

A Study on the Correlation Between the Feasibility Assessment of Idle Public Facilities and the Project Finance

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ABSTRACT

The idle phenomenon of public facilities (called “Mosquito Pavilions”), which represents the waste of national resources and people’s taxes, has been increasingly serious in Taiwan in recent years, and public sectors expect to list idle public facilities into the scope of management and activate them. Activating the public construction with full participation of civil society has become a policy promoted by local governments in Taiwan. However, the repeated idle status is presented after the policy promotion. Given this, the project financial capability of entrusted managers in civil society must be strengthened in order to effectively reduce the possibility of repeated idle status after the activation of idle spaces. The factor analysis approach was mainly used in this research, and it was found through the analysis that according to relevant literatures, the outsourcing management feasibility assessment of idle public facilities could be divided into five major factors: project finance, economic environment, project planning, market environment and government policy. The causal relationships of the factors with project finance were tested based on research hypotheses. The results show that project finance is the core in the outsourcing management feasibility evaluation of idle public facilities, and it is developed and contained in many aspects, thus becoming the key deciding whether an outsourcing project can succeed. The research results can provide a reference for the future outsourcing management feasibility assessment of idle public facilities.

Keywords: *Idle Public Facilities, Outsourcing Management, Structural equation model, Feasibility Assessment*

1. INTRODUCTION

The quantity of idle public facilities listed into the scope of management of public sectors in Taiwan is 254 (Committee of Public Works, Executive Yuan, before the first quarter of 2016). The existence of idle public facilities represents the waste of national resources and people’s taxes, activating the public construction by means of civil participation has become a guideline promoted by local governments in Taiwan, and a consensus has been rapidly reached with the civil society over outsourcing management of idle public facilities, in an effort to reduce the number of management cases. Due to the failure to implement the assessment of operating management and financial management abilities of civil society, and the failure to provide correct assistance in the outsourcing management, etc., many cases are faced with

various problems like insufficient operating management ability and financial overdraft and even go bankrupt before the expiration of outsourcing management. Therefore, promoting the outsourcing management of idle public facilities has become the main research topic of public sectors. On the precondition that people’s taxes are effectively utilized and the waste of idle public facilities is reduced, the project financial capability of entrusted managers in the civil society must be strengthened, and only in this way can the possibility of repeated idle status after the activation of idle spaces be effectively reduced. The research objectives are as follows: (1) Figure the key indexes influencing outsourcing management feasibility assessment of idle public facilities, (2) explore the correlation between the outsourcing management feasibility assessment of idle public facilities and project finance.

2. LITERATURE REVIEW

2.1. Outsourcing management of public-private partnership

Public-private partnership highlights active government and core importance of public sphere, [1] and it includes two levels: cooperation and partnership, where the former means that the public sector plays an inducing and supporting role while private sector plays a cooperative role during the horizontal interaction between public and private sectors. The latter refers to the fact that during the public-private interaction process, they form a relationship of equality and reciprocity, mutual participation and burden sharing. [4] The role playing is as seen in Table 1.

Table 1 Table of Construction Responsibility Allocation in the Management under Public-Private Partnership

		Management operation	
		Public	Private
Build	Public	(Government-owned and government-run) All by the administrative responsibility, part of the business entrusted to private	(Government-owned and civilian-run) Management and Operation Commissioning, facilities for rent, facilities to transfer, DBO(Design-Build-Operate)
	Private	(Civilian-owned and government-run) Facilities for rent, facilities to transfer	(Civilian-owned and civilian-run) PFI、BTO、BOT、BOO

Data source: Cheng M X, 2006. [14]

2.2. Structural equation modeling (SEM) theory

Structural equation modeling (SEM) has gradually aroused great attention in social sciences and behavioral science. [5] Relative to traditional statistics, SEM provides deeper and more rigorous explanation, so SEM is called by Fornell the second-generation statistical technique. [6] Being the technology integration used to analyze structural covariance coefficient, SEM [11] was proposed by Jöreskog to inspect and measure the causal relationship between variables and analyze their covariance structure, and it has been widely applied to various academic fields such as management, leisure and sports. [12][3] SEM has developed a set of comprehensive techniques to solve many problems (robustness, non-normal distribution, lack of power, etc.) that cannot be solved by traditional statistical techniques, and this set of second-generation statistical techniques may be

extensively used and become a new statistical renovation. That SEM has been widely applied to relevant fields like management science can be manifested in many theses, indicating the important role played by SEM. For instance, [9] used SEM to constructed a pattern, discussed about the potential significance between variables, established the relationship between estimation and testing hypothesis, and collected related data for the sake of verification.

