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Identification of Risk Factors in the Senior Care Facility PPP Project

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Abstract

China is currently facing severe pressure from an aging population, with the scale of aging population expanding and deepening. The demand for senior care facilities and services is increasing. The government and social capital provide senior care services and facilities through Public-Private Partnerships (PPP) projects. This not only efficiently provides services and safe and reliable institutions and facilities for residents with corresponding needs, but also alleviates the government's financial burden, shares government's public responsibilities, and better provide public services for society. Therefore, it has become the main way for many local governments to provide senior care services. However, the implementation of senior care facility PPP projects faces risks such as low project success rates, insufficient income to cover costs, and project abandonment, which negatively impact the sustainability and profitability of the projects. Therefore, researching the risks of senior care facility PPP projects holds significant practical significance and theoretical value.

Keywords

Elderly care facilities, risk identification, PPP projects.

1. Introduction

Currently, China's aging society is in a rapid development stage. According to the latest data from the Chinese government website, by the end of 2022, the elderly population aged 60 and above in the country reached 280.04 million people, accounting for 19.8% of the total population; the elderly population aged 65 and above was 209.78 million people, accounting for 14.9% of the total population, with a dependency ratio of 21.8 [1], showing an increasing trend year by year. At the same time, the number of elderly people continues to increase, while the birth rate of newborns has been decreasing. Meanwhile, a large proportion of the middle-aged and young population faces significant work pressure, has little leisure time, and lacks energy. Over time, the burden of caring for the elderly at the family level has been increasing, with the elderly generally lacking necessary care and services. Therefore, the social demand for elderly care facilities and services is growing rapidly, and the rapid construction of such facilities and services is urgent.

Traditional elderly care facility management is government-controlled, with all risks borne solely by government departments. This has led to issues such as insufficient financial resources, lack of technical expertise, collusion between government and business, corruption, etc., which not only hinder the efficient and quality completion of social elderly care service goals but also have a negative impact on the government's image, making it difficult for the public sector to manage public affairs effectively. Therefore, involving private sector participation in the construction and operation of elderly care facilities, through the implementation of PPP projects in elderly care facilities, has become an effective solution to these problems. Compared with traditional elderly care facility management, PPP elderly care

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facility management not only focuses on infrastructure quality but also places emphasis on post-operation quality. It introduces social capital to improve the profitability and service quality of elderly care institutions. Therefore, in-depth study of the risk factors in PPP elderly care facility and service projects using this model holds certain theoretical value and practical significance.

2. Construction of Framework for Identifying Risk Factors in Senior Care Facility PPP Projects

2.1. HHM Risk Identification Procedus

2.1.1. Sub-section Headings

The Hierarchical Holographic Mapping (HHM) risk identification procedure is a method used to identify and assess risks. It is based on the concept of Hierarchical Holographic Modeling, which involves breaking down a system into multiple levels and analyzing it from macro to micro levels to comprehensively and systematically identify and assess risks. HHM is a methodology aimed at capturing and showcasing the inherent differences across various perspectives, aspects, views, and dimensions within a system. By dividing a complete system into multiple subsystems and then continuously refining the system based on different models under each subsystem through iterations, the system can be further broken down [2].

Through the HHM risk identification procedure, risks can be comprehensively and systematically identified and evaluated, assisting organizations in formulating effective risk management strategies and decisions. It provides deeper insights, helping organizations better manage risks in uncertain and complex environments. Therefore, applying the HHM method allows for a holistic view of risk identification in senior care facility PPP projects, breaking down and identifying risk levels comprehensively to capture all risk factors involved.

The working process of risk identification using HHM is as follows: first, establish an overall identification framework for the project risk system, horizontally decompose identification dimensions under the framework, and then divide corresponding risk system levels at the next level. Once the division is complete, dynamic interactions between different perspectives and levels need to be conducted to identify risk factors. With the gradual improvement of information, the positions of the system levels during the identification process will continuously change, the risk identification framework will be optimized continuously, and the risk scenarios will gradually align with the actual situation. After multiple cycles, a comprehensive list of risk factors can be established [3]. The specific identification process is shown in Figure 1.

