

RESEARCH ARTICLE



Contract Governance, Uncertainty, and Project Performance: Evidence from Water Environment Public–Private Partnerships of China

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Abstract: A public–private partnership (PPP) contract is a long-term procurement contract between the government and private sector, which inevitably faces uncertainties. Existing studies have shown that uncertainty has a significant negative impact on project performance. Some strategies to deal with uncertainty have been proposed; however, they lack systematic attention to PPP contract governance. This paper builds a theoretical framework of PPP contract governance under the constraints of “behavior and environment” through the derivation of classic theories. The framework includes four theoretical variables: output-based specification, good-faith cooperation, flexibility, and public interest protection. The theoretical framework was tested empirically based on data from 368 respondents of a set of survey questionnaires regarding water environment PPP projects. Results reveal that the four theoretical variables are an organic unity and that PPP contract governance and its four dimensions have a positive impact on project performance. Meanwhile, this paper uses the NVivo12 quantitative analysis tool to identify the PPP mechanism: PPP contract governance promotes project performance through the prevention and reduction of behavioral, environmental, and semantic uncertainties. These findings provide evidence from the context of developing countries, such as China, for the improvement of PPP contract governance theory. Moreover, these findings contribute empirical experience and wisdom from contract governance theory to the improvement of long-term project performance.

Keywords: PPP, contract governance, project performance, uncertainty

1. Introduction

The modern administrative state may be appropriately called the “contracting state” in which the relevant government authorities meet once a year to award contracts to private sector entities, have lunch, and go home, happy with a job well done [1]. Many governments worldwide are stepping up their efforts to establish partnerships with the private sector, outsourcing many traditional functions to them, and relying on their provision. The governments render public services for reducing government size, saving costs, and improving efficiency. To achieve these goals, the government needs to cooperate actively with the private sector. In essence, public–private partnership (PPP) is advanced, complex, and innovative form of government procurement. The government and the private sector sign long-term contracts to establish a cooperative relationship. Through contract governance, the government realizes its sociopolitical economy management and national governance goals by utilizing the private sector’s power. The development of PPP has witnessed a move toward the era of government procurement. The main job of the government is not to provide services all by itself

but to determine who the better provider in the market is [2]. Driven by this new governance concept, the Chinese government also attaches great importance to cooperation with the private sector. In the 1980s, China began to explore the PPP model. After more than 20 years of persistence and development, in 2014, the government began to vigorously promote PPP nationwide and formulated several normative documents for the promotion of PPP development. Although the government has been issuing intensive policies since 2014 to provide macro guidance and selecting national demonstration projects to increase demonstrative leadership, neither theory nor practice has kept pace with it in a manner that is mature enough. PPP projects have existed for a long time, they last long, and they have many participants. Some PPP projects face irregularities, inefficiencies, and increased transaction costs, which have caused poor project performance [3].

The poor performance of some PPP projects is owing to several factors, including government, private sector, and contract, among which, contract is the most important. The implementation and performance of PPP projects are largely related to the performance and characteristics of contracts [4]. A long-term cooperative relationship is established between the government and private sector through PPP contract signing [5]. This contract is typically a long-term contract, with cooperation period of up to 30 years. However,

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all long-term contracts have potential uncertainties. The impact of uncertainty is not significant in the short term, but the long-term accumulation has a more pronounced negative effect. In essence, long-term PPP contracts may exhibit three types of uncertainty: The first type is the behavioral uncertainty caused by opportunism. The behavior of the contracting parties is unpredictable, and PPP contracting parties cannot effectively observe, evaluate, and judge the behavior of the counterparty. The second type is the uncertainty caused by the objective environment. The instability and unpredictable changes in the surrounding environment of the project bring uncertainty [6]. The bounded rationality of contract party, which is affected by political, economic, and other external environmental uncertainties, may not be able to predict the occurrence of various situations and control environmental changes. The third type is the semantic uncertainty caused by the bounded rationality. The complexity of the contract and the ambiguity of the language caused vague communication between the two parties, thereby resulting in inaccuracy and ambiguity.

2. Literature Review

There are many discussions on the impact of uncertainty on project performance [7–11]. Existing studies have shown that uncertainty has a significant negative impact on project performance. PPP projects face huge uncertainties because of the influence of bounded rationality and opportunistic behavior, which generate project risks, frequent litigation, and project failures, causing mistrust between the two parties and reducing the satisfaction of cooperation [12]. Environmental uncertainty makes it difficult for project participants to foresee future events at the beginning of the establishment of the contract, thus increasing transaction costs, extending the cooperation period, and increasing quality and rework issues. Moreover, behavior is highly self-contained. Hence, the uncertainty of behavior is closely related to the differences and disorder of the party's own interests and understanding. The contracting parties may enter into contract because of public interest for economic benefits. This behavior caused disorder of economic activities and economic losses.

