

Research on Project Management Based on PPP Model

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Abstract: With the continuous development of the global economy, the public-private partnership (PPP) model is increasingly used in the field of project management. Through in-depth cooperation between the government and social capital, the PPP model achieves optimal allocation of resources and reasonable sharing of risks, brings new solutions to infrastructure construction and the improvement of social public services, and achieves a win-win situation. This article analyzes the main characteristics of the PPP model through the literature review method, discusses the main advantages of PPP project management, focuses on the existing problems of PPP project management, and proposes specific solutions to the problems to help project managers carry out projects under the PPP model. Scientific and efficient project management provides theoretical support and practical guidance to ensure that enterprises maximize economic benefits, improve project quality, and promote the healthy and sustainable development of the PPP model in more fields.

Keywords: PPP model, project management, risk sharing, economic benefits

1. Introduction

With the continuous improvement of China's comprehensive competitiveness, the relevant researchers have applied the PPP model in project management work in order to maintain the development of the market economy comprehensively. This mode can relieve the pressure of social economy and resource pressure, improve the economic benefits of enterprises, and promote the healthy and stable development of enterprises. As an innovative way of cooperation, the public-private partnership (PPP) model has been widely used in infrastructure and public services.

This paper uses the literature review to sort out the relevant research results at home and abroad, and mainly studies the project management under the PPP mode [1]. At a special conference in 2023, Professor Wang Shouqing, known as the "Godfather of China's PPP," pointed out that rural revitalization and regional coordination are the strategies actively promoted at the national level. The central government is also vigorously promoting the general contracting of design, procurement and construction (EPC) and whole-process engineering consulting, to promote the coordinated development of intelligent construction and construction industrialization. The construction industry should seize the opportunity, do a good job in supply and demand analysis, promote strengths and make up for weaknesses, and build core competitiveness. Secondly, scholar Zhao Yunxia explored the existing problems and countermeasures of project management in PPP mode in the research published in Vitality magazine in 2023, aiming to improve the effectiveness of project management [2].

2. PPP model theory and project management application

2.1. Definition of the PPP mode

Public-private partnership (PPP) is a partnership between government departments and private organizations to provide public goods or services. This model is based on the concession agreement, encouraging private enterprises and private capital to participate in the construction and operation of public infrastructure, realizing resource sharing and risk sharing, and improving the efficiency and quality of projects through professional division of labor. The PPP model originated from the "public and private cooperation" financing mechanism in the UK, and was first proposed by the British government in 1982. This model forms a partnership through the concession agreement between the government and private organizations to jointly build urban infrastructure or provide public services. Since its introduction in China in 1995, the PPP model has gone through many stages from preliminary examination and exploration to high-speed development and regulation, and has been continuously improved and promoted [3]. Nowadays, the PPP model has become one of the governance modes to achieve sustainable development in the new urbanization construction, and is widely used in the field of infrastructure investment and construction and public utilities.

2.2. Characteristics of project management under the PPP mode

2.2.1. Multi-subject participation and collaborative management

Projects in the PPP model usually involve multiple entities, including the government, the private sector, financial institutions, contractors, operators, and so on. This multi-agent structure brings diversified resources and professional skills, enabling the project to obtain all-around support in the capital, technology, management and other aspects. At the same time, the various subjects need to cooperate closely, through the establishment of effective communication mechanisms and contract management mechanisms, to ensure that the interests of all parties agree, and can work together to achieve the goal in the whole life cycle of the project. Although the PPP model emphasizes the involvement of the private sector, the government still needs to strictly regulate the projects to ensure their compliance and public interest. The regulatory role of the government not only protects the public interest, but also provides trust and support for the smooth progress of the project. In PPP projects, multi-subject participation can bring rich financial resources, different subjects have different risk tolerance, and multi-subject participation gathers different ways of thinking and innovation ability, so as to meet the complex needs of the project, improve the project adaptability, and enhance the sustainability of the project. In addition, collaborative management not only improves the execution of the project, but also reduces the possible disadvantages caused by single-subject management, such as corruption and inefficiency, etc.