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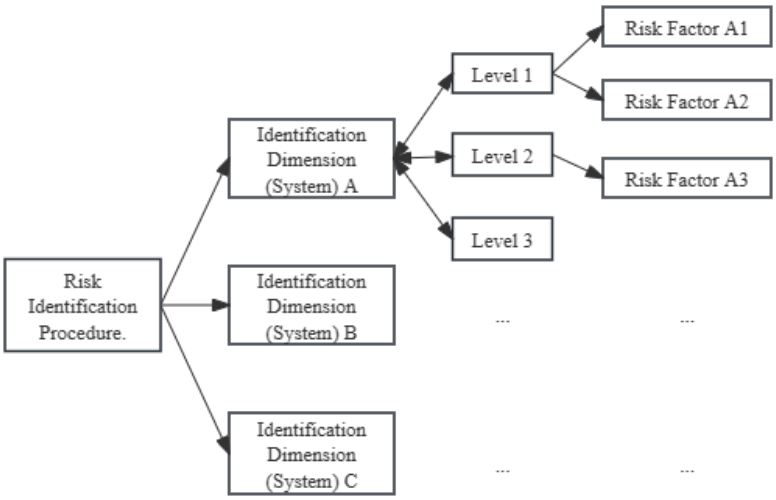

Figure 1: Risk identification process diagram

2.2. Overall Risk Identification Framewors

In order to attract investment from social capital and to have them jointly bear the social management functions with the government while sharing project risks, some elderly care facilities adopt a Public-Private Partnership (PPP) model which involves cost provision, project construction, operation and maintenance, as well as audit and supervision by a combination of national government and social forces. This makes projects in the elderly care facilities sector to have both inherent risk factors of the elderly care industry itself and some common risk factors present in PPP projects.

From the perspective of government regulation, the main entities and stakeholders involved in elderly care facilities PPP projects include social capital providers, third-party assessment agencies, and target service groups. The project's overall lifecycle involves different actors and tasks at each stage, with corresponding risks present at each stage. For example, deviations in the needs analysis for the target group during the planning phase could impact the project's implementation. The complexity and variability of the surrounding environment during the PPP project's cooperation period can affect contract formation, construction, and operations. Economic risks within the project system may lead to cost overruns, procurement and engineering changes, and operational cost overruns, potentially affecting the project's smooth operation and sustainability. External risks include societal and environmental factors that can influence the project's construction value and social benefits by impacting the surrounding environment, culture, and resident lifestyles. Therefore, a comprehensive risk identification framework for elderly care PPP projects from the government regulation perspective considers stakeholders, project lifecycle, and system engineering dimensions.

Based on the considerations of risk identification efficiency, effectiveness, cost, and feasibility, the overall risk identification framework for elderly care facilities PPP projects from the perspective of government regulation can be defined as follows:

(1) Stakeholder Dimension: Risk factors will be analyzed at four levels, involving social capital providers, third-party project evaluation agencies, and the target service groups.

(2) Project Lifecycle Dimension: Risk factor analysis can be conducted at four levels - planning stage, design stage, implementation stage, and completion stage.

(3) System Engineering Dimension: Risk analysis considers three levels - societal, economic, and environmental factors.

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Based on these dimensions, the comprehensive risk identification framework for elderly care facilities PPP projects from the government regulation perspective is depicted in Figure 2.

