EVALUATING LEAN GOVERNANCE OF URBAN GREEN COMMUNITY RETROFIT UNDER PUBLIC-PRIVATE PARTNERSHIP

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Abstract

The urban community, which is the fundamental unit of the city, has recently been governed inefficiently and extensively. Common occurrences like the dirty-disorderly-disparity appearance and slow operations of local public facilities have become a barrier to the growth of resilient urban oasis. The concept of lean governance emerges in the community retrofit at the right time under Public-Private-Partnership (PPP) to incorporate the "Green, Ecological and Low-Carbon" philosophy in the life cycle of the urban green community. In the life cycle of a green community retrofit, there are a variety of stakeholders whose objectives and interests are both in line with and at odds with one another, particularly during the community retrofit or construction management phases. Rebuilding a lean governance performance evaluation system is the goal to increase effectiveness and appease stakeholders in community retrofit under a PPP model. Principal component analysis (PCA) and data envelopment analysis (DEA) are used to build the input-output performance evaluation index system of the lean governance of the urban community. It compensates for the lack of domestic and international research on the assessment of the lean obsolete community governance level. In addition, the paper uses eighteen urban old communities in China that were renovated under PPP model as the subject of an empirical study. It uses a quantitative model to assess the level of lean governance in these communities and offers recommendations for performance enhancement. To successfully implement the new-type urban green community retrofit under the PPP model, a co-governance mechanism is established.

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INTRODUCTION

In China, with the deterioration of the aging communities, many troubling issues have emerged such as "being dirty and messy", gathering of vulnerable people and "weak network" under grid management. It is a concentrated contradiction of unbalanced and inadequate development in urban renewal. The aim of the urban community green retrofit is to coordinate the development of society, economy and environment, and focus on the harmony of humanity and nature, with the full wishes and joint participation of all stakeholders. This requires that an appropriate management model is established and a platform for stakeholders to participate in urban green community management is provided. These tasks for the community green retrofit cannot be achieved by relying on traditional urban management. Therefore, the Public Private Partnership (PPP) model has gradually become a new approach and effective way of urban governance (Nguyen, M. D. 2022). The effective evaluation of lean governance is a key for the sustainable program in the urban green community retrofit. Applying the green community retrofit projects, stakeholders include governments of public, social groups related with enterprises, and community residents (Fikfak, Bugaric & Plicanic, 2019). Establishing a multi-governance model led by the government and drawing attention to the potential and marginal stakeholders towards the incorporation mechanism are crucial to achieving sustainable development of the urban community green retrofit.

Community green retrofit under PPP involves improving living surroundings and community governance services and increasing happiness among its residents (De Paula, Marques, & Gonçalves, 2023). In the construction stage of previous urban community green retrofit projects, the PPP model has revealed its advantages and formed a good start with its abundant capital and technical coordination ability. However, in the future, what is uncertain is whether the various stakeholders can establish a good cooperative relationship, risk and benefit distribution mechanism, etc. It may emerge that challenges include service standards and specifications in operation and maintenance unsatisfying the design requirements, the environment quality and energy efficiency is lower than the design indicators, and how to hand over or exit after the Concession time. All the above challenges will depend on the advantages of the PPP model to continuously improve and upgrade (Sun, Zhong, & Han, 2023; Shen, Zhao, & Mu, 2019). According to the data analysis from the Ministry of Housing and Urban-Rural Development, about 167,000 old communities are updated in China with an investment of RMB 660 billion and influencing more than 29 million families in 2018–2022. The inputs and outcomes of urban community green retrofit under PPP is discussed commonly by releasing the lean governance evaluations, which can encourage stakeholders to improve their strategies to achieve the most outcomes. As for past research, the evaluation methods are mostly subjective judgements from the public while few quantitative

evaluations for the performance is based on actual situation data (Zhu, S., Li, D., & Zhu, J. 2019). Hence, it is vital to evaluate the holistic performance to establish effective guidelines for urban renewal under PPP.

