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# On Risks of PPP Projects in Urban Infrastructure

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## Abstract

The improvement of urban infrastructure constitutes an essential condition for sustainable development of one city. In urban infrastructure construction, the Public-Private Partnership (PPP) mode can advance Chinese urbanization and relieve governmental fiscal pressure. PPP projects are typically of a long-term and high-investment nature. In implementing the projects, the problems, such as asymmetric information, uneven risk allocation, and inadequate capital, between the government and private investors, may affect smooth operation of PPP projects. As China is at the preliminary stage of PPP project risk management, it still has a long way to manage well the risks of many projects. In this paper, the author studies risks and risk management in PPP projects, analyzes major risk factors in infrastructure field, and finally proposes corresponding measures for risk management and prevention.

## Keywords

PPP mode; risk management; government; private investors.

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## 1. Introduction

With Chinese accelerating urbanization, infrastructure construction is playing a more important role in urban development. Under any circumstance, inefficient infrastructure development will pose an adverse influence on economic development. Thus, infrastructure is of top significance for the development of a city and even a country.[1]

Chinese rapid economic growth and people's improving livelihood in recent years have set a new requirement on infrastructure development. Nevertheless, the governmental finance is limited for infrastructure construction, and governmental investment cannot meet people's needs for infrastructure services. As a result, it has become an inevitable issue to effectively raise efficiency of infrastructure construction and improve infrastructure services. In the mid-1990s, China began to introduce the PPP mode in several industries such as water, transportation, and power. After 2001, relevant ministries and commissions successively issued policies to introduce the PPP mode in infrastructure construction, such as Guidelines of State Development Planning Commission on Encouraging and Guiding Nongovernmental Investment[2]. The Decision on Some Issues concerning the Improvement of the Socialist Market Economy also stipulates clear "we should remove or revise such laws, regulations and policies as are against developing non-public sectors of the economy and eliminate the institutional obstacles. The areas should be expanded for market access of non-public capital, which will be permitted to go to the infrastructures, public undertakings and other industries and fields where the inflow of such capital is not prohibited by the laws and regulations." [3]

Following such support policies, the PPP mode emerged and flourished in rapid succession, and major cities, including Beijing, Shanghai and Chongqing, began to try it. Of the large number of PPP projects, the most successful and influential one is Line 4 of the Beijing Subway. The PPP mode in the project not only improves the efficiency in investment, construction, and operation, but also saves

financial capital and relieves burden of governmental finance through recovering the investment from project operation.

The introduction of PPP mode in infrastructure construction can maximize respective advantages of the government and private investors. On the one hand, the government can take full advantage of its strengths in overall guidance. On the other hand, private investors can introduce the competition mechanism in infrastructure market to improve efficiency of infrastructure market. Compared with traditional modes, completely state-funded or independently-constructed by private investors, the PPP mode expands new capital channels for the infrastructure field, and facilitates the infrastructure industry.

Meanwhile, several risks still exist in adopting the PPP mode in infrastructure construction. For instance, ineffective control and management of risks may impact profitability of private investors, and affect operation and services of infrastructure. Therefore, this paper will analyze risks of PPP projects from macro and micro perspectives, and put forth proper suggestions for risk management.

## **2. Literature Review**

In the early 1990s, Margaret Hilda Thatcher, then Prime Minister of the UK, vigorously introduced private capital in infrastructure construction because of governmental serious financial pressure resulting from expanding infrastructure needs in economic recession. To overcome the financial shortage in infrastructure construction, British government encouraged private capital in infrastructure field, and the government gradually withdrew from the field. Due to lack of experience in privatization of infrastructure, the development of the PPP mode was not smooth in the UK.[4]

Hodge and Graeme systematically analyzed the concept and framework as well the advantages and disadvantages of the PPP mode, introduced the concepts risk transfer and risk sharing, and concluded major risks in the implementation of PPP projects[5]. Brooks and Linebman introduced that, in their participation in infrastructure construction, private investors should seek the accurate position to achieve efficient cooperation with the government[6]. Doh and Ramamurti, through analyzing actual cases in the PPP mode, conclude experience and lessons, and analyze risk factors from the perspectives of the government[7]. Lam studied key risk factors in the BOT mode, and put forward the methods of avoiding those risks, i.e. the risks in infrastructure construction should be fairly allocated between the government and private investors, not be undertaken by one party[8].

