



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

International Journal of Recent Scientific Research
Vol. 8, Issue, 1, pp. 15292-15301, January, 2017

**International Journal of
Recent Scientific
Research**

Research Article

CONCESSIONAIRE SELECTION FOR PPP PROJECTS IN CHINA: PROCEDURES, DURATION, CRITERIA, AND METHODS

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ARTICLE INFO

Article History:

Received 15th October, 2016
Received in revised form 25th
November, 2016
Accepted 28th December, 2016
Published online 28th January, 2017

Key Words:

Public-Private Partnership, Concessionaire Selection, Case Study, Mainland China

ABSTRACT

Previous studies on public-private partnerships (PPPs) have shown that a "strong and good concessionaire" is critical to a project's success. However, empirical studies on schedule management of the bidding process and the selection of criteria and methods for properly evaluating PPP bidders in China are limited. This research aims to specify the concessionaire selection for PPP projects in China from the perspective of procedures, duration, criteria, and methods. Case studies were conducted to accumulate the valuable experiences in China. The concessionaire selection of six representative PPP projects in China was analyzed to provide both descriptive and predictive insights to the government and private investors. Valuable insights were gained in terms of selection procedures, duration, criteria, and methods. It was found that insufficient bidding and negotiation time restrict the site survey, information collection, and risk analysis of bidders, which may induce disputes during the project implementation period. Three commonly used methods for concessionaire selection, namely, single-index evaluation method, comprehensive evaluation method, and two-stage evaluation method, are presented and discussed. The findings provide useful references for concessionaire selection of future PPP projects in China.

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INTRODUCTION

Public-private partnership (PPP) is "a co-operative venture between the government and the private sectors, built on the expertise of each partner, that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards" (Ahadzi and Bowles, 2004; Bao *et al.*, 2015; Bao and Peng, 2016). With rapid urbanization in China, various urban infrastructure projects with significantly increased value have been successfully developed through the PPP model (Zhang, 2005a; Shen *et al.*, 2011; Wu *et al.*, 2012; Peng *et al.*, 2013). Selecting a qualified concessionaire guarantees the successful delivery of high-quality public services (Zhang, 2009). The government must not only ensure that concession is awarded to the most competitive concessionaire who can deliver and properly operate the project assets but also minimize the procurement cost, including transaction cost of bidding, service purchase cost, and monitoring cost (Liu, 2010; Peng *et al.*, 2014a; Peng *et al.*, 2014b; Peng, 2015).

PPP infrastructure projects are of natural monopolies (Xu, 2011). The introduction of competition into concessionaire selection enables the government to gain access to the cost and profit information of bidders and reduce its regulatory burden

(Deng, 2007). The local government can thus obtain price information to provide infrastructure services without knowing the construction and operation cost and market demand information (Guo, 2011). However, competitive bidding for concessionaire selection is a lengthy process. Delay in the pre-contact stage is one of the top-ranked negative factors for adopting PPPs (Chan *et al.*, 2010; Aziz, 2007; Ahadzi and Bowles, 2004; Cheung and Chan, 2011). Additionally, the costs for competitive bidding are high, exceeding the bidding cost of traditional procurement models (Kwak *et al.*, 2009).

Thus, this study aimed to address the following questions:

Question 1: What is the process and duration of concessionaire selection of PPP projects in China?

Question 2: How can PPP bidders be properly evaluated and transaction cost for concessionaire selection (i.e., adopt suitable evaluation criteria and methods) be reduced?

As the primary research method, multiple case studies were conducted. Lessons drawn from practice could provide valuable references for future PPP projects. The remainder of this paper is organized as follows. Section 2 presents the normal procedures for PPP concessionaire selection in China. Section 3 reviews previous studies on concessionaire selection.

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Section 4 presents the research methodologies adopted in this study. Afterward, the duration, criteria, and evaluation methods of concessionaire selection of typical PPP cases were analyzed and discussed by comparing and analyzing concessionaire selection, followed by the conclusion.

Procedures for PPP Concessionaire Selection

PPP concessionaires are selected through two approaches: competitive negotiation or open tendering. Competitive negotiation is adopted when the number of potential bidders is insufficient. Competitive negotiation has two advantages. First, the government can spend less time in preparing tender documents, and the project can start quickly. Second, the duration of concessionaire selection is short. The major disadvantage of competitive negotiation is the higher price proposal from potential bidders. Bidders may use their information and professional advantages to gain excess profits. Thus, the open tender has increasingly become the mainstream method for concessionaire selection of PPP projects. The procedures of open tender for PPP concessionaire selection in China are similar to those in the UK (Ahadzi and Bowles 2004), which consist of five stages, as shown in Figure 1 (Liu, 2007; Liu, 2004; Du, 2011; Peng et al., 2015).