How the contract plays a role in addressing the problem of poor project performance caused by the uncertainty of long-term PPP contracts is worthy of in-depth thinking and research. Some scholars have proposed that PPP contract governance affect project performance [13]. The government and private sector can coordinate the relationship between the two parties through a series of formal contract system arrangements. This would allow the contracting parties to influence and interact with each other for the realization and protection of the contract and public interests. The current research on PPP contract governance focuses on how to improve project performance through contract design, renegotiation, and contract performance, including the clarity of contract terms (risk sharing, output standards, etc.), flexibility (renegotiation and termination), strict performance (performance evaluation, government support, guarantee, etc.). First, for the clarity of the contract terms, the contract needs to clearly define the rights and obligations of both parties in terms of law and finance, and restrict opportunistic behavior. Second, flexibility is the ability of a contract to resolve uncertainties, including emergency arrangements and renegotiations, wherein the two parties cooperate in dealing with unpredictable environmental changes. Third, self-fulfillment capabilities need to be strengthened, which is achieved through government support and performance guarantees [14]. Existing research has also demonstrated the relationship between PPP contract governance and project performance. A formal contract governance mechanism can adjust the structure to save transaction time, reduce transaction costs, and

improve economic efficiency and project performance [15]. Contract governance uses a formal institutional framework to define the rights and obligations between cooperating entities. From the perspective of contract governance restricting opportunistic behavior, a few scholars analyze the impact of contract governance on project performance [16], but they ignore other important variables, such as unpredictable changes in the project environment. Existing research has certain limitations, and researchers have not systematically explained how contract governance affects project performance.

On this basis, this article attempts to define PPP contract governance and explore the relationship between PPP contract governance and project performance, that is, how PPP contract governance affects project performance. The contribution of this study has three aspects.

First, it makes up for the lack of current research on PPP long-term contract governance. PPP is a high-level, complex, and innovative government procurement with a long cooperation period. However, the current contract party and theoretical concerns are still focused on the “early” procurement process, ignoring the governance of long-term contracts. This study focuses on the design and implementation of long-term PPP contracts throughout the life cycle to help achieve better performance. Second, in this study, the theory of contract governance has been developed to determine the dimensions of PPP contract governance. In particular, the theoretical analysis framework of PPP contract governance under the constraints of “behavior-environment” is established: the fundamental theories of PPP contracts and PPP contract governance affecting project performance.

