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Implications from Park Public-Private Partnership (PPP) Initiatives in China and Japan

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Abstract In this study, the statistical information of 166 park Public-Private Partnership (PPP) projects in China, such as investment, area, project stage, and locality area, was collected to analyze types of clusters and defined five types. For each type of cluster, it was possible to analyze the merits of park PPP projects in China. The case study also revealed the construction process of the entities that build, manage and operate the projects. With the findings from the analysis, it can present a perspective on Japan and China and compare park Private Finance Initiative (PFI) and PPP projects between Japan and China.

Key words China, Japan, Park, Public-Private Partnership (PPP), Private Finance Initiative (PFI), Cluster analysis

1 Research background and objectives

The construction of urban park infrastructure is an important part of urban planning, directly related to social development, the national economy and people's livelihood. But in actual operation, due to the characteristics of long construction period and large investment demand, it is easy to inadequately invest funds, affecting the construction of park infrastructure. At the same time, constrained by traditional financing methods, it deprives local fiscal and monetary policies, and has a certain impact on the economic market structure^[1]. This environmental background, China strongly advocates the Public Private Partnership (PPP) model, encourages social capital to enter into urban park infrastructure construction through public-private partnership, to alleviate the shortage of funds for urban park infrastructure construction, and The PPP model encourages social capital to participate in the construction of urban park infrastructure through public-private partnerships, thereby alleviating the shortage of funds for urban park infrastructure construction and promoting the sustainable and healthy development of cities.

In fact, PPP in its modern form was applied in China in the late 1980s, first to industrial development projects and later to other sectors, mainly infrastructure. According to the Ministry of Finance of China (2020)^[2], by the end of 2019, a total of 9 440 projects from all over China have been included, with a total investment of 1.44 million yuan, ranking first in the world. As for the fields, the top five are 3 793 municipal construction projects, 1 317 transportation projects, 924 ecological construction and en-

vironmental protection projects, 611 comprehensive urban development projects, and 447 education projects, accounting for 75.2% of the total number of projects.

Of the 11 402 enterprises, including social capital, in the 6 309 projects, 3 847 were private and 5 936 were state-owned, accounting for 52%. Although PPPs are not unique to China, they are unique to China in that they involve state-owned enterprises. China has unique political, economic, and cultural characteristics. Prior to the 1980s, China adopted a highly centralized, planned, and purely socialist economy. Given the introduction of PPPs in infrastructure development and the complexity of such economic transactional activities, the practice of PPPs in China has been the focus of recent scholarly research with respect to various fields^[3], urban water environmental treatment^[4], sponge cities^[5], to draw lessons and experiences from the implementation of actual PPP projects, case studies have been the focus of much attention. These studies are intended to provide a better understanding of the current status, problems and constraints of PPP projects in China.

In the park sector, many national park PPP projects are included in various urban infrastructure projects. In Japan, the *Urban Park Law* was amended in 2009 in order to facilitate a smooth and rapid transition from the conceptual stage of infrastructure development to the project implementation stage for projects that contribute to infrastructure development and wide-area regional strategies with a high private investment inducement effect that are implemented in cooperation with the private sector, in line with the timing of private sector decision-making^[6]. In order to make a smooth and rapid transition from the conceptual stage of infrastructure development to the implementation stage, the *Urban Park Law* was revised in 2017, and a Private Finance Initiative (PFI) system was newly established to select private sector operators through public solicitation. It is expected that there will be an increase in the trend toward the

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sustainable development and renewal of facilities utilizing the vitality of the private sector^[7].

In this study, we present a detailed analysis from an institutional point of view, based on the characteristics of Chinese policy and the requirements for establishing public-private cooperation, with the aim of considering the necessity of expanding the involvement of the private sector, including PPP, in park projects, and to complement the advantages and disadvantages of the Japanese PFI system.

2 Previous studies

Prior studies on PPP projects and park PPP projects in China include the following.