SEM can be used to measure the goodness of fit between theoretical hypothesis pattern and data, and estimate the relationship between latent variables, both of which are its advantages over traditional statistical techniques. Moreover, SEM can develop and verify patterns, compare the goodness of fit of antagonistic pattern generated by theories with data, and enhance the research reliability and validity.

The outsourcing management pattern was mainly used as the research framework for activating idle public facilities. According to the flowchart of public-run and civilian-operated pattern established by Tong Y W and Du G R, each public sector serves as a very important decision maker in each phase, so the causes for idle public facilities must be the responsibility of public sectors. [17]

3. METHODOLOGY

In this research, the case survey method was used to analyze cases of idle public facilities listed into the scope of management in Taiwan. After the exploratory factor analysis and confirmatory factor analysis of questionnaire survey results, the SEM model was constructed for the financial feasibility assessment of outsourcing management project of idle public facilities.

Most researches on idle public facilities aim to verify the causal relationship framework derived based on theory. However, in this research, the SEM model was used to discuss about the multi-variable causal relationships or causal relationship between single variables.

In the basic SEM theory, it is deemed that latent variables cannot be directly measured, but instead, they are indirectly speculated through explicit variables. SEM is divided into two theoretical models: measurement model, which is used to demarcate the linear relation between latent variable and explicit variable (namely, the first set of model lies in defining how to indirectly speculate latent variables through explicit variables); SEM model, which is used to explain the linear relation between latent variable and latent dependent variable (namely, the second set of model demarcates how to speculate latent dependent variable through latent independent variable), so the actual observation data measured by researchers can be applied to the whole SEM analysis only through the linear relation obtained by the first set of model. [17]

Ideal goodness-of-fit criteria of SEM model: (1) $X^2/df (<5)$ Bollen (1989), Hair (1998); (2) GFI (>0.9) Gefen (2000), Hair (1998); (3) AGFI (>0.8) Gefen (2000), Hair (1998); (4) SRMR(<0.1) Bentler (1999); (5) CFI (>0.9) Bagozzi & Yi (1988); (6) RMSEA (<0.05) (favorable goodness of fit); 0.05-0.08 (not bad goodness of fit); 0.08-0.1 (moderate goodness of fit); >0.1 (bad goodness of fit) Jarvenpaa (2000); (7) NFI (>0.9) Bentler & Bonett (1980); (8) NNFI (>0.9) Bentler & Bonett (1980); (9) IFI(>0.9) Bentler & Bonett (1980); (10) CN(>150) Anderson & Gerbing (1988) and Rigdon, E. (2005).

The support from theoretical framework is needed in the SEM modeling process (Figure 1), and moreover, the measurement model and structural model should be tested, including the test conditions like reliability and validity, goodness of fit and explanatory power of overall model (path analysis), only on this basis will the SEM model hold true and be meaningful.

