

Risk Study of PPP Infrastructure Projects

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Abstract

The PPP (Public-Private Partnership) model provides significant financial impetus for public infrastructure projects in China. With the deepening of urban public infrastructure construction modes, there has been an increasing number of PPP projects that have gained recognition from the government for their role in promoting cooperation between the government and private capital. However, PPP projects are faced with various risks that affect their implementation and operation. This paper analyzes the risks and influencing factors of PPP projects in public infrastructure projects, starting with the characteristics of public infrastructure projects under the PPP model. Finally, this paper provides risk management strategies for PPP projects in infrastructure projects and makes recommendations for achieving better results in PPP project risk management.

Keywords

PPP projects, Infrastructure Construction, Risk Management.

1. Introduction

The PPP model for engineering projects is a cooperative model in which government departments and non-governmental partners jointly participate, sharing risks and achieving shared benefits between the government and private capital, while serving society. Major infrastructure projects that are crucial to national security and people's livelihoods, such as water conservancy projects, bridges, and water plants, require significant funding to be built and operated smoothly. The application of the PPP model in these projects greatly reduces the difficulty of raising funds for such projects. Compared with traditional mode projects, PPP projects have changed the outdated model of separating financing, construction, and operation, reducing the internal friction between the three and maximizing project value-added through deep integration. However, the implementation results of the PPP model in China's infrastructure field show that the value-added effect of projects is not significant, and a few projects have even failed to achieve the expected results, leading to problems such as project delays, investment or cost overruns. Therefore, analyzing and studying the risks of PPP projects has practical significance. In summary, this paper selects the distribution data of employment regions for college graduates in Anhui Province from 2019 to 2022, and analyzes the changing trend of regional mobility for graduates from a specific perspective.

2. PPP projects and their characteristics

PPP projects refer to a type of project operation mode in public infrastructure through government and social capital cooperation. By encouraging private enterprises and government to cooperate, they participate in the construction of public infrastructure, and introduce private capital to participate in the construction of infrastructure projects. Its characteristics include:

PPP projects are a new project financing and operation model. It refers to the government using pre-publicized profit-sharing rules such as franchise rights, reasonable pricing, and fiscal subsidies to introduce social capital to participate in social welfare investments and operations such as social infrastructure, with the characteristics of sharing benefits and risks. It plays to the advantages of both sides to improve the quality and supply efficiency of public goods or services.

The PPP model ensures that private capital can make profits to a certain extent. Non-profit infrastructure projects cannot attract private capital investment, and private sector participation in project investment and operation is aimed at obtaining profits. Under the PPP model, the government can provide corresponding compensation policy support to private capital investors, such as tax incentives, loan guarantees, priority development of land along the line for private enterprises, and other compensation and policy support. The implementation of these compensations and policies can increase the enthusiasm of private capital to invest in social infrastructure projects.

It also reduces the government's initial construction investment burden and risks while improving the service quality of infrastructure projects. During the implementation of the PPP model, public sector and private enterprises jointly participate in the construction and operation of social infrastructure projects. Private enterprises are responsible for project financing, which may increase the number of capital projects and reduce the debt-to-asset ratio. It can not only save government investment, but also transfer some project risks to private enterprises, thereby reducing government risks. At the same time, both sides can form a long-term goal of mutual benefit and win-win, better serving society and the public.

3. Risks in PPP projects

Due to the involvement of multiple parties and the long duration of PPP projects, it is difficult to predict their risks. As a result, risks need to be continuously identified and the project needs to be timely mitigated.

(1) Financial risk

PPP projects typically have a large construction scale and a long construction period, and currency and interest rate fluctuations are frequent and unpredictable, which can easily cause financial risks. A significant increase in the interest rate cost of project loans can lead to a rapid increase in project financial expenditures. Financial risks can lead to unpredictable project revenues, and even reduced returns that result in financial crises.

(2) Government credit risk

Government credit risk refers to the failure of the government of the country where the project is located to fulfill the responsibilities and obligations stipulated in the contract, causing losses to the project. Changes in government planning and insufficient implementation during the project implementation process can lead to construction interruptions, resulting in the idle use of project resources, wastage of resources, and loss of funds.

(3) Construction and operation risk

Construction risk mainly refers to the risk of cost overruns and project delays during the construction process. Sufficient construction funds are necessary for smooth project construction. If construction funds are insufficient, the project cannot be started on time, which not only delays the construction period but also leads to cost overruns.

Operation risk refers to the inadequate profitability of the project company due to unreasonable prior analysis, poor management, production and technical failures, and other factors after project construction completion. In recent years, China has gradually attached importance to environmental protection in project construction and operation processes, and

the construction and operation processes of many PPP projects may cause certain environmental damage to the local environment, which may delay the normal delivery and use of projects and increase project operating costs.

During the construction and operation process of PPP projects, there may also be risks of public resistance, which refer to the risks caused by various factors in the project construction process that fail to protect or damage public interests, resulting in public opposition to project construction.

(4) Force majeure risk

Force majeure risk mainly refers to natural risks (natural force majeure events) and social risks (political force majeure events). Force majeure risks can bring significant risks and impacts to the project and are unavoidable. Force majeure risks can only be transferred through insurance and other means.

