THE IMPACT OF SOCIAL GROUP BEHAVIORS ON LANDSCAPE PERFORMANCE: A CASE STUDY OF FOUR CHINESE URBAN PARK

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1 ABSTRACT

By using the approach of landscape performance evaluation, The Landscape Architecture Foundation (LAF) endeavors to measure the effectiveness of landscape solutions in achieving sustainability, and further to provide increasing knowledge and design exptise for future practice. But for now, the lessons learned summarized from the considerable cases are discursive in appearance. Comparatively, in the design process, the balanced benefits that sustainable development are pursuing (Campbell,1996) are comprehensive and strategy-oriented. In addition, the comprehensive strategies selection is subject to various social groups, not only designers. Therefore, this paper revealed the formative mechanisms of landscape performance, explored the factors influencing the performance of built projects at the social level, and drew up the diagram of hierarchical influence factors of landscape performance. Meanwhile, using literature review, it conducted a case study of four Chinese urban parks based on the data published in the Landscape Performance Series (LPS), and verified the influence relationship of social groups' behaviors to these projects' performance. At the community level, this paper connected the performance features of built landscapes with relevant factors that influence the design, and showed that the construction of the urban landscape is under the influence of social factors, to which great attention should be paid in future practice and research.

1.1 Keywords

landscape performance, formation mechanism, social group behaviors, case study, urban park

2 INTRODUCTION

With the current research trend of evidence-based design, the Landscape Architecture Foundation (LAF) launched the Landscape Performance Series (LPS; LAF, 2013a; ASLA, 2015a) in 2010, inspired by the forerunner of building performance. It purpose was to measure the performance of exemplary landscape projects and prove their environmental, social, and economic benefits. For that, LAF established the Case Study Investigation (CSI; ASLA, 2015b), to date, having completed over 100 case studies across the world. Further the performance data and results of these case studies were published in the Case Study Briefs (CSB; LAF, 2013b) on the website of LAF. This interactive set provides experience and lessons to help guide practitioners' work on sustainable and high-performance landscapes.

One problem worth discussing is whether plenty of effective landscape solutions, summarized simply, are able to help promote the coming landscape projects' comprehensive benefits in sustainability. Generally, we believe that good design solutions are able to make the built landscape produce good benefits. But the point is that the overall sustainability of a landscape project is not measured by certain sorts of high benefits. This means that a project's overall benefits are guided by integrated solutions, not one or some certain solutions. That is to say, designers should take strategies and methods under comprehensive consideration. Meanwhile, the selections of design solutions are not simply the individual behaviors of designers, but the result of social groups' behaviors. Accordingly, strategies and methods are factors at the level of appearance, but the method of selecting and integrating proper strategies and methods can influence the overall performances of landscape built fundamentally. And then back to the interactive set of LPS, it provides abundant shared resources of excellent cases and sustainable landscape solutions, yet it is unable to systematically help professional practitioners create sustainable landscape with comprehensive benefits. Therefore, we should clarify the formation mechanism of landscape performance, and seek the influential factors from the society level, so as to improve the comprehensive function of social groups' behaviors, then working on design solutions for sustainable landscape development.

By bringing to light the formation mechanism of landscape performance, this paper created a diagram of hierarchical influence factors of landscape performance. And then a case study demonstrated the relationship between these factors and landscape performance.

3 THE INFLUENCE FACTORS DIAGRAM OF LANDSCAPE PERFORMANCE

3.1 Directive factors influencing landscape performance

It is well known that a natural environment can provide numerous ecosystem services. Because urban green space is a kind of artificial natural environment, its capacity to generate benefits are influenced by human actions. The construction of urban greenland is the combined action of social groups, not only the individual action of designers. According to the general process of landscape construction, the formation mechanism of landscape performance can be illustrated as following: obeying relevant national policy and construction regulations, different social groups jointly affecting the final design solutions of urban landscape projects. In general, there are four groups, including the project owner, planner and designer, program reviewer, and user. Then this set of solutions would be drawn and be implemented by professionals; finally, the built landscape will produce various degree of benefits over different time periods (see Figure 1).

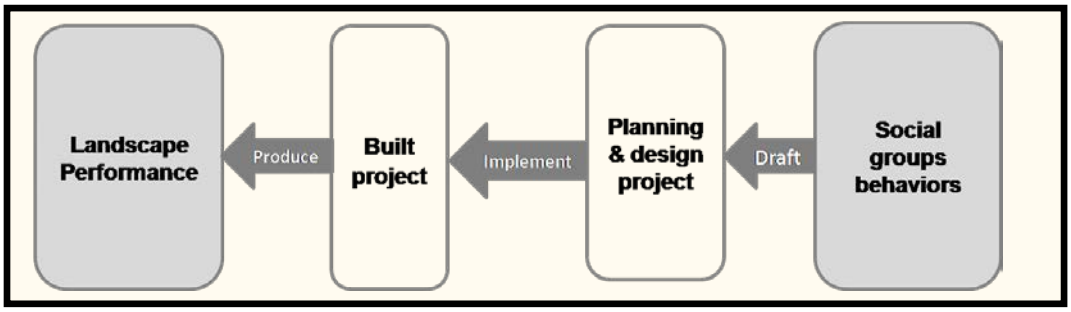

Figure 1. Diagram of Formation Mechanism of landscape performance (Diagram by the author)

From the above knowledge of the formation process of landscape performance, the four social groups play different roles in the stages of planning and designing the schemes which decide the form of the built landscape and affect the result of landscape performance. Therefore, they represent a significant directive influence to landscape performance.