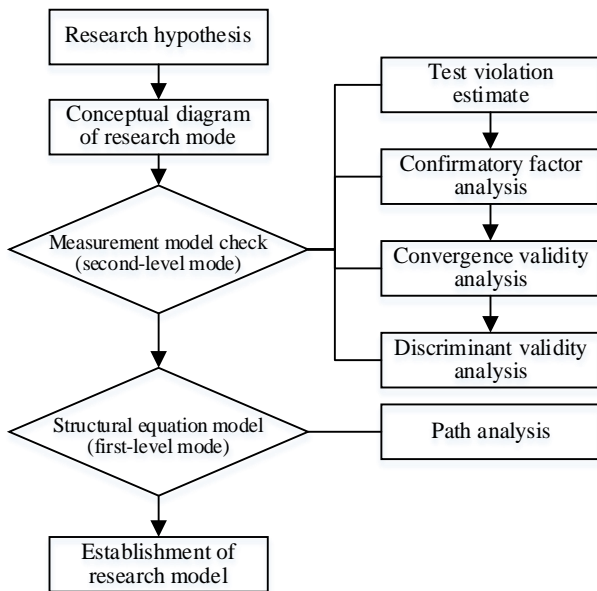


Figure 1 Test Flowchart of SEM Model

3.1. Feasibility assessment indexes of public-private partnership project

According to theories and frameworks related to public-private partnership as well as relevant domestic (Chinese) and foreign researches, various indexes were summarized and organized, and six dimensions were stipulated as follows: project finance, project planning, consultation mechanism, policy and system, economic environment and market environment, and a total of 37 feasibility assessment indexes (Figure 2) were included.

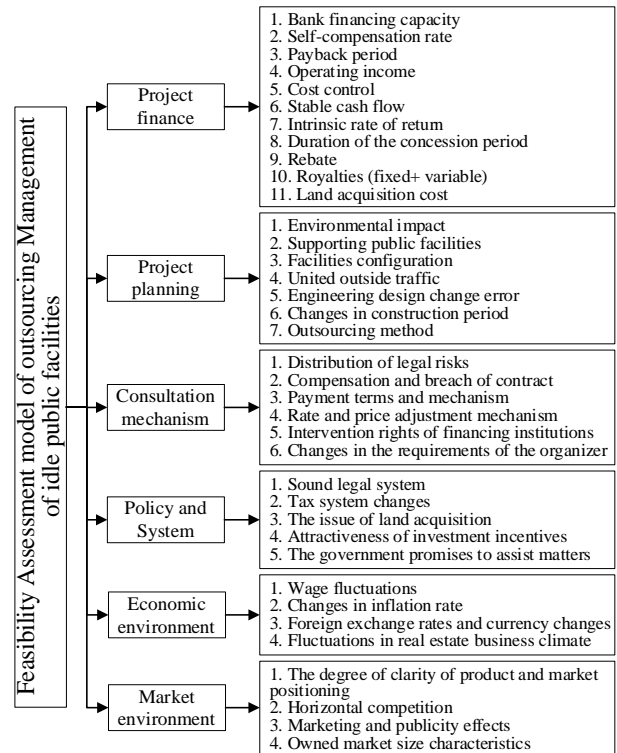


Figure 2 Feasibility Assessment Indexes of Public-Private Partnership Project

Data source: Xing Z H, 2015.

3.2. Conceptual research model

The causal relationships of project finance with economic environment, project planning, market environment, politics & decree and government policy of outsourcing management feasibility assessment indexes for idle public facilities were discussed in this research. After the relationships among different dimensions were figured out based on literature data, it was assumed that the project finance was the core of feasibility assessment, the SEM model was used to verify the financial feasibility assessment model for the outsourcing management project of idle public facilities, and whether the assumption was true was verified through a statistical analysis.

It was set that there was no difference between the model expected covariance matrix and sample covariance matrix, namely, $S = \Sigma(\theta)$, where S is sample covariance matrix, and $\Sigma(\theta)$ represents the research hypotheses and conceptual model in the model expected covariance matrix as below:

[13]

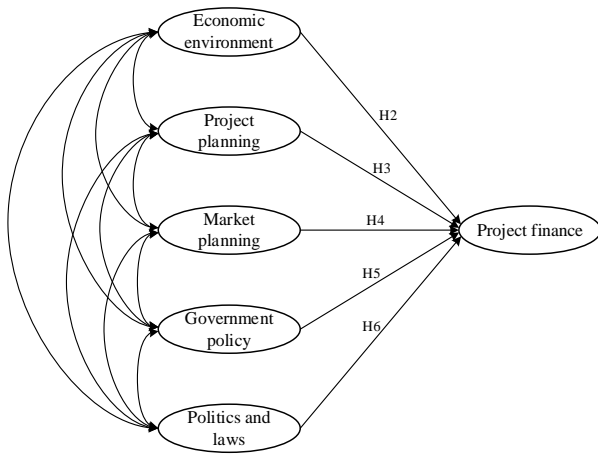


Figure 3 Conceptual Research Model

H1: The expected covariance matrix is identically equal to sample covariance matrix.