(5) Cooperation risk

Cooperation risk refers to the incompatibility of interests that impedes the formation of a stable strategic consensus community between the government and private sectors throughout the PPP project lifecycle. The first is the lack of cooperation and coordination among project participants, resulting in an increase in communication costs. The second is that risk sharing does not meet the actual needs, resulting in an unfair distribution of risk between the two parties. The third is the lack of experience of project participants, who are unfamiliar with the characteristics of PPP projects

4. Analysis of Investment Risk Factors in PPP Projects

PPP projects have a long life cycle, and at any stage, inadequate planning or insufficient work may lead to project investment risks. The specific reasons are as follows:

(1) PPP projects are long and complex

PPP projects are infrastructure construction projects with a long life cycle and a high degree of complexity in the operating model, making the project susceptible to many uncertain factors. These uncertain factors can be divided into two levels: the first level includes factors related to national management policies, economics, laws, and other aspects; the second level includes investment, market changes, costs, and project revenue factors related to project benefits. Throughout the entire life cycle of the project, these uncertain factors are likely to exist widely and may cause significant deviations between the actual operation of the project and the expected results, leading to risks such as market changes, policy changes, and failure to achieve expected targets.

(2) Imperfect risk-sharing mechanism

In PPP projects, there are many government, enterprise, and other participating parties, and because the project duration is long, no party is willing to bear all the risks independently. In this case, the risk-sharing mechanism of PPP projects will fail to function. Therefore, PPP projects need to establish a scientific risk-sharing mechanism based on the risk avoidance and risk-bearing abilities of each party to prevent project investment risks.

(3) Unsatisfactory economic benefits of PPP projects

In the construction process of PPP projects, inadequate cost control and frequent design changes can lead to cost overruns. In the construction process of PPP projects, delayed supply of raw materials and fluctuations in raw material prices can also lead to an increase in project construction costs. In this case, the final revenue of PPP projects often fails to reach the expected target, leading to unsatisfactory economic benefits of PPP projects, which can easily cause investment risks in the project.

(4) Lack of innovation in PPP project risk management mode

For the risk management of PPP projects, only by doing a good job in the risk management of PPP project decision-making, investment, construction, and operation can it be more effective. However, some cities do not pay attention to using the full life cycle theory to promote innovation in PPP project risk management mode during the implementation of PPP projects. The application of information technology in PPP project risk management is relatively limited, and some cities have not systematically applied BIM technology to PPP project risk management. The risk management of PPP projects exists in a fragmented way, with weak data aggregation and the comprehensive analysis and management system for PPP project risk management has not yet formed. Some cities do not pay attention to the application of big data technology, artificial intelligence technology, and other technologies in PPP project risk management, and lack scientific data support in internal control. The scientific level of PPP project audit work is not high.

5. Risk Management Measures for PPP Projects

(1) Strengthening the comprehensiveness of risk management for PPP projects

PPP projects involve various aspects that are closely interconnected, and only by further strengthening the comprehensiveness of risk management throughout the entire project can we better prevent and mitigate any risks that may arise during project implementation. This primarily involves enhancing the overall risk management of PPP projects by effectively managing decision-making risks, financing risks, construction risks, operational risks, and other project-related risks throughout the entire process. This will ultimately increase the overall level of PPP project risk management and establish a relatively sound mechanism for comprehensive risk management throughout the project lifecycle. Although many PPP projects have achieved high levels of risk management, it should also be noted that some cities are weaker in this aspect and need to improve their capabilities.

(2) Strengthening the comprehensiveness of risk management for PPP projects

The comprehensiveness of risk management for PPP projects is a prominent feature of the entire lifecycle theory, which has a fundamental and supportive role in strengthening the comprehensiveness of risk management for PPP projects. During the process of decision-making risk management for PPP projects, it is important to manage risks at each stage and in each area of decision-making, continuously optimize and improve the decision-making risk management system, and vigorously strengthen the mechanism for decision-making risk management. Applying the entire lifecycle theory to the risk management of PPP projects can also promote the overall construction of risk management work by systematically designing the risk management plan and work plan for PPP projects, which can ultimately achieve better results for PPP project risk management.

(3) Strengthening the inclusiveness of risk management for PPP projects

The entire lifecycle management requires the participation of all personnel; only in this way can it achieve greater breakthroughs. Applying the entire lifecycle theory to the risk management of PPP projects can involve personnel from various fields and levels in the risk management of PPP projects, thus maximizing the quality and level of PPP project risk management. PPP projects face certain environmental risks, and to effectively prevent and control these risks, the entire lifecycle theory can effectively combine "prevention" and "control" in decision-making. The government in the project area can scientifically design PPP projects based on their financial resources and analyze and judge the sustainable investment and effective operation capabilities of social capital during the organization and implementation process, ultimately making more informed decisions. During the implementation of PPP projects, the government, society, enterprises, and all personnel can

work together to organize the implementation of the project, thus forming a strong force to prevent and control the risks associated with PPP projects.

6. Conclusion

In this paper, we provide a detailed introduction of the reasons and management measures for investment risks in PPP projects. The paper has practical value and reference significance. The article analyzes PPP project investment risks from different perspectives and levels and proposes corresponding solutions, which can be used for reference by actual participants and managers of PPP projects. Additionally, the paper points out some deficiencies and limitations in PPP project risk management and provides beneficial suggestions for improving the level and effectiveness of PPP project risk management.

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