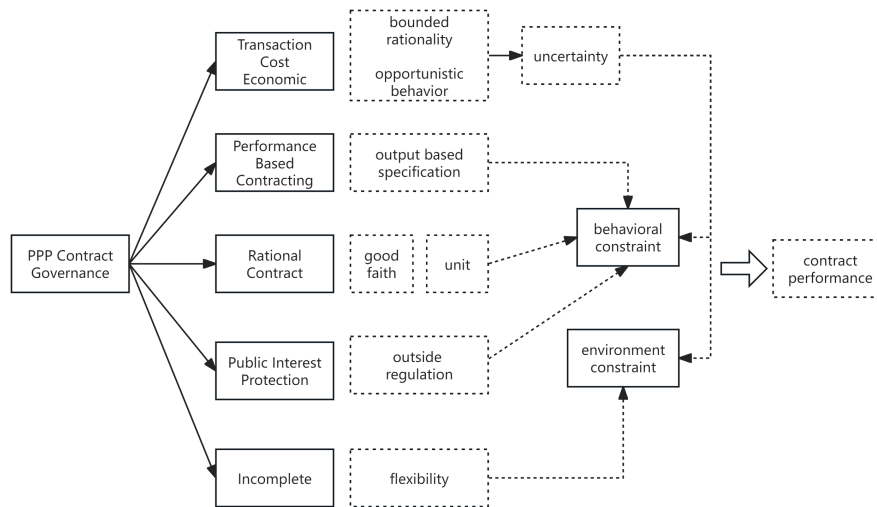
2.1. Theoretical framework

Poor project performance is mainly due to the uncertainty associated with bounded rationality and opportunism. Therefore, the contract governance theory should reflect the bounded rationality and opportunistic behavior constraints of contract party. This article builds a theoretical analysis framework of PPP contract governance under the constraints of “behavior-environment” (see Figure 1). The first theory is the basic theory of PPP contract governance affecting project performance: transaction cost economics (TCE). Market transaction entities use contract governance tools to make organizational adjustments, especially unforeseen environmental changes brought about by bounded rationality and opportunistic behavior, bargaining after the fact, and “hold-up” behaviors. The best contract governance structure saves transaction costs and promotes effective coordination and continuation of long-term partnerships to reduce uncertainty and help improve project performance. The second theory is the basic theory of PPP contracts. Focusing closely on the long-term, output-based relationship, and incompleteness and typical characteristics of “public interest” of PPP contracts, we choose performance procurement theory, relational contract theory, incomplete contracts, and contract regulation theory of public interest as the basis. The fundamental elements of contract governance are extracted from these PPP contract theories and discussed as the basic variables of PPP contract governance.

2.2. Research hypothesis

Contract governance theory originates from TCE. Williamson [17] provided ideas for contract governance to reduce transaction costs from the perspective of bounded rationality and opportunistic behavior through his paper titled, “TCE: The Governance of Contractual Relations”. Subject to bounded rationality, it is impossible for individuals to clearly predict the

Figure 1
Theoretical analysis framework of PPP contract governance



future trading environment and changes before trading. When no effective contract governance mechanism exists between the two parties, speculative behavior will occur, and the transaction faces uncertainty and risks in attaining the strategic goal of PPP projects. For example, a recent empirical study on the actual implementation of sustainable procurement in PPP projects has revealed that opportunistic behaviors, combined with certain distinctive features of PPPs, are highly likely to marginalize SMEs and other disadvantaged groups [18]. In order to deal with the problem of bounded rationality and prevent the increase in transaction costs caused by opportunistic behavior and the uncertainty in the transaction process, effective measures are needed.

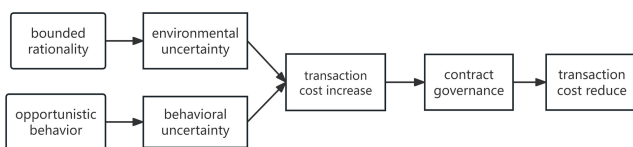
Transaction cost economy can explain the governance structure of contract relationships and the improvement of project performance (see Figure 2). Formal contracts are an important tool for regulating mutually beneficial partnerships. In general, contract governance affects project performance, on the one hand, by responding to the environmental uncertainty brought by bounded rationality, on the other hand, by curbing the behavioral uncertainty. Even in an uncertain environment, contract governance can ensure transaction stability and improve project performance. First, contract governance is a game of contract relations, and it curbs opportunistic behavior [19]. The incentives in the contract help to fully perform the contract and then achieve

the purpose of the contract. Second, contract governance is committed to improving economic efficiency, limiting opportunistic behavior in the inevitable renegotiations, reducing transaction costs, resolving disputes promptly, maintaining the relationship between the partners, and improving project performance [20]. Finally, contract governance guarantees strict performance, guides the parties to respect the spirit of the contract, and ensures that both parties to the contract maintain a continuous, stable, and healthy relationship.

Hypothesis 1: PPP contract governance has a positive impact on project performance.

Traditional government procurement tends to emphasize input rather than results. That is, the government is responsible for designing and supervising construction, operation, and maintenance activities. Moreover, it attaches importance to input elements such as procedures, processes, time, and labor. In recent years, the role of the government has changed. With the advancement of the new public management movement, more and more governments have fundamentally changed the way they provide public services, and through purchases, more people that are professional can provide better public services. This huge change in the nature of the government requires fundamental organizational changes. Their working methods must change and their ability to become a “smart buyer” must improve. In this context, performance procurement came into being, and the government began to pay attention to the result [21]. Performance procurement has shifted the focus from input and process to focus on output. It is an output-based procurement method that focuses on linking payment with contract output and results. “Output” is a direct result, a specific requirement of service activities, or the production process itself. It is usually an objective and measurable product, such as hospitals providing catering services for specific patient groups. The “result” is the value that users acquire from a given service or product.