H2: The economic environment of outsourcing management feasibility assessment of idle public facilities has a significant influence on the project finance.

H3: The project finance is significantly affected by the project planning for the outsourcing management feasibility assessment of idle public facilities.

H4: The market environment of outsourcing management feasibility assessment of idle public facilities significantly influences the project finance.

H5: The government policy of outsourcing management feasibility assessment of idle public facilities has a significant influence on the project finance.

H6: The politics & decree of outsourcing management feasibility assessment of idle public facilities exerts a significant influence on the project finance.

4. RESEARCH RESULTS

4.1. Characteristic analysis of survey samples

The questionnaire survey lasted one year, a total of 254 questionnaires were given out, 190 ones were collected, so the recovery rate was 71%. There were 26 invalid questionnaires which were excluded, and 164 valid ones were obtained. Anderson & Gerbing and Rigdon, E. once mentioned that ^{[1][5]} the sample size in the SEM-based questionnaire survey should at least exceed 150, the sample size in this research was 164, according with this basic requirement, and the sample characteristics were as follows:

(1) Three types—transportation construction, market and culture & education facilities—accounted for 63%, and it could be found that the probability for three types of public facilities to become idle was much higher than other seven types. There were totally 101 traffic facilities, 7 business parks, 30 culture & education facilities, 18

sports venues, 21 social welfare facilities, 12 exhibition venues, 22 general offices, 30 market facilities, and 13 engineering facilities.

(2) Local county-level and municipal governments are the main subjects which need to take the responsibility for activating idle spaces, and the responsibility percentages are as follows: 45.7% for county-level governments, 34.8% for village and town governments, and 4.3% for municipal government directly under the central government.

(3) The idle problem of public facilities is quite serious in southern area of Taiwan, and the quantity of idle public facilities in southern area accounts for 26%, that in middle and eastern areas for 24%, and that in northern area for 20%.

4.2. Assessment indexes

Through the literature review and analysis of survey data, the main directions and key indexes of outsourcing management feasibility of idle public facilities were obtained, the opinions of public sectors towards undertaking the outsourcing management of idle public facilities were screened out, and the important assessment indexes for the outsourcing management feasibility were found out.

Following the project analysis and exploratory factor analysis, the six factor dimensions were extracted by the SEM model for the outsourcing management feasibility report of idle public facilities. The overall reliability was 0.968, and the reliability values of different scales were 0.957, 0.877, 0.863, 0.838, 0.788 and 0.838, all of which were greater than 0.7. The accumulative explanatory amount of variation was 70.606%. It can be obviously seen that this SEM model is of favorable reliability and validity.

4.3. SEM model test

The estimation method must be selected before the analysis, while the estimation method is greatly affected by the variable allocation, so the allocation of variation trend and kurtosis of all observational variables was firstly inspected as the basis for selecting the estimation method. The verification steps of goodness of fit are as follows:

4.3.1. Test of basic goodness-of-fit index

According to the variance analysis, it could be known that the error variance in the outsourcing management feasibility assessment model of idle public facilities ranged from 0.033 to 0.321, without negative error variance, all reaching significance level. The standardization coefficient in the model was 0.730-0.943, not exceeding the threshold value of 0.95, and this

indicated that this model conformed to the basic goodness-of-fit criteria.

4.3.2. Test of overall model goodness-of-fit index

The reliability, goodness of fit and path value of all factor dimensions were above the criteria, so the indexes screened out were reliable to some extent, the improper indexes were excluded out of the original 37 indexes through the exploratory factor analysis and confirmatory factor analysis, and 16 ones were reserved. The correction phases are as follows:

(1) Phase I: Two indexes were excluded through the project test, factor analysis and reliability test.