Many scholars in China also study the risk in PPP projects. Li Xiuhui and Zhang Shiying (2002) concluded the advantages of PPP mode in several aspects: first, the PPP mode, compared with the traditional financing mode, can allocate potential risks in the projects; second, the investors selected through competition in PPP projects have better management capabilities and more advanced technologies; third, the PPP mode can improve efficient of infrastructure construction and realize the win-win results between the government and private investors[9]. Wang Hao (2004) studied the definition and classification PPP projects in the infrastructure field, and argued that the franchised PPP projects have the biggest risks because the government and private investors have to undertake the risks[10]. Lai Danxin (2010) studied the advantages and risks of the PPP mode, and found that the PPP mode can maximize private investors' strengths in advanced management technology and adequate capital, but the government and private investors should allocate their interests and risks in a rational manner[11].

## **3. Risk Identification, Prevention and Management of PPP Projects**

### **3.1 Risk Identification of PPP Projects**

The risk factors in Chinese PPP mode in infrastructure construction influence private investors' construction and operation of the infrastructure, and the service quality of the infrastructure. The risks in PPP projects can be classified into the following aspects:

First, legal risks.

Due to lack of well-functioned laws, the failure of most PPP projects can be ascribed to the change of governmental laws and regulations. In September 2009, the Notice of the General Office of the State Council on the Relevant Issues concerning the Appropriate Handling of the Existing Projects Guaranteeing the Fixed Return from Investments by Foreign Parties was issued. Thus, the government and private investors conduct several negotiations on the rate of return on investment in PPP projects. Due to various factors between the government and private investors, however, some PPP projects eventually fail [12]. Thus, legal risk is one most significant risk in PPP projects.

Second, governmental decision-making risks.

The decision-making risks are often caused by the government. In PPP projects, the government will undertake huge risks if it does not fully understand PPP projects and has no effective decision-making process and risk management. The governmental decision-making risk will pose a negative shock on normal construction and operation of PPP projects. Take the Lianjiang River China-France Water Supply Project as an instance. Due to the inadequate understanding of the project, and lack of early preparation for making water price, the government often wavers in its cooperation with private investors. Consequently, no rational project implementation plan is made after several rounds of negotiation, and the construction of the project is seriously affected due to endless delays of the contract negotiation[13].

Third, policy risks.

Urban infrastructure is the necessary conditions for the public. The government wants to improve people's livelihood through providing adequate and high-quality public facilities. Nevertheless, the governmental indiscriminate consideration for residents may pose an adverse influence. If the government overemphasizes the social welfare brought by public facilities, it will make the policy that is adverse to project construction through influencing private investors' construction and operation of infrastructure. For instance, the government denies the application of Beijing No. 10 Water Works on raising water price[14]. The public is benefited from the controlled water price. In the long run, however, private investors will lower operation and production cost to acquire a rational return, which will inevitably affect the service quality. Thus, the governmental decision-making from the only perspective of social welfare brought by infrastructure will result in policy risks that are against the sound development of PPP projects.

Fourth, natural risks.

Natural risks refer to unavoidable risks in the construction of PPP projects. These risks are unpredictable and irresistible. As natural risks are unpredicted for both parties, their occurrence will stop both parties from performing obligations and duties. In general, natural risks are mainly caused by flood, earthquake and war, etc.

Fifth, governmental credit risks.