Figure 2
Theoretical path of the relationship between contract governance and project performance



Moreover, it is a strategic byproduct derived from a long-term vision, such as whether the educational outcome can meet the project goal. The key feature of performance procurement is to emphasize the specification and evaluation of output or results, rather than the required input or process. Performance procurement is conducive to the realization of public value and helps the government to provide citizens with more and better public services. In order to achieve performance procurement, a contract that contains clear output standards and performance evaluation methods must be written in the procurement system; moreover, financial rewards and penalties must be incorporated into the contract. Specifically, the following must be included:

- 1) Output standards. Describe requirements based on the required output requirements and results, rather than specifying how to complete the work, and develop measurable output standards.
- 2) Advanced performance evaluation. The government must take measures to ensure that the performance of private sector meets output standards.
- 3) Financial rewards or punishments. Private sector is rewarded for good performance or punished for poor performance.

Output-based specification is an indispensable part of the contract, clarifying what the government needs, not how it is delivered. The success of PPP relies heavily on the formulation and implementation of output standards. A clear output standard, performance evaluation, and payment mechanism can define the scope of the project and output requirements, and form effective incentive measures. The private sector will be rewarded if it reaches the contract output standard and punished if it fails to meet the contract output standard. Therefore, output-based specification is a key factor in the success of PPP project and can affect project performance.

Hypothesis 2: Output-based specification has a positive impact on project performance.

Contract theory from the perspective of economics has experienced a development process from complete contract theory to incomplete one. A complete contract means that the contract party can fully anticipate events that may occur during the performance of the contract, whereas an incomplete contract is the opposite. Due to human-bounded rationality and opportunistic behavior, the parties to the contract cannot observe everything, and the contract terms are bound to be incomplete. The measure to deal with incomplete contracts is to rely on incomplete contracts as much as possible to complete contracts and to shift from unclear and uncertain contracts of rights and obligations to certain ones. The contract party needs to balance the ex ante commitment and ex post flexibility and timely adjust and restore efficiency in the unpredictable and unstable environment [22]. The contract is incomplete; hence, it will only stipulate a binding framework and explain the transaction content, procedures, etc. The problem can be solved through the contract change, and the omission of the contract can also be filled after the natural state is realized.

Uncertainty determines that long-term PPP contracts must be flexible to adapt to future changes. Flexibility is an important tool to deal with uncertainty, which can reduce transaction costs and increase profits. Therefore, flexibility can have an impact on project performance.

Hypothesis 3: Flexibility has a positive impact on project performance.

The relational contract theory began in the 1960s, and the contractual relationship was more complicated than expected. The traditional contract law could not explain some new contract problems. Under this background, some scholars proposed the relationship contract theory. The relationship contract plans the various relationships between the parties in the future exchange process and has the nature of future consensus. The relationship contract does not specify the terms of the contract. However, it attempts to establish a contractual relationship that determines the future trade: “constitution to manage continuing relationships” [23]. First, relationship contracts that rely on the value of future relationships to maintain fully affirm the principle of good faith, because it limits the parties’ opportunistic behavior and helps maintain the best relationship. Second, the continuous interaction of the relationship is the basis for the survival of the relationship contract [24]. In the contract, the interaction between the two parties should be strengthened in a clear way, which is conducive to the continuity and stability of the relationship. Finally, unlike other contracts that rely on courts to enforce, relationship contracts rely on the value of future cooperation to maintain. Therefore, in dispute resolution, we need to pay attention to alternative dispute resolution (ADR) mechanisms such as negotiation, mediation, and arbitration.

Good-faith cooperation, as the law of market economy operation stipulates, can regulate the behavior of market entities and ensure transaction security [25, 26]. Controlling the opportunistic behavior of contract party through good-faith measures can achieve cost efficiency. In the long run, good-faith cooperation between the two parties can guarantee the continuity of the relationship, help both parties do their utmost to achieve the expected goals, and then affect the project’s performance.

Hypothesis 4: Good-faith cooperation has a positive impact on project performance.

Along with the development of contract governance, the intervention of laws or regulatory agencies is also being promoted globally. PPP contracts are special; they are regulated public utilities, and they have more public interest protection needs. If the contract parties are sufficient to protect the public interest, then no law or external supervision is required. However, this is the ideal state, and it is difficult to achieve this in reality. It is embodied in three aspects: First, the regulatory agency can impose special obligations in the contract so that the commercial relationship of the contract considers the content of the public interest, and thus, the PPP follows the important legal principles of openness, fairness, and justice. Second, when an emergency occurs and the provision of public services may be interrupted, the government should exercise supervisory responsibilities over, intervene in, and take over PPP projects. Third, due to the protection of public interests, the government has the right to unilaterally change and terminate the contract [27]. However, the public interest must not be abused, and the government must have strict restrictions on exercising this right.