LITERATURE REVIEW

Research on old residential community renewals focus on the aspects such as retrofit content and governance methods and use technologies such as energy efference and saving (Kamel, E., & Memari, A. M. 2022), and sponging technology (Wright, Liu, Y., & Engel, 2016) to improve functions of the urban community. In China, the attention to old community retrofits originates from physical environment governance such as greening (Li, & Jia, 2023), and suitable aging (Yung, Conejos, &Chan, 2016). In Malaysia, sustainable urban regeneration plays a vital role in addressing the multi-faceted challenges of aging cities and reviving history (Nik Hashim, Dali, & Alias, 2023).

In terms of urban community green governance partnerships under PPP, some scholars focus on a single stakeholder, such as proposing policy optimization suggestions from the governmental perspective (Othman, K., & Khallaf, R. 2022). There are parts that explore the value and methods of market intervention in the community green retrofit under the PPP perspective (Alvanchi, A., Jafari, M. A., Shabanlou, M., & Meghdadi, Z. 2021). While others discuss the obstacles to public participation and the measures to overcome it from the perspective of residents (Li, Gu &Wang, 2019). The rest of the scholars paid attention to the interaction of stakeholders and proposed that an overall pattern of multi-stakeholder consultation and joint governance should be constructed together (Abdullah Hashim, Sapri & Ab. Azis, 2019). They mainly analysed their governance and effects qualitatively according to the community lean governance effects, such as economic, social and environmental benefits. Whereas only a few scholars carried out quantitative analysis on evaluating the lean governance, such as constructing an economic and social benefit evaluation model based on the AHM fuzzy comprehensive evaluation method (Zhang, Hu &Yang, 2017), or using hierarchical regression analysis to test the impact of community green renewal on residents' recognition and satisfaction (Chang, Xie, Chen, Wu, 2019). There are also a few that combined an evaluation of the combination of old communities green retrofit and lean governance under PPP. As the necessary of community participation in urban renewal widely accepts, increasing calls for more engagement and collaboration among stakeholders under PPP model, mainly nurtured by critical reflection on the previous urban renewal. Residents' recognition, perceptions and behaviours will inevitably affect the efficiency of lean governance in the community green retrofit under PPP (Zhang, Pan & Qian, 2023).

PPP has been claimed to set a range of advantages and benefits to accelerate project implementation in a timely manner, reduce life-cycle costs, and

upgrade the maintenance service (Almarri, K., & Boussabaine, H., 2023). However, a multi-stakeholder management is more complex in green retrofit projects, which will draw more stakeholders to be involved compared with the traditional method. It consists of many participants like the private investments and effective finance that have decisive roles on the retrofit. Besides that, the renewal quality of PPP, the trust of stakeholders, effective incentives and political certainties are important factors for the success of community green retrofit (Deng, B., Zhou, ..., & Li, X. 2021). A few studies focused on the crisis successful management factors that are considered as effective factors towards improving the PPP model (Muhammad, Kwang Sik, Johar, & Sabri, 2016).

The current literatures classify the lean management factors in existing urban old community retrofit under PPP projects into different items. The factors are identified as human factors, retrofit technologies, public policies, stakeholder needs and other uncertain factors by successful lean management (Khan, M., & Khan, S. 2023). It pays more on upgrading the function of communities, which is to improve facility and property services, and enhance social safety and energy efficiency. Although the risks vary in the public sustainable development policies, it can help to achieve a feasibility between low-carbon and retrofit function following the financial pressure under the PPP (Selim, A. M., & ElGohary, A. S. 2020).

