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RESEARCH ON RISK IDENTIFICATION AND COUNTERMEASURES OF WATER RESOURCES SURVEY AND DESIGN ENTERPRISES PARTICIPATING IN PPP PROJECTS

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ABSTRACT

The adoption of PPP mode in water resources projects is conducive to solving the defects of government funds shortage, long life cycle and low management efficiency under the traditional financing mode. It is an inevitable trend for water resources survey and design enterprises to participate in PPP projects. From the perspective of water resources survey and design enterprises, it is pointed out that the risks it faces when participating in PPP projects as private mainly involve three levels: risks at government level, risks at market level and risks at project level. The risk list of water resources survey and design enterprises participating in PPP projects is established, and the risk sharing mechanism is constructed on the basis of analyzing the influencing objects and imputation objects of various risk factors. The study provides operable guidance for water resources survey and design enterprises to carry out negotiation of relevant clauses and smooth operation of the project when participating in PPP projects.

Keywords: Water resources survey and design enterprises; PPP project risks; Risk identification; Risk response

INTRODUCTION

For a long time, water resources projects have been dominated by government financial investment for a long time, without forming a diversified, multi-level and multi-channel investment mechanism. Under such a background, water resources survey enterprises can obtain relevant survey and design services with the help of natural advantages. However, under the background that PPP mode has become a trend for government public welfare projects. Many cross- industry organizations rely on capital to intervene in the water resources industry. These

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organizations have great comprehensive strength and can realize the systematic operation of the whole activities such as design, construction and operation by integrating the industrial chain. This undoubtedly falls into a passive situation for the water resources survey and design organizations and can no longer utilize the natural resources and advantages of the past. Under this background, water resources survey and design enterprises began to participate in PPP projects, striving to realize the in-depth development of enterprise business chain and ensure the improvement of their own core competitiveness by participating in PPP projects. However, because PPP projects generally have the characteristics of large investment scale, long construction and operation cycle, and numerous participants, this makes the participation of water resources survey and design enterprises in PPP projects, which may bring a lot of uncertainties to the operation of enterprises.

This requires that water resources survey and design enterprises must improve the decision analysis system in the process of participating in PPP projects. Through the identification and analysis of risks participating in PPP projects, corresponding risk response strategies are put forward to provide effective support for water resources survey and design enterprises to participate in PPP projects.

1. Risk Identification and Analysis of Water Resources Survey and Design Enterprises Participating in PPP Projects

It is an inevitable development trend for social capital to enter the field of infrastructure construction. As an important component of infrastructure construction, water resources projects can and should reduce financial burden through the introduction of social capital, promote diversification of investment subjects, improve project implementation results and realize reasonable risk sharing. It is the general trend to adopt the cooperation mode between government and social capital in water resources projects. It is also an important measure for the water resources industry to improve government public services. It can organically combine the government's strategic planning, market supervision, management efficiency of public services and social capital, and technological innovation, thus helping to clarify the boundary between the government and the market, enhancing the government's legal awareness, contractual awareness, and market awareness, better performing public functions, and comprehensively improving the level of public services.

From the perspective of water resources survey and design enterprises, the risks they encounter in participating in PPP projects as social capital mainly involve three levels: risks at government level, risks at market level and risks at project level.

1.1 Risks at government level

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Risks at government level are risks that social capital should focus on. Since our government departments have been in a dominant position for a long time, many things are decided by the government. Under the PPP mode, as the government transfers most of the decision-making power to the social capital/project company, the government department is responsible for the decision-making, approval, supervision and management of the general direction, while the social capital/project company is responsible for the specific affairs. Due to the short implementation time of PPP mode, many local governments still do not apply the requirements of PPP mode for government management, and the laws and regulations are not perfect, which makes the management of PPP projects by government departments under PPP mode not completely standardized. For social capital, during the whole process of PPP project implementation, there are two main categories of government risks: The first type of government risks is the risks that the government exerts its macro-management functions, including government credit risks, government intervention risks, government public ownership risks, rent-seeking risks of government officials, government decision-making risks, government approval risks, legal change risks, imperfect legal and regulatory systems risks, tax adjustment risks, uniqueness risks, etc. The second type of risks is the risks of the government as the specific implementer of PPP projects, including the bidding risks of social capital partners and the payment risks.

Specifically:

1) Government credit risk: Government credit risk mainly involves the risk that the commitments made to the original government can continue to be fulfilled after the change of the main leading members of the government.