Stage I: Project proposal and preparation –The Development and Reform Commission (DRC) or the local government reviews the *Project Proposal* or *Pre-feasibility Study Report* and approves the project implementation. Preparatory work includes establishing the tender committee and tender office and employing the agency, which shall provide services or assistance for the project prequalification, tendering, evaluation, and specific work of negotiation. The tender committee is an agency authorized by the local government and established for the tender of a specific PPP project. The tender office is an organization of the tender committee and is responsible for the daily work of the project.

Stage II: Prequalification of bidders –Prequalification aims to ensure that PPP project investors have financing, construction, operation, and financial capabilities to deliver public services. Weeding out unqualified bidders can reduce the time and cost of subsequent bidder evaluation.

Stage III: Preparation of bid documents –The tenderer issues the tender document and organizes a site survey and pre-bid meeting to respond to bidders’ questions.

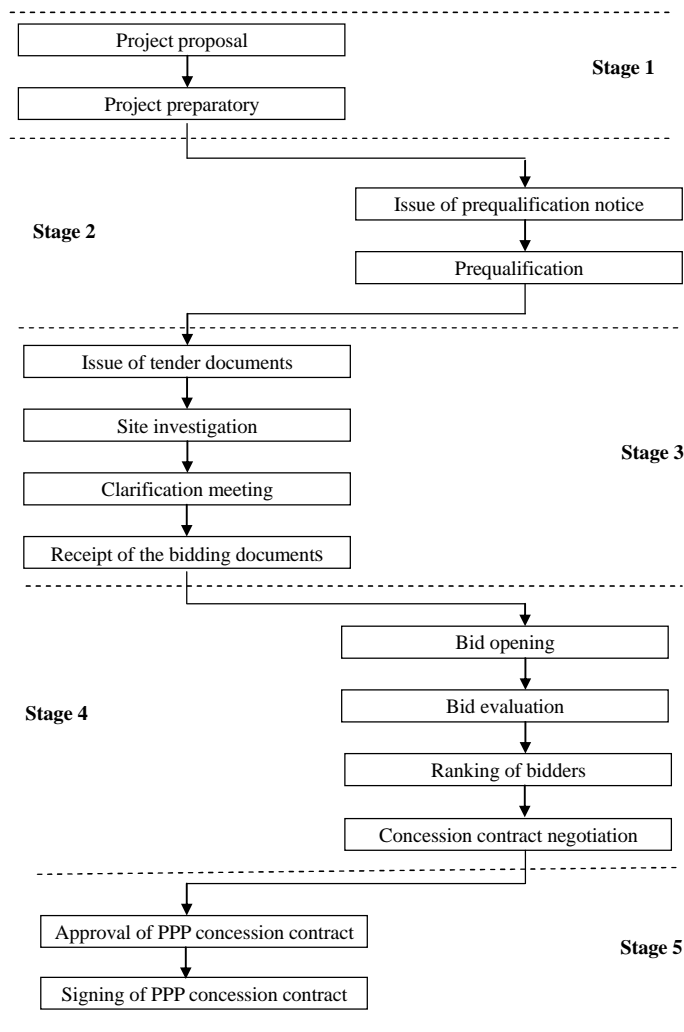


Figure 1 Procedures for concessionaire selection

The bidders should establish a bidding organization, prepare the bid documents, participate in a pre-bid meeting and site visit, and establish contacts with banks and suppliers. The tenderer usually allows the bidders to have sufficient time to prepare the bid documents, which usually takes three to five months.

Stage IV: Evaluation of bid documents –The tender committee publicly opens all bid documents at the time and place prescribed and organizes experts to perform bid evaluation in accordance with the evaluation criteria. In ranking order, successful candidates are invited to participate in the concession contract negotiation.

Stage V: Confirmation of PPP concession contract –The tenderer and the bidder confirm the concession contract after negotiations, and such confirmation is then reported to higher authorities for approval. In case the bidder is a foreign investor, confirmation should be reported to the Provincial DRC for preliminary review, then to the National DRC for official review, and to the State Council for final approval. Finally, the government and the investor sign a concession contract.

