors. Finally, the social sustainability of the UHD practices in Shanghai were assessed and analyzed to provide useful recommendations for further improvements and demonstrate the applications of this assessment tool. The conditions of Shanghai revealed that future work should focus on reducing the adverse impact of UHD on the daily lives of residents living near demolition sites.

7.2.4 Stakeholder Conflicts in UHD Project: Objective 3

The conflicts of interest among the key stakeholder groups have become a critical factor incurring a series of social sustainability issues in UHD projects such as mass incidents and violent resistance (He, 2014). To balance the interests of different stakeholders and mitigate stakeholder conflicts, this dissertation developed a conflict analysis model based on stakeholder salience theory and Pawlak's conflict analysis. This model can investigate the key attributes of stakeholders including power, urgency, legitimacy, degree of stakeholder impact and probability of impact. In addition, key concerns and attitudes of different stakeholder groups can be integrated in this model. Based on Pawlak's conflict analysis, stakeholder conflicts in UHD projects could be well quantified. More important, this model can generate action schemes for practitioners to deal with stakeholder conflicts in their UHD projects. The Sanlangqiao project in Wenzhou was studied to display the value of the proposed model. The results show that the model developed in this study could offer effective and robust action schemes for conflict mitigation.

7.2.5 Stakeholder-associated Social Risks in UHD Projects: Objective 4

To control the adverse impacts of stakeholder conflicts, the central government of China stipulates that social risks must be assessed and addressed before carrying out any UHD activities (The State Council of the People's Republic of China, 2011; Shi et al., 2015). Grounded in social network theory and classical risk management approach, this dissertation used SNA to investigate the underlying network of stakeholder-associated social risks in

UHD projects. A risk list containing 38 factors (see Table 6.1) was compiled through a literature analysis and interviews with critical stakeholders. On the basis of the network analyses, critical risks and interactions that directly or indirectly affected other risks were identified (see Table 6.5). The network analysis showed that local governments were the most important stakeholders that can determine the final effect of social risks during housing demolition. The lack of social security, information challenges, challenges to financial management, difficulties in decision-making, uncertainties in policies and legal disputes, and impulsive actions of relocated residents were identified as the primary concerns of social risk management. Decision-makers must consider these challenges when initiating URPs. Social security schemes, efficient financial management, multi-dimensional impact assessments, policy analyses and adherence to laws, and public participation were proposed to mitigate these social risks. The effectiveness of these solutions was tested and quantified by recalculating the network densities and cohesions of the improved risk network. The results show that these strategies could effectively mitigate social risks related to housing demolition.

7.3 Contributions to Knowledge

7.3.1 Theoretical Implications

The theoretical implications of this study can be summarized in four points. First, this study bridges social sustainability theory with stakeholder theory, particularly in the area of UHD projects. Conceptual implications of social sustainability were investigated and discussed

based on a stakeholder perspective. In addition, the social sustainability of UHD was quantified based on the opinions of the key stakeholders. Valuable suggestions were proposed to enhance the social sustainability of UHD by reducing stakeholder-associated challenges. As mentioned in *Section 1.1.3*, social sustainability has a strong linkage with the wellbeing of stakeholders. Accordingly, integrating social sustainability with stakeholder management can enrich the understandings on sustainable development.

Second, this study contributes to the body of knowledge on social sustainability evaluation. Previous studies have typically integrated empirical data with sustainability principles to evaluate the social sustainability of different economic activities (e.g., Hosseinijou et al., 2014; Dong and Ng, 2015). However, in the field o UHD, a comprehensive assessment system based on the opinions of key stakeholders is still missing. General social sustainability indicators such as the Human Development Index cannot capture the characteristics of UHD. Consequently, general indicators cannot effectively reflect the social sustainability of UHD. To bridge this gap, this study established an indicator system to measure the social sustainability of UHD.

Third, this study contributes to the area of stakeholder conflict analysis. Previous studies typically analyzed stakeholder conflicts in UHD based on a theoretical model (e.g., game theory) without any empirical validation (e.g., Liu and Yin, 2012; Yang and Zhang, 2012). Therefore, the effectiveness of these studies cannot be estimated. More important, the analytical models in previous studies were typically too abstract and general. Such models failed to reflect the project specifics of different UHD projects. For example, the model

developed by Liu and Yin (2012) assumed that each stakeholder in UHD only had one simple objective, i.e., maximizing their own economic benefits. However, in real UHD cases, the objectives of stakeholders are more complex. In the current study, a conflict analysis model is developed that can capture stakeholder concerns and attitudes based on empirical investigations. The model can also demonstrate the specifics of different UHD projects. Compared with the conflict analysis theory proposed by Pawlak (1998), this paper focuses on decision-making instead of conflict quantification. Pawlak's theory has been effectively integrated with stakeholder salience analysis and integer optimization analysis.

Fourth, this study contributes to the body of knowledge on social risk management. Compared with other types of risks, social risks can be significantly affected by project stakeholders and alleviated through proper stakeholder coordination. In a few current studies, scholars such as Shi et al. (2015) and Liu et al. (2016) investigated the interests of stakeholders on the basis of qualitative analyses when evaluating social risks. Compared with those studies, the present study highlights the importance of stakeholder analysis in social risk management and quantifies the linkages between risks and corresponding stakeholders. Therefore, the roles of different stakeholders can be examined based on quantitative analyses. In practice, social risks generally interact with one another in UHD. However, most studies such as Chen and Yu (2011) and Ni (2015) paid insufficient attention to these interactions when ranking the relative importance of different social risks. This research gap can adversely affect the efficiency of risk management (Li et al., 2016). The SNA model developed in *Chapter 6* can be used to examine complex inter-relationships

among different risks when evaluating the impacts of these risks and mapping the most important risks. Accordingly, this finding can enhance the efficiency of social risk models in previous literature. Resonating with researchers such as Li et al. (2016) and Yang et al. (2014), this study argues that SNA can be effectively applied to settle stakeholder-associated issues. The application of SNA has been extended to the area of social risk management.

In terms of stakeholder analysis in UHD projects, previous studies have typically focused on governments, property developers and relocated households (e.g., Shih, 2010; Hu, 2005). This study investigated the opinions of all the key stakeholders involved in UHD programs. The interests of demolition crews, nearby residents and the general public were considered as well.

7.3.2 Practical Implications

The practical value of this study can be demonstrated from four aspects. First, this study provided an evaluation tool with 22 social sustainability indicators in UHD programs. This tool can help practitioners evaluate the social sustainability performance of their UHD projects and diagnose the key social issues requiring further improvements. Second, the conflict analysis model developed in this study can help practitioners balance competing claims from different stakeholders and control stakeholder conflicts in their UHD projects. Third, this study provided a framework for practitioners to effectively manage stakeholder-associated social risks in practice. Using this framework, practitioners can control adverse stakeholder impacts on the social sustainability of UHD. Fourth, constructive

suggestions were proposed in *Chapters 4 to 6* to enhance current UHD practices in China. For example, it is argued that efforts should be taken to mitigate the adverse impacts of UHD on the daily lives of nearby residents (in *Chapter 4*). As a result, the findings achieved from this dissertation can help practitioners improve their UHD practices in real cases.