Lean concepts of retrofit in PPP projects is a new paradigm that aim at value-for-money (VFM) rather than others in the traditional methods. The lean governance in the community retrofit construction is concerned with concurrent and continuous improvements in all dimensions, which involve decision-making, bidding, designing, implementing, financing, operating, maintenance, and post-evaluation (Li, S., Fang, Y., & Wu, X. 2020). Green technological innovation plays a pivotal role as catalyst to keep sustainability in the community retrofit under PPP, which will promote the competitive advantages of green technological industry and encourage the private sector to adopt green retrofits (Xiong, W., Chen, B., Wang, H., & Zhu, D. 2020). The evaluating framework with key performance indicators (KPIs) are proposed to serve in performance measures on PPP projects (Malaeb, & Hamzeh, 2018). Based on the characteristics of urban renewal development in Guangzhou, an urban renewal performance evaluation system is proposed and verified by PCA-DEA, which is evaluated the performance of urban renewal, aiming to promote the sustainable development of urban renewal work (Duan, J., & Wang, Y. Urban (2023). It takes Jiangsu Province as an example to study the investment performance in real estate projects. The input-output performance evaluation index system is built and analyzed through PCA-DEA (Sui Y., Lu H. 2020).

At present, few studies have systematically concentrated on the relationship between lean governance and renewal effects in urban community under PPP. Greater attention will be paid to the factors that influence lean

governance and the relationship between lean governance and community renewal. Therefore, novel methods are applied to comprehensively understand and analyse the lean governance relationships between stakeholders. The aim of this article is to build a quantitative evaluation for lean governance performance of urban community green retrofit under PPP based on Principal Component Analysis (PCA) and Data Envelopment Analysis (DEA). The objectives are as follows:

(1) Analyse the lean governance indicators assessing urban community green retrofit under PPP and evaluating index through literature review.
(2) Discuss the methods of PCA-DEA and apply a feasible method to discover the relationship in the evaluating index.
(3) Use empirical analysis in urban community green retrofit under PPP in China to illustrate that the model works in a stepwise manner, and enlightenments and suggestions are put forward to promote existing urban community green retrofits under the PPP model in China.

RESEARCH METHOD
The advantage of DEA is that it does not need to unify dimensions or expert's judgment on indicator weights when analysing multiple input-output indicators in the research and the evaluation results are more objective (Xu, Y., & Sim, J. Y. ,2022). DEA can reveal the reasons for invalid results and the direction of improvement, and it will make resource allocation more effective (Hatami-Marbini, Hekmat, & Agrell, 2022).

Currently, the most concerning issues are on obtaining larger green retrofit efficiency and higher balance between the stakeholders as well as the social output, with less economic and humanity investment through lean management and control during the urban community renewal. This is the concept expressed by "relative efficiency" in DEA. Therefore, this article selects DEA as a performance evaluation method for lean governance in the urban community green retrofit under PPP.

DEA acts as a mathematical evaluation method that quantitatively evaluates the relative efficiency among the decision-making units (DMUs) with inputs and outputs through data envelope curves. Charnes, Cooper & Rhodes (CCR) and Banker, Charnes & Cooper (BCC) are the most classic models and have been widely used in efficiency evaluation in various fields. CCR are based on constant returns to scale and BCC are variable returns to scale respectively. The governance of old community green renewal is not a purely economic investment issue, but a more complex practical issue with many influencing factors. Mostly, it is impossible to increase output in equal proportions by increasing investment. It is found that variable returns to scale are more feasible with the actual situation of lean governance in the urban community green retrofit

under PPP. Therefore, this article uses the BCC model to analyze its lean governance performance.

DEA-oriented input-output index

This paper mainly collects the performance evaluation indicators of lean governance in the urban community green retrofit under PPP from the literature review. Since there are few articles and documents related to the evaluation of old community green retrofit, the collection scope is expanded to the fields of community governance evaluation and urban renewal. Through the combined search of keywords such as "urban", "community", "retrofit", "old community", "evaluation" and "DEA", it was found that the DEA evaluation method has significant effects on urban development efficiency, economic efficiency, infrastructure efficiency, tourism efficiency, land use efficiency, environmental governance efficiency and other aspects. It is rarely used in urban renewal and old community green reconstruction. Therefore, the application of the DEA method in the evaluation of old communities retrofit under PPP will be done.