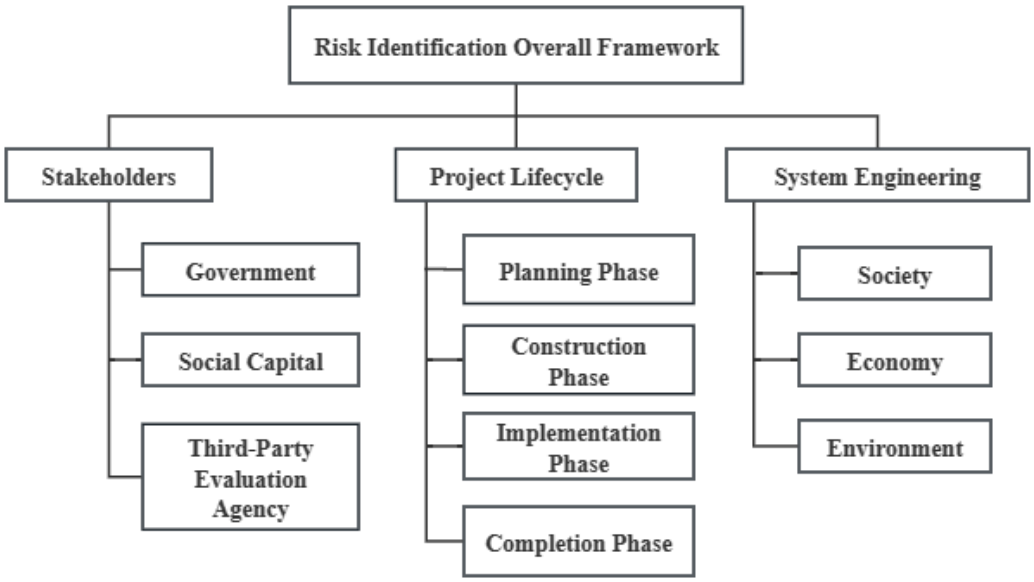

Figure 2: Risk Identification Framework

$$c_2 = a_2 + b_2. \quad (1)$$

3. Identification process of risk factors in the PPP project of elderly care facilities

3.1. Risk factor identification system

As shown in the above figure, this article establishes the overall risk identification framework for the Gung Ho Elderly Apartment PPP project. Based on the HHM risk identification procedure, the risk identification process of this project involves continuously changing positions among system levels within this framework and iteratively refining the identification framework, dividing a system into multiple subsystems, and further decomposing by the subsystems to compile a list of all potential risk factors, allowing for a layered analysis of the risks of the project. Initially, three analysis dimensions are used as specific scenarios for three systems: stakeholders in the system including social capital providers, third-party evaluation agencies, and target service groups as the first-level system; project lifecycle phases-planning, scheduling, implementation, and completion—as the second-level system; and the economic, social, and environmental aspects of the systems engineering as the third-level system. Subsequently, within these three specific scenarios, stakeholders are maintained as the first-level system, and the project lifecycle and systems engineering intersect and rotate scenarios at the second and third levels, capturing the intersecting risk factors among the systems and conducting risk identification to ultimately compile the project's risk list.

3.2. Composition of risk factor identification system

As shown in Figure 3, risk identification in the PPP project of elderly care facilities first requires the establishment of identification criteria. Based on the project itself, the identification criteria

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are determined as project stakeholders, project lifecycle, and project systemic engineering, with project stakeholders including social capital partners, third-party assessment agencies, and target service groups, project lifecycle encompassing planning, design, implementation, and completion phases, and project systemic engineering covering societal, economic, and environmental aspects. Each criterion forms a distinct layer of the system. Subsequently, these categories are interconnected and subjected to hierarchical exchanges to generate a variety of intersecting scenarios. Finally, risk factors are identified within each scenario to compile a comprehensive list of project risk factors.