7.4 Limitations

A few limitations should be acknowledged. First, due to the lack of a database, this study used first-hand data to fulfill the research objectives. As a result of limited time and resources, the sample size was relatively small. For example, in *Chapter 4*, the findings were mainly based on the context of Shanghai. Accordingly, modifications may be required in some other cases whose conditions differ from those of Shanghai. The primary modifications will be the indicator values instead of the indicator weights. Furthermore, as the findings of a signal case study may not be applicable to other cases, the conflict analysis model developed in *Chapter 5* should be further validated through more cases. According to Yin (2013), case study is not an effective method to build general theories but it enables researchers to extract in-depth and valuable insights from practices. The findings of a single case study can be regarded as the first step for theory building (Yin, 2013). In summary, the conclusions of this study should be tested by using large-sample data in future studies.

Second, this dissertation is a stakeholder-oriented study in which the focus was on the key stakeholders and stakeholder-associated challenges in UHD. In practice, other factors such as policies and laws can affect the social sustainability of UHD. These factors should be fully

examined in future studies.

Third, this study mainly focuses on the social dimension of sustainability in UHD. In practice, the economical and environmental indicators of UHD should be well integrated with the findings of this study. Tradeoffs among the social, economical, and environmental aspects of UHD may be required when practitioners design strategies for improving the sustainability of urban redevelopment.

7.5 Future Research Directions

Studies with large samples should be carried out to test the robustness and effectiveness of the findings in this study. Perhaps, a stakeholder-oriented database can be established in the future. With sufficient data, technologies such as regression and big data may be employed to provide more comprehensive analyses on stakeholder behaviors.

Other influencing factors such as housing policies should be investigated to produce a systematic map of the critical factors that determine the social sustainability of UHD. These critical factors should be integrated with this study. Empirical tools such as structural equation modeling can be used to examine the linkage and structure of these factors.

Additional studies linking sustainable development and stakeholder management should be conducted to bridge the gap between these two knowledge systems. Researchers should identify effective approaches to motivate and engage stakeholders to enhance sustainable development practices in China as well as in other countries across the world.

7.6 Conclusions

Due to the sharp conflicts of interest among different stakeholders, UHD has become a primary source of social sustainability issues such as mass incidents, social unfairness and violent resistance. In this study, the social sustainability and stakeholder-associated challenges in UHD were investigated to provide suggestions for improving the current UHD practices. First, the conceptual implications of social sustainability were analyzed based on literature analysis. Previous studies indicate that the social sustainability of UHD should be defined from the perspective of stakeholders. Second, an assessment system containing 22 indicators was established to quantitatively evaluate the social sustainability of UHD based on the wellbeing and key interests of stakeholders. This system was used to measure the social sustainability of UHD in Shanghai. Third, a conflict analysis model using Pawlak's conflict theory and stakeholder salience theory was developed to examine stakeholder conflicts in UHD. This model was applied in the case of the Sanlangqiao project. Forth, stakeholder-associated social risks in UHD were modeled based on SNA. Strategies were proposed to mitigate the adverse impacts of stakeholders on social sustainability. This study can provide guidance for practitioners to enhance the social sustainability of their UHD projects.

APPENDICES

Appendix A: Key Questions in the Pilot Study (English Version)

Part A: Stakeholder identification

1. In UHD projects, who can significantly affect the implementation of UHD? (followed by question 2)

2. Can you propose an example to show how this kind of stakeholders exerts an impact on the implementation of UHD?

3. In UHD projects, who can be significantly affected by UHD? (followed by question 4)

4. Can you propose an example to show how UHD projects influence this kind of stakeholders?

5. In the context of China, who has a stake in UHD projects?

Part B: The development of the indicator list

1. What are the key interests of Si (i=1,2,3,4,5,6) in UHD projects?

2. What factors can reflect the wellbeing of Si (i=1,2,3,4,5,6) in UHD projects?

3. What factors should be taken into consideration if decision-makers attempt to protect the key interests of Si (i=1,2,3,4,5,6) without sacrificing the key interests of other stakeholder groups in UHD projects?

4. What factors should be taken into consideration if decision-makers aim to improve the wellbeing of Si (i=1,2,3,4,5,6) without damaging the wellbeing of other stakeholder groups in UHD projects?

5. What measures can be taken to protect the key interests of Si (i=1,2,3,4,5,6) without sacrificing the key interests of other stakeholder groups in UHD projects?

6. What measures can be taken to improve the wellbeing of Si (i=1,2,3,4,5,6) without damaging the wellbeing of other stakeholder groups in UHD projects?

7. From the perspective of stakeholder, when practitioners aim to improve the social sustainability of UHD, the wellbeing or the key interests of these key stakeholders should be well maintained during UHD. Based on this viewpoint, what factors can significantly affect the social sustainability of UHD?

8. From the perspective of stakeholder, what indicators can be used to measure the social sustainability of UHD?

Appendix B: Key Questions in the Pilot Study (Chinese Version)

A 部分：利益相关者识别

1. 在城市拆迁项目中，哪些群体能显著影响拆迁的实施（第二题紧跟第一题）？
2. 能否举例说明，这类利益相关群体如何影响城市拆迁项目的实施？
3. 城市拆迁项目能够影响哪些群体（第四题紧跟第三题）？
4. 能否举例说明，城市拆迁项目如何影响这类利益相关群体？
5. 在中国情境下，哪类群体与城市拆迁项目存在显著的利害关系？

B 部分：指标开发

1. 在城市拆迁项目中，利益相关者 Si (i=1,2,3,4,5,6)的核心利益是什么？
2. 在城市拆迁项目中，哪些指标能反映利益相关者 Si (i=1,2,3,4,5,6)的幸福与健康状况？
3. 在城市拆迁项目中，不牺牲其他利益相关者核心利益的前提下保护利益相关者 Si (i=1,2,3,4,5,6)的核心利益，决策者要实现这一目标应考虑哪些因素？
4. 在城市拆迁项目中，不牺牲其他利益相关者幸福与健康的前提下保护利益相关者 Si (i=1,2,3,4,5,6)的幸福与健康，决策者要实现这一目标应考虑哪些因素？
5. 在城市拆迁项目中，不牺牲其他利益相关者核心利益的前提下保护利益相关者 Si (i=1,2,3,4,5,6)的核心利益，可以采取哪些措施实现这一目标？

6. 在城市拆迁项目中，不牺牲其他利益相关者幸福与健康的前提下保护利益相关者 Si (i=1,2,3,4,5,6)的幸福与健康，可以采取哪些措施实现这一目标？

7. 从利益相关者视角出发，如果要改善城市拆迁项目的社会可持续性，必须维护利益相关者的核心利益、幸福与健康。基于这一观点，哪些因素可以影响城市拆迁项目的社会可持续性？

8. 基于利益相关者视角，哪些指标可以度量城市拆迁项目的社会可持续性？

Appendix C: Key Questions in the Focus Group (English Version)

The indicator list (in Table 4.1) was sent to each member in the focus group before the open discussion. All of the participants in the focus group were stakeholders in UHD projects. The main topics of the discussion are displayed in the following part.

1. Can this indicator list comprehensively reflect the key interests of you in UHD projects?
2. Based on your personal experience, can you propose examples to show how these indicators reflect the key interests of you in UHD projects?
3. Can this indicator list comprehensively reflect the wellbeing of you in UHD projects?
4. Based on your personal experience, can you propose examples to show how these indicators reflect the wellbeing of you in UHD projects?
5. In your opinion, can this indicator list comprehensively reflect the key interests of the other key stakeholders in UHD?
6. In your opinion, can this indicator list comprehensively reflect the wellbeing of the other key stakeholders in UHD?
7. In your opinion, are there any logical or conceptual contradictions in the indicator list?
8. Which indicator in the list should be modified or cancelled? How can we modify this indicator?
9. Should we add more indicators to improve this indicator list?

