

Research on Performance Evaluation Index System of Rural Highway PPP Project

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Abstract: In recent years, China has actively and steadily expanded the effective investment in rural transportation infrastructure, actively guided social capital to participate in rural development, promoted the combination of PPP model and all aspects of rural areas, and implemented a new round of rural road construction and transformation. Rural highway construction is an important measure to promote rural economic development. Because of the wide range of rural construction in China and the huge capital investment and demand, it is necessary to build a scientific and comprehensive evaluation index system to evaluate the performance of rural highway construction projects, analyze the evaluation results, and put forward feasible suggestions to help decision makers grasp the benefits and effects of construction, and take targeted measures to guide and promote the positive development of rural highways. Taking the northern extension project of XL highway as an example, this paper constructs a performance evaluation index system, which can provide reference for the project management of XL highway and other highway projects.

Keywords: Rural Highway, PPP Project, Performance Appraisal, Balanced Score Card.

1. Introduction

As a part of the strategic layout of the national highway network, rural roads play an important role in the highway system, with the longest mileage and the widest coverage^[1]. At the same time, it is also a livelihood project that is directly related to the safety of people's travel, and is the main infrastructure that serves the production and life of farmers and promotes rural economic and social development. Due to the huge number of villages and complicated connections in China, the number of road construction projects is considerable. Through the construction of rural roads, not only can poor areas be linked with the outside world quickly, but also the development of rural economy can be effectively promoted, and the dual gap between urban and rural areas can be narrowed and urban and rural construction can be coordinated. Since the reform and opening up, China has attached great importance to the construction of rural roads.

As an important traffic link connecting urban and rural areas, rural roads play an irreplaceable role in promoting rural economic development, improving farmers' living standards and promoting rural comprehensive construction and modernization. Therefore, evaluating the performance of rural roads can help the government and relevant departments to better understand the construction and operation of rural roads, guide decision-making, optimize resource allocation, and improve the level of road construction and management. In order to ensure the rationality of fund management, the standardization of construction procedures and the continuity of operation and maintenance management, the performance evaluation system of rural roads should involve process control, quality control, social benefits and environmental benefits^[2].

XL Highway North Extension Project is a rural highway project implemented by Huantai County, which has been completed and put into operation. However, there is no clear conclusion about what kind of problems exist in the construction process and how to affect the overall performance. Taking this project as an example, this paper

constructs the performance evaluation index system of rural highway PPP project, which provides reference for the direction and key points of rural highway performance evaluation in the future.

2. Design Principles of Performance Evaluation Indicators

In the design of performance evaluation system, we should focus on the factors that have a great influence on the northern extension project of XL Highway. Therefore, we should fully consider its practicability and rationality when determining performance evaluation indicators, so as to avoid the situation that the performance evaluation work is difficult to advance and the correctness of performance evaluation results is reduced due to unreasonable selection of performance evaluation indicators. In order to ensure that the performance evaluation system of XL highway north extension project can better meet the needs of multi-evaluation, this paper will follow the following six principles when constructing the performance evaluation model of XL highway north extension project:

(1) The principle of objectivity

Before constructing the evaluation system of XL highway north extension project, the quantitative indicators in the original evaluation system will be screened, and the quantitative indicators with little or no influence on the evaluation results will be removed to increase the proportion of qualitative indicators. This is because the use of fuzzy comprehensive evaluation method involves a large number of non-quantitative indicators. In this paper, we will adhere to the principle of objectivity and truthfulness, adhere to the actual facts, objectively and accurately evaluate, and combine qualitative and quantitative methods to make the evaluation results more objective and reasonable.

(2) The principle of operability

Evaluation indicators should not only meet the theoretical evaluation needs, but also be operable in practical application. The characteristics of highway projects should be fully

considered when evaluating the system. Operability refers to the fact that relevant staff can successfully obtain all kinds of information needed to carry out performance evaluation, and managers give strong support to the development and implementation of performance management.

(3) Systematic principle

Each project participant plays a vital role in the construction process of XL highway north extension project, so it is necessary to carry out performance evaluation according to the systematic principle from an overall perspective. In the application process of fuzzy comprehensive evaluation method, it is necessary to fully consider every factor that may affect the development direction of the incident, predict the possible difficulties in combination with the construction process of highway projects, and then formulate solutions in advance to avoid the impact of performance evaluation.

(4) The principle of independence

When selecting indicators, we should ensure that the indicators selected under the same dimension have strong independence and avoid the situation of strong correlation between indicators. There are a large number of indicators involved in the construction of XL highway north extension project, but this does not mean that the accuracy of performance evaluation results will be affected by the number of indicators. In fact, there is no inevitable connection between them. On the contrary, if the number of indicators exceeds a certain value, the influence of indicators on performance results will be reduced invisibly, resulting in information overload. Correspondingly, if too few indicators are selected, the accuracy of performance results will be affected and information will be distorted. To sum up, when selecting performance indicators, it is necessary to appropriately increase or decrease the indicators according to the actual demand, so that the number is within a reasonable range.