(2) Phase II: Seven indexes were deleted through the screening process according to standardized factor loading<0.5

(3) Phase III: One dimension and seven indexes were deleted through the screening process according to standardized factor loading<0.6.

(4) Phase IV: Some questionnaire items, which involved a minority of cases and did not belong to general items, were deleted.

The indexes screened out were of a certain reliability, and the original 37 variables were downsized into 16 variables through the exploratory factor analysis and confirmatory factor analysis as shown in Figure 4.

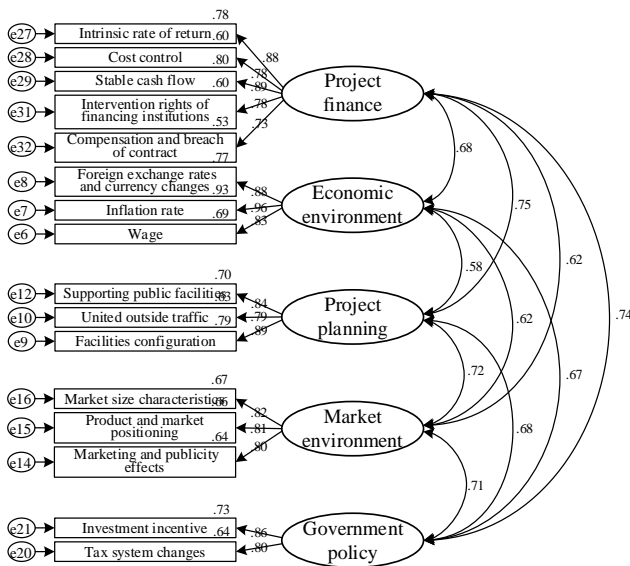


Figure 4 Measurement Model (after Correction)

After the measurement model was corrected by following the suggestions of Hair et al., (1) the absolute goodness of fit, (2) incremental goodness of fit and (3) downsized goodness of fit all reached favorable degrees, specifically as follows:

4.3.2.1 Measurement of absolute goodness of fit

As for the absolute goodness of fit, firstly, the Chi-square value reflected the difference degree between the research hypothesis model and observed data, where χ^2 was 419.568, the degree of freedom was 99, and $P = 0.0 (<0.05)$ meant that the significance level was reached, indicating poor goodness of fit of the model, but as the Chi-square value could be easily affected by the allocation of samples and variables, the judgment could not rely too much on Chi-square value, and other indexes should be combined. GFI was similar to the explainable amount of variation (R^2) in the regression analysis, and AGFI was similar to the adjusted explainable amount of variation (Adjusted R^2) in the regression analysis, both of which were standard values, the closer they were to 1, the higher the goodness of fit would be. According to the suggestions given by Gefen and Hair, if GFI, NFI, IFI and CFI indexes were all greater than 0.8 while AGFI was greater than 0.8, the goodness of fit of the model would be considered acceptable (Table 2). [7][8]

All absolute goodness-of-fit values of the model met the related criteria, indicating that the absolute goodness of fit of this model largely followed a certain pattern.

Table 2 Measurement Table of Absolute Goodness of Fit

Indicators	Standard	Numerical
X^2	The smaller the better	419.568
X^2/df	<5	4.24
GFI	>0.9	0.901
AGFI	>0.8	0.804
RMR	<0.8	0.025
RMSEA	0.08~0.1	0.10

4.3.2.2 Measurement of incremental goodness of fit

Among the relative goodness-of-fit indexes, CFI, IFI, NFI and NNFI will generally range from 0 to 1, and the greater the value is, the greater the improvement degree relative to the null model (namely, the model assuming that there is no co-variation between measured variables, and it is the least ideal situation) will be, so will the goodness of fit. The most important indexes are IFI and CFI, where the former can solve the problems of NNFI and NFI, namely the NNFI may fluctuate and the NFI is easily affected by the sample size, and the latter is applicable to the sample analysis.