2.2.2. Long-term cooperation and benefit sharing

PPP projects usually involve long-term cooperation cycles, ranging from several years to decades. This long-term cooperation mechanism ensures the sustainability and stability of the project, and helps all parties to build solid relationships to jointly meet various challenges in the life cycle of the project. The PPP model also emphasizes benefit sharing, and achieves win-win results between both public and private parties through reasonable distribution of project benefits. This mechanism can not only motivate the private sector, but also improve the investment efficiency of projects.

2.2.3. Complexity of the risk-sharing mechanism

In the PPP model, the government and the private sector jointly bear the project risks, clarify the rights and obligations of both parties through the contract terms, and reduce the risk burden of a single subject. The risk-sharing mechanism can encourage both parties to manage and control projects more carefully, reducing potential uncertainty. The PPP model encourages professional management in the private sector and uses advanced technology and management experience to improve the construction quality and operational efficiency of projects. The government is responsible for supervision and ensuring project compliance and public interest. The maintenance period of the project is an important link for the PPP project company to ensure the normal operation of the basic functions of the project. During the maintenance period of the project, regular inspection and maintenance are required to ensure that all functions of the project are in good condition, and the project is handed over to the government in good condition. Professional management not only improves the overall efficiency of the project, but also helps the government to save management costs and ensure service quality and safety [4].

2.2.4. Innovation and diversification of financing

The PPP model can broaden the financing channels of projects, attract the participation of private capital, and reduce the financial pressure on the government. Diversified financing channels not only improve the capital availability of the project, but also promote the development of the capital market. At the same time, the PPP model can promote innovation and efficiency improvement. Since the private sector usually has a higher level of management and technology, it is able to introduce advanced technology and management methods, thus improving the efficiency and effectiveness of the project [5].

2.3. Advantages of project management under the PPP mode

In the PPP mode, the key success factors of project management mainly include clear goal setting, effective communication mechanisms, comprehensive risk management, efficient resource optimization and strict cost control. Clear goals can ensure the consistent interests of all parties, effective communication to promote teamwork, risk management to reduce the impact of uncertainty, resource optimization and cost control to improve the economic benefits of the project. These elements complement each other and work together in the whole life cycle of the PPP project to ensure the smooth implementation of the project and achieve the expected goals. Through scientific and reasonable project management, the PPP model can realize the complementary advantages of the government and social capital, and promote the sustainable development of infrastructure construction and public services [6].

2.3.1. Integrate resources to improve project efficiency

In the PPP model, both the public sector and the private sector jointly participate in the project. The public sector often has resources such as land and policy support, while the private sector has resources such as capital, technology and management. For example, in some infrastructure construction projects, the government provides the land needed for the project construction, while private enterprises invest funds and professional engineering construction teams. The integration of resources of both sides can avoid the idle and waste of resources, and make the project start and be promoted faster.

The public and private sectors have different expertise in project management. The public sector is familiar with macro-level issues such as policies, regulations and social needs, while the private

sector has more experience in micro-operations such as cost control and innovative management. Take urban rail transit projects as an example: government departments are responsible for planning lines to meet the overall development needs of the city, while private enterprises are responsible for adopting advanced construction technology and efficient project management methods in the construction process, so as to improve the overall efficiency of the project through this division of labor and cooperation.

2.3.2. Reduce the financial pressure on the government

For large infrastructure projects, such as highways and airport construction, require huge investment. Under the PPP model, the private sector undertakes the task of raising a part of the project funds. For example, for a highway project that costs billions of yuan, private enterprises may invest part of the money, which greatly reduces the financial pressure on the government to bear all the construction funds alone.