Appendix D: Key Questions in the Focus Group (Chinese Version)

我们进行开放式讨论前，将指标列表（表 4.1）发送给每一位焦点小组成员。这些成员都是城市拆迁项目的利益相关者。本次讨论的话题如下：

1. 指标列表能否全面反映出您在城市拆迁项目中的核心利益？
2. 基于个人经验，能否举例说明这些指标如何影响您在城市拆迁项目中的核心利益？
3. 指标列表能否全面反映出您在城市拆迁项目中的幸福与健康状况？
4. 基于您的个人经验，能否举例说明这些指标如何影响您在城市拆迁项目中的幸福与健康状况？
5. 基于您的判断，该指标列表能否全面反映城市拆迁项目中关键利益相关者的核心利益？
6. 基于您的判断，该指标列表能否全面反映城市拆迁项目中关键利益相关者的幸福与健康状况？
7. 基于您的判断，当前指标列表是否存在逻辑或概念矛盾？
8. 哪些指标需要被调整或删除？应怎样调整？
9. 是否应增加新指标来改进当前指标列表？

Appendix E: A Survey for Measuring the Social Sustainability of Urban Housing Demolition-Questionnaire 1 (English Version)

Part A:

1. Professional expert in which you are representing:

A) Government B) Property developer C) Planner

D) Designer E) Consultant F) Academic G) Contractor G) Other:

_____

2. Years of working or research experience in the field related to urban housing demolition (please specify: _____)

A) < 3 years B) 3-5 years C) 5-10 years D) 11-15 years E) 16-20 years F) > 20 years

Part B:

Background: Stakeholders are defined as individuals or organizations that can affect or be affected by urban housing demolition (UHD). The key stakeholders in UHD include: local governments, property developers, relocated households, demolition crews, residents living in nearby communities and the general public. From the perspective of stakeholder theory, if practitioners aim to improve the social sustainability of UHD, the wellbeing or key interests of these stakeholders should be well maintained during UHD. Based on this viewpoint, an indicator system containing 22 indicators was developed for measuring the social

sustainability of UHD.

Please evaluate the relative importance of each indicator in the list:

1: Negligible, 2: Unimportant, 3: Less Important, 4: Important, 5: Extremely Important

Indicators	**Description of Each Indicator**	**Explanation of Each Indicator**	**Relative Importance**				
			1	**2**	**3**	**4**	**5**
Community transportation	To what degree the adverse impacts on community transportation can be controlled.	UHD can influence the transportation system of the nearby communities. For example, the transportation of demolition waste may cause traffic congestion in their communities. This issue adversely affected the daily life of residents living in nearby communities. Therefore, negative impacts on community transportation should be controlled during UHD projects.	□	□	□	□	□
Community security	To what degree the adverse impacts on community security can be reduced.	Valuable demolition waste products such steel may attract thieves and incur crimes. In addition, the flow of strangers (e.g., demolition crews) into the community can reduce the sense of security of the nearby residents. Consequently, efforts should be exerted toward improving community security during housing demolition.	□	□	□	□	□
Healthy/safe living conditions for nearby residents	To what degree the healthy/safe living conditions of nearby communities can be maintained.	UHD can cause adverse impacts on the health and safety of nearby residents. For example, toxic demolition waste such as lead can cause lung cancer. Thus, effective measures should be taken to reduce these adverse impacts.	□	□	□	□	□
Availability of public open place	To what degree the adverse impacts on the availability of public open place can be controlled.	Public open space can be occupied during UHD projects. For example, public spaces may be used for storing demolition waste and equipment. Since open place provides activity space for nearby residents to talk and share ideas with one other, UHD can adversely influence the social activities of these residents.	□	□	□	□	□
Availability of public facilities	To what degree the adverse impacts on the availability of public facilities (e.g., sport facilities; recreational facilities) can be reduced.	UHD can affect the nearby residents' use of public facilities. For example, outdoor sport facilities may be closed for safety reasons. Project managers should work to ensure that such facilities remain open.	□	□	□	□	□

Indicators	Description of Each Indicator	Explanation of Each Indicator	1	2	3	4	5
Fair remuneration	To what degree the payment for demolition crews and other employees in a UHD project can be reasonable and fair.	The employers should pay a fair salary to the demolition crews and other employees in a UHD project. However, some demolition workers maintained that their wages were docked in some projects because they were temporary workers without formal contracts with their employer.	□	□	□	□	□
Child labor	The percentage of child labor in UHD projects.	The employment of children should be avoided during UHD projects because it can incur social discontent from the general public and damage the reputation of governments.	□	□	□	□	□
Forced labor	To what degree the work load of demolition crews are reasonable.	Work overload should be avoided during UHD projects.	□	□	□	□	□
Health and safety of employees	To what degree the health and safety of employees can be protected.	The health and safety of demolition crews as well as other employees should be guaranteed during demolition projects. "Zero casualty" is an important indicator to evaluate the performance of government officials in UHD projects.	□	□	□	□	□
Working hours	To what degree the working hours of demolition crews and other employees are reasonable.	The working hours of demolition crews and other employees should be reasonable. For example, during the hot summer days of Shanghai, workers should have more resting time during the daytime. If not, their health and sense of happiness can be significantly damaged.	□	□	□	□	□
Equal job opportunities	To what degree individuals with different social backgrounds can obtain equal job opportunities in UHD.	In a demolition project, equal job opportunities should be given to people with different backgrounds and genders. For example, employers should not distinguish between local and nonlocal demolition crews. In addition, unemployment of relocated households induced by UHD activities should be compensated for in relocation schemes. A higher employment rate can contribute to enhancing the performance of local governments.	□	□	□	□	□
Personal dignity of demolition crews	To what degree the personal dignity of demolition crews can be protected in UHD projects.	The personal dignity of demolition crews should not be violated during UHD projects.	□	□	□	□	□
Illegal demolition	To what degree the relocation and demolition activities can conform to existing laws and policies.	Illegal demolition activities should be avoided during UHD projects. For example, demolition work should not be carried out without securing administrative approval.	□	□	□	□	□
Illegal waste disposal	To what degree illegal waste disposal can be reduced.	The disposal of demolition waste should not be performed in an illegal way. For example, demolition waste should not be transported to a waste disposal plant without an operating license.	□	□	□	□	□

Indicators	Description of Each Indicator	Explanation of Each Indicator	1	2	3	4	5
Violent incidents	To what degree violent incidents can be controlled during UHD.	Violent incidents among demolition crews, relocated households and governments should be avoided during UHD projects.	□	□	□	□	□
Stakeholder engagement and acceptance of the UHD plan	The degree of stakeholder engagement and acceptance.	Each stakeholder (especially vulnerable groups) should have effective approaches to express their opinions to the decision makers of UHD.	□	□	□	□	□
Fair compensation for relocated households	To what degree the compensation standards for different households can be consistent.	In a UHD project, reasonable compensation should be paid to relocated residents. To reduce development costs, in many cases governments/developers may send unfair compensations to relocated residents without any option for negotiation.	□	□	□	□	□
Personal dignity of relocated households	To what degree the personal dignity of relocated households can be maintained.	The personal dignity of relocated households should be protected in UHD projects.	□	□	□	□	□
Fair treatment for low-income and minority groups	To what degree low-income and minority groups can achieve the same benefits as stakeholders from higher social classes.	The interests of low-income or minority groups should be fairly treated and protected without discrimination.	□	□	□	□	□
Preserving social networks	To what degree the social ties in the demolished areas can be maintained.	The social relationships of relocated households should be well preserved because social relationships play an important role in maintaining the wellbeing of these residents. For example, relocated residents (especially the old) may feel frustrated after relocating because they may be unable to spend time with their old friends in his new community.	□	□	□	□	□
Preservation of the city's image	To what degree the city's image can be preserved during UHD.	Since UHD projects can change the image of a city, the adverse impacts of this process should be controlled to an acceptable degree.	□	□	□	□	□
Cultural heritage preservation	To what degree culture heritages can be preserved during UHD.	Cultural heritage near the demolition site should be carefully protected. However, to maximize business profit, governments/developers may demolish old buildings with cultural value to build high-priced buildings.	□	□	□	□	□