In this model, the IFI value was 0.917, CFI value was 0.917, both of which were greater than the acceptable value 0.9 suggested by scholars, meaning that this model was of a certain representativeness (Table 3). All incremental goodness-of-fit values meet the criteria, so the incremental goodness of fit of this model roughly conformed to a certain pattern.

Table 3 Measurement Table of Incremental Goodness of Fit

Indicators	Standard	Numerical
NNFI(TLI)	>0.9	0.901
NFI	>0.9	0.904
CFI	>0.9	0.917
IFI	>0.9	0.917
RFI	>0.9	0.902

4.3.2.3 Measurement of downsized goodness of fit

In order to prevent relative goodness-of-fit indexes from increasing the estimation parameters, reduce Chi-square value and pursue the perfect goodness of fit, the judgement should be done still by relying upon parsimonious goodness-of-fit indexes. PGFI reflects the degree of parsimony of the hypothesis model, and the closer it is to 1, the simpler the model is. A good model was once indicated by Mulaik, in which the PGFI index could reach over 0.5. ^{[10][14]}

In this model, the PGFI model was 0.624, showing not bad degree of parsimony (Table 4). All downsized goodness-of-fit indexes met the criteria, so the model was largely parsimonious.

Table 4 Measurement Table of Downsized Goodness of Fit

Indicators	Standard	Numerical
PNFI	>0.5	0.738
PGFI	>0.5	0.624
PCFI	>0.5	0.756
CN	>150	164

4.3.3. Goodness of fit test of model internal structure

The internal goodness of fit of this model could be assessed in two parts: assessment of measurement model and assessment of structural model. ^[19]

A good measurement model basically must meet two major conditions:

(1) All observational variables in this model can correctly measure the latent variables

The factor loading of items in the feasibility assessment scales for the activation of idle public facilities was within 0.732-0.961. As suggested by Hair, the factor loading of each observational variable for latent variable should reach above 0.5, indicating good reliability and validity of the outsourcing management feasibility assessment model for idle public facilities.

(2) The same observational variable should not generate significant loading to different latent variables

The combinational reliability values of five dimensions in the outsourcing management feasibility assessment SEM model all exceeded 0.6, so the favorable combinational reliability was manifested in all five dimensions, and their average variation extracted (AVE) values exceeded 0.5, indicating their good convergence validity. Given this, all goodness-of-fit indexes reached good patterns after the correction.

The financial feasibility assessment model established in this research for the outsourcing management project of idle public facilities based on the sampled data could be used to explain the actually observed data. In the research model, the independent variables exerted direct influences on the dependent variable, to be more specific, economic environment, project planning, market environment and government policy generated direct influences on project finance, respectively, and except the direct influence of market environment on project finance, other influences all reached significance levels, so Hypotheses 2, 3 and 5 held true, and Hypothesis 4 did not (Table 5).

Among the direct influences of independent variables on the dependent variable, the financial status of the outsourcing management project of idle public facilities was affected by the project planning to the greatest extent. In the SEM model, the explanatory power of each endogenous variable for other variables was denoted as R², the greater, the better, and the explanatory power was generally excellent if R² > 0.3. ^[21] In the explicit model, the explanatory power (R²) of project finance for the variation of the whole model was 0.69, and the explanatory power of each endogenous variable for other variables was denoted as R², except for market environment, the explanatory powers of other variables all reached over 0.3, so this model presented satisfactory explanatory power (Figure 5).

Table 5 Empirical Results of Research Hypotheses

Hypothesis	Path relationship	Path value	Hypothesis is valid
2	Economic environment → Project finance	.26*	Yes
3	Project planning → Project finance	.45*	Yes
4	Market environment → Project finance	-.09	No
5	Government policy → Project finance	.32*	Yes