LITERATURE REVIEW

Selecting a suitable concessionaire is a critical success factor (CSF) for PPP projects (Zhang, 2004). Ahadzi and Bowles (2004) revealed that 98% of PPP projects suffer from time overruns ranging from 11% to 166%. The longest time for bidding and negotiations can reach up to 50 months (Ahadzi and Bowles, 2004). Bidding cost in the PPP model accounted for 0.48% to 0.62 % of the total project cost, while in design and construction turn-key projects for 0.18% to 0.32%, and in traditional projects for only 0.04% to 0.15% (Kwak *et al.*, 2009; Merna and Smith, 1996). Zhang (2005b) suggests that the best way to select a suitable private partner is to maintain some degree of competition among tenders. The competition is particularly important when private investors correctly bid for the monopoly to provide public services through a long-term concession contract (Zhang, 2005b). Competitive bidding can achieve many significant advantages, such as fairness, transparency, and high efficiency. Bidders can focus on financial, building, and technical factors rather than time-consuming negotiations and political matters (Chen and Messner, 2005). Zhang and Kumaraswamy (2001) presented the selection procedures for the build-operate-transfer (BOT) tunnel projects in Hong Kong. The competitive bidding procedure included *notice of tender published in the government gazette, evaluation and short listing of tenders, negotiations with the shortlisted tenderers and preparation of project agreement, legislative council approval and enactment of special ordinance, and signing of project agreement and award of franchise*. Similar procurement processes adopted in the UK and the USA have also been reported by Ahadzi and Bowles (2004) and Garvin (2010), respectively. Limited and unfocused competition between bidders may compromise the value for money of the concession (Rintala *et al.*, 2008).

The formation of selection criteria is crucial to the selection process as they reflect owners' and project objectives (Xia and Chan, 2012). Eighty-three criteria for concession selection were identified by Zhang (2005b) through a comprehensive literature review and interviews with international PPP experts and practitioners. These criteria were further grouped into four

categories: (1) financial; (2) technical; (3) safety, health, and environmental; and (4) managerial. Guo (2011) presented 37 concessionaire selection criteria and categorized them into nine groups using factor analysis. Various criteria have been identified in several studies (Kwak *et al.*, 2009; Kumaraswamy *et al.*, 2009; Zhang, 2005b; Guo, 2011). However, for a specific project, the selection criteria should be structurally adjusted to accommodate the project characters. As for concessionaire selection methods, Tiong (1997) presented an overview of evaluation techniques adopted in concessionaire selection and identified the major ones as the net present value (NPV) method, the score system, and the Kepner–Tregoe decision-making technique. Zhang (2004) identified seven tender evaluation methods currently used, namely, simple scoring method, multi-attribute analysis, Kepner–Tregoe decision analysis technique, the two-envelope method, NPV + scoring method, and binary + NPV method. NPV and multi-attribute analysis are the two most commonly used methods. Prequalification has been widely used to reduce the number of bidders and thereby reduce the proposal evaluation work for PPP projects (Li, 2007).

PPP concessionaire selection is a challenging task. Meidut and Paliulis (2011) considered that the concession agreement must be appropriate to the project, explicitly stating all undertakings and liabilities, and determining the payment mechanism and dispute settlement procedure. Devkar *et al.* (2013) highlighted the complexity of the standardized PPP process and reported that the lack of transaction design and evaluation competency may affect the growth of urban PPP projects. Although PPP has attracted a fair amount of research interest, a comprehensive literature review indicates that “actual empirical studies in the area of concessionaire selection remain scarce” (Zhang, 2009). A better understanding of concessionaire selection is needed to provide management/policy implications to private investors and policy makers (Chen, 2009).

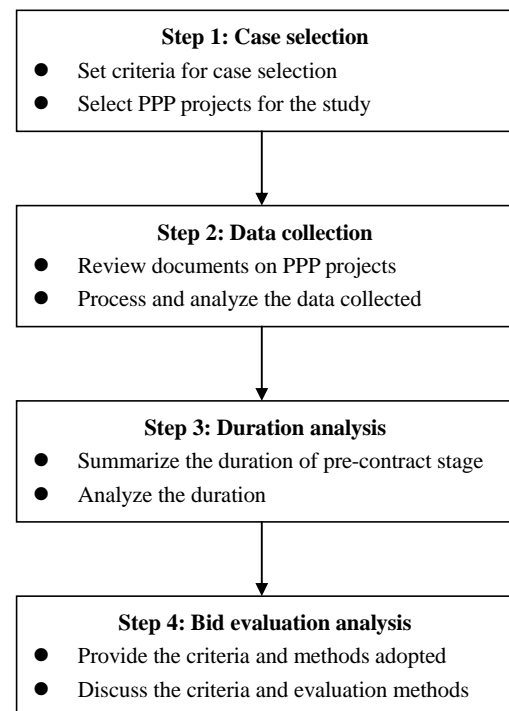


Figure 2 Research Flowchart (adopted from Song *et al.*, 2013)