As a practical issue, the lean management of urban community green retrofit under PPP should be combined with the actual reconstruction contents and field survey results in addition to reference indicators. With the field survey on the retrofit of old communities in China, it was found that in the process of renovating old communities, the retrofit content is different according to the characteristics of each community. By considering the existing literature review indicators comprehensively, the actual situation of old community retrofit projects, quantifiable principles and input indicators are selected from two aspects: economic input and human input, while output indicators are selected from three aspects: environment, economy, and society. The results are shown in Table 1.

Table 1: the evaluating index of the community green retrofit under PPP

Classification		Indicator	Literature review
Input	Economy	Retrofit investment T1	Nguyen, M. D. (2022); Zhu, Li, … & Zhu, (2019); Kamel, E., & Memari, A. M. (2022).
	Human	Manpower T2	De Paula, Marques, & Gonçalves, (2023);Zhu, Li, … & Zhu, (2019);
		Participate unitT3	Muhammad, Kwang Sik, Johar, & Sabri, (2016); Alvanchi, A., Jafari, M. A., Shabanlou, M., & Meghdadi, Z. (2021); Othman, K., & Khallaf, R. (2022)
		Residents' attendingT4	Li, Gu, & Wang, (2019); Chang, Xie, Chen,Wu, (2019);Zhang, Pan, & Qian, (2023)
Output	Environment	Reduce energy consumptionC1	Kamel, E., & Memari, A. M. (2022);De Paula, Marques, &

Classification	Indicator	Literature review
		Gonçalves, (2023); Wright, Liu, Carroll, Ahiablame, & Engel, (2016);Li, Li, Liu, Wang, & Jia, (2023)
	Improve environment C2	Li, Li, Liu, Wang, & Jia, (2023);
Economy	Space re-development income C3	Li, Gu, & Wang, (2019); Muhammad, Kwang Sik, Johar, & Sabri, (2016)
	Investment return C4	Yung, Conejos, & Chan, (2016);Zhang, Hu & Yang, (2017).;Seo, (2020)
	Special financial subsidies C5	Muhammad, Kwang Sik, Johar, & Sabri, (2016)
	Preferential financing policy C6	Almarri, K., & Boussabaine, H. (2023); Muhammad, Kwang Sik, Johar, & Sabri, (2016)
	Preferential green retrofit policy C7	Deng, B., Zhou, ..., & Li, X. (2021); Muhammad, Kwang Sik, Johar, & Sabri, (2016)
	Growing value of property rights C8	Almarri, K., & Boussabaine, H. (2023); Muhammad, Kwang Sik, Johar, & Sabri, (2016)
	Tax incentives C9	Almarri, K., & Boussabaine, H. (2023); Muhammad, Kwang Sik, Johar, & Sabri, (2016)
Society	Community harmony C10	Othman, K., & Khallaf, R. (2022); Malaeb, &Hamzeh, (2018); Li,Gu, &Wang, (2019)
	Integration industrial chains C11	Alvanchi, A., Jafari, M. A., Shabanlou, M., & Meghdadi, Z. (2021);Li,Gu, & Wang, (2019)
	Increasing employment C12	Deng, B., Zhou, ..., & Li, X. (2021)
	Residents' satisfaction C13	Chang,Xie,Chen, Wu, (2019); Zhang, Pan, & Qian, (2023).

In terms of investment, the economic investment in the lean governance of urban community green retrofit under PPP is mainly measured by the investment. The amount of investment in each project can be obtained through surveys. The PPP project requires the participation of many stakeholders, including the government, construction agents, communities and residents. Since the participation number of residents, communities and government is difficult to calculate, human resources are measured with the manpower of the community under PPP. In addition, another characteristic is co-governance and resident participation. Therefore, the number of participating units and the number of times residents attending meetings or delivering suggestions during the retrofit period were selected for quantitative evaluation. In terms of output, based on

relevant policies, the environmental improvement includes house appearance, community roads, increased parking, fire safety protection, greening facilities and reusable spaces. These have become the components of green community renewal evaluation. Reducing energy consumption and improving environment condition indicators are summarized to evaluate the reference as the environmental output.