In a study of public-private partnerships in infrastructure projects in China, Albert *et al.*^[8] found that over the past few decades, the Chinese government has been ambitiously pursuing large-scale investments in infrastructure development. In order to promote urbanization in China, it is expected that the funds needed for urban infrastructure development in the first two decades of the 21st century will be around 350 – 500 billion yuan. Zhang Shuibo *et al.*^[9] argued that it is difficult to finance such a large investment with government funds alone, and therefore the Chinese government needs to implement reforms regarding investment and financing of infrastructure projects. In order to alleviate this problem, PPP was introduced in China. Xu Xi *et al.*^[1] found that considering the fee mechanism, investment return level, risk allocation framework, and financing needs of urban park infrastructure projects in China, parks belong to the infrastructure such as municipal projects, tourism, and environmental protection, which have stable long-term demand and are suitable for implementation in public-private partnership (PPP). It is suitable for PPP implementation. If the urban park is a new project, a build-operate-transfer (BOT) scheme can be adopted in which the project company undertakes financing, construction, operation, maintenance, and delivery at the end of the contract period. At the end of the contract period, the project assets and related rights are handed over to the organization designated by the government free of charge. Shi Lanjiang *et al.*^[10] said that a park is a public green space with better facilities and a good green environment for the public to visit, enjoy, rest and carry out scientific, cultural and physical exercise activities. Zou Chenbin^[11] said that since China's park PPP project is still in the initial stage, the theory and practical construction are still in the exploration stage, and there are still many problems in the construction and management. This means that China's park PPP project needs a more complete and effective legal system to provide consideration for its concrete operation.

These studies allow us to better understand the current status, problems, and constraints of PPP projects in China. These studies also suggest that sound institutions are very important for the success of PPPs, and that China needs to build an institutional environment that enables PPPs^[9]. Thus, it is shown that there is still a lack of systematic institutional analysis to address PPPs, es-

pecially in terms of parks in China.

3 Research methodology

3.1 Outline of this study In this study, in order to clarify the characteristics and merits of park PPP projects in China, we compiled the project name, announcement date, investment, area and other factors of 166 park PPP projects implemented by July 2020 based on the official website of the Government and Social Capital Cooperation Center of the Ministry of Finance of China^[12]. In addition to the implementation documents such as reports and plans of each park PPP project^[13], the project stage, project period, project method, industry sector, *etc.* were obtained, and the population, area and economic information of the area where the park is located were obtained through the official website of each local government^[14].

After that, we divided the target parks into provincial units. Fig. 1 shows the distribution map of park PPP projects in China, from the macroscopic point of view, the park PPP projects are unevenly distributed in China, mainly distributed in the central and southern provinces of China, among which Henan, Guizhou and Shaanxi are ranked in the top three, with 22, 13 and 11 parks respectively. According to the economic data of Chinese provinces in 2019^[15], among 31 provinces and municipalities, Henan, Zhejiang, Guizhou and Shaanxi ranked 5th, 4th, 22nd and 14th respectively. As can be seen from this, most of the park PPP projects are concentrated in the provinces with developing economies, and with the rapid economic growth, these provinces and cities are also paying more attention to environmental protection and living environment, the infrastructure in the developed areas is almost already built, while in the underdeveloped areas, the projects such as improving the living environment are ranked second to other infrastructure. On the other hand, in the underdeveloped areas, projects such as living environment improvement are ranked second to other infrastructures.



Fig. 1 Distribution of park PPP projects in China

3.2 Analysis method In this study, we included 166 park PPP projects that have been implemented by July 2020, and we conducted a literature review of Chinese institutions, case reports and plans, and published materials. Since there are large data differences among the components of the park, such as investment, area, project method, and industry sector, the data of each

component were processed into points, and group grouping is done using cluster analysis based on the scored data. In this way, the regional characteristics among the clusters were used to evaluate the characteristics and merits of Chinese park PPP projects, and the differences between Japanese P-PFI and Chinese park PPP were evaluated through comparative analysis.

4 Results

4.1 Results of clustering by elements in this target park In this study, the elements used in the analysis and their sources are shown in Table 1. Therefore, we used three categories of elements for the analysis of project characteristics: "base" (investment and park area), "project structure" (project stage, procurement method, industry classification, *etc.*), and "regional characteristics" (area and population of the locality, *etc.*).

As for the "base", as the investment of the park, the minimum value is 47.6 million yuan, the median value is 54.3 million yuan, and the maximum value is 74.64 million yuan. As for the area of the park, the minimum value is 0.01 km², the median value is 0.7 km², and the maximum value is 48.9 km², with a large

span variation in investment amount and area. As for the "composition" of the project, there are mainly TOT (Transfer-Operate-Transfer), BOT, ROT (Renovate-Operate-Transfer) and other methods, among which BOT method accounts for 85% of the total. There are 11 industry sectors, including municipal projects, government infrastructure, ecological construction and environmental protection, tourism, *etc.* Among them, municipal projects account for 41.6% of the total, followed by ecological construction and environmental protection with 26.5%.