Appendix F: A Survey for Measuring the Social Sustainability of Urban Housing Demolition-Questionnaire 1 (Chinese Version)

城市拆迁的社会可持续性度量：问卷 1

A 部分：

1. 您代表了那种专业人士：

A) 政府　B) 地产开发商　C) 规划师

D) 设计师　E) 咨询师　F) 学术界研究者　G) 承包商　G) 其他:

_____

2. 您在城市拆迁相关领域的工作或研究经验（请您详细列出从业年数：

_____）

A) < 3 年　B) 3-5 年　C) 5-10 年　D) 11-15 年　E) 16-20 年　F) > 20 年

B 部分：

背景：城市拆迁项目的利益相关者被定义为：能够影响城市拆迁或者受到城市拆迁影响的组织或个人。城市拆迁项目的主要利益相关者包括：地方政府、房地产开发商、拆迁户、拆迁实施人员、拆迁项目附近的社区居民、社会公众。基于利益相关者理论，如果拆迁从业者想改善项目的社会可持续性，必须维护主要利益相关者的核心利益、幸福与健康。基于这一观点，我们建立了一个评价体系，包含22个指标，用于评估城市拆迁项目的社会可持续性。

请您评估下表中每个指标的重要性：

1：微不足道，2：不重要，3：次要，4：重要，5：非常重要

指标	指标描述	指标内涵解释	相对重要性				
			1	2	3	4	5
社区交通	拆迁项目能对周边社区的交通产生不利影响，本指标度量这种影响被有效控制的程度。	城市拆迁项目能显著影响附近社区居民的交通出行。例如，拆迁废弃物的运输能引起周边社区交通堵塞。这种堵塞对周边居民的日常生活带来负面影响。因此，在项目实施过程中，必须合理控制拆迁活动对周边交通的不利影响。	□	□	□	□	□
社区治安	拆迁项目能对周边社区的治安产生不利影响，本指标度量这种影响被有效控制的程度。	有价值的拆迁废弃物（例如，钢材）可能诱发偷盗等犯罪案件。此外，陌生人群（例如，拆迁实施人员）涌入社区会降低周边居民的安全感。因此，在城市拆迁项目中，应采取有效措施改善周边社区治安。	□	□	□	□	□
周边居民健康与安全的生活环境	在多大程度上，周边社区健康而安全的居住环境能够被维护。	拆迁项目能对周边居民的健康与安全产生负面影响。例如，有害拆迁废弃物铅的排放能够诱发癌症。因此，必须采取有效措施控制这类负面影响，维护社区居住环境的健康与安全。	□	□	□	□	□
公共空间的可达性	拆迁能对周边公共空间的使用带来负面影响，本指标度量这种影响被有效控制的程度。	公共空间在拆迁项目中可能被占用。例如，公共空间可能被用来堆放拆迁废弃物与设备。由于公共空间是周边居民日常交流、活动的主要场所，因此拆迁项目能够对居民正常的社交活动产生不利影响。	□	□	□	□	□
公共设施的可达性	拆迁能对周边公共设施（例如，体育设施、娱乐设施）的使用带来的不利影响，本指标度量这种影响被有效控制的程度。	拆迁项目能影响周边居民对公共设施的使用。例如，户外体育设施可能因为安全因素而被关闭。项目经理应尽量保证这些设施的正常使用。	□	□	□	□	□
公平的薪酬	在多大程度上，项目中拆迁实施人员以及其他雇员的薪酬是公平而合理的。	在拆迁项目中，雇主应支付给拆迁实施人员以及其他雇员合理的薪酬。然而，一些拆迁工人抱怨道，他们的工资在一些项目中被克扣，因为他们大多是临时工，往往与雇主之间没有正式合同。	□	□	□	□	□
童工	拆迁项目中童工使用比例。	在拆迁项目中，童工的使用应被杜绝。因为，童工的使用会引起社会不满情绪、损害政府形象。	□	□	□	□	□
强迫性劳动	拆迁实施人员工作强度的合理性。	在拆迁项目中，强制性超负荷工作应被杜绝。	□	□	□	□	□
雇员的健康与安全	雇员健康与安全的保障程度。	在拆迁项目中，拆迁实施人员以及其他雇员的安全与健康应该被保障。在拆迁项目中，“零伤亡”是政府官员绩效考评的重要指标。	□	□	□	□	□

指标	指标描述	指标内涵解释	1	2	3	4	5
工作时间	拆迁实施人员以及其他雇员工作时间的合理程度。	拆迁实施人员以及其他雇员的工作时间应该是合理的。例如，在上海炎热的夏季，拆迁工人在白天应该获得更多的休息时间。否则，这些工人的幸福感会被严重损害。	□	□	□	□	□
公平的就业机会	不同社会背景人士在拆迁中获得就业机会的公平程度。	在拆迁项目中，不同社会背景与性别的人应该能获取平等的就业机会。例如，雇主不应该区别对待本地与外地拆迁工人。此外，拆迁方案应该补偿那些由于拆迁而失业的拆迁户。高就业率可以改善地方政府的政绩。	□	□	□	□	□
拆迁实施人员的尊严	拆迁实施人员基本尊严得到维护的程度。	在拆迁项目中，拆迁实施人员的尊严不应该被侵犯。	□	□	□	□	□
非法拆除	拆迁活动符合法律与政策的程度。	拆迁项目应杜绝非法拆迁活动。例如，没通过行政审批的房屋拆除活动不应该被开展。	□	□	□	□	□
非法废弃物处置	在多大程度上，非法废弃物处置能够被消除。	拆迁废弃物的处理应该符合法律规定。例如，拆迁废弃物不应该被运送到没有运营许可证的处置场地进行处置。	□	□	□	□	□
暴力事件	在多大程度上，拆迁过程的暴力事件能够被控制。	在拆迁项目中，拆迁实施人员、拆迁户以及政府之间的暴力事件应该被杜绝。	□	□	□	□	□
利益相关者参与、利益相关者对拆迁方案的接受程度	利益相关者参与程度，对拆迁方案的接受程度。	拆迁项目应具备高效的沟通途径，使各利益相关者（特别是弱势群体）能够向拆迁决策者表达自己的观点与诉求。加强利益相关者参与，提高其对拆迁方案的接受程度。	□	□	□	□	□
公平的拆迁补偿款	对不同拆迁户，拆迁补偿标准的公平程度。	在拆迁项目中，政府应该向拆迁户支付合理的拆迁补偿。然而，为了降低开发成本，政府与开发方可能支付给拆迁户不公平的补偿金额，并且不进行任何协商。	□	□	□	□	□
拆迁户的个人尊严	在多大程度上，拆迁户的个人尊严能够得到维护。	在拆迁项目中，拆迁户的个人尊严应该得到维护。	□	□	□	□	□
对低收入、弱势群体的公平对待	在多大程度上，低收入或弱势群体能从拆迁项目中获取同其他利益群体（具备更高社会地位的群体）同等的利益。	低收入或弱势群体的利益应该被公正地对待，避免歧视的存在。	□	□	□	□	□
社会网络的保护	拆迁区域中社交网络的维护程度。	拆迁户的社交关系应该被有效维护。因为，社会关系对这些居民的幸福与健康产生重要影响。例如，拆迁户（特别是一些长者）在搬迁后可能产生失落情绪，因为他们不能在新社区经常见到自己的老朋友。	□	□	□	□	□
城市形象的保护	在拆迁过程中，城市形象的保护程度。	拆迁能改变城市的特征与风貌，应控制拆迁对城市形象的负面影响。	□	□	□	□	□
文化遗产的保护	在拆迁过程中，文化遗产的保护程度。	应合理保护拆迁场地附近的文化遗迹。然而，为了最大化经济利润，政府或开发商可能拆除那些具有文化价值的旧建筑，开发一些更有商业价值的建筑。	□	□	□	□	□