The economic output includes the growth in the value of the property rights after renovating the community houses. In addition, to attract more social capital to enter green community renewal, the state has given great support in all aspects, including space re-development income, investment returns, special financial subsidies, preferential financing policies, preferential green retrofit policies, tax incentives, the growing value of property rights and other indicators. Social output mainly includes indicators such as increasing employment, community harmony, resident satisfaction, and promoting the integration of industrial chains. Increasing employment and promoting the formation of industrial chains are mainly achieved by introducing professional property companies for service management. Community harmony and resident satisfaction are reflected in community security such as the number of complaints and the reduction in the frequency of crimes.

Principal component analysis (PCA)

A performance evaluation index system for lean governance of old communities is established based on DEA, which includes 4 input indicators and 13 output indicators. Due to the current excessive number of indicators and certain correlations between the above indicators, it is easy to differentiate the DEA model and it will directly affect the quality of the final evaluation. Therefore, the existing index system needs to be reduced dimensionally. PCA can reduce the dimensionality of multiple indicators with little information loss, and it will obtain more objective weight information based on the original information provided by the indicators.

In general, the extracted comprehensive indicators are called principal components. Every principal component is expressed as a linear combination of the original indicators, and the principal components are linearly unrelated to each other. The principal component index will be obtained through such conversion that has superior performance than the original index. The ranking of the principal component score can reflect the maximum comprehensive difference between evaluation objects with reducing variables and improving the efficiency of analysis.

The sample values of the lean management input-output indicators of the old community green retrofit were obtained through field survey. Assuming that there are 'n' old communities as evaluation objects and the sample input and output data matrices are 'M' and 'N' respectively. Then the principal component

index can be simply summarized. To ensure the effect of principal component analysis, KMO value and Bartlett sphericity test will be obtained to verify the higher correlation data by reliability test. When conducting adaptability testing, the original data should simultaneously meet the criteria that the KMO value is not less than 0.6 and the Bartlett sphericity test significance is less than 0.05. Based on the eigenvalue $\gamma_i \geq 1.0$ and the cumulative contribution rate on the principle of $\Sigma C_i \geq 60\%$, k_1 principal components are selected as new input variables and k_2 principal components are selected as new output variables in the same way. Calculate the new index weight. Perform a weighted sum of the extracted k_1 and k_2 principal components. The ratio of the single principal component contribution rate to the sum of the contribution rates of all principal components is the weight of the principal component.

EMPIRICAL ANALYSIS
This article takes 18 urban retrofit projects as an example to quantitatively evaluate its lean governance performance and explore ways to improve the lean governance performance in urban community green retrofit under PPP in China. These cases are collected from the official website Chinese Procurement (http://www.ccgp.gov.cn/), which include the detail budget and bidding price, the summary of the projects. The corresponding input and output index data were extracted by questionnaires with the experts in the industry and then entered into the PCA-DEA performance evaluation system for calculation and analysis.

Extraction of principal component indicators
This article uses SPSS 26.0 to conduct an adaptability test on the input-output data of 18 old communities with lean management in the urban community green retrofit under PPP. The KMO values of the input index and output index of the sample data are 0.687 and 0.609 respectively, and the Bartlett sphericity test significance, sig. is 0.000 and 0.001. It passes the reliability test and is suitable for principal component analysis. The input and output indicator indexes were extracted to obtain the contribution rate of each component by PCA. One principal component indicator (named G1) was extracted from the original 4 input indicators, with a cumulative contribution rate of 60.579%; 4 principal component indicators (named F1, F2, F3, F4) were extracted from 13 output indicators, with a cumulative contribution rate of 78.441%, which can basically cover most of the information. The new comprehensive indicators are summarized based on the input and output indicator component matrix and named by the original indicators that are included. The results are shown in Table 2. Since the input principal component, G1 covers all input original indicators, G1 is named the comprehensive input indicator. The renewed items such as house appearance, community roads, increased parking, fire safety, greening facilities and space reusability in the output principal component F1 are all basic contents

