

# Research and Enlightenment on VFM Evaluation of PPP Project

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## Abstract

**In recent years, with the development of cooperative operation between government and social capital, China is steadily promoting the PPP model. VFM qualitative evaluation plays a key role as a means to measure whether the project adopts PPP mode. However, VFM evaluation of PPP projects in China is still in the development stage, and the theoretical framework and methods are not mature. Designing a reasonable evaluation method is of great significance to further develop VFM evaluation. This paper carries out case analysis and puts forward strategic suggestions for improving VFM evaluation, which will help to improve the construction of VFM qualitative evaluation system, promote the development of quantitative evaluation, give play to the guiding role of VFM evaluation results in decision-making, and promote the benign and stable development of VFM evaluation of PPP mode in China. This paper improves VFM evaluation design by combining PPP project establishment and VFM evaluation operation.**

## Keywords

**PPP Project; VFM Evaluation; Evaluation Process; Evaluation Model.**

## 1. Introduction

With the promotion of PPP (Public-Private-Partnership) mode in China's project construction, the number of PPP projects meeting VFM (Value for Money, VFM) evaluation criteria in the field of public infrastructure and services has exploded[1]. The social capital party undertakes the design, construction and operation of the project, and obtains the expected investment income by charging service fees and Government recovered quotations. The government department formulates prices for infrastructure and services, and supervises and manages the quality of the project. With its low cost and high-quality public infrastructure services, PPP mode is regarded as a new public-private partnership mode of mutual benefit.

The cost-benefit analysis method and the public sector comparative value method are generally accepted evaluation methods in the world at present. Qianhui Wang [2] pointed out that the cost-benefit analysis method is based on the net present value, which is abandoned by most countries because of the inconsistent discount rate and data distortion. Yi Diao[3] et al believe that under the premise of the traditional procurement mode, the PSC value is the total cost of public infrastructure and services that the government uses existing resources to maximize efficiency. Jingfeng Yuan [4] et al believe that government departments judge whether the project reaches VFM through PSC value, because PSC value comprehensively considers the price, quality, duration and potential risks of infrastructure and public services.

Based on this, domestic scholars have done a lot of research on the basic concepts, evaluation processes and methods of VFM evaluation, but the selection of qualitative evaluation indicators, the selection methods of indicator weights and the specific methods of quantitative evaluation need to be further studied and discussed.

## 2. Empirical Analysis on VFM Evaluation of PPP Project

### 2.1. VFM Theory and Project Overview

In order to promote the development of China's VFM evaluation model, the Ministry of Finance issued *the guidelines for PPP value for money evaluation (Trial)* (hereinafter referred to as *the guidelines*) in 2015, which provides a guiding document for the VFM evaluation of PPP projects in China [5]. *The guidelines* stipulate that at the present stage, China focuses on qualitative evaluation, and does not make mandatory provisions for quantitative evaluation. It clearly stipulates that the project can only be constructed in PPP mode after passing VFM evaluation and financial capacity certification. Within a certain range, quantitative evaluation guides the use of public sector comparative value method to identify whether the project really achieves value for money.

This paper takes an economic development zone as the research object. The project cycle is 20 years, of which the construction period is 7 years. The construction contents include the transformation of shanty towns, the construction of economic parks, the construction of public infrastructure in the parks and the construction of commercial streets. The project has large investment scale, long construction cycle and many project contents, and is representative.

### 2.2. Indicator Weight Setting

**Table 1.** Qualitative evaluation index weighting results

Serial number	Indicator category	Evaluating indicator	Index meaning	Weight (%)	
				Analytic hierarchy process	Expert direct weighting method
1	Basic indicators	Full lifecycle integration	Project whole process task integration and management	14	14
2		Risk identification and allocation	Clear identification and optimal allocation of industry risks and project risks	23	18
3		Performance orientation and encouraging innovation	Project performance requirements, third-party supervision and project innovation	14	12
4		Potential competition	Attention of social capital parties to the project content	9	7
5		Government institutional capacity	Ability of government departments to perform the contract, change their functions and supervise and manage	8	10
6		Financiability	Market financing capacity of the project	12	19
7	Supplementary indicators	Project properties	Impact of project scale and expected	7	8

			service life on the project		
8		Social welfare	Public benefits brought by the project to the society	7	7
9		Industry demonstration	Whether it can provide demonstration guidance for similar projects in the future	6	5