In order to analyze the characteristics of park PPP projects in China, we used SPSS Statistics 25.0 to analyze the clustering of three categories of factors, such as park investment and area, industry sector, and location characteristics, which can reflect the characteristics of the projects. Based on the results of the clustering analysis, we defined five types of clusters.

In Cluster I, the name of the group is "I. Large-area ecological and tourism project type". The average park area of Group I is 2.4 times the average of the total park area, which is the largest among the five groups. Ecological construction, environmental protection and tourism account for 93% of the total area of this group.

Table 1 Elements used in the analysis clusters and their sources

Category	Elements	Content	Source
Base	Park investment	The average value was 822 637 yuan	Official website of the Chinese government and the Center for Social Capital Cooperation
	Area of the park	Average, 3.79 km ²	
Project structure	Project stage	Preparation phase, procurement phase, execution phase	PPP project implementation plan for each park
	Project period	Average value 16 years	
	Business method	TOT, BOT, ROT, <i>etc.</i>	
	Financing way	General competitive bidding, open bidding, and voluntary contracts	
	Method of payment	Government purchases, VGF (Viability Gap Funding), and user fees	
	Industry sector	City government projects, government infrastructure, <i>etc.</i>	
Regional characteristics	Area of city	Average value 5 476.1 km ²	Official website of each local government
	Population of the city	Average value of 1.89 million people	
	GDP of the city	The average value was 1 136.47 yuan	

In Cluster II, the name of the group is "II. Small-area diversity project type". The average park area of Group II is 1.1 km², the smallest among the five groups. Eight of the eleven industries are included in this group, but even so, ecological construction, environmental protection, and tourism account for about half of the total.

In Cluster III, the name is "III. Investment balanced municipal project type". Compared with the disparate investment of the other four groups, the investment of this group is balanced, and at the same time, in the field of industry, it is concentrated on municipal projects.

In Clusters IV and V, the names of the two groups are "IV. Metropolitan city government project type" and "V. Metropolitan diversity project type". The common feature of these two groups is that the park project is located in a metropolis, while the industry in Group IV is mainly specialized in municipal projects, and the industry in Group V is more diversified.

4.2 Analysis of the benefits of park PPP projects in China by clustering In analyzing the merits of the project, we used the

method of reading the documents published by the 166 park projects. Here, the documents correspond to "feasibility reports" and "implementation plans". We examined and summarized documents to provide an objective view of the overall situation by looking not only at the internal workings of the park project but also at the external social policies. We also analyzed both sides of the issue, such as managers and users. In addition, each clustering is discussed and classified into three categories as shown in Table 2: benefits for the community, benefits for the park and its management, and benefits for the park users.

In terms of local benefits, the first common benefit is that the park PPP project reduces the government's financial risk and solves the problem of lack of financial resources because of the injection of social capital. It also promotes the utilization of local stock assets and stimulates private investment. Third, it plays a positive role in promoting social and economic development, improving the vulnerability of local infrastructure, and increasing employment opportunities in cities. Changing the functions of government and improving administrative efficiency. As for the

benefits of clustering, a stable and sustainable investment environment promotes the development of urbanization, ecological protection and biodiversity, and accelerates the development

of tourism. Finally, private capital promotes the construction of a variety of projects and maintains the social utility of the facilities.