Risks in PPP projects are shared by the public and private sectors. The government no longer needs to face all the risks of the project alone, such as market risks, construction risks, etc. In project processing, if the market demand is lower than expected or the construction cost is overspent, private enterprises will bear a certain proportion of the risk according to the contract, rather than all paid by the government, which indirectly reduces the financial burden of the government [7].

2.3.3. Introducing advanced technology and management experience

Private companies tend to introduce advanced technologies in order to become profitable and remain competitive. Take new energy power projects, for example, private energy companies apply the latest solar or wind power technologies to projects. Advanced technology can not only improve the performance of the project, such as improving the efficiency of power generation and reducing operating costs, but also promote the technological upgrading of the whole industry.

Private enterprises have accumulated rich management experience in the market economy environment, such as cost management, quality management, human resource management, etc. In PPP projects, management experience can be introduced into project management. For example, in the PPP project of hospital construction and operation, private enterprises will apply their efficient cost management experience to the operation of hospitals, optimize the procurement process and rationally allocate human resources, so as to improve the operation efficiency of the hospital.

3. Problems and measures of project management under PPP mode

3.1. Main problems existing in the project management under the PPP mode

3.1.1. Risk management

A comprehensive risk management mechanism, including risk identification, assessment, response and monitoring. The risk-sharing mechanism of the government and social capital parties is clarified and specified in detail in the contract. A risk-sharing fund can be set up, and when a risk event occurs, it can be quickly handled according to the contract terms, so as to reduce the uncertainty and disputes in the project promotion.

3.1.2. Financing issues

PPP projects, especially infrastructure projects, have huge investments in the early stage, a long investment recovery period and slow capital recovery speed. In addition, the private sector faces many obstacles in obtaining financing, such as high financing costs and limited channels. Compared with

the traditional operation mode, the PPP mode often presents the dilemma of high financing costs and few financing channels, leading to the decline of project participation [8].

3.1.3. Contract management

As in the project management of PPP model, contract management plays a vital role. In the PPP project contract, the imbalance of risk sharing is a significant problem. In some cases, the government makes too many commitments and guarantees in contracts to attract social capital to participate in projects, such as providing large tax incentives. This results in the government taking on more risks that could have been dispersed through a more balanced distribution. The opposite situation also exists. Sometimes, the government will take advantage of its strong position to transfer more risks to social capital, so that they can bear more risks than a reasonable share, thus affecting the enthusiasm of social capital to participate in projects. This unbalanced risk-sharing not only increases the project uncertainty, but may also lead to frequent disputes in contract execution. At the same time, the contract lacks a dynamic adjustment mechanism.

3.2. Improve the project management measures under the PPP mode

3.2.1. Strengthen risk identification and assessment

To establish a comprehensive risk identification system, we should not only consider traditional construction and operation risks, but also pay attention to emerging risks such as environment and society. For example, for a PPP project involving infrastructure construction, the risk of the impact on the surrounding ecological environment in the project construction process, as well as the risk of changes to the social structure of the local community after the operation of the project. It is helpful to determine the probability distribution of risk and the degree of possible loss, and to provide the basis for the development of coping strategies. Clarify the principle of sharing between government and social capital under different risk types. Establish a dynamic risk adjustment mechanism. With the progress of the project, the nature of the risk and influence degree may change, according to the actual situation timely adjust the risk sharing ratio, the diversification of risk response strategy, for unpredictable risks, such as natural disaster risk, risk reserve system, and buy the corresponding commercial insurance, to reduce the risk loss [9].