Appendix G: A Survey for Measuring the Social Sustainability of Urban Housing Demolition in Shanghai-Questionnaire 2 (English Version)

Part A:

1. Professional expert in which you are representing:

A) Government B) Property developer C) Planner

D) Designer E) Consultant F) Academic G) Contractor G) Other:

_____

2. Years of working or research experience in the field related to urban housing demolition (please specify: _____)

A) < 3 years B) 3-5 years C) 5-10 years D) 11-15 years E) 16-20 years F) > 20 years

Part B:

Background: Stakeholders are defined as individuals or organizations that can affect or be affected by urban housing demolition (UHD). The key stakeholders in UHD include: local governments, property developers, relocated households, demolition crews, residents living in nearby communities and the general public. From the perspective of stakeholder theory, if practitioners aim to improve the social sustainability of UHD, the wellbeing or key interests of these stakeholders should be well maintained during UHD. Based on this viewpoint, an indicator system containing 22 indicators was developed for measuring the social

sustainability of UHD.

Please evaluate the indicator values of Shanghai in the list.

1: Very poor, 2: Low Level, 3 Ordinary, 4: Outstanding, 5: Extremely outstanding

Indicators	**Description of Each Indicator**	**Explanation of Each Indicator**	**Indicator Values of Shanghai**				
			1	**2**	**3**	**4**	**5**
Community transportation	To what degree the adverse impacts on community transportation can be controlled.	UHD can influence the transportation system of the nearby communities. For example, the transportation of demolition waste may cause traffic congestion in their communities. This issue adversely affected the daily life of residents living in nearby communities. Therefore, negative impacts on community transportation should be controlled during UHD projects.	□	□	□	□	□
Community security	To what degree the adverse impacts on community security can be reduced.	Valuable demolition waste products such steel may attract thieves and incur crimes. In addition, the flow of strangers (e.g., demolition crews) into the community can reduce the sense of security of the nearby residents. Consequently, efforts should be exerted toward improving community security during housing demolition.	□	□	□	□	□
Healthy/safe living conditions for nearby residents	To what degree the healthy/safe living conditions of nearby communities can be maintained.	UHD can cause adverse impacts on the health and safety of nearby residents. For example, toxic demolition waste such as lead can cause lung cancer. Thus, effective measures should be taken to reduce these adverse impacts.	□	□	□	□	□
Availability of public open place	To what degree the adverse impacts on the availability of public open place can be controlled.	Public open space can be occupied during UHD projects. For example, public spaces may be used for storing demolition waste and equipment. Since open place provides activity space for nearby residents to talk and share ideas with one other, UHD can adversely influence the social activities of these residents.	□	□	□	□	□
Availability of public facilities	To what degree the adverse impacts on the availability of public facilities (e.g., sport facilities; recreational facilities) can be reduced.	UHD can affect the nearby residents' use of public facilities. For example, outdoor sport facilities may be closed for safety reasons. Project managers should work to ensure that such facilities remain open.	□	□	□	□	□

Indicators	Description of Each Indicator	Explanation of Each Indicator	1	2	3	4	5
Fair remuneration	To what degree the payment for demolition crews and other employees in a UHD project can be reasonable and fair.	The employers should pay a fair salary to the demolition crews and other employees in a UHD project. However, some demolition workers maintained that their wages were docked in some projects because they were temporary workers without formal contracts with their employer.	□	□	□	□	□
Child labor	The percentage of child labor in UHD projects.	The employment of children should be avoided during UHD projects because it can incur social discontent from the general public and damage the reputation of governments.	□	□	□	□	□
Forced labor	To what degree the work load of demolition crews are reasonable.	Work overload should be avoided during UHD projects.	□	□	□	□	□
Health and safety of employees	To what degree the health and safety of employees can be protected.	The health and safety of demolition crews as well as other employees should be guaranteed during demolition projects. "Zero casualty" is an important indicator to evaluate the performance of government officials in UHD projects.	□	□	□	□	□
Working hours	To what degree the working hours of demolition crews and other employees are reasonable.	The working hours of demolition crews and other employees should be reasonable. For example, during the hot summer days of Shanghai, workers should have more resting time during the daytime. If not, their health and sense of happiness can be significantly damaged.	□	□	□	□	□
Equal job opportunities	To what degree individuals with different social backgrounds can obtain equal job opportunities in UHD.	In a demolition project, equal job opportunities should be given to people with different backgrounds and genders. For example, employers should not distinguish between local and nonlocal demolition crews. In addition, unemployment of relocated households induced by UHD activities should be compensated for in relocation schemes. A higher employment rate can contribute to enhancing the performance of local governments.	□	□	□	□	□
Personal dignity of demolition crews	To what degree the personal dignity of demolition crews can be protected in UHD projects.	The personal dignity of demolition crews should not be violated during UHD projects.	□	□	□	□	□
Illegal demolition	To what degree the relocation and demolition activities can conform to existing laws and policies.	Illegal demolition activities should be avoided during UHD projects. For example, demolition work should not be carried out without securing administrative approval.	□	□	□	□	□
Illegal waste disposal	To what degree illegal waste disposal can be reduced.	The disposal of demolition waste should not be performed in an illegal way. For example, demolition waste should not be transported to a waste disposal plant without an operating license.	□	□	□	□	□

Indicators	Description of Each Indicator	Explanation of Each Indicator	1	2	3	4	5
Violent incidents	To what degree violent incidents can be controlled during UHD.	Violent incidents among demolition crews, relocated households and governments should be avoided during UHD projects.	□	□	□	□	□
Stakeholder engagement and acceptance of the UHD plan	The degree of stakeholder engagement and acceptance.	Each stakeholder (especially vulnerable groups) should have effective approaches to express their opinions to the decision makers of UHD.	□	□	□	□	□
Fair compensation for relocated households	To what degree the compensation standards for different households can be consistent.	In a UHD project, reasonable compensation should be paid to relocated residents. To reduce development costs, in many cases governments/developers may send unfair compensations to relocated residents without any option for negotiation.	□	□	□	□	□
Personal dignity of relocated households	To what degree the personal dignity of relocated households can be maintained.	The personal dignity of relocated households should be protected in UHD projects.	□	□	□	□	□
Fair treatment for low-income and minority groups	To what degree low-income and minority groups can achieve the same benefits as stakeholders from higher social classes.	The interests of low-income or minority groups should be fairly treated and protected without discrimination.	□	□	□	□	□
Preserving social networks	To what degree the social ties in the demolished areas can be maintained.	The social relationships of relocated households should be well preserved because social relationships play an important role in maintaining the wellbeing of these residents. For example, relocated residents (especially the old) may feel frustrated after relocating because they may be unable to spend time with their old friends in his new community.	□	□	□	□	□
Preservation of the city's image	To what degree the city's image can be preserved during UHD.	Since UHD projects can change the image of a city, the adverse impacts of this process should be controlled to an acceptable degree.	□	□	□	□	□
Cultural heritage preservation	To what degree culture heritages can be preserved during UHD.	Cultural heritage near the demolition site should be carefully protected. However, to maximize business profit, governments/developers may demolish old buildings with cultural value to build high-priced buildings.	□	□	□	□	□