2) Risk of government intervention: Since many PPP projects, especially water resources PPP projects, are generally of a public welfare nature and are public welfare projects or quasi- public welfare projects, under the PPP mode, the government will generally invest and participate in them. Moreover, because the government pays more attention to controlling the ownership of public welfare projects, it may bring some intervention to the implementation of the projects.

3) Risk of government public ownership: If the government's macro policies change, social capital may withdraw ahead of schedule.

4) Rent-seeking risks of government officials: Due to the opaque decision-making process of the government and the limitations of policy implementation, the subjective will of officials plays an important role in the implementation of the project, thus increasing the rent-seeking risks of government officials.

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5) Government decision-making risks: During the implementation of PPP projects, local governments may have the risks of lengthy process or irregular decision-making due to insufficient preparation or asymmetric information.

6) Government approval risks: As the project adopts PPP mode approval process, it needs to involve more departments, which leads to certain approval risks in the project implementation process.

7) Risk of legal change: During the implementation of water resources projects, if the law changes, it may lead to conflicts between the relevant clauses of the projects.

8) Risk of imperfect legal and regulatory systems: If the current PPP-related laws and regulations are imperfect or have low effectiveness level, it may affect the operation of PPP projects.

9) Tax adjustment risk: The change of tax policy may have a greater impact on the operation of PPP projects, which will further affect the effective implementation of PPP mode of the projects.

10) Uniqueness risk: If the government approves or implements another project of the same nature in the same area, it will affect the operating income of the project.

11) Bidding Risk of Social Capital Partners: Social capital plays a very important role in PPP projects. If the government lacks fairness in the bidding process of social capital partners, it may affect the realization of the project objectives.

12) Cost payment risk: For PPP projects whose payment mechanism is government payment or feasibility gap subsidy, if the government fails to do a good job of government payment as agreed, it may affect the smooth implementation of the project.

1.2 Risks at market level

Under the PPP mode, the implementation of some operable PPP projects is largely implemented through the market-oriented operation of social capital, so the projects under the PPP mode are also facing risks and pressures from the market.

The market risks faced in the implementation of PPP projects involve the following aspects: market demand change risks, interest rate risks, foreign exchange risks, inflation risks, etc.

Specifically:

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1) Risk of changes in market demand. Due to changes in market demand during the implementation of PPP projects, it may have an impact on the smooth implementation of the projects, especially on operating projects and quasi-operating projects.

2) Interest rate risk. Under the condition of market economy, due to changes in the market environment, the central government will adjust macroeconomic development through changes in interest rates. This may affect the financing cost of the Social capital partner/project company, thus affecting the success of PPP projects.

3) Foreign exchange risk. As overseas financing may be involved in the financing process of PPP projects, foreign exchange risks may be involved.

4) Inflation risk. Influenced by the economic environment, inflation will occur in the market, which will further affect the income of the project.

1.3 Risks at project level

The PPP project itself has certain characteristics, and at the same time it faces many uncertainties in the process of project implementation, including personnel, material supply, cost payment and other aspects.

The project risks faced in the implementation of PPP projects involve the following aspects: social capital capacity risk, natural environment risk, war risk, construction risk, material and equipment supply risk, operation risk, environmental protection risk, project financial supervision risk, project expectation subjective risk, project organization and coordination risk, public attitude risk, etc.

Specifically:

1) Risk of social capital capacity: During the implementation of PPP projects, social capital, as a direct participant in the project, will have an impact on the implementation of the project due to its own financing capacity and construction management capacity. If the water resources survey and design enterprise participates as a non- investor, the comprehensive ability of the investor in all aspects will have an impact on the project, and will also have a direct impact on the interests of the water resources survey and design enterprise.

2) Natural environment risk: During the implementation of PPP project, the natural environment is relatively complex, and geological conditions, terrain conditions and hydrological conditions will all affect the implementation of the project.

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3) War Risk: Once a war occurs, it may lead to the failure of the project.

4) Construction Risk: During the implementation process, if the construction side selected by the social capital/project company cannot complete the project implementation task well, it will affect the project.

5) Material and equipment supply risks: During the implementation process, if the material and equipment supply risks selected by social capital/project company or construction unit cannot complete the project material and equipment supply tasks well, it will affect the project.

6) Operational risk: If PPP projects involve operational and maintenance issues, the operational and management capabilities of social capital investment projects will have an impact on the projects.

7) Environmental risks: With the increasing awareness of environmental protection, the environmental problems brought by the project may affect the smooth implementation of the project.

8) Project financial supervision risks: PPP projects are bound to face financing problems in their implementation. Therefore, relevant financiers will also have an impact on the implementation of the project.