RESEARCH METHODOLOGY

This study aimed to investigate the duration, criteria, and methods for concessionaire selection of PPP projects in China. The conduct of multiple case studies can be an effective research approach for this purpose “as this approach offers a useful means to study themes that emerged from the cases, which can be applicable elsewhere by adjusting to individual contextual situation” (Liu and Wilkinson, 2013). The research flowchart is adapted from the research work of Song et al. (2013). Figure 2 shows the overall research flowchart, which consists of four steps, including case selection, data collection, duration analysis, and bid evaluation analysis.

Case selection Cases were selected according to the following criteria: 1) The project is representative and can provide valuable references for subsequent PPP projects; 2) detailed project information related to research objectives could be collected; and 3) the projects selected cover different types and operate under different conditions. Three PPP projects were selected to study Question 1, including Laibin B Power Plant, Chengdu No. 6 Water Plant B, and Shantou–Puning Expressway. Laibin B Power Plant and Chengdu No. 6 Water Plant B were selected because they are both official pilot PPP projects initiated by the Chinese central government. Concessionaire selection is formal and strict. The Shantou–Puning Expressway is one of the latest local projects. Its concessionaire selection process is not standardized. The comparison of concessionaire selection between official projects and local project can provide valuable lessons for future PPP projects. Another three projects, including Leshan–Yibin Expressway, Liaocheng Sports Park, and Huai’anWaste water Treatment Project, were selected to study Question 2 because three different criteria and methods of

concessionaire selection were employed in these three cases, respectively, including single-index evaluation method, comprehensive evaluation method, and two-stage evaluation method.

Data collection Data for the above cases were collected from journal papers and doctoral and master theses. A detailed background information of these cases is summarized in Table1.

DURATION OF CONCESSIONAIRE SELECTION

This section reports the duration of concessionaire selection of three representative cases in China, namely, the Laibin B Power Plant, Chengdu No. 6 Waterworks Plant B, and Shantou–Puning Expressway. Among them, Laibin B Power Plant and Chengdu No. 6 Waterworks Plant B are official PPP pilot projects of the Chinese central government. The concessionaire selection process is shown in Tables 2 and 3. Although these two projects are different in terms of types and sizes, the concessionaire selection duration is relatively short. Project preparation (the establishment of tender agency) lasts for about three months, the pre-qualification lasts for two to three months, the time for bidders to prepare bid documents is about five to six months, the evaluation of bid documents is approximately one month, and the contract negotiation is approximately two to four months, as summarized in Table 4. The process and duration of concessionaire selection for the Laibin B Power Plant and Chengdu No. 6 Waterworks is also similar to the research result from Li (2009), covering project feasibility study and the government approval of the project proposal (6–12 months) prequalification (5–6 weeks) tender preparation (15–20 weeks) preparation of bid documents (20 weeks) bid evaluation and award (4 weeks)