Effective external regulation is essential for project performance and solving problems caused by uncertainty. The procedural fairness of PPP cooperation is conducive to achieving project goals. Moreover, it can enable the public to understand project-specific information promptly and form a social supervision force. Apart from the openness and transparency of procedures, the government’s step-in and takeover of PPP projects in crisis situations can guarantee the normal operation and continuous provision of public services. In some special circumstances, the government may not be able to continue to perform the contract, such as changes in laws and

policies, services, and public interests. The government can choose to terminate the contract early. The protection of public interests in the PPP contract embodies the values of economy, efficiency, and sustainability. It helps improve project performance.

The output-based specification, good-faith cooperation, flexibility, and public interest protection in the governance of PPP contracts are interlinked and work together to promote the success of the project.

Hypothesis 5: Public interest protection has a positive impact on project performance.

Hypothesis 6: The four dimensions of PPP contract governance are a unified whole.

3. Methodology

This study utilized the questionnaire method for the analysis of the water environment PPP industry for the following reasons. First, environmental governance is an important means to achieve ecological civilization and environmental protection. Environmental

protection is closely related to human health and is highly concerned and supported by the state. Second, water environment treatment projects are the core of the development of the eco-environmental protection industry. The market is mature, and there are many successful projects.

3.1. Research design

The questionnaires are mainly distributed to experts who have experience in the project and who are listed in the Ministry of Finance and Development and Reform Commission database. The questionnaires are also distributed to the government, private sector, and lawyers who are engaged in the project. The questionnaire sources are paper and electronic questionnaires. Most of the paper questionnaires come from professional environmental protection PPP meetings. Meanwhile, electronic questionnaires are sent to target employees and experts of ecological and environmental protection enterprises. The 434 questionnaires collected were checked, eliminating the invalid questionnaires (see Table 1). The remaining valid questionnaires were 368. The effective questionnaire recovery rate was 84.7%.

Table 1
Descriptive statistical analysis of samples

Classification	Options	Frequency	Percentage	Cumulative percentage
Profession	Civil servant	117	31.8	31.8
	Project practitioner	180	48.9	80.7
	Scholar	28	7.6	88.3
	Other	43	11.7	100
	Total	368	100	
Age range	21–30	60	16.3	16.3
	31–40	153	41.6	57.9
	41–50	117	31.8	89.7
	>50	38	10.3	100
	Total	368	100	
Number of years of research/practice	3 or less	94	25.5	25.5
	3–5	176	47.8	73.4
	6–10	58	15.8	89.1
	10 or more	40	10.9	100
	Total	368	100	
Project operating period	1 or less	115	31.3	31.3
	1–3	105	28.5	59.8
	3–5	33	9	68.8
	5 or more	115	31.3	100
	Total	368	100	
Ways to participate in PPP projects	Government	112	30.4	30.4
	Private sector	87	23.6	54.1
	Financial institutions	10	2.7	56.8
	Consultancy	128	34.8	91.6
	Other	31	8.4	100
Education background	Total	368	100	
	Junior college	8	2.2	2.2
	Undergraduate	168	45.7	47.8
	Master’s degree	152	41.3	89.1
	PhD and above	40	10.9	100
Number of participating projects	Total	368	100	
	3 or less	101	27.4	27.4
	3–5	84	22.8	50.3
	6–10	47	12.8	63
	10 or more	136	37	100
Total	368	100		

3.2. Variable measurement

This article draws on existing mature scales and combines theory, cases, and interviews to determine independent variables: output-based specification, good-faith cooperation, flexibility, and public interest protection. Output-based specification includes output standards, performance evaluation, and payment. Meanwhile, good-faith cooperation includes good faith, regular review, and ADR. Flexibility includes renegotiation and early termination of contracts. Information disclosure and transparency, government step-in, and unilateral government changes and termination rights comprise public interest protection. In this study, the dependent variable is project performance, including the commonly used “4E” evaluation indicators, namely economy, efficiency, effectiveness, and fairness. The measurement of economy mainly depends on cost prediction and control, capital value, etc. Efficiency is the realization of the project schedule, whereas effectiveness refers to the government’s satisfaction with the project results, the public’s praise of the project, and the project’s safety standards [28]. Fairness is the equal cooperative relationship between contract party and the impact of the project on the environment, society, and economy. Control variables include occupation, way of participating in PPP projects, age range, educational background, number of years of research/practice, number of participating projects, and project operating period.

