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Research on Key Performance Indicators of PPP Projects in Area Development

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Abstract: *This paper uses the literature analysis method to complete the preliminary selection of performance indicators and introduces individual indicators of area development PPP projects based on the research of traditional PPP project performance evaluation. This resulted in 29 indicators .After the second-order confirmatory factor analysis of the theoretical model, 28 key performance indicators were finally determined. From this, the developmental PPP project performance evaluation key performance indicator system was constructed, which is a comprehensive developmental PPP project. Process dynamic performance management provides a reliable reference basis.*

Keywords: *PPP project, Area development, Performance management, Structural equation model, Key performance indicators*

1. Introduction

During the 14th Five-Year Plan period, China's new urbanization construction has entered a new journey. Developmental PPP projects have become an important breakthrough in the realization of China's urbanization goals. Shangxi Liu [1] defined the innovative PPP: To achieve regional sustainable development, the government and social capital have established long-term cooperative relations to provide comprehensive development services, such as infrastructure and urban operations centered on industrial development. Effective key performance indicators are the basis for the performance management of the entire process of PPP projects, and they are the key to ensuring the realization of project management objectives.

In this context, it is particularly important and has urgent practical needs to research on key performance indicators for developmental PPP projects.

2. Selection of initial performance indicators for developmental PPP projects

Developmental PPP projects aim to achieve regional sustainable development, with industrial development as the core, providing comprehensive services such as infrastructure and urban operations[2]. Its industrial development and space development are the key differences from traditional PPP projects. Combining the above characteristics, set characteristic indicators for developmental PPP projects.

(1) Reasonable land planning. The land consolidation and land development of developmental PPP projects is the advancement of the realization of the regional strategic goals. Reasonable land use planning based on the characteristics of developmental PPP projects is essential. Reasonable land use planning has a significant impact on the effective use of resources, the satisfaction of people's lives, and the later industrial economic development.

(2) Perfect city functions in the region. The regional construction of developmental PPP projects must be people-oriented. While the industry is the core to attract labor and talents, it must provide them with comprehensive urban services. Whether the function of the city in the region is perfect and whether it can provide corresponding services continuously and steadily will directly affect the satisfaction of the public.

(3) Reasonable industrial planning. Industrial development is the core of developmental PPP project development. Industrial planning needs to design a customized and differentiated industrial support model based on the current industrial advantages and resource advantages of the region. Reasonable industrial planning is the prerequisite guarantee for the good development of the industry.

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(4) Quality of industrial clusters. The quality of an industrial cluster does not refer to the quality of a single enterprise. It involves related enterprises, industrial organizations, public service platforms, consumers, and governments, including technology, talents, services, and many other aspects. It has the typical characteristics of resource sharing, advantage overflow, and mutual growth.

(5) Contribution to industrial development. To highlight the characteristics of "incremental remuneration" and "self-hematopoiesis" of developmental PPP projects, it is necessary to set economic indicators for industrial development.

In addition, this paper analyzes related papers [3~18] on the research of representative PPP performance evaluation indicators all over the world and selects indicators that have more than 5 occurrences of performance evaluation indicators for PPP projects. Based on the CSF theory and the internal logic of the indicators, divide them into five dimensions: project characteristics, management control, economic evaluation, output effects, and regional development and development, thereby constructing an SEM theoretical model scale, as shown in Table 1.

Table 1: The scale of the theoretical model of development PPP project

Second-order factor	First-order factor	Observation variable
Performance of developmental PPP projects	Project characteristics (PC)	Stable macroeconomic environment PC1
		Stable and suitable legal environment PC2
		Stable macro-political environment PC3
		PPP project experience PC4
		Public support PC5
	Management control (MC)	Risk Management MC1
		Project construction quality management MC2
		Project construction progress management MC3
		Safety management effect MC4
		Determination and implementation of technical solutions MC5
		Contract performance MC6
		Harmonious partnershipMC7
		Relevant systems and regulations MC8
		The comprehensive strength of project investors MC9
	Economic evaluation (EE)	Financing plan EE1
		Project construction cost control effect EE2
		Financial evaluation during operation period EE3
		Post-financial evaluation EE4
	Output impact (OE)	Public satisfaction OE1
		Social capital satisfaction OE2
		Government satisfaction OE3
		Ecosystem OE4
		Social benefit OE5
		Project sustainability after recycling OE6
	Regional development (RD)	Reasonable land planning RD1
		Complete urban functions in the region RD2
		Reasonable industrial planning RD3
		Industrial cluster quality RD4
		Industrial development contribution RD5

3. Identification of key performance indicators for developmental PPP projects

This paper chooses the second-order CFA of the structural equation model to study the importance of each index to project performance. The research data comes from questionnaires. Send questionnaires to PPP project participants, sent out 340 questionnaires and recovered 319 questionnaires.

3.1. Convergence validity

This paper conducts a CFA analysis on each measurement model. During the verification process, the model matching of the measurement model where the management control dimension is located is

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low, and the second-order model correction is required. Deleted MC9 indicator and verify again, the model matching appropriately meets the requirements, as shown in Table 2.

