Research on Asset Management in Construction Phase of PPP Project——Based on Tracking Auditing Perspective

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Abstract. In the actual operation process of PPP (Public-Private Partnership) projects, due to inaccurate estimation, lack of accuracy of submitted data and asymmetric information of all parties involved, problems such as asset falsification often occur when assets are formed. In order to solve this problem, we have properly integrated the concept of asset life-cycle management (ALM) into the whole life cycle of PPP projects, and established an ALM-PPP model to analyze the asset management of PPP projects. We select the construction phase of PPP project as the research scope, and take tracking audit as the core to audit the actual value of PPP project, so as to improve the management efficiency of PPP project and ensure the public interest.

1. Introduction

The standard operation of PPP projects cannot be separated from the audit supervision on PPP projects[1]. Tracking audit focuses on management, economy, finance, technology and other aspects. It not only strengthens administrative supervision, but also plays a good regulatory role on the authenticity, legality and effectiveness of funds use, cost structure and technical measures[2]. In order to improve the asset value of PPP projects, the government should adopt effective auditing methods and key auditing points for PPP projects.

Auditing PPP projects is more difficult than traditional construction projects. According to the characteristics of PPP projects, it usually take a long time to build public infrastructure or provide public services. In the contract system of PPP project, there are many parties involved and the contract system is relatively complicated, and the data transfer of all parties is often a weak link in control. Auditing key nodes is not only a PPP project, but also a key point of traditional project auditing[3]. The audit content of PPP projects should deepen with the increase of influencing factors. This paper introduces the concept of Asset Lifecycle Management (ALM) to audit PPP projects and manage the assets of PPP projects rationally, which is conducive to the successful operation of PPP projects. Therefore, on the basis of summarizing the concept of asset life cycle management, this paper proposes to establish an asset management method with tracking audit as the core[4].

The construction phase is an important stage for the realization of PPP project assets. During the construction phase of the PPP projects, attention should be paid to reasonable control of investment and reduction of unnecessary expenses, so as to achieve the goal of building high-quality assets, meeting functional requirements and reducing later operation and maintenance costs[5]. From the perspective of the whole life-cycle, this paper analyzes how to increase the value of PPP projects, and proposes the method of tracking audit, which includes auditing the construction process and completion process in the construction phase, as well as the necessary contract audit. From the
perspective of these three audits, this paper puts forward the implementation path of asset management in the construction phase of PPP project.

2. Integration of ALM Concept and PPP Mode

Asset Life-cycle Management (ALM) is the enrichment and development of the concept of life cycle cost management[6]. In ISO55000 asset management system, if the management system related to the project is integrated with the concept of asset life-cycle management and all systems are integrated, PPP project can reduce a large part of the cost on the premise of meeting the same performance and requirements[7].

ALM is a comprehensive and dynamic process[8]. From the perspective of the whole life cycle, PPP project has gone through the process of asset planning, asset formation, asset dissipation and asset replenishment. The whole life cycle perspective required by PPP project management is essentially compatible with ALM concept. Therefore, it is also more appropriate and feasible to regard PPP projects as "assets". By recording and tracking assets, the generated data can provide decision support for relevant activities of the project[9]. The ALM-PPP model is derived by combining the division of work content in different phases of PPP projects with the whole life cycle of assets, so as to achieve the optimal comprehensive goal in all aspects of asset use[10].

3. Asset management in construction stage with tracking audit as the core

Tracking audit can carry out timely and dynamic audit on all materials constituting final accounts, which is a comprehensive audit and covers all links of the project construction process[11]. The advantage of tracking audit is that it combines pre-audit and post-audit to avoid the defect of only paying attention to a certain stage in pre-audit or post-audit[12]. There are many standards for the
division of audit methods. According to the different contents of audit, follow-up audit can be divided into three categories.