According to the notice of *the guidelines*, the qualitative evaluation indicators include six basic indicators: the degree of integration in the whole life cycle, risk identification and distribution, performance orientation and innovation encouragement, potential competition, government institutional capacity, and financiability [6], and six auxiliary indicators: project scale, expected service life, types of major fixed assets, accuracy of cost calculation in the whole life cycle, growth potential of operating income, and industry demonstration. Among them, basic indicators account for 80%, and each single indicator does not exceed 20%; The auxiliary indicators account for 20%, and the individual indicators do not exceed 10%. Finally, the results are scored by experts. In this paper, analytic hierarchy process and expert direct weighting method are used to set the weight of indicators. The weighting results of qualitative evaluation indicators are shown in Table 1. The data analysis shows that the index weight of "risk identification and distribution" is 23%, which is greater than the highest standard of 20%. Therefore, the weight calculated by the analytic hierarchy process is abandoned and the index weight calculated by the "expert direct weighting method" is selected.

### 2.3. Qualitative Evaluation Results

At this stage, the arithmetic mean value is generally selected for the qualitative evaluation score, which will lead to a loss of consideration for the professional ability of experts, resulting in a huge difference between the evaluation results and the actual situation [7]. Based on this phenomenon, the scoring method adopts the "expert scoring method with different weights", and sets the weight of indicators through the experts' industry characteristics and professional expertise, so as to enhance the scientificity and credibility of the assessment. See Table 2 for the index weighted score results of different weight expert scoring and qualitative evaluation. The weighted qualitative evaluation score of the project is 78. The project is rated well. Through VFM qualitative evaluation, it is suitable for PPP mode construction.

**Table 2.** Scoring results of qualitative evaluation experts

Serial number	Indicator name	Index weight (%)	Score	Weighted results
1	Full lifecycle integration	14	90	13
2	Risk identification and allocation	18	75	13
3	Performance orientation and encouraging innovation	12	80	9
4	Potential competition	7	73	5
5	Government institutional capacity	10	79	8
6	Financiability	19	80	15
7	Project properties	8	79	6
8	Social welfare	7	73	5
9	Industry demonstration	5	81	4

## 2.4. Quantitative Evaluation Results

The quantitative evaluation of the project uses the public sector comparative value method to calculate the PSC value and PPPs value, so as to judge whether it passes the VFM quantitative evaluation. PSC value includes initial PSC value, competitive neutrality adjustment value and risk adjustment value.

### 2.4.1. Calculate PSC Value

(1) The cost under traditional government procurement is called initial PSC value, which is divided into total construction investment, capital income, later maintenance cost and third-party income. The formula is:

Initial PSC= (Total construction investment-Capital gains) + (Post maintenance cost-Third party income)

In this project, the total construction investment is 16752.5954 million yuan, including 15395.1215 million yuan of investment during the construction period and 1357.4739 million yuan of loan interest during the construction period. The later maintenance cost of the project is 5027.2416 million yuan, including employee wages and welfare, maintenance and other sales expenses. The third-party income is 5965.202 million yuan, which should be eliminated from the initial PSC value.

(2) In order to offset the advantages of the traditional procurement model for the social capital side, it is necessary to set up a competitive neutrality adjustment to ensure the fairness of the quantitative evaluation of both sides. The adjusted value of competition neutrality consists of approval fee, enterprise income tax, etc. in the calculation process, the project expenses under the PSC value shall be consistent, the income tax and value-added tax rates shall be the same, the PSC value and PPP value shall be calculated under the same calculation rules, and the government shall be in a neutral state. Based on this, the PSC value of the competition neutral adjustment is taken as 0.

(3) When the risks at each stage of the project are difficult to be quantified and the probability of risk occurrence is difficult to measure, a certain proportion of the total construction investment and the total operation and maintenance cost of the project can be used to determine the risk expenditure. After consulting relevant literature and project experience, the proportion of each part of the risk is set as follows: the investment and financing risk accounts for 1% of the annual construction investment; The construction risk accounts for 3% of the annual construction investment; The operation risk accounts for 3% of the annual construction risk; The government risk accounts for 1% of the annual construction investment; Unknown and irresistible risks account for 1% of the annual construction investment. According to the above estimation principles, the total risk expenditure is 113.5817 million yuan.