Table 1 Background of PPP cases studied for concessionaire selection

No	Case name	Background of PPP cases	References	Purposes
1	Laibin B Power Plant	Laibin B Power Plant is the first pilot BOT project approved by the State Planning Commission, with a total investment of USD 616 million, of which USD 154 million comes from investment of the shareholders. The installed capacity is 720,000 kilowatts, and the annual maximum power generating capacity is 5.834 billion kwh. In October 1996, a concession agreement was signed, and the project concession period was 18 years, including two years and nine months of construction period and 15 years and 3 months of operation period.	(Li, 2009; Wang and Tiong, 2000)	
2	Chengdu No. 6 Waterworks Plant B	Chengdu No. 6 Waterworks Plant B is the first urban water supply BOT pilot project in China, which is located in Chengdu, Sichuan Province. The designed maximum water supply capacity is 460,000m ³ /day and the normal water supply is 400,000m ³ /day. The project has a total investment of USD 106.5 million, including 30% of shareholder investments. In July 1998, a concession agreement was signed, which stated a concession period of 18 years, including three years of construction period and 15 years of operation period.	(Liu, 2004; Chen, 2009)	Research question one
3	Shantou-Puning Expressway	Shantou-Puning Expressway has a full-length of 87.133km, with six double-way lanes, designed speed of 120km/h, roadbed width of 34.5 meters, and asphalt concrete pavement. The estimated total investment is RMB 10,582 million and project bidding began in May 2008.	(Cai, 2010)	
4	Leshan-Yibin Expressway	Leshan-Yibin Expressway is the first BOT open tender highway project in Sichuan Province. The Expressway is 138 km long, including approximately 80 km in Leshan and approximately 58 km in Yibin. The Expressway is two-way, four-lane highway with designed speed of 80 km/h, roadbed width of 24.5 meters, and a total investment of RMB 5.98 billion. Bidding ended in September 2005 and the expressway was opened to the public in December 2010.	(Cai, 2010)	
5	Liaocheng Sports Park	The Liaocheng Sports Park project has a total planned area of 1,100 mu, including 400 mu for Phase I, 350 mu for Aosen Garden residential community, and 350 mu for Phase II, with a total investment of RMB 1.45 billion. The concession was awarded in 2007 with a 30-year concession period.	(Du, 2011)	Research question two
6	Huai’an Wastewater Treatment Project	Huai’an Sewage Treatment Project is a transfer, operate, transfer (TOT) project. The tender scope includes two plants. One is the theHuai’an City Sijiqing Sewage Treatment Plant with a waste treatment capability of 65,000 tons/day, which was completed in 2011. The other isHuai’an No. 2 Sewage Treatment Plant,with a waste treatment capability of 100,000 tons/day, and a concession period of 20 years (excluding the construction period of two years).Huai’an municipal government appoints Huai’an Housing and Urban-Rural Development Bureau as the tenderee to be responsible for tender of the concessionaire.	(Li, 2007)	

contract negotiations (12 weeks) financing and approval (15 weeks) honor the concession agreement. **Chen (2009)** regarded that owing to “the flagship project status with strong commitment from the central government, local government and an international multilateral organization,” the timetable for concessionaire selection of the Laibin B Power Plant and Chengdu No. 6 Waterworks can provide valuable reference for the schedule management of concessionaire selection in subsequent PPP projects.

The Shantou–Puning Expressway is a local project. Its concessionaire selection process is not standardized and has some shortcomings in the bidding arrangement by the local government. The timetable for the concessionaire selection is summarized in Table 5. It has a general preparatory period of about 26 months. The duration between the issuance of invitations to bid and the bid deadline is approximately two months.

Table 2 Timetable for the concessionaire selection of the Laibin B Power Plant

No.	Time	Milestone events
1	Beginning of 1995	The State Planning Commission organized the BOT pilot work and seeks investors with experience in the construction and operation of BOT projects.
2	08/05/1995	Laibin B Power Plant was approved as a pilot project by the State Planning Commission.
3	08/08/1995	The Tender Committee issued pre-qualification notice.
4	30/09/1995	Deadline for submission of pre-qualification documents. Thirty-one international companies or consortiums submitted pre-qualification documents. The Bid Evaluation Committee reviewed the pre-qualification documents and selected 12 companies as Group A, which could bid either alone or as a consortium. Another 19 companies were in Group B, which could not directly participate in the bidding and could only bid by forming a consortium with one or more companies in Group A.
5	10/1995	The People’s Government of the Guangxi Zhuang Autonomous Region announced the prequalification results and issued invitations to bid.
6	07/05/1996	Tender deadline. Six bidders submitted bid documents to the People’s Government of the Guangxi Autonomous Region.
7	08/05/1996	The People’s Government of the Guangxi Autonomous Region held a bid opening ceremony for the Laibin B Power Plant project in Beijing.
8	08/05/1996-08/06/1996	The People’s Government of the Guangxi Autonomous Region organized an expert team consisting of technical, legal, and financial experts to review, compare, analyze, and summarize the bid documents as well as produce the tender evaluation report.
9	17/06/1996-17/06/1996	The Bid Evaluation Committee assessed each tender and determined the three most competitive bidders based on the tender evaluation report. The top three bidders were the French Electricity Consortium, the Hong Kong New World Consortium and the American International Power (Hong Kong) Limited, respectively.
10	01/10/1996	The People’s Government of the Guangxi Autonomous Region and French Electricity Consortium signed the agreement in Beijing.

