Engineering risk management of China transnational PPP infrastructure projects

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Abstract. With the implementation of One Belt And One Road plan in 2013, Chinese enterprises have gradually increased their investment in transnational PPP infrastructure projects. Due to the difficulty of transnational investment and asymmetric information, the engineering risk factors of transnational PPP infrastructure project investment deserve everyone's attention. Based on the literature review, this paper identifies the engineering risk factors of current transnational PPP infrastructure projects. Meanwhile, according to the experience of domestic PPP projects allocation and the experience of enterprise interviews, it comes to the engineering risk management focus of Chinese enterprises when they invest in transnational PPP infrastructure projects.

1. Introduction
In 2013, the Chinese government put forward the One Belt And One Road plan, which not only contributed significantly to China's international influence, but also contributed economically to the less developed regions of Asia, Europe and Africa[1]. Risk is a common research problem in the field of infrastructure. With the promotion of One Belt And One Road, transnational PPP risk comes with it. The premise and guarantee of planning and formulating fair and reasonable risk management plan is to clearly sort out the risks of TPPP project.

The risk of TPPP project is inevitable, and how to reduce it to the minimum needs to be considered, because its risk is affected by many external factors, such as the change and difference of price and climate, which will become the risk factor of the project. The internal factor is related to the technical level of the manager, and the management method is related to the risk.

2. Literature review
Risk management has been a hot topic in academic research[2]. Generally, risk identification, risk assessment and risk analysis[3] will be carried out in the project risk management, but the PPP project will add the process of risk allocation due to the special nature of public-private joint venture, and risk identification and analysis is the core process of risk project management. Fair risk allocation for PPP projects is the key to project risk management[4]. Currently, there are relatively few studies on transnational PPP risks. Currently, TPPP is considered as an institutionalized cross-border interaction between the public and private sectors, which aims to provide public goods[5]. The identification of TPPP risks has concluded the key risk factors through literature review[6]. Currently, there is a lack of mainstream research on the allocation of TPPP risks, which still needs the efforts of follow-up researchers.
3. Methods

3.1. Literature review

This paper uses literature research method to find out the current risk identification factors and risk allocation principles of transnational PPP risk related articles, and summarizes them, so as to draw the research foundation of this paper.

3.2. Semi-structured interviews

We conducted detailed questionnaire interviews with four TPPP project investors, and obtained the main risk factors and countermeasures that Chinese enterprises take into consideration when facing transnational PPP projects through semi-structured interviews.

4. Risk identification

According to the interview, transnational PPP projects are different from normal PPP projects in terms of risk focus. Enterprises will consider more risks including political risks related to the stability of the government when investing in transnational projects, legal risks caused by imperfect foreign laws on PPP, exchange rate risk of mismatching of loan currency and receiving currency. There are currency risks caused by foreign exchange restrictions and tax risks caused by tax opacity in some countries. According to the stage classification, the risk is usually divided into construction risk, operational risk and transfer risk. Since the transnational projects have not reached the handover stage, construction risk and operation risk are mainly considered. As a construction enterprise, the risk in construction stage is relatively controllable, and the risk in operation period is the key concern.

5. Risk allocation

Due to the lack of research on transnational PPP risk allocation at present, the risk allocation principle of PPP projects is still mainly used in this paper, and the allocation object chooses between private capital and public sector[7]. Its main performance is as follows(Figure 1.).

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![Figure 1.](image-url)
Firstly, the risk should be borne by the sector with the most control. That’s mean that The sector to whom the risk is assigned should have a stronger interest and incentive to manage it, which shows as follows: the risk distributor has a stronger interest and motivation to control the risk, and can reduce the cost of risk generation and loss through control.

Table 1. TPPP risks and their allocation.

| Risk                               | Stages  | Allocation                           |
|------------------------------------|---------|--------------------------------------|
| Political risk                     | Life cycle | Public.                               |
| Legal risk                         | Life cycle | Public.                               |
| Cooperation risk between public and private sectors | Life cycle | Public and private.                   |
| Tariff risk                        | Life cycle | Public: Tariffs are part of the policy. |
| Corruption risk                    | Life cycle | Public                               |
| Administrative procedures risk      | Life cycle | Public or private: Who causes the delay of approval time who bears the risk. |
| Currency risk                      | Life cycle | Public.                               |
| Environmental risk                 | Life cycle | Private.                             |
| Force majeure risk                 | Life cycle | Public and private: Each sector shall bear its own losses and extend the construction period. |
| Rate risk                          | Life cycle | Private.                             |
| Credit risk                        | Life cycle | Public or private: Which sector’s credit problem, which party bears the responsibility. |
| Lack of government support         | Life cycle | Public.                               |
| Manage personnel quality risk      | Life cycle | Private.                             |
| Cultural barrier risk              | Life cycle | Private.                             |
| Religious risk                     | Life cycle | Private.                             |
| Financing risk                     | Preparation | Private.                             |
| Public opposition/resistance       | Preparation | Public or private: If public opposition events affect the project, social capital shall be responsible for mediation and the government shall cooperate. Among them, the responsibility object is determined according to the specific rule object. |
| Competitiveness risk               | Procurement | Private.                             |
| Contract risk                      | Procurement | Private.                             |
| Bidding risk                       | Procurement | Private.                             |
| Period risk                        | Construction | The delay caused by the government shall be borne by the government; The delay caused by social capital shall be borne by social capital; The delay caused by force majeure shall be borne by each sectors. |
| Operation cost risk                | Operation | Public or private: the government shall bear the cost overruns caused by it's mandatory improvement of standards, poor operation management, and other market environment factors; The excess cost caused by the insufficient operation capacity of the project company shall be borne by the private itself. |
Besides, the return on investment is corresponding to the assumption of risks. TPPP projects should also follow the market rules, because its essence is the marketization of public services and products.