9) Subjective risks of project expectation: In the project decision-making process, if social capital or government departments are too optimistic about the project expectation and face many uncertainties in the implementation process, it may lead to insufficient preparation in advance and affect the smooth implementation of the project.

10) Risk of project organization and coordination: During the implementation of the project, whether social capital can organize and coordinate the relations between many participants is related to the smooth implementation of the project.

11) Public Attitude Risk: As the construction of PPP project may have certain impact on the ecological environment of local and surrounding areas, the public's attitude towards the construction of the project will also affect the implementation of the project.

1.4 Risk list establishment

Based on the above analysis, a risk list for water resources survey and design enterprises to participate in PPP projects can be constructed, as shown in Table 1.

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Table 1: Risk List of Water Resources Survey and Design Enterprises Participating in PPP Projects

	Risk Category	Specific risk factors
Risk List of Water resources Survey and Design Enterprises Participating in PPP Projects	Government risk	Government credit risk
		Risk of government intervention
		Risk of government public ownership
		Rent-seeking risk of government officials
		Government decision-making risk
		Government approval risk
		Risk of legal change
		Risks of imperfect legal and regulatory systems
		Tax adjustment risk
		Uniqueness risk
		Bidding risk of social capital partners
		Expense payment risk
	Market risk	Risk of changes in market demand
		Interest rate risk
		Foreign exchange risk
		Inflation risk
		Social capital capacity risk
		Natural environment risk
		War risk
		Construction risk
		Material and equipment supply risk

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	Project risk	Operational risk
		Environmental risk
		Project financial supervision risk
		Project expected subjective risk
		Project organization and coordination risks
		Public attitude risk

2. Risk Countermeasures of Water Resources Survey and Design Enterprises Participating in PPP Projects

For water resources survey and design enterprises, the overall response principles for the three types of risks they face when participating in PPP projects are as follows: according to the different impact objects and imputation objects of various risk factors, different participants are agreed in the contract to bear them.

2.1 Analysis of the affected objects and imputation objects of various risk factors

There are various risk factors including government risk, market risk and project risk in the implementation of PPP projects. Moreover, the origins of various risk factors are different. To explore the coping mechanism of PPP project implementation risks, it is necessary to clarify the origin of various risks, that is, to clarify the impact objects and imputation objects of various risk factors faced by water resources survey and design enterprises in participating in PPP projects.

The impact objects and imputation objects of various risk factors faced by water resources survey and design enterprises participating in PPP projects shown in Table 2.

Table 2: Impact Objects and Rule Objects of Risks Faced by Water resources Survey and Design Enterprises Participating in PPP Project

	Risk Category	Specific Risk Factors	Affect Objects	Imputation Objects
		Government credit risk	Social capital partner	Government
		Risk of government intervention	Social capital partner	Government

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Risk List of Water resources Survey and Design Enterprises Participating in PPP Projects	Government risk	Risk of government public ownership	Social capital partner	Government
		Rent-seeking risk of government officials	Social capital partner	Government
		Government decision-making risk	Social capital partner	Government
		Government approval risk	Social capital partner	Government
		Risk of legal change	Social capital partner	Government
		Risks of imperfect legal and regulatory systems	Social capital partner	Government
		Tax adjustment risk	Social capital partner	Government
		Uniqueness risk	Social capital partner	Government
		Bidding risk of social capital partners	Local government/public	Government
		Expense payment risk	Social capital partner/public	Government
	Market risk	Risk of changes in market demand	Local government/Social capital partner	——
		Interest rate risk	Social capital partner	Government
		Foreign Exchange Risk	Social capital partner	Government
		Inflation risk	Social capital partner	——
		Social capital capacity risk	Local government/government	Social capital partner
		Natural environment risk	Local government/ Social capital partner	——
		War risk	Local government/ Social capital partner	——
		Construction risk	Social capital partner	Construction side

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	Project risk	Material and equipment supply risk	Social capital partner	Supplier
		Operational risk	Social capital partner	Social capital partner
		Environmental risk	Social capital partner	Government/public
		Project financial supervision risk	Local government/financier	Government/financier
		Project expected subjective risk	Social capital partner	Local government/ Social capital partner
		Project organization and coordination risks	Social capital partner	Social capital partner
		Public attitude risk	Social capital partner	——

2.2 Construction of risk sharing mechanism

On the basis of following the principles of risk-benefit equivalence, effective control, lowest risk control cost, risk imputation, fairness and justice, and dynamics, the general idea for establishing the sharing mechanism of various risk factors faced by water resources survey and design enterprises participating in PPP projects is as follows:

1) The risk factors that affect one side's liability on the other side shall be borne by the risk imputation object. In the process of implementing water resources projects under PPP mode, there are many such risks, which are solely borne by the government or social capital.