Table 2: Convergence validity test

Dimension	index	Untd.	S.E.	t-value	P	Std.	SMC	CR	AVE
Project characteristics	PC1	1.000				.762	.581	.900	.646
	PC2	1.180	.070	16.924	***	.898	.806		
	PC3	1.153	.069	16.696	***	.886	.785		
	PC4	.840	.062	13.531	***	.737	.543		
	PC5	.966	.074	13.086	***	.716	.513		
Management control	MC1	1.000				.674	.454	.898	.527
	MC2	1.122	.096	11.656	***	.721	.520		
	MC3	1.045	.095	11.005	***	.676	.457		
	MC4	1.066	.094	11.403	***	.703	.494		
	MC5	1.205	.099	12.177	***	.758	.575		
	MC6	1.306	.092	14.146	***	.912	.832		
	MC7	.624	.058	10.686	***	.655	.429		
	MC8	1.100	.100	11.006	***	.676	.457		
Economic evaluation	EE1	1.000				.787	.619	.878	.643
	EE2	1.084	.068	15.946	***	.862	.743		
	EE3	.964	.072	13.420	***	.734	.539		
	EE4	1.034	.068	15.196	***	.818	.669		
Output impact	OE1	1.000				.666	.444	.881	.554
	OE2	1.143	.101	11.325	***	.728	.530		
	OE3	.974	.091	10.665	***	.678	.460		
	OE4	1.258	.102	12.384	***	.813	.661		
	OE5	1.269	.100	12.746	***	.846	.716		
	OE6	1.111	.100	11.151	***	.715	.511		
Regional development	RD1	1.000				.727	.529	.900	.644
	RD2	.898	.074	12.065	***	.696	.484		
	RD3	1.217	.079	15.335	***	.882	.778		
	RD4	1.257	.083	15.204	***	.874	.764		
	RD5	1.055	.074	14.217	***	.816	.666		

3.2. Discriminative validity

The correlation between the latent variables is less than the square root of the corresponding AVE. It shows that although the latent variables are related, they also have a certain degree of discrimination. The test results of discriminative validity as shown in Table 3.

Table 3: Appropriate modification of the model

	AVE	Management	Output	Economic	characteristics	development
Management	.527	**.726**				
Output	.554	.501	**.744**			
Economic	.643	.555	.611	**.802**		
characteristics	.646	.542	.466	.542	**.804**	
development	.644	.543	.523	.600	.536	**.802**

Note: The diagonal is the square root of AVE

4. Model fitting and result analysis

4.1. Model fit analysis

Before using the structural equation model for theoretical verification, a good model fit is a prerequisite for SEM analysis [19]. The higher the model suitability, the higher the degree of fit between the theoretical model and the actual survey data. The initial model fit is not ideal. After two corrections according to the correction index output in AMOS, the model fits well. So continue follow-up SEM

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analysis and research. The modified SEM model path coefficient as shown in Figure 1.

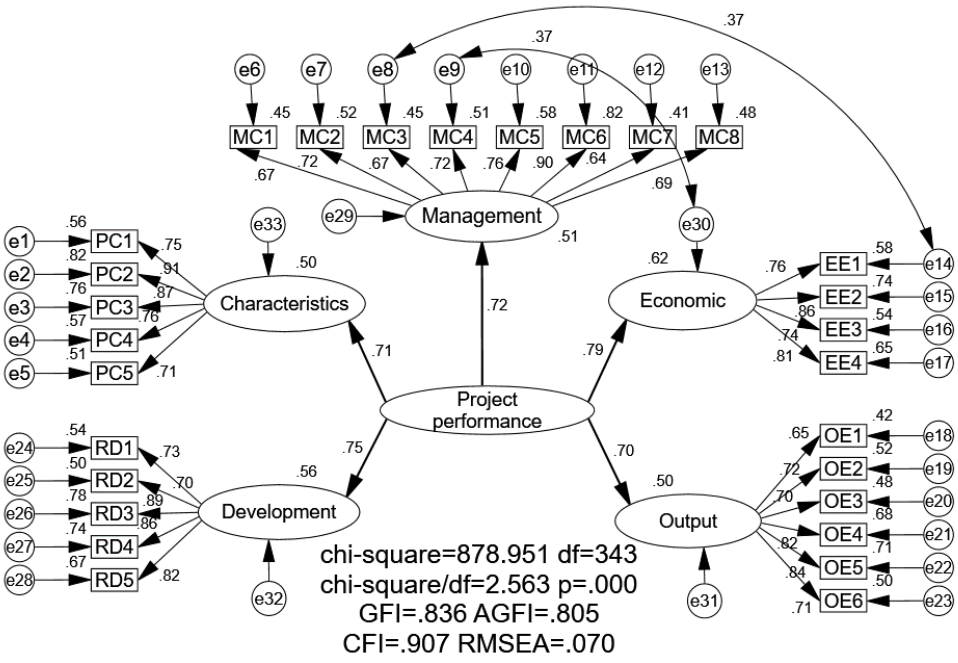

Figure 1: Modified SEM model path coefficient structure diagram

4.2. Result analysis

The standardized path coefficients of all indicators are bigger than 0.65, and they have strong explanatory capabilities, indicating that the 28 remaining indicators can all be used as key performance indicators for performance evaluation of developmental PPP projects.,

5. Conclusion

In this paper, the selection of the developmental PPP project performance index covers the entire life cycle. Based on the performance index of traditional PPP project, Proposes regional development, a new dimension with the characteristics of developmental PPP projects. Through the structural equation model, screened to obtain 28 key performance indicators for the performance evaluation of development PPP projects, and know the degree of influence of each indicator. The analysis results of the thesis can provide a reference value for performance evaluation basis for the practice of developmental PPP projects, which is conducive to grasping the key points of performance management, improving the implementation efficiency of developmental PPP projects, and helping achieve project management goals.

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