Table 2 Benefits of park PPP projects in China

Category	Local benefits	Benefits for parks and administrators	Benefits for park users
Common benefits	(i) Reducing the government's fiscal risk and solving the problem of insufficient funds. (ii) Utilizing stock assets and stimulating private investment. (iii) Promoting social-economic development and improving regional infrastructure shortages. (iv) Transforming administrative functions. (v) Increasing urban job opportunities.	(i) Establishing profit-making facilities. (ii) Increasing the value of land development and use around the park. (iii) Urban green space for cultural promotion, science, popularization and education, and children's play. The park has various functional facilities.	(i) Improving the quality of the living environment. (ii) Increasing the convenience and safety of the park by updating the facilities. (iii) Use for rest, leisure, entertainment, learning and related cultural and educational activities.
I. Large-area ecological and tourism project type	(i) Improving ecological protection and biodiversity. (ii) Promoting the tourism development	(i) Increasing wildlife and plant resources. (ii) Becoming a place for education and research, scientific dissemination and environmental protection.	Recreation and science promotion
II. Small-area diversity project type	Private capital will be introduced in a variety of projects	Multi-building facilities, increased land use.	The facility is free and open to the public for a low fee.
III. Investment balanced municipal project type	A stable and sustainable investment environment will promote the development of urbanization.	It beautifies the environment and increases many ecological functions such as biodiversity.	Making it easy for residents to participate in events, sports, etc.
IV. Metropolitan city government project type	Developing city government infrastructure and comprehensive service systems.	Cultural assets and ancient sites have historical cultural value.	A variety of features are available, including cultural assets, ancient sites, and natural scenery.
V. Metropolitan diversity project type	Demonstrate the social utility of the facility.	Improving the quality of integrated park management services and the operational efficiency of the park.	A wide variety of facilities are available.

As for the advantages for the park and its management, it is possible to establish profitable facilities in the park from an operational standpoint, and to increase the value of land development and utilization in the surrounding area. The park itself has not only a leisure function but also a science promotion and education function. Between the clustering, the benefits are similar, and the ecological and tourist system type is mainly reflected in the increase of wild animals and plants, and the science popularization aspect is dominant. Projects in large cities are mainly reflected in historical and cultural heritage and high level of service.

As for the benefits of park users, the common aspect is that it has improved the quality of people's living environment. It is more convenient and safer to use the park for resting, leisure and entertainment. As a cluster, most of the facilities are open to the public free of charge and at low cost. In addition, many parks are integrated with historical sites and cultural heritages so that users can not only enjoy the natural scenery but also gain knowledge of history and culture.

5 Comparison between Japan and China

Table 3 shows the items that will be used in this study to make a comparative study of park PFI/PPP in Japan and China. Among these, "private sector projects" is dominated by state-owned enterprises, excluding private enterprises, which account for more than half of the total in China. The project period is within 20 years in Japan and 10 to 30 years in China.

In terms of project method, the BTO (Build Transfer Oper-

ate) method in Japan accounts for 70%. In the BTO method, the national government, local governments, and other entities become the owners of the facilities, and real estate acquisition tax, fixed asset tax, and city planning tax are not imposed. In the case of BOT, these three taxes are levied because the selected company is the owner of the facility^[16]. In China, the BOT method is used for new projects, while the TOT and ROT methods are used for the operation and expansion of stock projects, and conversely, the BTO method is rarely used in China.

In Japan, payment methods are classified into three types: purchase of service type, mixed type, and independent payment type. China's payment methods are divided into the government purchase method, the VGF method, and the user fee method. As the most commonly adopted payment method, Japan adopts the purchase of service method, while China adopts the VGF method.

In addition to the items listed in Table 3, there are several other differences between Japan and China. Japan is the first country in Asia to develop PPP projects by law, promulgating the *PFI Promotion Law* in 1999, and amending the law in 2001, 2005, 2011, 2013, and 2016. China is one of the largest PPP markets in the world, and has already promulgated laws such as the *Law on Call for Tender*, *Law on Government Purchasing*, and *Law on Budget*. However, until now, there is no law specific to PPP projects, and the work of PPP promotion and standardization mainly relies on ministry regulations in the form of "opinions", "manuals" and "guides" established by the State Council and local governments.