3.2 Indirect factors influencing landscape performance

In the same context, generally speaking, a social group's actions have common features, which are affected by two factors: the specific role and function in the stage of landscape construction; and their thoughts on behalf of different group's social interests. We see them as the indirect influence factors to landscape performance.

According to the general construction and management mode of urban landscape projects, the four groups own their specific roles and functions (see Figure 2). Specifically, by providing the construction funds, the project owner has the development and decision-making rights. Based on the land development plan, they draft the basic design task statement, and also hold the decision-making power throughout the project, affecting the result of the project fundamentally. As the direct exporter of the design plan, the landscape architects largely determine the ultimate form of the project, by their design ideas and strategies. The reviewers have selection rights and partial suggestion rights, so their professional attitude and preferences affect the results of the project to a certain degree. As to users, they have the voting and suggestion rights, and in some countries and areas, the public users own the power of final decision making prior to the beginning of construction.

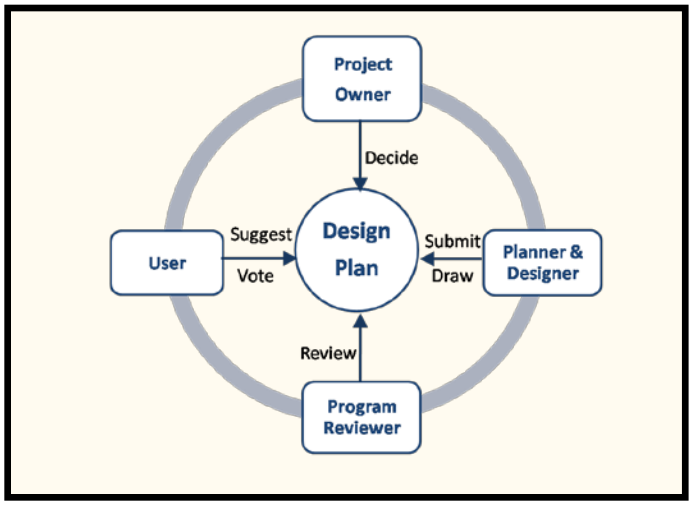

Figure 2. Roles and Functions of Four Social Groups in Project Phase (Diagram by the author)

On the basis of functional distribution, each group has their respective social interests, which induces their common group behaviors therby affecting the performance of the built project. For the project owner, the advantages brought by the project are paramount. The various types of green space are divided into municipal and commercial projects. Generally, the municipal projects focus on public welfare, along with some market functions, and are funded mainly by the government, or combined with corporations. As to the commercial project, it is dominated by economic interests, along with public welfare, invested by corporations mostly, and supervised by the government. Therefore, due to the different positions, the government department emphasizes the overall ecosystem services of green spaces according to its national development policy. The corporation pays more attention to the economic value. For the designer, their thoughts are reflected within the professional concepts of the individual or team. For the reviewer, their thoughts are a significant part of the mainstream thought in the industry. For users, the reasonable design of green space affecting the quality of life is quite vital. Relatively, their demands and suggestions are necessary to improve social services of the green space.

Overall, the four social groups have their specific functions in the project, and represent their own separate interests and thoughts. These features indirectly influence the landscape construction and its performance.

3.3 Fundamental factors influencing landscape performance

At a macroscopic level, these social group behaviors are closely linked with national socioeconomic development, guided and affected by national policies and rules fundamentally.

With the rapid development of modern cities, environmental issues are becoming more urgent. Governments worldwide are giving increasing weight to the construction and development of urban green space and have established macro policies suited to their national conditions. These policies give action guidance for local governments and industry staff. Meanwhile, for the practitioners, an important basis for construction work is the relevant construction industry laws and regulations, which usually clarify the duties of management departments, the technical conditions of project designers, construction mode and processes of types of green spaces, including matters from design solution, completion of project, approval and acceptance to the late-stage management.

3.4 The diagram of hierarchical influence factors of landscape performance

To sum up, the paper analyzed the corresponding influence factors based on the formation process of landscape performance, and established the hierarchical influence factor diagram of landscape performance (see Figure 3). As it has shown, the performances are produced by the built landscape,and result from planning and design solutions. The various social groups working on the final design solutions together, are seen as the main direct factors. Furthermore, the actions of these social groups are abided by related national policies and construction rules. As to the specific policies and regulations, different groups perform various roles and functions. The awareness and thought of a group are essentioal factors in guiding action. Therefore, objective roles and functions and subjective thoughts are regarded as indirect factors influencing the design solutions. And national policy and constuction regulations are considered as fundamental factors guiding the action of social groups' behaviors at the macro level.