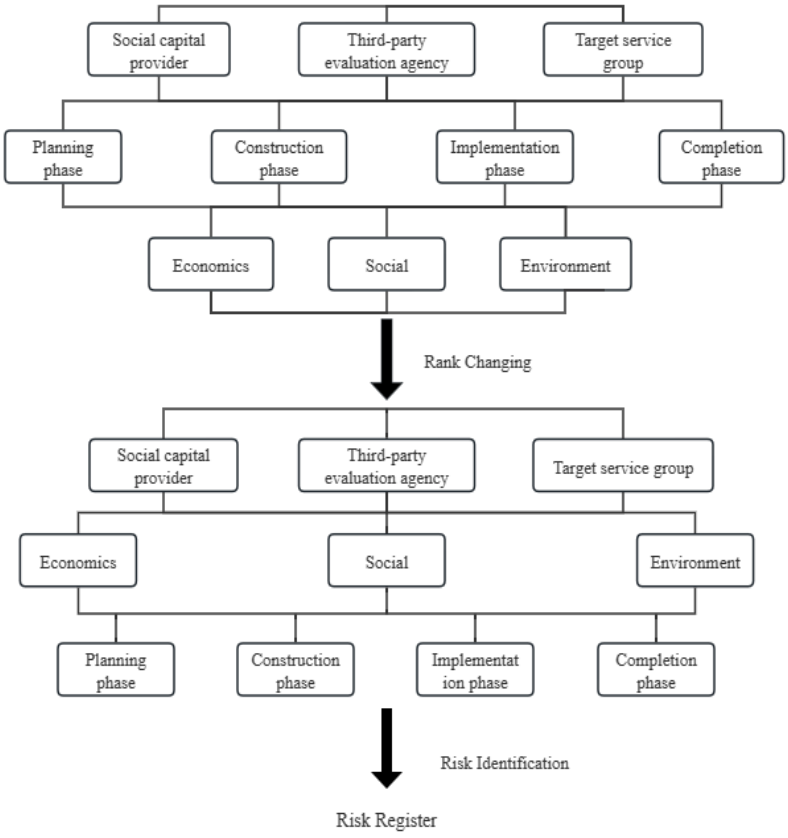

Figure 3. Risk identification process

4. Risk identification results for the pension facility PPP project

4.1. Components of risk factors

This article summarizes and analyzes the main risk factors that have led to the failure or issues in Chinese PPP projects based on the compilation of cases by Qi Xia [2]; Li Li [7] reclassifies the risks of infrastructure PPP projects from a full lifecycle perspective, divided into decision-making, financing, construction, operation stages, and overall lifecycle standpoint; Liu Jicai [4] employs a questionnaire survey to collect relevant data, conducts multi-factor analysis using SPSS 17.0 software to identify key risks affecting China's PPP projects; Feng Xuedong [5] summarizes 16 risk factors in the investment process of pension real estate PPP projects from four aspects: project construction, operation status, elderly care industry, and macro environment; Liu Chengguang [10] synthesizes the research content and findings of scholars

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such as risk factors summarized by consulting experts and managers of elder care PPP projects to draw conclusions in section 4.2, in combination with the content of this study.

4.2. Components of risk factors

By combining the perspectives of the aforementioned scholars, project participants (i.e., project stakeholders), the project itself (with the project lifecycle as a guideline), and the project's external relationships (from a system engineering perspective), a relatively comprehensive list of project risk factors has been formed.

Firstly, under the stakeholder dimension [11], the risk factors involved by each party are as follows:

(1) Social capital providers, including risks associated with government financing, government credit, government intervention, administrative approval, project construction, etc.;

(2) Third-party evaluation agencies, including inadequate evaluations, favoritism, difficulty in applying evaluation results, etc.;

(3) Target groups, including satisfaction with the project, recognition of government work, etc.

Secondly, under the project lifecycle dimension [12], the risk factors involved in each project development stage are as follows:

(1) Planning stage, including demand analysis, feasibility analysis, etc.;

(2) Planning stage, including decision-making, investment, bidding, organizational establishment, etc.;

(3) Implementation stage, including organizational coordination, supervision, management, etc.;

(4) Completion stage, including evaluation, acceptance, project termination, etc.

Finally, under the system engineering dimension [13], the risk factors involved in various aspects are as follows:

(1) Social risks, including risks related to social development, social equity, social opposition, government intervention, etc.;

(2) Social capital providers, including risks associated with government financing, government credit, government intervention, administrative approval, project construction, etc.;

(3) Economic risks, including cost overruns, insufficient income, economic management risks, etc.;

(4) Environmental risks, including risks related to land acquisition and relocation, impacts on residential life, inadequate supporting infrastructure, etc.

After forming a comprehensive risk list through the risk identification process mentioned above, unnecessary factors are filtered, repeated factors are merged between levels, and the final key risk factor list and their interpretations are obtained as shown in Table 1.

Table 1: List of risk factors

Risk Factors	Interpretations	Source of Indicators
Government credit risk	Government's various credit risks in contracts and throughout the project process	Qi Xia [6], Liu Jicai [8], Liu Chengguang [10]