The credit risks in PPP projects are mainly caused by asymmetric information between the government and private investors. The opaqueness of data provided by the government may cause misunderstandings in signing the contract. This risk will bring a loss to both parties. If the government lacks credit, the public will lose confidence in the government, which will pose an adverse effect on social development. Take Lianjiang River China-France Water Works project for instance. The government and investors signed a contract of 30 years, but they ended their cooperation due to low water demand and failed water price adjustment [15]-[16].

Sixth, financing risks.

After selecting private investors of the infrastructure in the PPP mode, the government will sign the contract with partners to allocate franchised rights. The deadline and scale of financing shall be stipulated in the contract, and the agreement about franchised rights is not effective before the success of financing. Thus, financing risks in many aspects exist in the PPP mode. On the one hand, private investors will lose the opportunity of participating in PPP projects because of their irrational financing structure and the fluctuation of financial market. On the other hand, private investors participating in the construction and operation of PPP projects also need financing from the financial market. Thus,

private investors also confront with financing risks when the financial market experiences fluctuations. As a matter of fact, financing risks exist in the whole period of the construction of PPP projects.

Seventh, risks of infrastructure service market.

Due to project operation or untimely financial subsidy, private investors have no stable capital flow, so they may not operate the project with high-quality products or services. Consequently, private investors cannot acquire a reasonable return, and residents' benefits will be damaged. Taken Tianjin Shuanggang Waste Incineration Power Plant as an instance. In the operation stage, private investors acquire no expected earning, and the subsidy provided by the government fails to make up their loss, which poses certain risks to the project operation[17].

### **3.2 Risk Prevention and Management of PPP Projects**

PPP projects are influenced by the above risk factors through the whole process of the infrastructure. To ensure the service quality of infrastructure in PPP projects, it is necessary to conduct effective risk prevention and management.

Risk prevention and management in PPP projects are actually the feasibility report that lays a foundation for making standardized and rational decision and minimize the loss resulting from risks. The risk management of PPP projects should consider macro environment, material supply, management of technicians, product or service of the project because all these factors may pose potential risks. The Project Feasibility Analysis Report on project risk management should be made to avoid risks in project implementation.

As risks in PPP projects involve the factors at the macro and micro levels, their prevention and management should be implemented through cooperation of the government and private investors.

### **3.3 Risk Prevention and Management in PPP Projects at the Macro Level**

As mentioned above, the risks in PPP projects at the macro level mainly include legal risks, governmental decision-making risks, policy risks, governmental credit risks, and natural risks. Due to their systematic and universal feature, the risks at the macro level should be prevented and managed by the government rather than one private investor.

The governmental risk prevention and management in PPP projects can be conducted from three aspects: first, the government should improve legislation system of PPP projects to address legal risks. A sound legal environment can promote construction and development of PPP projects, protect legal rights and interests of investors, and attract more private investment. Second, the government should make rational and effective policies to guide and promote PPP projects. A rational and effective policy related to PPP projects can minimize the influence of policy and decision-making risks on the project, and guide healthy development of PPP projects. Third, the government should improve financial subsidy mechanism and prevent the shock of natural risks on the construction of PPP projects.

### **3.4 Risk Prevention and Management in PPP Projects at the Micro Level**

The risks in PPP projects at the micro level mainly include financing risks and risks of infrastructure service market. The risks of different PPP projects at the micro level are of a big difference. Thus, these risks are mainly managed by private investors.

Private investors can prevent and manage the risks in PPP projects from two aspects. On the one hand, private investors should optimize financing structure and minimize financing risks. Due to different financing structures of PPP projects, private investors may have different financing risk performance in project construction. Private investors should combine concrete features of PPP projects, make rational financing structure and prevent the adverse influence of capital problem on project construction. On the other hand, private investors should establish the pricing mechanism based on market risks, and prevent the shock of risks of infrastructure service market on infrastructure operation. While operating infrastructure, private investors often confront with risks such as a small number of customers and the fluctuation of customers. To minimize the shock of risks of

infrastructure service market, private investors should improve pricing mechanism of infrastructure service of PPP projects, and include risk factors such as customer fluctuation in the pricing mechanism.