3.3. Reliability and validity test

This study includes two scales: PPP contract governance and project performance. PPP contract governance includes four subscales: output-based specification, good-faith cooperation, flexibility, and public interest protection. Using SPSS23.0 software to analyze the above scales. Cronbach’s α coefficients for the output-based specification, good-faith cooperation, flexibility, public interest

Table 2
Cronbach’s alpha

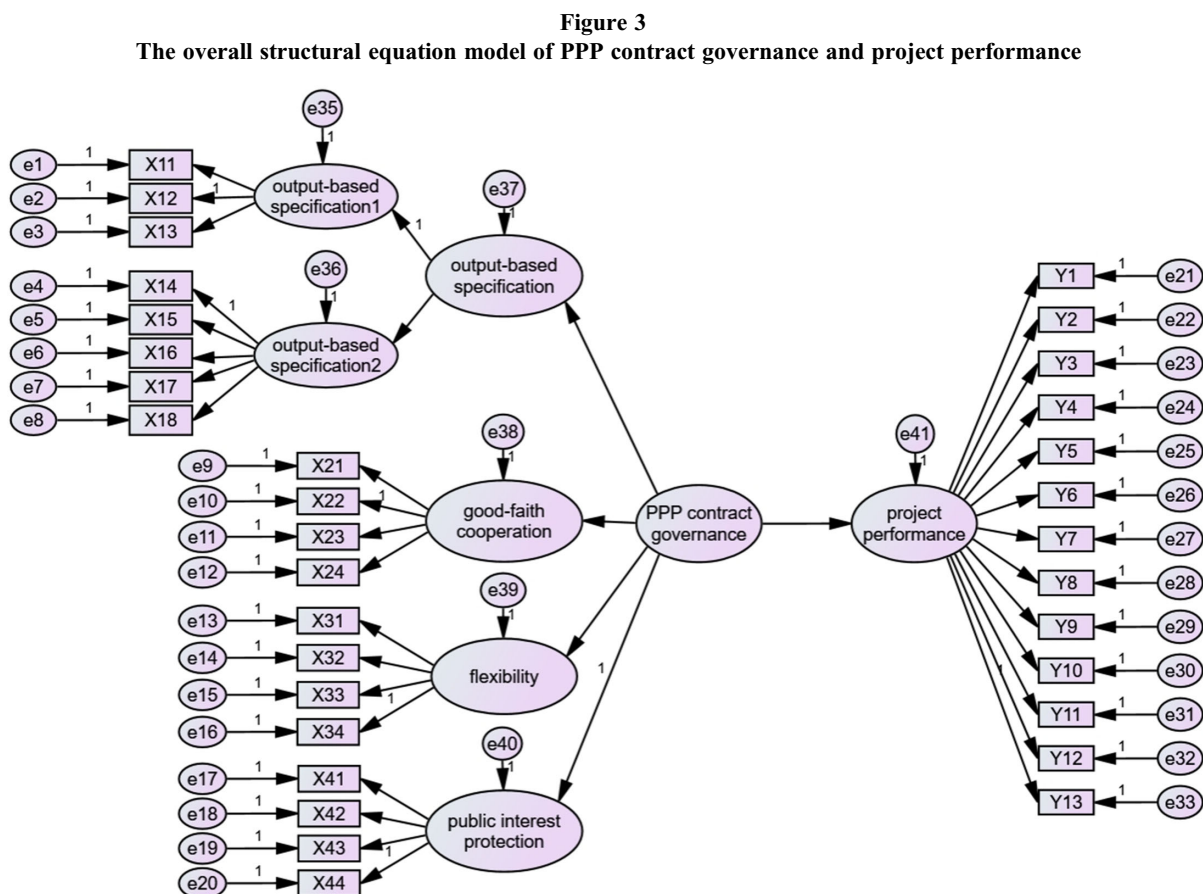
Inventory	Component table	Cronbach’s alpha
PPP contract governance	Output-based specification	0.836
	Good-faith cooperation	0.749
	Flexibility	0.819
	Public interest protection	0.761
Performance		0.934

protection, and project performance of contract governance are 0.836, 0.749, 0.819, 0.761, and 0.934, respectively, which are higher than the basic requirements (see Table 2). The reliability of each scale has reached a more satisfactory result and has a higher reliability. We used the structural equation model to test the validity of PPP contract governance and project performance.

The results of the CFA analysis show that the average variance precipitation (AVE) of PPP contract governance and project performance is 0.703 and 0.525, respectively, and AVE is greater than 0.5, indicating that the scale has a good construction.