Table 3 Comparison of park PFI/PPP between Japan and China

Category	Park-PFI in Japan	Park PPP projects in China
Business entity	Local public body	Local government
Implementing body	Administrators of public facilities, <i>etc.</i>	Managers of government public facilities or related state-owned enterprises
Private enterprise	Private capital	State-owned enterprises, private-owned enterprises, foreign-invested enterprises, <i>etc.</i>
Special purpose company	SPC(Special Purpose Company)	SPV (Special Purpose Vehicle)
Division of roles in the project	Local public body; planning & programming	Local government; planning, planning, and supervision
Project period	Private; design, construction, operation, maintenance, <i>etc.</i> Within 20 years	Private; design, construction, operation, maintenance, relocation, <i>etc.</i> 10 to 30 years
Business method	BTO Build-Transfer-Operate BOT; Build-Operate-Transfer BOO; Build-Own-Operate RO; Rehabilitate-Operate	TOT; Transfer-Operate-Transfer BOT; Build-Operate-Transfer DBFOT; Design-Build-Finance-Operate-Transfer ROT; Renovate-Operate-Transfer Others: O&M, MC, LOT, BOO
Payment method	Service purchase type; a method in which the cost of maintenance and operation of the facility is recovered solely through payments from the public. Mixed type; a method in which the cost of maintenance and operation of facilities is recovered through payments from the public and user fees collected from users. Self-service accounting model; a method in which the cost of maintenance and operation of the facility is recovered solely from the user fees collected from the user.	Government payment; it is the government's direct purchase of public products and services for a fee. VGF; in the case of inadequate cost recovery and reasonable revenue for the business, the government provides a certain amount of economic subsidy to the business to make up for the shortfall of the business. User charge; end consumers pay direct payments to purchase public products and services.
Industry sector	Town planning	Municipal construction, forestry, transportation, comprehensive urban development, water conservancy facilities, government infrastructure, ecological construction and environmental protection, sports, cultural centers, security and housing construction, tourism
Features	A system to select, through public solicitation, a person who will be responsible for the establishment or management of park facilities subject to public solicitation, such as restaurants and stores, and the maintenance and renovation of specified park facilities, such as parkways and plazas in the vicinity.	I. Large-area ecological and tourism project II. Small-area diversity project III. Investment Balanced Municipal Project IV. Metropolitan city government project V. Metropolitan diversity project type
Benefits for parks and administrators	By utilizing private funds, the financial burden of park maintenance and management will be reduced; improving the attractiveness and service level of parks through maintenance and management that incorporates the creativity and ingenuity of the private sector.	Multi-functional facilities, increasing land use, establishing revenue-generating facilities, improving the quality of operational services and the operational efficiency of the park; increasing wildlife and plant resources, beautifying the environment, and improving the quality of the park, including biodiversity.
Local benefits	The period of time during which profitable facilities can be established will be extended, and together with the special exceptions to the building-to-land ratio regarding the size of facilities, it will be possible to invest and manage from a long-term perspective. The ability to design and develop plazas and other spaces that match the revenue-generating facilities to be established in an integrated manner, utilizing lush green spaces, will create high quality spaces that will lead to increased revenue.	Reduce the government's financial risk, solve the problem of insufficient funds, and promote the functional transformation of government departments and socioeconomic development. Urbanization process for ecological protection, biodiversity improvement, social utility of facilities, and acceleration of regional infrastructure construction
Benefits for park users	Enhance services for users, such as food and beverage facilities. Increasing the convenience and safety of parks by upgrading aging and declining quality facilities.	Free and low-cost park facilities, increased convenience and safety, and a wide variety of facilities. Easy to participate in events, sports training, <i>etc.</i> with various functions such as tourism, rest, entertainment, learning and related cultural and educational activities.

Some local governments in Japan are generally not positive about PFI projects due to their economy and population size, and are particularly concerned that PFI projects will exclude local small and medium-sized enterprises from participating in the market due to the winning bids of large companies^[17]. The PPP fever in China is generally supported from the central government to the local governments, and the local governments are particularly enthusiastic. There are very few PPP projects initiated by the central committee, and most of them are reported to the central committee after the local governments and private capital complete the contracts according to the relevant laws.

The above differences between Japan and China reflected that China must establish a sound legal system related to PPP and carry out PPP projects under the legal framework. Japan is very well equipped in terms of the legal system, *etc.*, but there are problems such as slow progress and lack of enthusiasm in the process of execution, which rather limits the development of PFI projects in the region.

6 Conclusions

In this study, we collected statistical information on park investment, area, project stage, procurement method and locality area in 166 park PPP projects in China, and analyzed the clustering. Based on the results of the clustering analysis, we defined five types of clusters: I. large-area ecological and tourism project type, II. small-area diversity project type, III. investment balanced municipal project type, IV. metropolitan city government project type, and V. metropolitan diversity project type. For each type of cluster, it is possible to analyze the benefits to the community, park and park management, and park users according to the published documents of park PPP projects in China. In addition, the case study revealed the construction process of the entities that plan, construct, and manage the park PPP projects in China. We reached conclusions with the findings from the analysis and present a comparison of park PFI/PPP in Japan and China, with a view to Japan and China. In the future, we plan to conduct research on PPP projects that encompass a variety of fields.

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