## **4. Policy Suggestions**

On the basis of the above risk analysis in PPP projects, the author concludes that the risk prevention and management in PPP projects should be implemented through cooperation between the government and private investors. The government should prevent and manage risks at the macro level, while private investors should manage and prevent risks at the micro level.

### **4.1 Policy Suggestions for Risk Management of the Government**

First, the government should further improve laws related to PPP projects to create a sound legal environment.

PPP projects in the infrastructure field are cooperated between the government and private investors through signing contracts. The well-functioned laws related to PPP projects can guarantee the status of private investors in the market, provide a fair and just operation environment, and avoid the interference of the government and relevant enterprises. The contract protected by better laws will effectively maintain private investors' legal interests, and promote their positivity of building and operating PPP projects. Chinese relatively weak legislation on the PPP mode has caused several controversial problems in infrastructure implementation. Thus, a legislative system shall be designed through combining international PPP experience and Chinese actual conditions to protect private investors' legal rights and interests in the whole process of projects.

Second, an effective sharing mechanism shall be established to prevent systematic risks in constructing and operating PPP projects.

PPP projects in infrastructure field are implemented through the cooperation between the government and private investors, so they should undertake the risks in the projects even though they take charge of different tasks. On the one hand, the government cannot ask private investors to undertake all risks. On the other hand, private investors should not completely rely on the government and expect the government will undertake all risks. Thus, both parties should undertake their respective risks in PPP projects. While designing risk sharing mechanism, the government should make clear that the risks are undertaken by both parties, and the government should provide convenience for a better development instead of avoiding risks and lowering the efficiency in production and operation of project implementation. Thus, both parties can make different risk sharing plans according to the principle of different earnings, which can give full play to respective strengths and avoid risks in the projects.

Third, an independent supervision institution should be established to improve private investors' behaviors.

This has been proved necessary by international risk management experience in PPP projects. The independent supervision institution can monitor the government and private investors in a fairer and more professional manner. In addition, supporting legal measures and legal system shall be established to provide the solid foundation for effective supervision. The third-party supervision institution should not be affiliated to any governmental authority to guarantee the fairness and effectiveness. Thus, the institution can effectively supervise and avoid the conflict with other supervision departments. In addition, the power of the supervision institution shall be constrained to avoid abuse of power. Different offices shall be set up in the institution to take charge of different industrial fields. The members shall be composed of professionals from industrial institutions, and nominated by the government or elected by the People's Congress.

### **4.2 Policy Suggestions for Risk Management of Private Investors**

First, the risk-oriented pricing mechanism shall be established to prevent the shock of market risks.

The most effective risk management method in PPP projects is to quantify the risks and establish risk-oriented pricing mechanism of infrastructure services, through which risks can be quantified and prices can be made according to the result of quantitative evaluation. The pricing method can provide private investors with the basis of the scientific pricing of infrastructure, and prevent the governmental possible deviation on the price guidance of infrastructure service. Thus, the risk-oriented pricing mechanism of infrastructure services in PPP projects can improve private investors' risk management capability, and control the risks in the risks.

Second, the risk avoidance mechanism to effectively transfer risks.

As PPP projects are often featured by a large capital, a long payback period, a large scale, and a long duration, they often have various types of risks. Thus, one rational risk management and avoidance mechanism is necessary to ensure the smooth implementation and operation of the large projects. In addition, different types of risks in PPP projects may interact with each other, and involve cause-and-effect relationships. Any ignorance of risk management will cause the failure of projects. Besides the quantitative management on risks, the mechanism can also effectively transfer risks. For instance, financing risks can be transferred to other investors through hedging the maturity risk with financial derivative instruments.

Third, interdisciplinary professionals shall be introduced to improve risk management capability of the project team.