3.2.2. Diversified financing

Encourage social capital parties to adopt diversified financing methods. In addition to traditional bank loans, we can also actively use the bond market, equity financing and other ways. For some large-scale PPP projects with international influence, it can attract funds from international financial institutions or foreign investors, and introduce international advanced financing concepts and risk management experience. The government will strengthen the policy support for the PPP project financing. We will improve the infrastructure of the financial markets and make them more transparent and efficient. According to the characteristics and needs of the project, the proportion of debt financing and equity financing is reasonably determined. For PPP projects with low risk and stable income, the proportion of debt financing can be appropriately increased to reduce the financing cost; while for projects with high risk and uncertain income, the proportion of equity financing should be increased to improve the anti-risk ability of the projects. Adopt structured financing methods, such as asset securitization. The assets, such as future usufruct or receivables in PPP projects, are packaged, and asset-backed securities are issued to withdraw funds in advance and improve the liquidity of funds [10].

3.2.3. Strengthen the contract specification

Strictly control the contract approval process in the procurement phase of PPP projects. During contract approval, ensure that the allocation of risks, rights, and responsibilities is reasonable, with particular attention to the government's commitments, which should be strictly regulated to avoid excessive risk-taking. Standardized contract templates should be used and reviewed from a technical perspective to ensure contract compliance, thereby reducing additional financial risks caused by unclear terms. Through a rigorous approval process, ensure that each stage is supported by evidence and follows established rules, thus improving the overall quality and reliability of the contracts. Establish effective contract adjustment mechanisms to address uncertainties arising from environmental changes. Contracts should incorporate a degree of flexibility and adjustment mechanisms to regulate execution and improve the credibility of local governments in honoring agreements[11].

4. Conclusion

This paper deeply discusses the public-private partnership (PPP) model theory, project management application, project management problems and measures. As an innovative way of cooperation, PPP mode combines the advantages of the public sector and the private sector, which can effectively integrate resources and improve the efficiency and quality of the project. It is an innovative mode integrating public-private cooperation, which requires the joint efforts of all parties to constantly innovate and improve the management mechanism. With the continuous promotion and deepening of PPP model, project management will pay more attention to innovation, synergy and sustainable development.

However, this study has certain limitations, particularly the lack of sufficient data analysis to support its conclusions. In future research, greater emphasis will be placed on conducting in-depth empirical studies and collecting comprehensive data to further validate and refine the findings presented in this paper.

References

- [1] Cheng, M., Liu, L., Cheng, X., & Tao, L. (2024). Risk analysis of public-private partnership waste-to-energy incineration projects in China: A hybrid fuzzy DEMATEL-ISM approach. *Engineering, Construction and Architectural Management*, 31(11), 4255–4280.
- [2] Zhao, Y. (2023). Discussion on the problems and countermeasures in project management in PPP mode. *Vitality*, (15), 142–144.
- [3] Zheng, Y. (2021). Construction project management measures based on PPP mode. *Smart City*, (21), 102–103.
- [4] Wang, S. (2020). Research on PPP model construction project management. *Building Materials and Decoration*, (14), 197, 199.
- [5] Li, Z. (2023). Discussion on the problems and countermeasures existing in project management in PPP mode. *Dwelling*, (27), 169–172.
- [6] Parikesit, D. (2009). Capacity building needs for local government agencies on the development of PPP projects. *Proceedings of the Eastern Asia Society for Transportation Studies*, 2009(0), 73–73.
- [7] Wei, C. (2020). Explore the dynamic project management for the full life cycle of infrastructure PPP projects. *Small and Medium-sized Enterprise Management and Technology (Next Ten-day Journal)*, (01), 31–32, 35.
- [8] Wei, W. (2024). Analysis of some problems of PPP mode construction project management. *Theoretical Research on Urban Construction (Electronic Version)*, (12), 82–84.
- [9] Tao, Q. (2018). *Whole-process performance audit study of sponge city PPP projects (Master's thesis)*. Jiangsu University of Science and Technology.
- [10] Liu, X., Zhang, Y., & Cao, X. (2020). PPP projects, financial marketization and local government leverage. *Research on Financial Development*, (12), 35–42.
- [11] Cheng, C. (2024). The development status, challenges and countermeasures of PPP project in China. *Small and Medium-sized Enterprise Management and Technology*, (15), 85–87.