of renovating old communities. Therefore, F1 can be named as the basic revenue output, covering housing, transportation and overall environment. The number of complaints during the retrofit process, the demolition area of illegal construction, the number of carport retrofits and the area of newly built places provide the community with a good atmosphere for living and working, so F2 is named as an expanded revenue output. Green community retrofit under the PPP brings policy dividends to social capital, which mainly reflects financial subsidies and preferential treatment of finance interest rates. F3 is summarized as the viability gap funding output. Social harmony and residents' satisfaction are the guarantees for the smooth implementation of community green retrofit under PPP, so F4 can be named as a social responsibility output.

DEA analysis

The original data of the principal component index according to the PCA score matrix is obtained. Based on the min-max normalization, the data is converted into a mapping relation between [0.1, 0.9] following the formula (1). Then, the data envelopment analysis results are obtained by the DEA-BCC model. This article uses DEAP2.1 software for calculation, and the calculation results are shown in Table 3.

$$y = \frac{x_i - x_{min}}{x_{max} - x_{min}}(0.9 - 0.1) + 0.1 \quad , \quad i = 1,2,\dots,m \quad (1)$$

Fifteen communities achieved technical effectiveness, three communities are ineffective, and the average efficiency is 0.988, closing to 1. The lean governance performance of the urban community green retrofit under PPP is generally higher. There are two main reasons why the scale efficiency is less than 1. The first reason is that the community retrofit scale is too small to reach the optimal output scale. The second is that the scale is too large with redundancy occurring. Theoretically, according to the existing community retrofit scale, it should produce greater output. Judging from the analysis results, the community green retrofit whose scale efficiency has not reached 1 are all experiencing diminishing returns to scale. It is indicated that the scale is too large, and the input does not catch up with the output in the lean governance of the urban community green retrofit, resulting in a decrease in efficiency. It is necessary to reduce scale and input or increase output. Taking the three communities with the lowest scale efficiency as an example, they are packaged into one project during the construction process. Through field research, it's said that the final investment in these three projects was expanded half approximately than the beginning. The detailed decision-making program plan and lean governance layout under PPP are affected as well as the final efficiency. In addition, these three projects were built for decades with poor congenital conditions, small retrofit spaces, and

limited parking spaces, which also results in high investments that cannot be perfectly converted into output.

Table 2: Extracted indicator principal component eigenvalues and contribution rate

Classification	Principal Component	Eigenvalues	Contribution rate	Cumulative contribution rate	Raw indicator involved
Input (I)	Comprehensive input G1	2.423	60.579	60.579	T1, T2, T3, T4
Output (O)	Basic revenue F1	5.731	44.082	44.082	C1, C2, C3, C4
	Expanded revenue F2	2.052	15.781	59.863	C8, C11
	Viability gap funding F3	1.320	10.154	70.017	C5, C6, C7, C9
	Social responsibility F4	1.095	8.424	78.441	C10, C12, C13

Table 3: the DEA analysis results of lean governance in community green retrofit

DMU	TE	PTE	SE	RTS	DMU	TE	PTE	SE	RTS
A1	1	1	1	-	A10	1	1	1	-
A2	1	1	1	-	A11	0.977	1	0.977	DRS
A3	1	1	1	-	A12	0.922	1	0.922	DRS
A4	1	1	1	-	A13	1	1	1	-
A5	1	1	1	-	A14	1	1	1	-
A6	1	1	1	-	A15	1	1	1	-
A7	1	1	1	-	A16	1	1	1	-
A8	0.885	1	0.885	DRS	A17	1	1	1	-
A9	1	1	1	-	A18	1	1	1	-

Note: TE=PTE * SE, technical efficiency; PTE is pure technical efficiency; SE is scale efficiency; RTS is returns to scale; DRS is diminishing returns to scale; - is constant returns to scale.