Source: adopted from Li (2009)

Table 3 Timetable for the Concessionaire Selection of Chengdu No. 6 Waterworks Plant B

No.	Time	Milestone events
1	01/1997	The State Planning Commission approved the Chengdu No. 6 Waterworks Plant B project as the first urban water supply BOT pilot project in China.
2	21/04/1997	The Chengdu Municipal Government released the prequalification notice of Chengdu No. 6 Waterworks Plant B and issued open invitations to potential investors for prequalification.
	28/07/1997	Prequalification results were released.
3	18/09/1997	The Chengdu Municipal Government officially sold tender documents, and seven prequalified companies (or consortiums) purchased the tender documents and became potential bidders.
4	20/10/1997-23/10/1997	The Chengdu Municipal Government organized the bidders to perform site visit to ensure that the bidders would have a better understanding of on-site conditions and economic development in Chengdu.
5	25/10/1997	The Chengdu Municipal Government held a pre-bid meeting in Chengdu to answer the questions of bidders.
6	25/02/1998	Tender deadline. Five bidders submitted bid documents to the Chengdu Municipal Government.
7	27/02/1998-18/03/1998	An expert team assessed the bid documents (criteria are as follow: the least government expenditures, the lowest public burden, technology advancement, and the feasibility of financing).
8	26/03/1998	The Bid Evaluation Committee announced the evaluation results.
9	27/04/1998	The Chengdu Municipal Government began confirmatory negotiations with the French Vivendi and Japanese Marubeni consortium.
		The Chengdu Municipal Government and the consortium of French Vivendi and Japanese Marubeni signed concession agreement in Beijing.
10	12/07/1998	Approved by the State Planning Commission, the Chengdu Municipal Government issued a Letter of Acceptance to the French Vivendi and Japanese Marubeni consortium.
11	12/02/1999	The State Planning Commission formally approved the concession agreement.
12	11/08/1999	The Chengdu Municipal Government and the project company signed the concession agreement in Beijing.

Source: adopted from Li (2004)

Table 4 Comparison of the duration of concessionaire selection

Selection Stage of Concessionaire	Laibin B Power Plant	Chengdu No.6 Waterworks Plant B	Shantou-Puning Expressway
Project preparatory	3months	3 months	26 months
Prequalification	2 months	3 months	0
Preparation of bidding documents	6 months	5 months	2 months
Evaluation of bidding documents	1 months	1 months	1day
Contract negotiation	4 months	2.5 months	Less than 1 month

The tender evaluation time is one day, and the time to review and approve the evaluation results is approximately one month (the time for contract negotiation is less than one month). Compared with the Laibin B Power Plant and the Chengdu No. 6 Waterworks, the Guangdong Shantou–Puning Expressway Project involved no prequalification, and the tenderee neither provides bidders sufficient time to prepare bid documents nor provides evaluation experts sufficient time to evaluate PPP proposals. The insufficient time allotted for concessionaire selection may result in the following problems:

1. Insufficient preparation time for bid documents weakens bidders’ ability to perform site survey, collect information, analyze project risks, and propose optimized programs and reasonable risk-coping strategies. Thus, more disputes may arise in the implementation period (Cai, 2010).
2. Insufficient time to evaluate and analyze the bid documents will increase the risk of the tenderee. The anticipation of re-negotiating the PPP concession contract during the construction and operation stage may significantly increase the concessionaire’s moral risk.
3. In terms of post-bid negotiation of PPP projects, the tenderee has the option to require bidders to modify the implementation plan and quotes and to adjust the construction period. However, upon the signing of the concession contract, the bidder is out of the competitive environment, and the tenderee needs to pay a high price for any new requirement and change on contract conditions.

higher level on project proposal and concession contract. By contrast, local projects, such as the Shantou–Puning Expressway, only require approval from the local government, which can significantly accelerate the project implementation. The power supply project (Case 1) and water supply project (Case 2) feature more complicated technology than expressway projects. The tenderee needs more time to evaluate the technical performances of equipment, prepare and review bid documents, and balance technical factors and cost. Furthermore, operational projects are more attractive than quasi-operational ones as they allow private investors to earn more profits. Thus, the concession agreement negotiation will be smoother.

Criteria and Methods for Concessionaire Selection

Criteria for prequalification

Prequalification can filter those investors who do not meet the requirements, thereby reducing the average loss of bid failures and the workload of the tenderee. To ensure that investors can fulfill the responsibilities and commitments of constructing and operating PPP projects, the prequalification criteria generally include the following aspects (Liu, 2007).

1. Financial capability –Investors have the financial strength or financing capacity that matches the capital scale of the tender project. The net corporate assets shall not be less than a certain number, and the capital shall be no less than 30% of the total investment.
2. Project experience –Investors must be involved in at least one similar-sized project in the past five years.