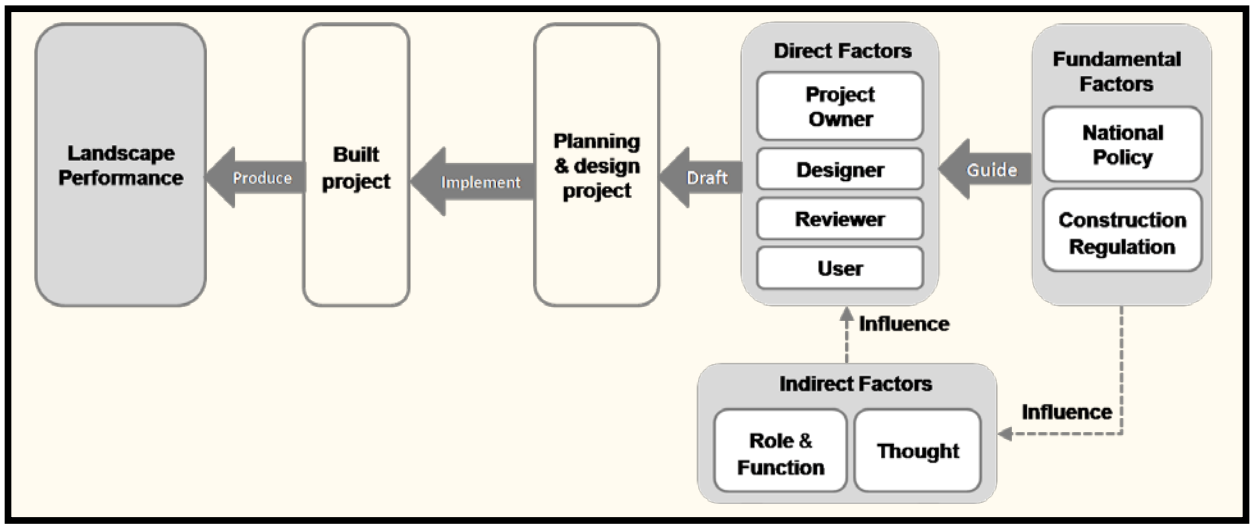

Figure 3.Diagram of Hierarchical Influence Factors of Landscape Performance (Diagram by the author)

4 CASE STUDIES

The case studies from CSI program funded by LAF were completed by student-faculty research teams consisting of research fellows, students and design firms. Though faced with many difficulties and challenges, their research is relatively excellent for the moment. Thus, given its research advantage and professionalism, this paper used data published on LPS by LAF.

4.1 Cases selection

In terms of cases, in the same social context as principle, this study used four Chinese exemplary urban parks, which are the Beijing Olympic Forest Park (2012),Tianjin Qiaoyuan Park (2012),Tangshan

Nanhu Eco-city Central Park (2011), and Shanghai Houtan Park (2011). As China is in a period of rapid urbanization with the prominent contradiction between environment, economy and society, the theory and practice of sustainable landscapes has been a long-term concern of the government and community. Furthermore, the urban park is the green space closely related to urban eco-environment and domestic living. Therefore, these cases are representative and meaningful in the sustainable landscape research area.

As representatives of landscapes built in the last decade in China, the four main park cases are well known in the world and selected by LAF as case studies on landscape performance evaluation, reflecting the status of sustainable landscape construction and development in China. These cases are all urban comprehensive park projects. The sites we're formerly brownfield, greyfield, and residential. In these cases, the Beijing Olympic Forest Park and Tangshan Nanhu Eco-city Central Park are large-scale parks, and Tianjin Qiaoyuan Parkand Shanghai Houtan Park are medium-scale parks; in terms of site features, they are all parks with multi-functions including wetlands, environmental restoration, stormwater management and so on, of which the Olympic Forest Park and Nanhu Eco-city Central Park have the function of protection of urban nature.

4.2 Research approach

Based on literature review, a qualitative and quantitative multi-method was chosen to make a comparative analysis. Firstly, the study conducted a comparative analysis of the composition of the benefits between the four cases, summarizing the common performance features of the same type green spaces in the same context. Then, based on the diagram of hierarchical influence factor, it analyzed four social groups' behaviors and relevant influence factors of the parks, testing the relationship between each factor and performance features of these parks.

4.3 Data collection

Performance evaluation conclusions of the Chinese four cases (published in LPS), and basic data of relevant cases were selected for organizing and summarizing. The four Chinese parks are over 1,000 acres or under 50 acres in size, and mainly used to be brownfield and greyfield. Table 1 shows the construction background of the selected cases. Table 2 shows the summarized performance information of these cases according to three categories of environmental, social, and economic benefits.