Appendix H: A Survey for Measuring the Social Sustainability of Urban Housing Demolition in Shanghai-Questionnaire 2 (Chinese Version)

上海城市拆迁的社会可持续性度量：问卷 2

A 部分：

1. 您代表了那种专业人士：

A) 政府　B) 地产开发商　C) 规划师

D) 设计师　E) 咨询师　F) 学术界研究者　G) 承包商　G) 其他:

_____

2. 您在城市拆迁相关领域的工作或研究经验（请您详细列出从业年数：

_____）

A) < 3 年　B) 3-5 年　C) 5-10 年　D) 11-15 年　E) 16-20 年　F) > 20 年

B 部分：

背景：城市拆迁项目的利益相关者被定义为：能够影响城市拆迁或者受到城市拆迁影响的组织或个人。城市拆迁项目的主要利益相关者包括：地方政府、房地产开发商、拆迁户、拆迁实施人员、拆迁项目附近的社区居民、社会公众。基于利益相关者理论，如果拆迁从业者想改善项目的社会可持续性，必须维护主要利益相关者的核心利益、幸福与健康。基于这一观点，我们建立了一个评价体系，包含22个指标，用于评估城市拆迁项目的社会可持续性。

请您在下表中评估上海在每个指标项的得分：

1：很差，2：低水平，3：普通水平，4：出色，5：非常出色

指标	指标描述	指标内涵解释	上海的分值				
			1	2	3	4	5
社区交通	拆迁项目能对周边社区的交通产生不利影响，本指标度量这种影响被有效控制的程度。	城市拆迁项目能显著影响附近社区居民的交通出行。例如，拆迁废弃物的运输能引起周边社区交通堵塞。这种堵塞对周边居民的日常生活带来负面影响。因此，在项目实施过程中，必须合理控制拆迁活动对周边交通的不利影响。	□	□	□	□	□
社区治安	拆迁项目能对周边社区的治安产生不利影响，本指标度量这种影响被有效控制的程度。	有价值的拆迁废弃物（例如，钢材）可能诱发偷盗等犯罪案件。此外，陌生人群（例如，拆迁实施人员）涌入社区会降低周边居民的安全感。因此，在城市拆迁项目中，应采取有效措施改善周边社区治安。	□	□	□	□	□
周边居民健康与安全的生活环境	在多大程度上，周边社区健康而安全的居住环境能够被维护。	拆迁项目能对周边居民的健康与安全产生负面影响。例如，有害拆迁废弃物铅的排放能够诱发癌症。因此，必须采取有效措施控制这类负面影响，维护社区居住环境的健康与安全。	□	□	□	□	□
公共空间的可达性	拆迁能对周边公共空间的使用带来负面影响，本指标度量这种影响被有效控制的程度。	公共空间在拆迁项目中可能被占用。例如，公共空间可能被用来堆放拆迁废弃物与设备。由于公共空间是周边居民日常交流、活动的主要场所，因此拆迁项目能够对居民正常的社交活动产生不利影响。	□	□	□	□	□
公共设施的可达性	拆迁能对周边公共设施（例如，体育设施、娱乐设施）的使用带来的不利影响，本指标度量这种影响被有效控制的程度。	拆迁项目能影响周边居民对公共设施的使用。例如，户外体育设施可能因为安全因素而被关闭。项目经理应尽量保证这些设施的正常使用。	□	□	□	□	□
公平的薪酬	在多大程度上，项目中拆迁实施人员以及其他雇员的薪酬是公平而合理的。	在拆迁项目中，雇主应支付给拆迁实施人员以及其他雇员合理的薪酬。然而，一些拆迁工人抱怨道，他们的工资在一些项目中被克扣，因为他们大多是临时工，往往与雇主之间没有正式合同。	□	□	□	□	□
童工	拆迁项目中童工使用比例。	在拆迁项目中，童工的使用应被杜绝。因为，童工的使用会引起社会不满情绪、损害政府形象。	□	□	□	□	□
强迫性劳动	拆迁实施人员工作强度的合理性。	在拆迁项目中，强制性超负荷工作应被杜绝。	□	□	□	□	□
雇员的健康与安全	雇员健康与安全的保障程度。	在拆迁项目中，拆迁实施人员以及其他雇员的安全与健康应该被保障。在拆迁项目中，“零伤亡”是政府官员绩效考评的重要指标。	□	□	□	□	□

指标	指标描述	指标内涵解释	1	2	3	4	5
工作时间	拆迁实施人员以及其他雇员工作时间的合理程度。	拆迁实施人员以及其他雇员的工作时间应该是合理的。例如，在上海炎热的夏季，拆迁工人在白天应该获得更多的休息时间。否则，这些工人的幸福感会被严重损害。	□	□	□	□	□
公平的就业机会	不同社会背景人士在拆迁中获得就业机会的公平程度。	在拆迁项目中，不同社会背景与性别的人应该能获取平等的就业机会。例如，雇主不应该区别对待本地与外地拆迁工人。此外，拆迁方案应该补偿那些由于拆迁而失业的拆迁户。高就业率可以改善地方政府的政绩。	□	□	□	□	□
拆迁实施人员的尊严	拆迁实施人员基本尊严得到维护的程度。	在拆迁项目中，拆迁实施人员的尊严不应该被侵犯。	□	□	□	□	□
非法拆除	拆迁活动符合法律与政策的程度。	拆迁项目应杜绝非法拆迁活动。例如，没通过行政审批的房屋拆除活动不应该被开展。	□	□	□	□	□
非法废弃物处置	在多大程度上，非法废弃物处置能够被消除。	拆迁废弃物的处理应该符合法律规定。例如，拆迁废弃物不应该被运送到没有运营许可证的处置场地进行处置。	□	□	□	□	□
暴力事件	在多大程度上，拆迁过程的暴力事件能够被控制。	在拆迁项目中，拆迁实施人员、拆迁户以及政府之间的暴力事件应该被杜绝。	□	□	□	□	□
利益相关者参与、利益相关者对拆迁方案的接受程度	利益相关者参与程度，对拆迁方案的接受程度。	拆迁项目应具备高效的沟通途径，使各利益相关者（特别是弱势群体）能够向拆迁决策者表达自己的观点与诉求。加强利益相关者参与，提高其对拆迁方案的接受程度。	□	□	□	□	□
公平的拆迁补偿款	对不同拆迁户，拆迁补偿标准的公平程度。	在拆迁项目中，政府应该向拆迁户支付合理的拆迁补偿。然而，为了降低开发成本，政府与开发方可能支付给拆迁户不公平的补偿金额，并且不进行任何协商。	□	□	□	□	□
拆迁户的个人尊严	在多大程度上，拆迁户的个人尊严能够得到维护。	在拆迁项目中，拆迁户的个人尊严应该得到维护。	□	□	□	□	□
对低收入、弱势群体的公平对待	在多大程度上，低收入或弱势群体能从拆迁项目中获取同其他利益群体（具备更高社会地位的群体）同等的利益。	低收入或弱势群体的利益应该被公正地对待，避免歧视的存在。	□	□	□	□	□
社会网络的保护	拆迁区域中社交网络的维护程度。	拆迁户的社交关系应该被有效维护。因为，社会关系对这些居民的幸福与健康产生重要影响。例如，拆迁户（特别是一些长者）在搬迁后可能产生失落情绪，因为他们不能在新社区经常见到自己的老朋友。	□	□	□	□	□
城市形象的保护	在拆迁过程中，城市形象的保护程度。	拆迁能改变城市的特征与风貌，应控制拆迁对城市形象的负面影响。	□	□	□	□	□
文化遗产的保护	在拆迁过程中，文化遗产的保护程度。	应合理保护拆迁场地附近的文化遗迹。然而，为了最大化经济利润，政府或开发商可能拆除那些具有文化价值的旧建筑，开发一些更有商业价值的建筑。	□	□	□	□	□