Table 5 Timetable for the Concessionaire Selection of Shantou-Puning Expressway Project

No.	Time	Milestone events
1	08/11/2005	The Guangdong Shantou-Puning Expressway Construction Department was established to conduct the pre-preparation of the Shantou-Puning Expressway project.
2	At end of May, 2006	The local government and relevant departments gave preliminary approval of the pre-feasibility report of Shantou-Puning Expressway project.
3	Beginning of December, 2006	The Transportation Department of Guangdong Province extended the Shantou-Puning Expressway project to Jiexi. A new feasibility study was required.
4	23/11/2007	The Expressway Project Construction office was established to be in charge of the bid, preparation of the feasibility study report, organization, and coordination of the project.
5	01/2008	The project proposal was approved. Shantou and Jieyang were authorized to jointly organize the project construction during 2008 and 2010.
6	03/2008	The tender documents of the Shantou-Puning Expressway were completed.
7	End of Mar., 2008	The Transportation department of Guangdong Province approved the tender documents and clarified the basic eligibility requirements of bidders, registered capital of the foreign investment company, net assets, exchange rate, registered capital of project legal person’s corporation, as well as concession period of not exceeding 25 years with no further extension.
8	19/05/2008	Tender notice was announced.
9	29/07/2008	Bid document deadline. A total of five bidders submitted the bid documents.
10	29/07/2008	The Bid Evaluation Committee evaluated the bid documents and recommended Shenzhen Zhongzhou Group with the highest combined rating as the first successful candidate.
11	01/09/2008	The municipal governments of Shantou and Jieyang approved the evaluation results and recorded their approval.
12	02/09/2008	The tenderee issued a Letter of Acceptance to the Shenzhen Zhongzhou Group.
13	03/2009	Shantou Transportation Bureau, Jieyang Road Bureau, and Shenzhen Zhongzhou Group all signed a project investment agreement in Shantou City.
14	End of Sep., 2009	The project company was established and responsible for project investment and construction, management and fulfillment of the rights and liabilities under “Project Investment Agreement.”

Source: adopted from Cai (2010)

The comparison of concessionaire selection practices between these three cases also reveals that the bidding and negotiation time is influenced by the types of investors, project scale and technical complexity, and profitability (Du, 2011). Projects involving foreign investors, such as the Chengdu No. 6 Waterworks Plant B Project, require approval from the DRC of

3. Technical capacity –Investors and key management personnel must possess technical and operational management capacities related to the project or have reached preliminary agreements with partner institutions that possess appropriate technical and operational management capabilities.

4. Legal requirements –The corporate entity must be legally registered in Mainland China. Meanwhile, the entity must meet the qualification requirements of a municipal public sector management.
5. Reputation condition –The company must have good business reputation, with no involvement in illegal action or cases of breach of contract in the past.

The following documents must be submitted to the tenderer for prequalification (Liu, 2007):

1. Qualification documents (business license, legal code certificate, and tax registration certificate);
2. Technical capacity information (technical and management personnel list and profiles, recent project investment, including investment amount, scale, technology, construction time, the work undertaken, and current status);
3. Financial proof (bank credit, capital payment affirmation, audited financial statements of recent three years); and
4. Legal proceedings (no default, litigation, and arbitration cases; property is secure, not regulated, confiscated, or cleaned).

Generally, from the pre-qualification to bid opening, the number of bidders are gradually reduced, and some bidders even expect to withdraw their bid documents after submitting them. The tenderer should ensure that a certain number of bidders will continue to participate in the bidding, or the bid will have the minimum number of bidders mandated by law when bidding starts (Li, 2009). However, many pre-qualified bidders will discourage the participation of bidders who are not willing to spend more resources and time to bid (Li, 2009). Therefore, pre-qualified investors should not be excessive or few. Having four to six bidders per project is ideal.

Criteria and methods for evaluating PPP bidders

To assess the PPP proposals and bidders, three evaluation methods were employed in Cases 4, 5, and 6, which include the single-index evaluation method, the comprehensive evaluation method, and the two-stage evaluation method, as summarized in Table 6.