PPP projects in infrastructure field involve multiple disciplines such as Economics, Science of Law, Management, and Engineering, so it is necessary to cultivate interdisciplinary professionals to score a long-term development of PPP projects. Private investors can invite industrial experts at home and abroad to popularize concepts, essence, procedure and details of PPP projects. After receiving lecture-type training, private investors should visit PPP projects for on-site study. Furthermore, they should regularly hold lectures for college students of PPP-related majors to cultivate their interest and help them lay a good foundation. In the end, they should increase international exchanges and learn experience from overseas PPP projects.

## References

- [1] Lu Zaiming. An Analysis on Infrastructure Investment Efficiency in Urbanization [J]. Market Weekly, 2006 (10), pp. 92-94.
- [2] State Development Planning Commission of the People's Republic of China. Guidelines of State Development Planning Commission on Encouraging and Guiding Nongovernmental Investment, 2001-12-11.
- [3] Luo Wenge. Seize Opportunities and Brave Challenges—Ten Thoughts on Studying Decision on Some Issues concerning the Improvement of the Socialist Market Economy [J]. Selected Excellent Papers of Beijing Administration for Industry and Commerce (2003).
- [4] Nick Timmins. Building Better Partnership [J]. Financial Times, 2002(2): 34-37.
- [5] L. Y. Shen Project Risks Management in Hong Kong International. Journal of project Management, Vol. 15 No. 5. 1997. pp. 101-105.
- [6] Pauline Vaillancourt, Roesnau. Public Private Policy Partnerships [M]. Cambridge, Mass: MIT Press, 2000.
- [7] Jonathan P. Doh, Ravi Ramamurti. Reassessing Risk in developing Country Infrastructure. Long Range Planning, 2003, Vol. 36 (4), pp. 337-353.
- [8] Patrick T I Lam. A sartorial review of risks associated with major infrastructure projects. International Journal of Project Management, 1999, Vol.17 (2), pp.77-87.
- [9] Li Xiuhui, Zhang Shiyong, PPP: One New-type Project Financing Mode, China Soft Science [J], 2002 (02).
- [10] Wang Hao. On Definition and Classification of PPP, Urban Rail Transit [J], 2004 (05).
- [11] Lai Danxin, Fei Fangyu. Efficiency of PPP Partnership: An Overview, Economist [J], 2010 (07).

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- [12] Wang S. Q. Lessons Learnt from the PPP Practices in China (Keynote Speech) (C). AsianInfrastructure Congress 2006. Organized by Terrapinn and sponsored byIAPF, Hong Kong, November 29-30, 2006.
- [13] Xinhua Telecommunication Broadband Website. Guangdong Lianjiang River Water Works Idle for 8 Yearsafter Investing 16.69 Dollars.[http://xnews.xintv.com/html /NEWS/JIUZ\\_HOU\\_QUANLIAOWANG /2007/06/19/430016.html](http://xnews.xintv.com/html /NEWS/JIUZ_HOU_QUANLIAOWANG /2007/06/19/430016.html).
- [14] China Water Website. China-France Lianjiang River Stranded [EB/OL]. [http://news.h2o-china.com/finance/information/114651029478620\\_1.shtm](http://news.h2o-china.com/finance/information/114651029478620_1.shtm).
- [15] Zhejiang Business. Who Moved the Cheese of Hangzhou Bay Sea-Crossing Bridge? [EB/OL]. (2005-3-2)[2010-03-21].<http://www.zjol.com.cn/gb/node2/node138665/node257861/node257865/node257874/userobject15ai3951216.htm>.
- [16] World New Energy Website. Failure of BOT Project of Tangxun Lake Sewage Treatment Plant in Wuhan,[EB/OL].(2004-9-29)[2010-03-21].[http://www.86ne.com/Jnhb/200409/Jnhb\\_38197.html](http://www.86ne.com/Jnhb/200409/Jnhb_38197.html).
- [17] Qi Xia, Ke Yongjian, Wang Shouqing. Case Analysis on Key Risk Factors of Chinese PPP Projects, 2009 (05).