Table 1.Basic Information of Four Chinese Parks Cases

Case Project	Location	Size（acre）	Former Land Use	Project Function	Completion Time	Budget (million US $)
Beijing Olympic Forest Park	Beijing	1 680	Residential	Nature preserve; Open space; Wetland	2008	420
Tangshan Nanhu Eco-city Central Park	Tangshan He Bei	1 557	Brownfield	Nature preserve; Open space; Wetland	2009	68
Tianjin Qiaoyuan Park	Tianjin	54	Greyfield	Open space Wetland	2008	14.1
Shanghai Houtan Park	Shanghai	34.5	Brownfield	Open space; Waterfront redevelopment Wetland	2010	15.7

Table 2. Main benefits of projects in China (Source: LPS. http://landscapeperformance.org/case-study-briefs.)

Project	Main Benefits	Environmental Benefits	Social Benefits	Economic Benefits
	Carbon sink	●		○

Beijing Olympic Forest Park	Water saving	●		○
	Energy saving	●		○
	New energy resources	●		○
	Sewage disposal	●		
	Providing animal habitat	●		
	Biodiversity protection	●		
	Stormwater management	●		
	Providing recreation		●	
	Outdoor teaching		●	
	Job creation		●	●
Tangshan Nanhu Eco-city Central Park	Carbon sink	●		○
	Climate regulation	●		
	Providing animal habitat	●		
	Biodiversity protection	●		
	Water saving	●		○
	Waste gas treatment	●		
	Waste recycling	●		○
	Providing recreation		●	
	Commercial taxation			●
	Enhancing land value			●
Tianjin Qiaoyuan Park	Carbon sink	●		○
	Soil improvement	●		
	Providing animal habitat	●		
	Native biodiversity protection	●		
	Stormwater management	●		
	Pollution treatment	●		
	Waste recycling	●		○
	Reducing noise		●	
	Providing recreation		●	
	Outdoor teaching		●	
	Environmental education		●	
Shanghai Houtan Park	Carbon sink	●		○
	Sewage disposal	●		
	Providing animal habitat	●		
	Native biodiversity protection	●		
	Water and soil conservation	●		
	Water saving	●		○
	Waste recycling	●		○
	Providing recreation		●	
	Scientific education		●	
	History and cultural memory		●	
	Low maintenance cost			●

Note: "●" represents direct benefit, each "●" is counted once in calculation of benefits below;

"○"represents attached benefit, created by some environmental or economic benefits, whole "○" are accounted once in each project in calculation of benefits below.

With regard to Chinese urban parks, the four social groups are government officials, landscape architects, peer experts, and the public. Due to the restrictions in research, lacking the original file of projects, the paper obtained relevant data through literature review from website news, offical information and published papers, and summarized the projects' building objectives and tasks drawn up by policymakers (the design objective is in accordance with the upper master planning), the design strategies put forward by landscape architects in the program design phase, participation mode of each group, and literature implying the group's ideas and thoughts. In addition, national policies on strengthing urban green space construction refers to National Garden City, Ecological Garden City, Sponge City and other policy documents. The Regulations on Urban Greening(RUG) are the main construction regulations. (see the specific data on this below.)

4.4 Analysis on landscape performance data

First, this study focused on the ratio of each number of three benefit categories in a project to comparatively analyze its landscape performance composition. Accordingly, the ratio of the three environmental, social, and economic benefits is calculated in the following equation 1 (refer to the logic of Equation 2). The specific data of benefits are shown in Table 3, where each of the benefits is valued at 1.

Equation 1 $\mathrm{Rb} = \mathrm{B1}: \mathrm{B2}: \mathrm{B3}$(1)

Where Rb represents the ratio of each number of the three types of benefits; B1 represents the total number of the environmental benefit; Rb represents the total number of the social benefits; B3 represents the total number of the economic benefits.

Second, to further understand the composing characteristics of landscape performance in the specific social context of China, the ratio of the number of each type of benefit to the total benefits number in a project is calculated in the following equation 2 (Luo, Li, 2014).

$$\mathrm{R}(\mathrm{R1}, \mathrm{R2}, \mathrm{R3}) = \frac{\text{number of each type of benefits}}{\text{total number of benefits}} \times 100\% \quad (2)$$

Where R_1, R_2 and R_3 represent the ratio of the number of the environmental, social, economic benefit respectively to the total benefits number.

5 RESULTS

5.1 General performance feature of cases

The result of comparing the benefit composition of the four parks is shown in Table 3. In terms of the benefit composition characteristics, these parks had outstanding environmental benefits with great breadth, considering various comprehensive ecosystems including water, climate, animals and plants, resources and so on; but their social benefits were relatively simple in relation to providing some recreation and outdoor environmental education services, and the economic benefits of each park were thin as well.

Further, concerning the ratio of the number of each type of benefit to the total benefits number in a project, there were similar results in the four parks (see Table 3 and Figure 3). Generally, in these parks, the proportion of environmental benefits were similar, up to 60%, the proportion of social benefits were most at 25%-35%, and the proportion of economic benefits were at 15%-30%, averaging around 17%. Consequently, the model sustainable parks had a common benefit composition: high environmental benefits was twice the social and economic benefits, which were relatively low, and the economic benefits were comprised of indirect economic benefits resulted from environmental benefits.