Appendix I: Key Types of Interview Questions in the Sanlangqiao Project (English Version)

Part A: Identification of Stakeholder Concerns

1. What are your key concerns in the Sanglangqiao project?

2. What will affect your key interests in the Sanglangqiao project?

3. What do you want to achieve from the Sanglangqiao project?

4. What are your key objectives in the Sanglangqiao project?

Part B: Stakeholder Attitudes

1. What is your attitude toward concern i (the 22 stakeholder concerns in Table 5.3)? Positive, neutral, or negative?

   "Positive" means that an increase in this concern will benefit you. "Neutral" means that this concern does not affect your interests. "Negative" means that a reduction in this concern will benefit you.

2. To what degree can concern i (the 22 stakeholder concerns in Table 5.3) affect your interests? Please give a value from 1 to 5 where a high value indicates that this concern can significantly affect your interests.

Part C: Stakeholder Attributes

We can use five stakeholder attributes to describe the characteristics of the stakeholder

groups in the Sanlangqiao project. The five attributes include power, urgency, legitimacy, the level of impact and the probability of impact. The power of a stakeholder group depends on their ability to mobilize social and political forces as well as their ability to control the key resources that determine the survival and development of the organization. Urgency refers to "the degree to which stakeholder claims call for immediate attention." Legitimacy is defined as "a generalized perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions." Typically, a high level of legitimacy means that the claim is reasonable or proper. The level of impact reflects to what degree the stakeholder will take efforts to influence the project. The probability of impact reflects the likelihood that the stakeholder will exert an impact on the project.

1. Please evaluated the five stakeholder attributes of Si (i=1,2,3,4,5,6) on a 5-point Likert scale where 5 denoted extremely high, 4 denoted high, 3 denoted ordinary, 2 denoted low and 1 denoted extremely low.

Stakeholder attributes of relocated residents

Relocated residents	1	2	3	4	5
Power	□	□	□	□	□
Urgency	□	□	□	□	□
Legitimacy	□	□	□	□	□
The level of impact	□	□	□	□	□
The probability of impact	□	□	□	□	□

Stakeholder attributes of local governments

Local governments	1	2	3	4	5
Power	□	□	□	□	□
Urgency	□	□	□	□	□
Legitimacy	□	□	□	□	□
The level of impact	□	□	□	□	□
The probability of impact	□	□	□	□	□

Stakeholder attributes of developers

Developers	1	2	3	4	5
Power	□	□	□	□	□
Urgency	□	□	□	□	□
Legitimacy	□	□	□	□	□
The level of impact	□	□	□	□	□
The probability of impact	□	□	□	□	□

Stakeholder attributes of demolition crews

Demolition crews	1	2	3	4	5
Power	□	□	□	□	□
Urgency	□	□	□	□	□
Legitimacy	□	□	□	□	□
The level of impact	□	□	□	□	□
The probability of impact	□	□	□	□	□

Stakeholder attributes of nearby residents

Nearby residents	1	2	3	4	5
Power	□	□	□	□	□
Urgency	□	□	□	□	□
Legitimacy	□	□	□	□	□
The level of impact	□	□	□	□	□
The probability of impact	□	□	□	□	□

Stakeholder attributes of the general public

General public	1	2	3	4	5
Power	□	□	□	□	□
Urgency	□	□	□	□	□
Legitimacy	□	□	□	□	□
The level of impact	□	□	□	□	□
The probability of impact	□	□	□	□	□

Part D: Decision-making Parameters

1. What are the primary decision-making principles in the Sanlangqiao project?

2. Whose interests should be given a higher level of priority in the Sanlangqiao project? Please evaluate the weight of each stakeholder group (i.e., ∂_i).

3. The maximum degree of stakeholder conflict in this project is 154.94 (a theoretical value). What is your acceptable degree of stakeholder conflict in this project (i.e., SC_{max})? What is your expected degree of stakeholder conflict?

4. To what degree can stakeholder conflicts damage the performance of this project (i.e., γ)?

Appendix J: Key Types of Interview Questions in the Sanlangqiao Project (Chinese Version)

A 部分：利益相关者的利益关注点识别

1. 在三郎桥项目中，您有哪些利益关注点？

2. 在三郎桥项目中，哪些因素可能影响到您的利益？

3. 您期待从三郎桥项目中获得什么？

4. 在三郎桥项目中，您的主要目标是什么？

B 部分：利益相关者态度

1. 您对利益关注点i（表5.3中的22个利益关注点）的态度是什么？积极，中立，还是消极？

   “积极”意味着 i 的水平有所上升会给您带来好处。“中立”意味着 i 不会影响到您的利益。“消极”意味着 i 的水平降低会给您带来好处。

2. 利益关注点i（表5.3中的22个利益关注点）在多大程度上能够影响到您的利益？请用1到5的数值表示，一个较高的数值意味着i能够对您的利益产生较为显著的影响。

C 部分：利益相关者属性

在三郎桥项目中，我们可以用五大利益相关者属性来度量不同利益相关者集团的特征。这五个属性包括：权力性，紧迫性，合法性，影响程度，以及影响可能性。利益相关者集团的权力性取决于其调动社会、政治以及自身资源来影响项目组织生存与发展的

能力。急迫性指的是“在多大程度上，利益相关者的索求需要一个及时的关注。”合法性被定义为“在一个被广泛接受的认知或假设前提下，一个实体的行为在一定道德规范、价值观、信仰体系中的合理程度。”一般情况下，某种索求的合法性比较高意味着这种索求是理性的、合理的。影响程度反映了利益相关者对项目施加影响的程度。影响可能性反映了利益相关者对项目施加影响的可能性。

1. 请在一个 5 分制李克特量表上评估利益相关者 Si （i=1,2,3,4,5,6）的五大利益相关者属性。5 意味着非常高的水平，4 意味着高水平，3 意味着普通水平，2 意味着低水平，1 意味着非常低的水平。

拆迁户的利益相关者属性

拆迁户	1	2	3	4	5
权力性	□	□	□	□	□
紧迫性	□	□	□	□	□
合法性	□	□	□	□	□
影响程度	□	□	□	□	□
影响可能性	□	□	□	□	□

地方政府的利益相关者属性

地方政府	1	2	3	4	5
权力性	□	□	□	□	□
紧迫性	□	□	□	□	□
合法性	□	□	□	□	□
影响程度	□	□	□	□	□
影响可能性	□	□	□	□	□

开发方的利益相关者属性

开发方	1	2	3	4	5
权力性	□	□	□	□	□
紧迫性	□	□	□	□	□
合法性	□	□	□	□	□
影响程度	□	□	□	□	□
影响可能性	□	□	□	□	□