P* < .05

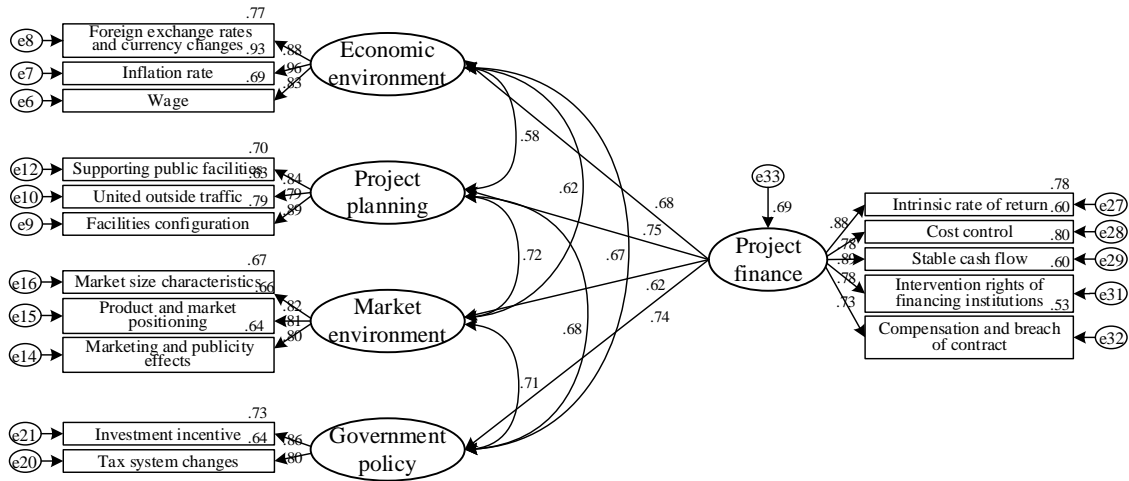


Figure 5 Financial Feasibility Assessment Model for Outsourcing Management Project of Idle Public Facilities

4.4. Analysis results

After the project analysis and exploratory factor analysis, six factor dimensions were extracted with favorable reliability and validity. Based on the feasibility assessment indexes of activation of idle public facilities compiled for the exploratory factor analysis, the confirmatory factor analysis and basic goodness-of-fit test of the model were conducted. The results show that the proposed outsourcing management feasibility assessment SEM model meets the basic goodness-of-fit criteria.

In this research, it was obtained that the project finance was the core framework for the outsourcing management feasibility assessment of idle public facilities. The project finance decided whether the overall outsourcing management of idle public facilities could succeed. Based on the research result, the financial feasibility assessment SEM model was constructed for the outsourcing management project of idle public facilities.

Through the rigorous screening based on confirmatory factor analysis, rate of return, cost control, stability of cash flow, intervention right of financing organization, compensation and event of default, which are related to project finance, are mainly considered in the outsourcing management feasibility assessment carried out by managers from public sectors, and moreover, economic environment-related foreign exchange rate, currency, rate of inflation and wage, etc. are also taken into account. Next, attention is paid to project planning-related public facilities layout, external traffic and facilities layout, as well as market environment-related market size, product and market positioning, marketing and propaganda, etc. In the end, government policy-related investment award and change in tax system, etc. are considered.

The analysis results show that the factors considered by public sectors in the outsourcing management

feasibility assessment of idle public facilities are divided into the following dimensions: project finance, economic environment, project planning, market environment and government policy, which serves as the guideline for the feasibility assessment. Through the final explanatory power test of the overall model, H2, H3 and H5 are verified, while H4 is rejected, showing that the project finance is the core of the outsourcing management feasibility assessment of public facilities, it is developed and contained by many dimensions, and moreover, it is also the key to the success of a project. The SEM model established in this research is applicable to the feasibility assessment of outsourcing management projects of idle public facilities, expecting to provide a reference for the future outsourcing management of idle public facilities.

5. CONCLUSION

In this research, the survey data was combined to discuss about the factors influencing the outsourcing management feasibility of idle public facilities, and a Structural equation modeling model was constructed for the feasibility assessment. Based on the confirmatory factor analysis and rigorous screening, the research objectives could be reached through the outsourcing management feasibility assessment conducted by the managers from public sectors. This research manifests that project finance is the key to the outsourcing management feasibility assessment of idle public facilities, and it is developed and contained by various dimensions, thus becoming the priority among priorities deciding whether an outsourcing project can succeed.

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