3.4. Path analysis

The overall structural equation model is shown in Figure 3. PPP contract governance includes four dimensions: output-based specification, good-faith cooperation, flexibility, and public interest protection. In addition to using the structural equation model to verify the relationship between these four dimensions, we verify the relationship between PPP contract governance, output-based



specification, good-faith cooperation, flexibility, and public interest protection on project performance.

The study found the direct impact of PPP contract governance on project performance (see Figure 3). The standard path coefficient is 0.48, and the P value is less than the significant standard of 0.05. Therefore, PPP contract governance has a positive impact on project performance. Taking age, educational background, working years, quantity, and operating period of PPP projects in the river environment as control variables, the standard path coefficients of output-based specification, good-faith cooperation, flexibility, and public interest protection on project performance are 0.41, 0.32, 0.41, and 0.48, respectively. The significant value of P value is less than 0.05. Therefore, Hypotheses 1, 2, 3, 4, and 5 are supported: output-based specification, good-faith cooperation, flexibility, and public interest protection have a positive impact on project performance.

The results of PPP contract governance CFA reveal that the load factors of contract governance and output-based specification, good-faith cooperation, flexibility, and public interest protection are 0.84, 0.82, 0.84, and 0.86, which are all greater than 0.8. Therefore, Hypothesis 6, which states that output-based specification, good-faith cooperation, flexibility, and public interest protection are an organic whole, is supported.

4. Results

The following results are drawn from this study. First, the four dimensions of PPP contract governance are organically unified. Through CFA analysis, the four dimensions of PPP contract governance, namely, output-based specification, good-faith cooperation, flexibility, and public interest protection, are related to each other, and they are an organic whole.

Second, PPP contract governance and its four dimensions have a positive impact on project performance. Through CFA and path analysis of the questionnaire data, it is concluded that PPP contract governance has a positive impact on project performance. PPP contract governance coordinates the relationship between the government and private sector and achieves good order through governance, which can improve project performance. Moreover, output-based specification, good-faith cooperation, flexibility, and public interest protection can improve project performance.

5. Discussion

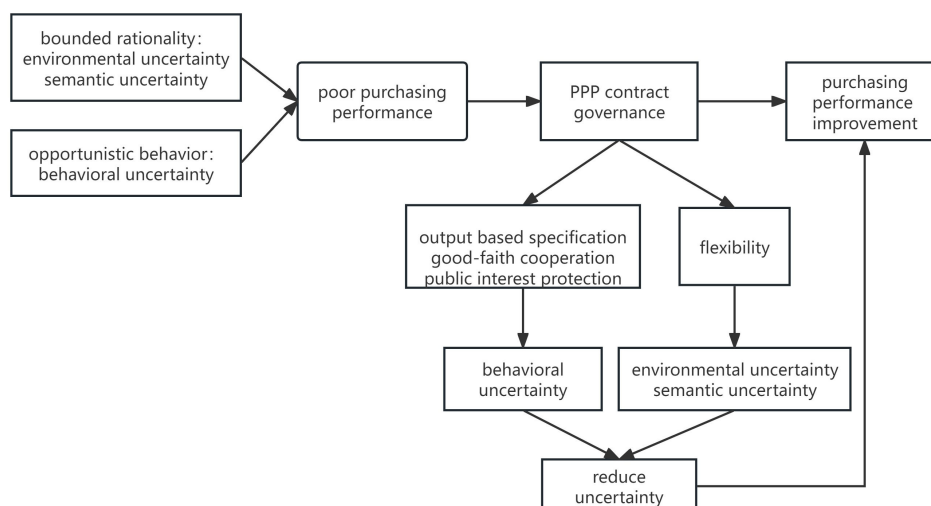
PPPs are an alternative approach to conventional public procurement (CPP), and there is rich discourse on the benefits and problems of PPPs. Much of the research on PPPs has compared PPPs with CPP with respect to cost [29], quality [30], timeliness of project delivery, risk transfer, and a most recent research, to sustainable procurement [18].

The four dimensions of PPP contract governance are related to each other, and they are an organic whole. Output orientation, good-faith cooperation, flexibility, and public welfare protection have been verified in the national demonstration project contract, reflecting that PPP contract governance can prevent, reduce the problems caused by behavioral, environmental uncertainties, and contribute to project success and sustainable development.