拆迁实施人员的利益相关者属性

拆迁实施人员	1	2	3	4	5
权力性	□	□	□	□	□
紧迫性	□	□	□	□	□
合法性	□	□	□	□	□
影响程度	□	□	□	□	□
影响可能性	□	□	□	□	□

周边居民的利益相关者属性

周边居民	1	2	3	4	5
权力性	□	□	□	□	□
紧迫性	□	□	□	□	□
合法性	□	□	□	□	□
影响程度	□	□	□	□	□
影响可能性	□	□	□	□	□

公众的利益相关者属性

公众	1	2	3	4	5
权力性	□	□	□	□	□
紧迫性	□	□	□	□	□
合法性	□	□	□	□	□
影响程度	□	□	□	□	□
影响可能性	□	□	□	□	□

D 部分：决策参数

1. 在三郎桥项目中，您的主要决策原则是什么？

2. 在三郎桥项目中，谁的利益应被优先考虑？请您评估每个利益相关者集团的优先度权重（即，∂_i）。

3. 三郎桥项目中利益相关者的最大冲突程度是 154.94（理论计算值）。如果 154.94 表示极度冲突（例如，大规模群体性事件），0 表示没有冲突，您能够接受的冲突程度是多大（即，SC_{max}）？您所期待的利益相关者冲突度是多少？

4. 利益相关者冲突会在多大程度上造成项目绩效的损失（即，γ）？

Appendix K: Key Types of Interview Questions in the Social Risk Analysis (English Version)

Part A: Identification of Social Risks

Emails were sent to each interviewee before this research step. The email briefly described the background and purposes of this study (social risks in UHD).

1. What are the major risks that may cause social conflicts in UHD projects?

2. In the latest UHD project that you experienced, can you list some social risks in this project?

3. Can you propose additional social risks that are not presented in the risk list (in the third question, the researcher showed each interviewee a risk list compiled based on existing literature, i.e., risks identified by literature in Table 6.1; in the first and second questions, the researcher did not display this list)?

4. How can these additional risks affect the benefits of stakeholders and the performance of UHD projects?

5. In the latest UHD project that you experienced, how did these additional risks affect the benefits of stakeholders and the performance of this project?

6. Which risks (in Table 6.1) may be associated with you in UHD projects?

7. In the latest UHD project that you experienced, how did these risks affect you? How did

you influence these risks?

Part B: Identification of Inter-relationships

The social risks listed in Table 6.1 were sent to each interviewee before this step.

8. Can risk S_aR_b significantly affect S_cR_d in UHD projects?

9. If S_aR_b impacts S_cR_d, what is the likelihood of this potential effect (the likelihood of the link)?

10. If S_aR_b impacts S_cR_d, to what degree can S_aR_b influence S_cR_d (the degree of influence)?

Part C: Identification of Risk Mitigation Strategies.

The critical risks presented in Table 6.5 were sent to each interviewee before this research step.

11. Based on the perspective of stakeholder management, what can be done to mitigate challenge i (i=1,2,3,4,5,6)?

12. If you are a senior manager in a UHD project, how can you deal with challenge i (i=1,2,3,4,5,6)?

13. If you are a senior official in the local government, what measures can you take to deal with challenge i (i=1,2,3,4,5,6)?

14. In the latest UHD project that you experienced, what measures were adopted to deal with challenge i (i=1,2,3,4,5,6)?

Appendix L: Key Types of Interview Questions in the Social Risk Analysis (Chinese Version)

A 部分：社会风险识别

本文作者在调研前向每位访谈专家发送电子邮件。邮件简要描述了研究背景与目的（城市拆迁的社会风险）。

1. 在城市拆迁项目中，能够诱发社会冲突的风险主要有哪些？

2. 在您最近经历的一个城市拆迁项目中，能否列举出一些这个项目中存在社会风险？

3. 您能否补充几个没有出现在这张风险清单上的社会风险（在第三个问题中，研究者向每个访谈专家展示了一张基于文献梳理而编制的风险清单，即，表 6.1 中基于文献而识别的风险；在第一与第二个问题中，研究者没有展示这张风险清单）？

4. 这些额外补充的社会风险如何影响利益相关者的利益以及拆迁项目的绩效？

5. 在您最近经历的一个拆迁项目中，这些额外补充的社会风险如何影响利益相关者的利益以及拆迁项目的绩效？

6. 表 6.1 中列举的社会风险，哪些会在拆迁项目中与您产生关联？

7. 在您最近经历的一个拆迁项目中，这些（与您产生关联的）风险如何影响您？您如何影响这些风险？

B 部分：风险间相互关系识别

在这一研究步骤开始前，本文作者将表 6.1 中列举的全部社会风险发送给每一位访谈专家。

8. 在城市拆迁项目中，风险 S_aR_b 是否能影响风险 S_cR_d？

9. 如果风险 S_aR_b 能影响风险 S_cR_d，那么这一影响发生概率是多少（网络关联的概率）？

10. 如果风险 S_aR_b 能够显著影响风险 S_cR_d，那么 S_aR_b 对 S_cR_d 的影响程度是多少（影响强度）？

C 部分：风险消除策略识别

在这一研究步骤开始前，本文作者将表 6.5 中识别的重要社会风险发送给每一位访谈专家。

11. 基于利益相关者管理视角，哪些策略可以用来消除风险挑战 i (i=1,2,3,4,5,6)？

12. 如果您在城市拆迁项目中担任高级经理，您会如何应对风险挑战 i (i=1,2,3,4,5,6)？

13. 如果您是一名政府高级行政人员，您会采取哪些措施应对风险挑战 i (i=1,2,3,4,5,6)？

14. 在您最近经历的拆迁项目中，哪些措施被采用应对风险挑战 i (i=1,2,3,4,5,6)？

Appendix M: The Computer Program of the Sanlangqiao Project

```
from pyomo.environ import *

import numpy as np

#data

gamma = 0.4

SCmax = 40

sn = 6

n = 22

SI = {1:0.46, 2:1, 3:0.4, 4:0.26, 5:0.16, 6:0.24}

partial = {1:0.15, 2:0.075, 3:0.075, 4:0.1, 5:0.1, 6:0.5}

a_txt = np.loadtxt('data_a_ik.txt')

b_txt = np.loadtxt('data_b_ik.txt')

dim_sn = range(1,sn + 1)

dim_n = range(1,n + 1)

model = ConcreteModel()

model.d = Var(dim_n, bounds = (-1,1), within = Integers)

a = {}

for i in dim_sn:

    for k in dim_n:

        a[i,k] = a_txt[i-1,k-1]

b = {}
```

```
for i in dim_sn:
    for k in dim_n:
        b[i,k] = b_txt[i-1,k-1]
def obj_rule(model):
    return sum(partial[i]*sum(model.d[k]*a[i,k]*b[i,k] for k in dim_n) for i in dim_sn)\
    - gamma*(sum(sum(SI[i]*b[i,k]*((1 - a[i,k]*model.d[k])/2)for k in dim_n) for i in dim_sn))
model.OBJ = Objective(rule = obj_rule, sense = maximize)
def SC_rule(model):
    return sum(sum(SI[i]*b[i,k]*((1 - a[i,k]*model.d[k])/2)for k in dim_n) for i in dim_sn) <= SCmax
model.SC = Constraint(rule = SC_rule)
solver = SolverFactory('gurobi')
results = solver.solve(model)
results.write()
obj = []
obj = value(model.OBJ)
print(obj)
d = []
for i in dim_n:
    d.append(value(model.d[i]))
```

```
print(d)
```

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