**Table 1.** Tracking audit content of different types audit

| Track audit type            | Specific content                                                                                                                                 |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Phased tracking audit       | Through intervening and carrying out audit work from a specific stage of the construction project. The intervention time node is the link that the auditor considers necessary after evaluation, which requires the auditor to fully understand the project. |
| tracking audit of key links | The whole process of audit from the beginning of the project intervention until the completion of the construction project.                         |
| Whole process tracking audit|                                                                                                                                                   |

The construction phase of PPP project is an important phase for the whole life cycle of PPP project. In this phase, the SPV (special purpose vehicle) formed by the government and social capital put the blueprint of PPP project into practice, forming the project asset entity through construction and providing the foundation for the operation and maintenance phase. During the construction period, the uncertainty of PPP project leads to more complicated risk factors. This study takes ALM target requirements as the starting point, takes PPP project assets as the specific research object, and analyzes the starting point and value-added mechanism of PPP project assets during the construction phase. In the construction phase, the key link tracking audit method is adopted, with emphasis on three aspects: contract audit, construction process audit and completion settlement audit[13].

4. **Asset appreciation path in PPP project construction phase**

Contract management, project alteration, claim management and completion settlement of PPP projects can be regarded as the key contents of PPP project construction phase. Timely audit of these contents is conducive to reducing unreasonable costs and unnecessary expenditures in the construction process of the project, so that the project can reduce construction costs under the premise of unchanged functions, which is a value-added method of cost reduction, or on the premise of constant cost, through the effective management of the project, increase the value and sustainability of PPP project assets, the cash flow inflow and operating income in the operation and maintenance phase of PPP project, which is a value-added method. The SPV continuously optimizes the work in the construction process, reduces costs and increases benefits, so that social capital can obtain good benefits in the operation phase.

4.1. **PPP Project Contract Management**

When the PPP project started construction, the project-related contracts had been basically determined. The management of PPP project contracts is not to reduce the function of the project, but to clarify the requirements of construction period, quality and cost in the contract to achieve the objectives of all parties to the greatest extent. in the process of contract performance. If relevant conditions permit, social capital can reasonably optimize the work in the process of PPP project construction, because the SPV is likely to be the operator after the completion of the project construction. Optimizing the work tasks is not only conducive to increasing the government's trust and recognition of social capital, but also conducive to the provision of public services at a later stage. This process not only facilitates social capital but also improves the public's satisfaction with public services.

4.1.1. **Time limit for a project control.** If there is no technical succession between different processes, the SPV can reasonably select the processes to carry out the construction according to the requirements of the project.
4.1.2. Quality control. The construction entities of PPP projects usually provide services to the public, which takes a long time to operate and maintain. Continuous optimization in the construction process will also affect the performance of PPP project operation and maintenance in the later period. The SPV should fully integrates the concept of asset life-cycle management (ALM) in the quality control of PPP projects to solve the problems encountered in the construction process.

In addition to the SPV should ensure the performance of the contract, the government and other parties should also perform their corresponding obligations in a timely manner so that the project can proceed on schedule. Therefore, audit institutions should audit the contract management process of the government, social capital and other parties in the construction process. In the construction phase, the key audit points of the contract management process are shown in Figure 3.

![Figure 3. Key points of construction contract audit](image)

| Contract subject qualification | Whether the main body signing the contract is the winning bidder; Whether the qualification of the winning bidder meets the standards. |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Contract terms                 | Whether there is a black and white contract; The main review of the general terms of the contract; Whether the terms of the contract violate the current laws, regulations, norms and standards as well as the provisions of the tender documents; Whether the risks related to the nature of the work to be performed are specified. |
| Obligations of parties to a Contract | Whether the specific contents and requirements of the work of both parties are complete; Whether the contract is binding and the scope of work is clear; If one party fails to complete the relevant work as agreed, what responsibilities should it assume. |
| Audit of construction contracts | Check whether the contract price is filled in as required; Whether the project contract pricing method is clear, complete and inconsistent; The sharing of contract risks between the two parties is also different with different pricing methods. |
| Contract Price and Adjustment | The amount of advance payment for the project; Deduction and deduction point of advance payment; Conditions for disbursement of project progress payment; How to measure the amount of completed projects; How to calculate the payment amount for each payment period. |
| Payment                        | Whether there are any incentives. |
| Time limit                     | What is the quality standard stipulated in the contract? Whether the contract has any clauses reflecting high quality and good price. What work is work is required for the project, who will provide the equipment and how will the cost be borne; If it fails to meet the agreed quality standards and parameters; Whether the relevant provisions of the warranty fund are complete and appropriate. |
| Quality                        |                                                                                                                                  |

4.2. Asset Management in Construction Process

Asset virtualization is a problem that is likely to occur in the construction process. It makes the price formed by PPP project construction entities in the market far higher than its actual value, thus affecting the efficiency of public services. During the construction process, the engineering quantity of PPP project and the construction of concealed engineering works are mainly reviewed.