From the above analysis, we see that in general, performance features of Chinese urban parks that the environmental benefits are high, and social and economic benefits are lower.

Table 3. Project ratio of three benefits number and each type of benefit number to the total benefits number

Project	Rb	R1	R2	R3
Beijing Olympic Forest Park	8:3:2	8:13	3:13	2:13
Tangshan Nanhu Eco-city Central Park	7:1:3	7:11	1:11	3:11
Tianjin Qiaoyuan Park	7:4:1	7:12	4:12	1:12
Shanghai Houtan Park	7:3:2	7:12	3:12	2:12

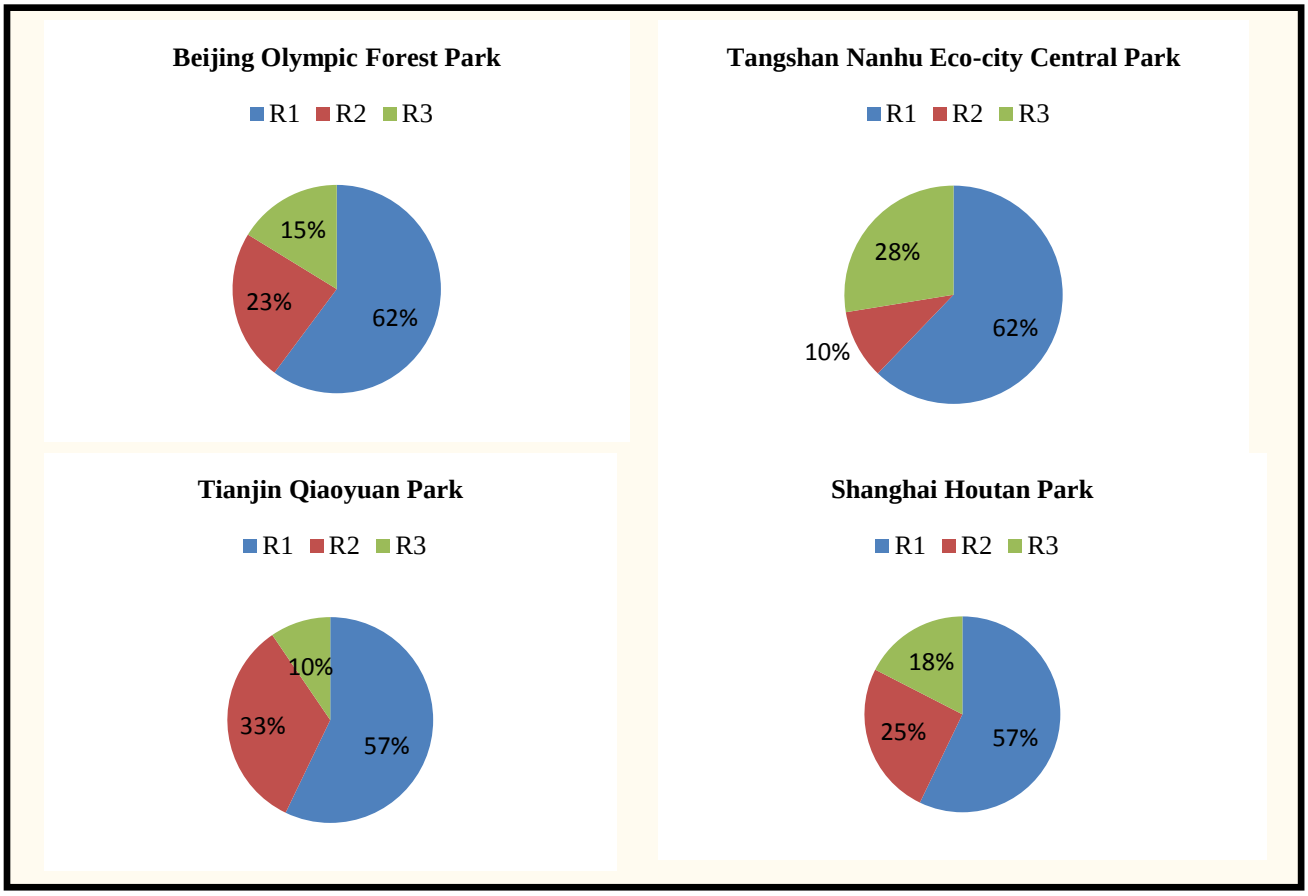

Figure 3. Diagram of Project Ratio of each type of benefit number to the total benefits number （Diagram by the author）

5.2 The social factors influencing the performance of cases

Next, following the diagram shown before in Figure 3, this study analyzed the direct factors of four social groups' actions in these projects (the groups are government official, designer, peer expert, and the public in Chinese projects), so as to make clear the relationship of the groups and project's performance feature. Then, it explored the indirect factors influencing the groups' actions in defining their potential common features. Finally, it discussed the fundamental factors guiding the groups' action at the macro level.