(5) Scientific principle

The design indicators are intrinsically related to the project construction management, which can reflect the project construction management to a certain extent. In order to improve the rationality of the performance evaluation index system, it is necessary to evaluate things carefully and objectively on the basis of clarifying the concepts of different indicators. The types of performance evaluation indicators, the setting of scores and weights, and the application of methods and steps should fairly reflect the responsibilities of departments and posts, the assessment process should be fair and transparent, and the assessment results should be fed back to the assessed objects.

3. Design Principles of Performance Evaluation Indicators

At present, the state has successively issued a number of policy documents to guide the standardized operation of PPP projects, among which the Operational Guidelines for Performance Management of Government-Social Capital Cooperation (PPP) Projects gives a framework of performance common indicators during the construction and operation periods of PPP projects. However, it is still necessary to determine the evaluation index and carry out evaluation according to the specific conditions of different projects. The influencing factors of highway PPP project performance evaluation include financial funds, engineering

construction, social influence and the performance behavior of various stakeholders. On this basis, this paper refers to the Operational Guidelines and the commonly used dimension model of PPP project performance evaluation, and combines the balanced scorecard theory^[3] to search the relevant literature in recent ten years, and summarizes the dimensions of indicators as an important basis for the initial selection of indicators, and extracts four dimensions: financial dimension, process control management dimension, social responsibility dimension and stakeholder dimension, so as to build an evaluation index system with these dimensions, which can cover the related work of project construction management more comprehensively.

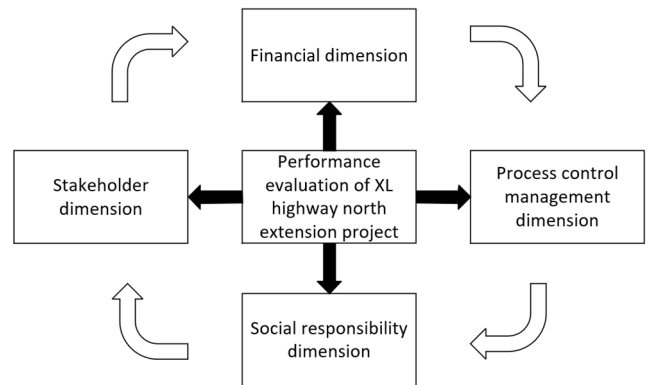


Figure 1. Index dimension diagram

4. Design Principles of Performance Evaluation Indicators

4.1. Financial dimension

The core of PPP project is to help the public sector to alleviate financial pressure and achieve construction goals by introducing social capital. In the whole project process, the project company is the main manager of the financial-related business during the construction period of PPP project, and all kinds of capital investment during the construction period are uniformly controlled by the project company. Evaluating the financial status such as funds and benefits can reflect the operation status of the project. Therefore, in order to strengthen the performance monitoring of PPP project, it is necessary to evaluate the project finance and fund management. In addition, after the completion of the construction period, there will be many uncertain factors in the handover stage, and evaluation criteria need to be adopted to ensure the stability and sustainability of the handover process, so the management of transferred assets is also an aspect that needs to be considered.

(1) Financial management

Highway construction projects cost a lot, involve various matters and have a wide range of sources. In order to make the project successfully completed and used, it is necessary to do a good job in accounting management of highway construction projects, ensure smooth financial flow, put financial funds in place and improve efficiency. It can be evaluated from two aspects: financial process, implementation and financial benefit level.

(2) Implementation of funds

Project funds play an important role in the preparation, implementation, completion and practical application of highway projects, and should be put in place in time, prepared early, implemented early and deployed early. The compliance

of the use of funds is the guarantee of "transferring funds for special purposes" so that no one can occupy or misappropriate them. The indicators of fund implementation mainly include: the rate of project funds in place, the timely rate of funds in place, and the compliance of fund use.

4.2. Process control management dimension

The goal of rural highway PPP project of the construction unit is to complete all the work according to the contract requirements, and the process control management dimension mainly examines the completion of project safety, quality, cost and construction period. The 17-year "Construction Project Management Standard" lists various standards of project construction, among which the contents of process control management include: schedule management, quality management, cost management, safety production management, resource management, communication and coordination management and so on. On this basis, according to the characteristics of rural highway PPP project and combined with the characteristics of XL highway north extension project, the process control indicators are summarized.

(1) Construction quality

The project quality mainly examines whether the project quality meets the specification requirements, which is a very important evaluation standard for rural highway projects. It can be evaluated from three aspects: the quality of engineering materials, the quality of engineering design and the qualified rate of engineering.

(2) Safety management

Safety management mainly examines whether construction safety complies with relevant regulations, and can be evaluated from two aspects: the level of emergency measures and the incidence of safety accidents.

(3) Progress control

Progress management mainly examines whether the project construction progress conforms to the PPP project contract, and can be evaluated from two aspects: the completion rate of progress and the number of downtime and rework.

(4) Handover coordination management

The handover period is the completion and delivery period of the project. According to the inspection report of the handover facilities, the project handover report and the maintenance records during the defect liability period, the handover coordination management is evaluated from two aspects: the integrity of the operation mechanism and the handover training of the takeover personnel.