Last but not least, the distribution of risks shall not exceed the limit that the sector can bear, the distribution of risks shall be reasonable. In the process of risk allocation, the risk should not exceed its controllable and tolerable range.

According to these, the risks and allocation of transnational PPP projects are concluded as shown in table 1.

6. The main risks of TPPP projects
According to the literature collection and interviews with enterprises that are good at developing overseas PPP projects, it is known that many current TPPP risk, including the main consideration in addition to the popular political risk and legal risk, exchange rate risk, contract risk, environmental risk, management personnel quality risk, information risk is also currently TPPP enterprises focus on common risks in the project. This paper focuses on the risk categories mentioned in the interview.

6.1. Contract risk
The weakness and lack of contract management organization are common in the contract management of TPPP project. There is a lack of excellent and experienced legal and contract management personnel related to transnational PPP, as well as insufficient attention and professional legal personnel and strength in the official work of contract and law. The contract management system is lack of standardization and the contract management is chaotic. At present, the contract is still written by referring to the experience of European and American countries and considering the project situation. According to interviews, suggestions for dealing with such risks are as follows:

- Risk aversion. Take effective measures from risk sources to avoid the risk factors associated with the maximum probability of occurrence. If the risk is unavoidable, even stop loss waiver contract is signed. If there is still cooperative value, communicate and negotiate the contract terms and coordinate the modification or supplement of unfavourable terms.
- Risk transfer. We can use the insurance channel to transfer the contract risk to the insurance company to achieve the transfer of risk.

6.2. Environmental risk
Environmental protection has always been an important consideration for TPPP. In the developing countries of Europe, the occurrence of environmental group incidents is less, and in the developing countries, the occurrence of extreme environmental group incidents is more frequent. The main reason for this is that the laws of the country are not sound enough and people's demands are in conflict with the laws and regulations. Therefore, environmental protection is not the only factor. The legal integrity, social responsibility and internal factors of local government are the potential factors that lead to environmental protection incidents. According to interviews, suggestions for dealing with such risks are as follows:

- Enterprises should give more in-depth consideration to community contribution, public stability and school medical construction to alleviate problems.
- In the preparation stage of the project, it is possible to negotiate with the relevant environmental protection departments of the local government or apply for permits in advance to avoid the passive situation after entering the project.

6.3. Manage personnel quality risk
At present, many multinational enterprises have not established a sufficient concept of modern talent resources, and there is a shortage of high-quality talents with rich experience in financing, law, business and project execution in the implementation of international investment projects. However,
the training speed of such talents cannot match the development speed of international business. According to interviews, suggestions for dealing with such risks are as follows:

- Adopt personnel with rich TPPP project experience or relevant overseas project experience as managers. And they should have a detailed understanding of the host country and certain channels of contacts.
- We need to provide specialized training for relevant personnel, such as language training, social and cultural sensitivity training and adaptability training, etc., and we can set up a two-way exchange scholarship for cooperation with the intended country, and establish an international talent pool and international expert pool.
- At present, it is found that there is a big gap between China and the rest of the world in terms of talent capacity building, and there is a certain language threshold. Therefore, the current legal personnel in overseas PPP projects are mainly local or international.

6.4. Insufficient information risk
At the early stage of the overseas projects, we should be fully and adequately collect project information, and to local law, the traditional religions, local customs, cultural differences, raw materials procurement, transportation, communications, energy and mechanical equipment are in prophase survey do comprehensive and transparent investigation, provide the premise for the feasibility of the project. The social environment in the host country of the intended project before the overseas PPP project cooperation must be taken into account. Therefore, the information of the local country and the information related to the local PPP project must be fully understood before the cooperation. According to interviews, suggestions for dealing with such risks are as follows:

- Public opinions are collected through media, embassies and ministries, etc. Local information is collected by localized public opinion monitoring departments.
- Through cooperation with risk agencies in the country where the intended project is located, learn about local risk information of relevant projects, and timely avoid or solve potential risks.
- Establish project information base, including previous project information, national financial data, and data of the world bank, China Export & Credit Insurance Corporation and other institutions.

7. Conclusion
This study puts forward the main risks and suggestions for dealing with them that Chinese enterprises face when investing in PPP projects of transnational infrastructure under the background of One Belt And One Road. In order to prevent the adverse impact of risks on projects, it is necessary to strengthen the identification of various risks in PPP projects by project managers, and propose specific methods to reduce or eliminate risks, so as to reasonably allocate risks. This paper finds that in addition to common political and legal risks, contract risks, environmental risks, managerial quality risks and information risks are all the key factors that Chinese investment enterprises focus on for TPPP projects at present, and reasonable handling of these risks is what enterprises need to pay attention to.

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