5.3 The direct factors influencing the performance of cases

The summary results of building objectives and design strategies are shown in Table 4 and Table 5. Known from these, in terms of program orientation, the local governments greatly focused on ecological environment within the green city, restoration of degraded land, as well as human well-being, which revealed that they pursued many environmental and social benefits, but few economic benefits. As to the designers of these park cases, the three types of strategies put forward were largely in agreement with the

result of the performance towards the built parks; therefore, it is shown that these strategies had fulfilled their intended purposes, and that one strategy might cause multiple benefits. There were limited economic strategies, around cost-savings, raised systematically in the design phase, with the result that the economic benefits were low in the final performance evaluation. What is more, it needs to be mentioned that some strategies were not reflected in the result of performance evaluation, so there were some potential benefits unconsidered by the evaluators. It could also be a recommendation for later evaluators to combine the design strategies within the evaluation process.

As to peer experts, though, without their review data, viewed from the review organization of the projects in the Chinese city construction industry, the reviewers belong to the expert designers group from well-known design agencies and universities in the field. Thus, these programs of built landscape were approved and suggested by peer experts, and the final design strategies were in accordance with their opinions. As to the public, there were two forms of participation. One way was to vote and give comments on several optimal design plans reviewed by the Expert Evaluation Commission, the Beijing Olympic Forest Park being done in this way (BMCUP, 2003). Another way was to show the final plans assessed by peer experts, and give comments in a period of time. The other three parks (CECA, 2010; LC, 2009; Editorial S., 2009) being done in this way. Thereby, the public was limited in expressing their opinions, having little impact on the projects.

Table 4. Project orientation of four parks in China

Project	Project orientation
Beijing Olympic Forest Park (BMCUP, 2003)	Construct forest park a green and ecological area to become a part of green screens between urban and rural areas of Beijing, in order to improve the urban environment and climate, and provide entertainment and leisure for the general public. Reflect the theme of "Scientific Olympics, Green Olympics, Humanistic Olympics".
Tangshan Nanhu Eco-city Central Park (CECA, 2010)	Build the mining subsidence area into a new urban district having a beautiful and ecological environment and expressing humanism, that will be a central park in the future.
Tianjin Qiaoyuan Park (LC, 2009)	Municipal recreation Park; The key project of urban environment transformation program in Tianjin, that was built to provide an excellent recreation area for residents and include a bridge museum and some 1000 m^2 of commercial areas.
Shanghai Houtan Park (Editorial S., 2009)	Part of the core green space in the Expo Site; Show the Expo theme of ecology, science and technology, Humanism; Stick to the Expo theme of "Better City Better Life"; Achieve the strategic target of "Green EXPO and Ecological EXPO".

Table 5a. Design Strategies and Benefits Matrix of Beijing Olympic Forest Park (Hu et al, 2006)

Strategyclassifycat-ion	Benefits / Strategies	Carb-on Sink	Water Ssaving	Energy Conser-vation	New Energy Resour-ces	Sewage Disposal	Animal Habitat	Biodive-rsity Protect-ion	Stormwater Manageme-nt	Recrea-tion	Outdoor Teaching	Job Crea-tion
Environm-ental Strategies	Plant Diversity Design	●	–	–	–	–	○	●	–	–	–	–
	Native Plant Protection and Reconstruction	●	–	–	–	–	○	●	–	–	–	–
	Provide Habitat for Wild Animal and Build Swift Tower	–	–	–	–	–	●	●	–	–	–	–
	WaterPurification System	–	●	○	–	○	–	–	○	–	–	–
	Eco-wetland Landscape	–	–	–	–	●	○	○	●	○	–	–
	Green Energy	–	–	–	●	–	–	–	–	–	–	–
	Enegy-saving Building	–	–	●	–	–	–	–	–	–	–	–

Environm-ental & Economic Strategies	Waste Recycling	–	–	●		–	–	–	–	–	–	–
Social Strategies	Landscape Experience and Recreaion	–	–	–	–	–	–	–	–	●	–	–
	Wetland as Education Center	–	–	–	–	–	–	–	–	–	●	–
	Children Playgrounds	–	–	–	–	–	–	–	–	●	–	–
	Fire Protection Design of Forest Park	–	–	–	–	–	–	–	–	–	–	–

Table 5b. Design Strategies and Benefits Matrix of Tangshan Nanhu Eco-city Central Park (BTUPDI, 2011; Hu, 2014)