(5) Highway technical condition

Highway technical conditions reflect the maintenance work of the project company, which can be evaluated from three aspects: pavement maintenance, subgrade maintenance and facilities maintenance along the line.

4.3. Social responsibility dimension

The essence of rural highway PPP project is public infrastructure, and its most important feature is its positive impact on social benefits and ecological environment[4]. The dimension of social responsibility should consider not only the sustainable development of ecological environment, but also the sustainable development of industry ecology and social ecology.

(1) Socioeconomic performance

The construction of highway projects makes the links

between regions closer and the market smoother, provides traffic guarantee for the deployment of various commodities, strengthens the coordinated development of regional economy, improves the efficiency of people's travel, and brings economic benefits. It can be evaluated from two aspects: the degree of regional economic promotion and the degree of regional traffic improvement.

(2) Ecological impact

Highway construction needs a lot of land resources, which will inevitably have an impact on the surrounding ecological environment. And a large amount of waste water, waste residue and solid waste generated in the construction process will also pollute the surrounding environment. It can be evaluated from two aspects: land resource impact and environmental pollution impact.

4.4. Stakeholder dimension

Rural highway construction under PPP mode has complex stakeholders, and the needs of all stakeholders need to be considered comprehensively when designing indicators. Among them, the government is the guide and supporter of PPP projects^[5], which plays a regulatory role and needs to bear part of the project construction costs, and provide certain profit space for social capital parties contracting projects through other policy measures such as policy subsidies; Social capital is an important participant in the project, and will get some benefits from the project, and the funds it introduces can help alleviate the pressure of government funds; The public belongs to potential stakeholders. The original intention of rural road project construction is to serve the public, and the source of government subsidies is also public taxes. The public's feelings about the use of public service facilities are related to whether the public's interests are met. At the same time, rural road construction needs to re-plan and allocate the land along the way, and some road sections will have an impact on the residents' gathering places. It can be seen from many aspects that the public's interests are closely related to road projects.

(1) Social capital satisfaction

Social capitalists participate in the whole process of highway investment, construction, operation and maintenance, and their satisfaction has an important impact on highway projects, which can be evaluated from three aspects: return on investment, government support and social reputation.

(2) Government satisfaction

The government's satisfaction with highway projects is the goal feedback of whether the established goals are achieved or not. It reflects whether reducing the financial burden of the government and building high-quality public service infrastructure will improve the efficiency of public service supply to a certain extent. It can be evaluated from two aspects: the realization of value for money and the satisfaction of the government with the project itself.

(3) Social public satisfaction

Social public satisfaction is the degree of satisfaction of highway users, road administration departments and transportation departments with the operation and management of the project company. This index is subjective, including the satisfaction of the public and the satisfaction of relevant government departments.

To sum up, based on the principle of balanced scorecard, the policy requirements of relevant national departments of PPP projects and engineering practice, and on the basis of

literature analysis and expert interviews, this paper divides the first-level evaluation indicators into four dimensions: financial dimension, process control management dimension,

social responsibility dimension and stakeholders. The indicators under each dimension are shown in Table1.

Table 1. Performance Evaluation Index System of XL Highway North Extension Project

First-level evaluation index	Secondary evaluation index	Three-level evaluation index
financial affairs	financial management	Financial process and implementation
		Financial benefit level
	Implementation of funds	Rate of project funds in place
		Timely rate of funds in place
		Compliance of fund use
Process control management	safety management	Level of emergency measures
		Incidence rate of safety accidents
	construction quality	Quality of engineering materials
		Engineering design quality
		Engineering qualification rate
	progress control	Progress completion rate
		Number of downtime rework
	Handover coordination management	Operational mechanism integrity
		Handover training for takeover personnel
	Highway technical condition	Pavement maintenance condition
		Roadbed maintenance status
		Maintenance status of facilities along the line
social responsibility	socioeconomic performance	Regional economic promotion degree
		Improvement degree of regional traffic trip
	Ecological impact	Impact of land resources
		Environmental pollution impact
stakeholder	Social capital satisfaction	Degree of government support
		Social reputation
	Government satisfaction	The realization of value for money
		Government's satisfaction with the project itself
	Social public satisfaction	Public satisfaction with the project
		Public opinion expression channel

5. Conclusion

Rural highway construction is the only way to realize a well-off society, the road to prosperity for farmers, and an important measure to achieve common prosperity for the country. The performance evaluation system of rural highway projects established in this paper can help policy makers to improve the service level of rural transportation to the maximum extent under the limited economic conditions, and has important practical significance for speeding up the construction of rural highway and building a well-off society in an all-round way. At present, the research on rural highway projects is gradually deepening. However, for the construction of performance evaluation index system of rural roads, there is a lack of certain methods and theoretical support, which greatly reduces the practicability of evaluation and makes it difficult to ensure the effect of performance evaluation. In view of this, taking XL highway project as an example, this paper screens and constructs the performance evaluation system of rural highway project according to the balanced scorecard and the theory of sustainable development,

which enriches the existing research on rural highway project evaluation.

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