Theory and method of project post-evaluation

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Abstract. Project post-evaluation is the service extension after the completion of the project and an important part to be considered in the whole life of the project. This paper briefly introduces the theory, method and content of the post-evaluation of engineering projects in order to provide reference for the post-evaluation of engineering projects.

1. Introduction
Post-project evaluation refers to a systematic and objective analysis of the project completed or its planning purpose, implementation process, benefit play, role and influence. Through the inspection summary and evaluation of project practice [1-2], to determine whether the project anticipated target achieved, lessons learned, and project information, timely and effective feedback for future new project decision-making and improve the management level of project investment decision-making to provide experience for reference, at the same time on the problems existing in the evaluation of project put forward the corresponding solution measures, in order to better able to achieve the purpose of improving investment benefit.

2. The timing and type of the post-evaluation of the project
Generally, the post-project evaluation of the construction project should be carried out when the capacity of the construction facilities and the direct economic benefits of the investment can be brought into play. However, in the actual work, due to the existence of a variety of complex social factors, the project post-evaluation point is changing at any time. From the start of the project, that is, after the project starts to invest, all kinds of evaluations conducted by the supervision department belong to the scope of post-evaluation of the construction project, which can be extended to the end of the life of the project [3].

According to the different evaluation time points, project post-evaluation can be divided into tracking evaluation, implementation effect evaluation and impact evaluation in detail.
2.1. Project tracking assessment
Project tracking evaluation (also known as "intermediate evaluation" or implementation process evaluation) refers to the evaluation conducted at any point between the formal commencement of the project and the completion of the project. The general evaluation work to the independent institutions, the purpose of the evaluation is: check the assessment of the quality of project evaluation and design, project evaluation on the significant changes in the construction process and its benefit what is the role and impact of the project, diagnostic program produced by the major difficulties and problems, and seek for the corresponding response, etc. This kind of evaluation focuses on the problems at the project level.

2.2. Project implementation effect evaluation
This evaluation is commonly referred to as the post-project evaluation, which refers to the evaluation of the operation status of the project, the benefit of the project and other aspects within a period of time after the completion of the project. It is generally considered that the productive industry carries out post-project evaluation two years after the completion of the project; 5 years after completion of projects in the infrastructure sector; Social infrastructure takes a little longer. The main purpose of this evaluation exercise is to examine and determine the degree to which the investment project or activity has achieved the desired results, and to summarize the lessons learned as important information available for the macro orientation, policy and management feedback of the new project. The evaluation analyzes and summarizes the problems at the project level and decision-making management level, and provides information support services for improving the built projects, adjusting the projects under construction and guiding the projects to be built.

2.3. Project impact assessment
It can also be called "project benefit supervision and evaluation", which refers to the evaluation of the project after a period of time after the completion of the project evaluation report. Project impact assessment is to investigate the operation or operation of a project on the basis of the post-evaluation report, analyze the development trend of the project and the impact of the corresponding trend on society, economy and environment, summarize the experience and lessons from macro aspects such as decision-making, and develop the corresponding coping mechanism.

3. Scope and classification of project post-evaluation
The scope and classification of project post-evaluation the post-evaluation of construction project is based on the comparison between the goals and indicators determined in the early stage of project construction and the results after the actual implementation of the project. Its content scope and project classification are basically the same as the scope of pre-evaluation.

3.1. Scope of post-project evaluation,
The content scope of project post-evaluation mainly includes four aspects: economy, environment, society and institutional development.

3.2. Classification of project post evaluation
According to the project benefit evaluation method and the source of funds to create benefits, the post-project evaluation can usually be divided into the following categories.

3.2.1. Production of class. Production construction projects generally have direct output of material products, which are generated and increased through input, thus providing direct accumulation for the area where the project is located, mainly including industry and agriculture. Agricultural category is divided into agriculture, forestry, animal husbandry, fishery and irrigation projects.
3.2.2. **Infrastructure class**, There are mainly energy, transportation, communications and other industries. This kind of project is to provide necessary services and basic conditions for production projects. The main investment comes from the accumulation of social production. The focus of post-project evaluation is economic analysis and effect analysis of social impact.

3.2.3. **Social infrastructure and human resource development**, There are mainly projects in public education, public health, public social services and welfare, environmental protection, personnel training and skills development. In some countries, human resource development is evaluated as a separate category.

4. **The content of the project post-evaluation**

4.1. **Post-evaluation of project objectives**

Post-evaluation of project goals is to check the actual realization and changes of the project by referring to the main indicators of the original expected goals, analyze the reasons for the difference between the actual situation and the original goals, and judge the realization degree of the goals. The post-evaluation of project goals should also analyze and evaluate the correctness, rationality and practicality of the original expected goals [4-5].

4.2. **Evaluation after project implementation process**

In the process of project implementation, more or less there will be some implementation problems. The post-evaluation of the project implementation process is to compare and analyze the estimated situation and the actual implementation process established in the project evaluation or feasibility study report, and analyze the reasons for the differences. The main contents of post-evaluation include: project establishment, preparation and evaluation. The content and scale of the project construction; Deteriorating project progress and implementation; Supporting facilities and conditions of service; Scope of beneficiaries and their reflection. The management mechanism of the project. Financial performance, etc.

4.3. **Post-evaluation of project economic benefit**

The economic benefit evaluation of the project consists of national economic evaluation, financial evaluation and effect evaluation. The main evaluation indexes are economic internal rate of return (EIRR), economic net present value (ENPV), loan repayment period (Pt), economic benefit cost ratio (EBCR) and so on. In the post-evaluation of water-saving irrigation projects, the post-evaluation analysis is carried out for the national economic evaluation and effect evaluation, without considering the financial evaluation.

4.4. **Project impact post-evaluation**

The main contents of environmental impact assessment include environmental impact assessment, soil and water conservation assessment and social impact assessment. Environmental impact assessment mainly analyzes and evaluates the environmental impact of the project on the region, industry and country. The evaluation includes water environment impact assessment, soil environment impact assessment and ecological environment impact assessment. The evaluation of soil and water conservation is the evaluation of soil erosion and erosion in the area where the construction project is located. Social impact assessment is an analysis of tangible and intangible benefits and results of projects in social and economic development, such as changes in agricultural production methods, per capita income of farmers, poverty reduction, changes in labor productivity, etc.

4.5. **Project sustainability post evaluation**

The post-evaluation of project sustainability refers to whether the established goals of the project can be continued after the completion of the construction capital investment of the project, whether the
project can be sustained, whether the project owners receiving the investment are willing and able to continue to achieve the established goals by their own ability, and whether the project has certain repeatability. The post - sustainability evaluation of water-saving irrigation projects includes internal and external conditions. Internal conditions include: technical level, energy consumption and environmental protection level, talent quality, financial status, organizational operation and management level. External conditions include relevant policies, laws and regulations, social and economic development, resource allocation, ecological and environmental protection, technological progress, and sources of funds, local government support and the will of the masses.

5. Conclusion
The post-evaluation of the project is the continuous improvement of the theory, method, content, help to promote the project construction and maintenance cost of equilibrium ratio, rather than a one-off sum investment construction, lack of maintenance or late maintenance does not reach the designated position, make project life even sudden loss of service capacity.

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