Strategy classifyc at-ion	Benefits / Strategies	Carbon Sink	Climate Regulation	Animal Habitat	Biodiversity Protection	Water Ssavin g	Waste Gas Treatme nt	Waste Recycli -ng	Recreation	Commer ci-al Taxation	Land Value Promotio n
Environm -ental Strategie s	Reclaimed Water as Supplement	–	–	–	–	●	–	–	–	–	–
	Build Water System and Wetland Based on Existent Fishpond and Subsidence Places	–	○	–	–	●	–	–	–	–	–
	The existent plant Reservation and Native Plant Design	●	○	○	●	–	–	–	–	–	–
	Build Wooden Architecture and Reduce Emission and Resources Consumption	–	–	–	–	–	–	–	–	–	–
Environm -ental & EconomicStrategies	Industry Waste Treatment and utilization and Trash-filled Mountaion	–	○	–	–	–	●	●	–	–	○
Social Strategie s	Create Green Space for Public Recreation	–	–	–	–	–	–	–	●	–	○

Environm-ental &Social Strategies	Connect with the Central Park by Green Corridor	–	–	–	–	–	–	–	●	–	●
EconomicStrategies	Cost Saving	–	–	–	–	–	–	–	–	–	–
	Business Taxes	–	–	–	–	–	–	–	–	●	–
	Enhance the Land Value	–	–	–	–	–	–	–	–	–	●

Table 5c. Design Strategies and Benefits Matrix of Tianjin Qiaoyuan Park (Yu et al, 2009)

Strategy classifyc at-ion	Benefits / Strategies	Carbon Sink	Soil Improve-ment	Animal Habitat	Native Biodiversity Protection	Stormwater Management	Pollution Treatment	Waste Recycl-ing	Noise Reduct-ion	Recrea t-ion	Outdoor Teachin g	Environ-mental Educat i-on
Environm-ental Strategies	Topographical Design Combining the Rainwater Collection System	-	○	-	-	●	-	-	-	-	-	-
	Resue the of Field Trash	-	-	-	-	-	-	●	-	-	-	-
	Choose Adaptability Plant by Dynamic Seeding	●	-	○	○	-	-	-	-	-	-	-
	Biodiversity Protection	-	-	●	-	-	-	-	-	-	-	-
	Restore the Characteristics of Regional Landscape	-	-	○	●	-	-	-	-	-	-	-
Social Strategies	Recreation System Design	-	-	-	-	-	-	-	-	●	-	-
	Advocate Ecological Esthetics	-	-	-	-	-	-	-	-	-	-	○
	Environmental Interpretation Design	-	-	-	-	-	-	-	-	-	●	●
EconomicStrategies	Low Cost	-	-	-	-	-	-	-	-	-	-	-

Table 5d. Design Strategies and Benefits Matrix of Shanghai Houtan Park (Yu, 2010a; Yu, 2010b)

Environmental strategy	Benefits / Strategies	Carbon Sink	Sewage Disposal	Animal Habitat	Native Plant Protection	Water and Soil Conservation	Water Saving	Waste Recycling	Recreation	Science Education	History and Culture Memory	Maintance Cost

Environm-ental Strategies	Absorb Carbon Dioxide	●	-	-	-	-	-	-	-	-	-	-
	Purify the Contaminated Land and Water	-	-	-	-	●	○	-	-	-	-	-
	Sustainable Flood Control System	-	-	-	-	●	-	-	-	-	-	-
	Provide Habitat for Native Plant and Animal	-	-	●	●	-	-	-	-	-	-	-
Environm-ental & EconomicStrategies	Waste Recycling	-	-	-	-	-	-	●	-	-	-	-
Social Strategies	Create Path System with Landscape Experience	-	-	-	-	-	-	-	●	-	-	-
	Create Historical and Ecological Site	-	-	-	-	-	-	-	-	○	●	-
EconomicStrategies	Low Maintenance Cost	-	-	-	-	-	-	-	-	-	-	●

Note: "●" represents strong connections; "○"represents some kind of connections

5.2.2 Indirect factors influencing the groups' behaviors of cases

In terms of the roles and functions, since the four parks were funded by the government, the government officials had development and decision-making rights considerably. The design units of the parks were respectively Beijing Tsinghua Urban Planning & Design Institute and Turenscape, the representative design teams in China. The reviewers were peer experts invited by the government, who had the selection and suggestion rights partly. And the public, as the direct users and taxpayers, were unable to track the entire design process, though the designers conducted a survey review early in the process. They only could vote and make suggestions at the publication stage after the project had been formed, but the mechanism was opaque and incomplete.

In terms of the thought, as to government officials, since urban parks do not have direct or obvious economic benefits essentially, and lack market forces, they always considered controlling and saving costs, neglecting the potential economic benefits and cost-benefit ratio; besides, an urban park is an important carrier of political achievements, so they tended to embody the superior leaders' political thoughts of eco-city construction, highlighting the protection and improvement of the ecological environment, and providing recreational places for the general public (Qou,2013; Qiang, 2011). As to the designers, their thoughts are reflected within the professional concept of individuals or teams. Yu Kongjian and Hu Jie, the designers of these park cases as well as representatives of the excellent landscape architects in contemporary China, followed the sustainable landscape concept in practice, underlining ecological thought and humanities (Yu, 2004; 2007; Hu, 2008). As to experts, their thoughts are the significant parts of the mainstream thought in the industry. Several researches have shown that the ecological design concept of sustainable development, and achieving harmony between man and nature, is the key thought in the contemporary Chinese landscape industry (Yang, 2013; Zhu, 2008). As to the public, in China, they have few opportunities of participation into the design process, owing to the long-term centralization of power and planned economy in China. Thereby, the public, whose participation is repressed, are becoming sort of acceptable, without strong awareness of social services (Guo, 2004).