ISSN: 2688-8653

Government credit risk	Risks arising from government's excessive intervention in the process of public-private cooperation	Li Li [7], Liu Jicai [8]
Administrative approval risk	Risks encountered in the project approval process, such as complicated procedures and delays in project timelines	Qi Xia [6], Li Li [7], Liu Jicai [8]
Contract risk	Abnormal losses caused by actions of one or both parties to the contract	Li Li [7], Liu Jicai [8]
Project competition risk	Risks of competition with projects of the same type	Qi Xia [6], Liu Jicai [8] Feng Xuedong [9]
Inadequate evaluation	Risks of evaluation agencies engaging in favoritism, fraudulent behavior, or perfunctory evaluations during the assessment process.	Author proposed
Difficulties in applying evaluation results	Difficulties in applying evaluation results in form and content	Author proposed
Project satisfaction	Risk of project target group's satisfaction level with the project	Author proposed
Government work recognition	Risks associated with evaluation of government work in the project	Author proposed
Risk of demand analysis	Risk of project demand analysis errors	Qi Xia [6], Liu Jicai [8] Feng Xuedong [9], Liu Chengguang [10]
Feasibility analysis risk	Risk of project feasibility analysis errors	Liu Chengguang [10]
Decision-making errors	Risks of procedural non-compliance or unscientific content in the decision-making process	Qi Xia [6], Li Li [7] Liu Jicai [8]
Tendering risks	Various technical and non-technical risks in the project tendering process	Li Li [7]
Financial Risk	Risk of not meeting financing objectives due to market, institutional, credit and other reasons	Qi Xia [6], Li Li [7], Liu Jicai [8], Liu Chengguang [10]
Organizational Establishment Risk	Risks such as improper distribution of authority and responsibilities, human resource management errors, etc., in the establishment of the project organization	Li Li [7], Liu Chengguang [10]
Coordination risk	Coordination among various stakeholders, functional departments, and organizational members	Li Li [7], Liu Chengguang [10]
Product pricing risk	Risk of user benefits and project profits being damaged due to inappropriate price setting	Liu Jicai [8], Feng Xuedong [9]
Process control risk	Risks such as neglecting process control or failing to implement process control adequately	Author proposed
Evaluation acceptance risk	Project failure or failure to achieve expected goals based on evaluation results	Li Li [7], Feng Xuedong [9]
Project closure risk	Difficulties encountered during project handover and closure after the contract expires	Li Li [7], Feng Xuedong [9]

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Public opposition	Risks caused by project opponents and stakeholders who suffer from the project implementation	Qi Xia [6], Li Li [7], Liu Jicai [8]
Societal development risk	Risks of improper or negligent behavior during the project implementation affecting societal development	Author proposed
Social equity risk	Impact on social equity due to the limited regional scope of target groups for the project	Author proposed
Financial risk	Macro-economic risks such as interest rate fluctuations beyond a certain range or inflation	Qi Xia [6], Liu Jicai [8], Feng Xuedong [9]
Cost overrun	Risks of exceeding the budget in project construction, operation, and maintenance	Li Li [7], Liu Jicai [8], Feng Xuedong [9]
Insufficient income	Risk of project income being unable to cover costs	Qi Xia [6], Liu Chengguang [10]
Economic management risk	Risk of financial mismanagement, purchasing, marketing mistakes in project management	Li Li [7], Feng Xuedong [9], Liu Chengguang [10]
Land requisition and demolition risk	Risks related to the legality of land requisition and demolition process, issues with compensation of relevant interests in land acquisition	Li Li [7]
Impact on residents' lives	Various detrimental effects on the lives of local residents due to the project	Feng Xuedong [9]
Inadequate supporting facilities	Risk of insufficient supporting facilities around the project area, such as inconvenient transportation	Feng Xuedong [9]

5. Conclusion

This article uses the HHM hierarchical holographic modeling method to construct a risk identification framework for the PPP project of elderly care facilities. By integrating the research of some scholars, a general list of risk factors has been formed:

(1) The risk factor list consists of three dimensions:

Risks related to stakeholders;

Risks during the project lifecycle;

Risks arising from the project's impact on the external environment.

(2) Risks related to stakeholders include:

Risks associated with government actions;

Risks for project operators;

Risks related to third-party evaluation entities.

(3) Risks during the project lifecycle include factors associated with the following stages:

Project planning stage;

Project design stage;

Project implementation stage;

Project completion stage.

(4) External risks generated by the project as a systemic project include:

ISSN: 2688-8653

Risks related to the project's social impact;
Risks associated with the project's economic impact;
Risks arising from the project's environmental impact.

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