Uncertainty is the essence of a risk society, which will lead to disorder of contractual relations, and the role of governance is to inject certainty into the risk society [31]. Contract governance can improve the ability of contracting parties to deal with uncertainty and ensure the stability of transactions [32]. It is an important tool for regulating mutually beneficial cooperative relations. From the perspective of institutional arrangements, PPP contract governance adjusts transactions through internal governance structures to produce cost-saving effects, restricts transaction behavior through formal institutional arrangements, and provides contract countermeasures under environmental changes. PPP contract governance itself is the governance of transaction relations, which is intended to reduce the uncertainty in the transaction process, make the uncertainty relatively certain, reduce transaction costs, increase efficiency and effectiveness, and ultimately improve project performance.

PPP contract governance dimensions include output-based specification, good-faith cooperation, flexibility, and public interest protection. Output-based specification, good-faith cooperation, and public interest protection can effectively deal with behavioral uncertainty, whereas flexibility can deal with environmental and semantic uncertainties. Output-based specification is the core of contract governance. It clarifies the preconditions for output standards, performance evaluation, and payment mechanisms to achieve contract goals. Moreover, the design of incentive-compatible mechanisms can effectively restrict the behavior of contract party.

Figure 4 Path analysis of the relationship between PPP contract governance and project performance



Meanwhile, good-faith cooperation runs through the execution of the contract and is an important basis. It reduces the uncertainty of behavior in economic activities and enables contract party to strictly perform the contract. Furthermore, public interest protection is a measure taken by the government to avoid expanding losses when the government and the public lack trust in private sector. Public interest protection requires the government to play an active role, reduce the opportunistic behavior of private sector in terms of information disclosure and transparency and government step-in, and strengthen social supervision while protecting the public's interests. Finally, flexibility is an important mechanism to effectively deal with environmental and semantic uncertainties. When the environment changes or the contract text is ambiguous, the flexible adjustment mechanism is used to modify or explain the content of the contract promptly (see Figure 4). When the contract cannot be performed, the "contract deadlock" is broken, the contract is terminated, and the loss is avoided.

6. Conclusion and Policy Recommendations

The PPP contract reflects the long-term cooperative relationship between the government and private sector. It is typically a long-term contract, which is often as long as several decades. However, due to bounded rationality, the contract party cannot predict unforeseen environmental changes and has opportunistic behavior. Moreover, PPP long-term contracts face behavioral, environmental, and semantic uncertainties. Uncertainty affects PPP project performance, resulting in poor project performance. Due to the problem of poor performance of PPP caused by uncertainty, contract governance provides a realistic and feasible governance framework for the development of PPP and the stability, health, and continuity of contractual relations. PPP contract governance includes output-based specification, good-faith cooperation, flexibility, and public interest protection. These four dimensions are an organic and unified whole, and PPP contract governance and all dimensions can improve project performance. For the mechanism of influence, PPP contract governance promotes project performance improvement by preventing and reducing behavioral, environmental, and semantic uncertainties. Output-based specification, good-faith cooperation, and public interest protection can prevent and reduce behavioral uncertainty and limit the opportunistic behavior of the contract party. With flexible performance prevention, environmental and semantic uncertainties are reduced, and environmental changes and text ambiguity received appropriate responses. PPP contract governance improves project performance by reducing uncertainty, thereby achieving the goal of contract governance.

The government should promote the use of PPP standard contracts and internalize the PPP contract governance mechanism into the standard contract terms. We proposed the following steps that governments can undertake. First, output-based specification, performance evaluation, and payment should be specified in the contract. Output-based specification is the core of the contract, including economic and technological standards, the specific scope of construction and services, and direct and indirect outputs (economic, social, and environmental benefits). The performance evaluation is based on the output standard, and payment is linked to performance. Second, the guarantee measures for good-faith cooperation include government commitments and guarantees, private sector guarantees, insurance, periodical review, and dispute resolution focusing on "relationship repair". The government's guarantee of expenditure responsibility and private sector guarantee increase the cost of default and punishment measures. Third, a flexibility adjustment system must be set up, contracts should be

effectively changed or terminated in accordance with corresponding procedures, response should be given to changes in the environment, and losses should be stopped promptly. Fourth, the government uses the rights of information disclosure and transparency, step-in, unilateral change, and termination of contracts to protect the public interest. In principle, except for state secrets and commercial secrets, project information should be made public. In emergency situations such as interruption of public services, the government takes over projects to ensure the continuity of public service provision. Based on specific circumstances such as public interest protection, changes in laws, policies, and service demand, the government can unilaterally change and terminate the contract, but the private sector must be bound to strict restrictions and reasonable compensation.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

The data that support this work are available upon reasonable request to the corresponding author.

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