4.2.1. Audit of engineering quantity. Audit institutions should focus on examining the authenticity and accuracy of the engineering quantities, whether there is any deviation between them and the quantities in the construction drawings, whether the deviation range is reasonable, and try their best to avoid errors and omissions in the list. When the engineering quantity deviates seriously from the original data, the reasons for this situation should be reviewed. If there are any design changes and other phenomena, the reasons for the changes should be reviewed to determine whether they are for design optimization or gratuitous changes, and the audit results should be compiled into a report situation so as to accumulate experience for the next construction.
4.2.2. Review of hidden engineering. The construction of concealed engineering plays a vital role in the quality of the project. The concealed engineering are eventually covered, timely auditing of the process and results of the concealed engineering is an important step to ensure that the concealed engineering is complete in steps, compliant in procedures and complete in data. The key audit points of concealed engineering are shown in Figure 4.

Figure 4. Key points of concealed engineering audit

4.3. Asset Management in the Process of Completion Acceptance

Completion settlement audit is an effective way to check the effect of cost control. The completion settlement report contains relevant data on the construction of the project and reflects the total construction cost of the project. By auditing the authenticity and integrity of the data, the auditing organ can check whether the social capital has reasonable and effective measures to control the construction cost of the project and whether the corresponding cost-saving effect has been achieved during the construction process. During the audit process, auditing whether the social capital has taken certain measures during the construction process to pave the way for the PPP project to increase efficiency, reduce operating costs, improve operating income and increase cash flow inflow is also necessary.

4.3.1. Is it checked and accepted according to the procedure?. After the PPP project is completed, the relevant departments shall organize the project acceptance. Acceptance shall be based on the provisions of the contract, strictly conform to the provisions of the contract, and reach the corresponding acceptance standards. If the project does not meet the acceptance criteria, the SPV shall make corresponding repair measures.

4.3.2. Whether the concealed acceptance records of PPP projects are complete. In the initial stage of PPP project construction, the SPV should have a detailed concealed engineering acceptance plan, and determine the quantities of concealed engineering acceptance and relevant data, which is conducive to the smooth progress of the project construction. Audit institutions shall examine whether the acceptance of concealed engineering meets the corresponding standards, whether there have relevant data records for self-inspection in advance, whether the acceptance of concealed engineering is carried out in accordance with the relevant time limit. It is strictly prohibited to make up the
acceptance after the event. Whether the records in the concealed acceptance report are detailed and complete, so as to avoid the phenomenon that the data records are too general.

4.3.3. **Review relevant visas and changes.** First of all, we should strictly examine whether the relevant visas procedures are reasonable and legal. Secondly, we should conduct a detailed examination of the reasons for the changes, and examine whether the changes have achieved the purpose of increasing the efficiency of PPP project operation, so that the results of PPP project construction are conducive to the realization of public services and provide empirical data for the next project construction.

4.3.4. **Check whether the quantity and price conform to the agreement between the government and the social capital.** According to the available relevant information, review whether the final project quantity is greatly deviated from the original agreement and whether the calculation of various expenses is reasonable.

4.3.5. **Check the error audit in the calculation process.** After the review of relevant technical data in the completion settlement report is guaranteed, the calculation of relevant data should also be rigorously reviewed to avoid the

5. **Conclusion**

The construction of PPP project is the basis for the realization of the blueprint drawn up in the design phase and it provides physical assets for the operation and maintenance phase. It is an indispensable link in the whole life cycle of PPP project.

Therefore, some measures must be taken to ensure the success of PPP projects, for example, combining the concept of asset life-cycle management, focusing on contract management, construction process and completion settlement audit in the construction stage, and transforming the benefit-oriented asset management into value-oriented asset management. This not only ensures the reasonable interests of all parties involved in the project, but also ensures the maximization of public interests.

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