2) For the risk factors caused by the third side, and the third side has a direct contractual relationship with one of them, the risk shall be borne by the side with a direct contractual relationship with the third side. During the implementation of PPP projects, there are risk factors such as consultants, constructors, material suppliers, etc. Although such risk factors are caused by non-governmental or social capital parties, they should be borne by social capital parties due to their direct contractual relationship with social capital parties.

3) For the risk factors affecting the third side's problems, and the third side has no direct contractual relationship with either side, such risks shall be shared by both parties. During the implementation of PPP projects, there are risks caused by non-governmental

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or social capital, and the third side has no direct contractual relationship with either side, such as risks caused by public reasons, which can be jointly borne by both parties.

4) For the risks that belong to the government risks and are within the scope of national macro-control, both parties should share the risks. During the implementation of PPP projects, there are risks such as interest rates, foreign exchange, taxes, etc. Although such risks are caused by government reasons, it is impossible to adjust a single project. For such risks, both parties shall share the risks.

Based on the above analysis, a sharing mechanism for various risk factors faced by water resources survey and design enterprises participating in PPP projects can be formed, as shown in Table 3.

Table 3: Sharing Mechanism of Various Risk Factors Faced by Water resources Survey and Design Enterprises Participating in PPP Projects

Risk Category	Specific Risk Factors	Affect Objects	Imputation Objects	Sharing Mechanism
Government risk	Government credit risk	Social capital partner	Government	Government
	Risk of government intervention	Social capital partner	Government	Government
	Risk of government public ownership	Social capital partner	Government	Government
	Rent-seeking risk of government officials	Social capital partner	Government	Government
	Government decision-making risk	Social capital partner	Government	Government
	Government approval risk	Social capital partner	Government	Government
	Risk of legal change	Social capital partner	Government	Government
	Risks of imperfect legal and regulatory systems	Social capital partner	Government	Government
	Tax adjustment risk	Social capital partner	Government	Shared
	Uniqueness risk	Social capital partner	Government	Government

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	Bidding Risk of Social Capital Partners	Local government/public	Government	Government
	Expense payment risk	Social capital partner/Public	Government	Shared
Market risk	Risk of changes in market demand	Local government/Social capital partner	——	Shared
	Interest rate risk	Social capital partner	Government	Shared
	Foreign exchange risk	Social capital partner	government	Shared
	Inflation risk	Social capital partner	——	Shared
Project risk	Social capital capacity risk	Local Government/Government	Social capital partner	Social capital partner
	Environmental risks	Local government/ Social capital partner	——	Shared
	War risk	Local government/ Social capital partner	——	Shared
	Construction risk	Social capital partner	Construction Side	Social capital partner
	Material and equipment supply risk	Social capital partner	Supplier	Social capital partner
	Operational risk	Social capital partner	Social capital partner	Social capital partner
	Environmental risk	Social capital partner	Government/public	Shared
	Project financial supervision risk	Local government/financier	Government/financier	Shared
	Project expected subjective risk	Social capital partner	Local government/ Social capital partner	Shared

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	Project organization and coordination risks	Social capital partner	Social capital partner	Social capital partner
	Public attitude risk	Social capital partner	——	Shared

In the specific negotiation of the relevant clauses of the PPP contract and the setting of the relevant clauses in the contract, the various types of risk factors faced by the water resources survey and design enterprises participating in the PPP project listed in Table 3 shall be used to reasonably carry out the relevant contract negotiation and signing work to ensure that Water resources survey and design enterprises can occupy an active position in the performance of PPP project contracts.

CONCLUSION

The application of PPP mode in water resources projects is an inevitable trend of development. It changes the limitations of the traditional mode, such as government financing pressure, high risks and low management level, and promotes the diversification of investment subjects to enhance the effectiveness of project implementation. Based on the angle of view of water resources survey and design enterprises, this paper summarized and analyzed the risk factors identified in the process of water resources project facilities, as well as their sources, influencing objects, imputation objects. Then, it established the sharing mechanism of all kinds of risks faced by water resources survey and design enterprises participating in PPP projects. The main body that bears all kinds of risks was clearly defined, which provided a guarantee for water resources survey and design enterprises to occupy an active position in the contract negotiation process, and also provided a reference basis for them to further formulate relevant risk management systems and improve risk defence awareness.

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