The difference between the original value of input and output and the target value calculated by the input angle BCC model is the improvement value. The higher the improvement ratio, the gap will be greater compared with the ideal value, which requires special attention. It is no improvement that the original value is equal to the target value if the decision-making unit is valid. If the decision-making unit is invalid, a negative input improvement value indicates that the input is redundant while a positive output improvement value indicates that the item has not reached the ideal output. Under the fix investment amount and without reducing the output scale, the reason for redundancy in

comprehensive output is that the ideal output is unreachable, and the focus is on analysing the difference between the output and the target value.

SUGGESTIONS

Based on the results of empirical cases by DEA-PCA and field surveys, this article puts forward the following suggestions for the lean governance in the urban community green retrofit under PPP.

Establish detailed decision-making program plan to achieve lean governance layout under PPP

The analysis and calculation results show that most communities are in a state of diminishing returns of scale, and inputs have not been converted into ideal outputs. The main problem is that the detailed decision-making program plan is unsystematic and unrigorous. There is quite a large difference on the investments and renewal plans between the beginning of the project establishment and the ending of completion acceptance and settled accounts. Therefore, in the future, sufficient field survey should be conducted before a detailed decision-making program is planned. Accurately, to further grasp the needs of stakeholders and the actual situation of the community green retrofit under PPP, multiple factors should be fully considered to achieve a lean integration design. It is strongly advocated to promote the area-based coordinated retrofit under PPP model. Package one or more old communities and adjacent urban renewal areas to form a comprehensive old community retrofit group.

Standardize construction processes and standards to achieve lean construction management

The lean governance in urban community green retrofit under PPP should have more efficient construction requirements than in the traditional construction method. The construction unit that is selected by bidding should be the best economically and technically. Additionally, unified construction processes and standards should be formulated to avoid waste of resources. Facing the phenomenon of the reworking situation in the retrofit of some communities that emerged during the survey, rationalized measures should be made in advance including a retrofit program review, the arrangement entry of the power and material, and the admission sequence of each construction unit.

Pay attention to green retrofit and achieve the goal of the sustainability on lean governance in the urban community

From the input perspective of the BCC model, calculating the input-output improvement value of the non-effective decision-making unit, some communities need to increase their green satisfactions. According to the survey, it is known that some communities have reduced greening in order to increase parking spaces

or build new activity areas to get more rent by the operators. Some residents also want to harden the ground in front of the door. However, in fact, the renewal at the expense of green area is not conducive to the sustainable development of the community environment and will also cause a decline in the quality of urban life in the future. Therefore, in future community green retrofits under PPP, attention should be paid to greening retrofit, restoring the exposed ground surfaces, and increasing plant varieties.

Introduce professional property management companies to achieve long-term lean governance

In order to make full use of the advantages under PPP, the introduction of professional property companies is the key partner of all stakeholders and it plays basis and premise roles for achieving long-term lean governance in the urban community green retrofit. As the operation and maintenance of the PPP model, good property management can ensure the cleanliness of the community environment, orderly parking, and residents' sense of security. In the process of social capital involvement in the retrofit of urban community green retrofit, the support policies by the government have a positive role in promoting the concession rights of social capital. The concession operations include property management income, service repair indoors, and other needs. The policy supports social capitals involved in the retrofit of urban old communities to have an operating period in the community green retrofitted within the legal scope. It should also strengthen the supervision of the operation of relevant projects by social capital after the retrofit.

CONCLUSION

This article combines urban old communities retrofit with lean governance under the PPP model to explore their quantitative evaluation and improvement paths. Lean governance in the urban community green retrofit under PPP is a complex system that includes environmental, economic, social and other aspects, involving many indicators and high correlations between them. Empirical analysis results show that the PCA-DEA evaluation model can play their respective advantages effectively to solve the problem that the DEA model is affected by the number and correlation of input-output indicators, causing the evaluation results to lose distinction. To ensure the original information completely, a scientific and objective evaluation of the lean performance is conducted in the urban old communities in China. Countermeasures and suggestions are put forward to guide and promote the sustainable and efficient development of lean governance in the urban community green retrofit in China.

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