5.2.3 The fundamental factors influencing the groups' behaviors of cases

In order to explore the construction model of urban environmental development that conforms to Chinese national conditions, the National Housing and Urban-Rural Development(NHURD), as the supreme administrative department of urban construction in China, initiated the construction of National Garden City nationwide in 1992 and released officially National Garden City Declaration and Assessment Methods and National Garden City standards on March 25, 2005. After a period of development, these documents were revised, with more attention paid to ecological garden city, and new documents of Ecological Garden City Declaration and Assessment Methods and Ecological Garden City standards were issued on November 26, 2012. Besides, there were more policy documents issued by the government in relation to urban biodiversity conservation, wetland conservation, infrastructure development, and so on. Especially on October 22, 2014, *Sponge City Construction Technology Guidelines: Stormwater System Construction with Low Impact Development* was worked out to guide cities to strengthen infrastructure construction. According to the policies published by the supreme administrators, the ecological environmental protection and construction is regarded as an important national policy of urban development in China. Instructed by these policies, local government and industry staff would place environmental benefits in the most prominent position in specific construction practice, thus the environmental benefits are greater and apparent in the performance result of Chinese urban comprehensive park.

Currently, the *Regulations on Urban Greening* (RUG), originally implemented in 1992, is the only administrative regulation of the urban and rural greening in China (Lin, 2010), and it has played an important role in regulating and guiding the construction of the whole country. According to the RUG, the administrative department of urban construction would set the related construction index of urban comprehensive parks, and entrust the project to the design units with the appropriate qualification certificates, according to the basic procedures of approval. The stages from the design plan, project completion to putting into use shall be subject to approval, acceptance and management by relevant administrative departments. From the RUG, the construction and management mode of urban green space are clear. The comprehensive park is generally funded by the government; the processes from location, index control, design, construction, to operation, are all managed directly by the relevant administrative departments. Furthermore, the planners and designers are also commissioned and approved by administrative departments, but there is no rule to support public participation. Therefore, by analyzing the rules of RUG, we can see that the construction and management of urban parks are fully controlled by the government, with less market-orientation and little consideration for cost-profit balance and other potential economic benefits; besides, without legal guarantees, the public participation in landscape design is limited. Consequently the social strategies of the project are carried out with little substance, and it is hard to turn the social benefits into reality.

6 Discussion

By taking the cases of four Chinese sustainable urban parks, this paper revealed the characteristics and current problems in Chinese urban park construction with prominent environmental benefits and poor social and economic benefits. It indicated that the relationship among the three categories of benefits are comprehensively balanced in the construction of sustainable landscape projects in China at present. In terms of the protection and construction of the ecological environment, there is a solid social consensus and explicit policies to guide them, which promotes environmental benefits relatively prominently. By contrast, the considerations of the society and economy are still inadequate, causing the final social and economic benefits to not be obvious. Meanwhile, proceeding from the social group behaviors, this paper discussed the influences of multiple factors on performance of the cases. For the furture related landscape projects, it points out that it is required to proceed on the main factors to improve the situation and strengthen the way and intensity for the public participation to practically highlight the social benefits of landscape. Moreover, we need to do better in evaluation of the economy input-output and to exploit the potential economic value of the Landscape. In order to achieve these changes, we need to construct more improving and specific policies and more guided regulations of the construction at the national and community level to effectively lead the practice of sustainable landscape planning and design.

It should be noted that this paper mainly took a method of literature review, and did not carry out the specific assessment research during the case study, resulting in the lack of primary survey data. Besides, the case studies of the LPS are also incomplete. As these case studies were conducted after the project was built, and the project designers probably never anticipated the post-construction research,

often-times little baseline data is available. That means their performance indicators are not flawless, as well as the assessment results.

Additionally, the influence factors diagram of landscape performance constructed in this paper was based on personal opinion from personal long-term experience in professional practice and research. This diagram has some inadequacy in scientifically logicality and rigorousness. In the subsequent research work, it will be necessary to strengthen the related knowledge of sociology to further elaborate on the different influences of social factors on the landscape design.

7 Conclusion

Landscape performance research is of great significance in showing and improving the values of sustainable landscape. When we get back to how to effectively promote the sustainable landscape design in practice, it needs to jump out from a pure thinking of design to design, as this study shows that, in addition to the designers, all other groups behaviors of the owners, reviewers and users will affect the landscape performance results, moreover their actions are subject to their specific roles and thoughts, guided by national policies and regulations as well. Thus, the construction of urban landscape is under the influence of social factors, which should be paid great attention in the future practice and research.

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