To sum up, PSC value = initial PSC value + competitive neutrality adjustment value + risk adjustment value =15814.635 million yuan.

### 2.4.2. Calculate PPPs Value

PPPs value consists of government investment fee, gap subsidy and risk bearing expenditure.

Under the traditional mode and PPP mode, the fundamental reason for the different financing costs is the inconsistency of financing schemes, which has a certain impact on the total construction investment under the PPP mode. It is necessary to recalculate the total construction investment and operating costs, and finally get the PPPs value.

(1) With reference to the financing plan, 30% of the project construction investment is used as the project capital, 30% of which is financed by government departments, and 70% of which is financed by social capital. Therefore, government equity investment =1539512.15 × 30% × 30%=1385.560935 million yuan.

(2) The project is a feasibility gap subsidy mode. According to the policy requirements, the government departments undertake the direct payment during the project operation. Government departments shall pay gap subsidies according to the pricing method specified in the contract to make up for the difference between construction investment and operating income. The gap subsidy of government departments is 12577.5924 million yuan.

(3) Risk bearing expenses include: the risk of shanty town reconstruction expenses accounts for 1% of the demolition expenses of the current year; The gap subsidy risk accounts for 3% of the gap subsidy; The government risk accounts for 1% of the total construction investment and operation and maintenance cost; The irresistible factors account for 1% of the total construction investment. Based on the above rules, the total risk expenditure retained by the government is 758.9358 million yuan.

To sum up, PPPs value = government investment + gap subsidy + risk bearing expenditure = 14722.0891 million yuan.

VFM value = PSC value - PPPs value = 1092.5459 million yuan, PSC value > PPPs value, through VFM quantitative evaluation.

### 3. Suggestions and Improvement Measures

1. Improve the qualitative evaluation index system. At present, the domestic VFM evaluation is still in a steady development stage, and the evaluation mode based on qualitative evaluation will not change. However, the imperfection of the qualitative evaluation index system in China has affected the realization of project VFM to a certain extent. Exploring suitable VFM evaluation indexes and establishing a perfect VFM qualitative evaluation index system will contribute to the healthy and stable development of PPP projects in China.

2. Establish a VFM evaluation system for the whole process. According to the provisions on PPP project operation process in *the guidelines*, VFM evaluation can be divided into multi-stage VFM evaluation of project identification, preparation, procurement, implementation and handover. At each stage, it is necessary to measure whether the project conforms to VFM and the degree of VFM satisfaction. When VFM is getting lower and lower, it is necessary to improve construction measures to maximize value for money.

3. Promote the development of quantitative evaluation. At present, China lacks quantitative evaluation data and does not have a perfect quantitative calculation model. Supported by tools based on big data and artificial intelligence, it has established a PPP project quantitative evaluation database to make the evaluation results more convincing. The establishment of PPP comprehensive information platform will solve the problem of insufficient quantitative evaluation data, and government departments should speed up the improvement of quantitative evaluation operation rules and calculation models. To some extent, learn from foreign mature experience to simplify the quantitative evaluation process and enhance its operability.

4. Continuously refine and improve relevant guidance documents. As a guiding document for PPP projects in China, the current guidelines set up a systematic framework for the development of VFM evaluation in China from the perspective of top-level design. However, there is no specific rules to support the practical operation. It is necessary to accumulate some project experience, so as to improve the evaluation links at each stage and ensure the authenticity of the evaluation results.

### 4. Conclusion

Under the current economic situation, the promotion of PPP mode is growing all over the world, and the importance of VFM evaluation tool is becoming increasingly prominent. This paper

carries out a comprehensive VFM evaluation on an economic development zone under the PPP mode. Compared with the traditional procurement mode, the PPP mode has realized complementary advantages, mutual benefit and win-win results, and rational utilization of resources. China is in the explosive growth stage of PPP projects, improving the qualitative evaluation index system, establishing the whole process VFM evaluation, promoting quantitative evaluation in actual projects, accelerating the improvement of relevant policies and regulations, and accelerating the healthy and sustainable development of PPP mode.

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