Table 6 Evaluation methods adopted in cases

No.	Project name	Evaluation methods
Case 4	Leshan-Yibin Expressway	Single-index evaluation method
Case 5	Liaocheng Sports Park	Comprehensive evaluation method
Case 6	Huai'an Wastewater Treatment Project	Two-stage evaluation method

In Case 4, the concession was awarded to the investor with the shortest concession period (27 years, 9 months, and 16 days) (Cai, 2010). The tenderer of the Leshan–Yibin Expressway Project selected the concessionaire by single-index evaluation. In this method, the tenderer specifies the quality and requirements of public services, and the Bid Evaluation Committee selects the bidder who satisfies the qualification examination and offers the lowest concession price or the shortest concession period (Lin, 2011). The single-index evaluation method is easy to conduct, can effectively eliminate the internal corruption of the tenderer, and can ensure that bidding is fair and just (Li, 2007). The method is suitable for

projects with specific quality standards of concession service and does not apply to technically complex projects, such as waste incineration project and sewage treatment project. Affordable bidders who provide high quality service may be rejected, because the single-index evaluation method cannot effectively balance price and non-price factors. Thus, the successful bidder may offer the lowest price but with poor quality (Li, 2007).

In Case 5, the local government used comprehensive evaluation method to select the concessionaire of the Liaocheng Sports Park. Comprehensive evaluation method is a weighted scoring method that assigns weights to criteria. The evaluation experts score all criteria and then calculate a total score by weighted average. The bidders of the Liaocheng Sports Park were rated using the following formula (Du, 2011):

$$\begin{aligned} \text{Total score of the bidder} = & \text{Financing capacity and financial management capacity (score)} \\ & * \text{weight} + \\ & \text{Construction and operation management capability (score)} * \\ & \text{weight} + \\ & \text{Safety, health, and environmental management capacity} \\ & \text{(Score)} * \text{weight} + \\ & \text{Other technical capacity factors (score)} * \text{weight} + \\ & \text{Public safety (score)} * \text{weight} + \\ & \text{Work system health and safety (score)} * \text{weight} + \\ & \text{Design innovation and flexibility (score)} * \text{weight} + \\ & \text{Resource utilization efficiency and waste recycling (score)} * \\ & \text{weight} + \\ & \text{Organization's values (score)} * \text{weight} + \\ & \text{Organization members' attitudes (score)} * \text{weight} \end{aligned}$$

Establishing evaluation indicators and their weights is the core of comprehensive evaluation method. The evaluation experts are required to have extensive project experience, because different index weights will produce different evaluation results (Du, 2011). Comprehensive evaluation method has no minimum limit for each indicator, which may weaken the control of officer corruption (Du, 2011). Thus, in practice, selecting the most suitable investors is difficult.

In Case 6, a two-stage evaluation method was adopted in the concessionaire selection of the Huai'an Wastewater Treatment Project (Li, 2007). The Bid Evaluation Committee first reviewed the financial, technical, legal, and organizational programs after confirming that the bid documents are qualified. The first stage has 40 points, including 5 points for financing programs, 15 points for technical programs, 5 points for legal programs, and 15 points for organizational programs. Each indicator shall not be less than the predetermined minimum standard (60% of the total score). The qualified bidders in the first stage will be eligible to participate in the second stage of the concession price assessment. The second stage is the business review stage, focusing on scoring the concession prices. The total score of the bidder is the sum of the scores during the first and second stages (Table 7).

Table 7 Two-stage comprehensive evaluation of the Huai'an wastewater treatment project

Stages	Indicators	Instruction for indicators	Total score	Score
Stage I	Financing program	Have the financial strength or financing capacity that matches the capital scale of the project	A ₁	a ₁
	Technical program	The technology is feasible, reliable, and advanced	A ₂	a ₂
	Legal program	Responds to all requirements of the tender documents	A ₃	a ₃
	Organization program	The technical capabilities, management experience, and organizational structure of the personnel involved in the project are all ideal	A ₄	a ₄
Stage II	Concession Price	Bidder's score	B	b

Note:
 $A = (A_1 + A_2 + A_3 + A_4) ;$
 $A + B = 100 ;$
 $a = a_1 + a_2 + a_3 + a_4$
 $b = 60 - (P_i - P_0) / P_0 * 60$

P_i is the quoted price other than the minimum concession price;
P₀ is the quoted minimum concession price of all bidders.

Source: adopted from Li (2007)

The first stage aims to identify qualified bidders with a certain operational capability to provide high-quality services. The second stage aims to obtain the lowest concession price with the precondition of quality assurance. The two-stage evaluation method combines the advantages of the single-index evaluation method and comprehensive evaluation method (Li, 2007). This method ensures that the successful candidate has sufficient wastewater treatment operation and management capacity to guarantee the quality of wastewater treatment and the lowest and most reasonable sewage treatment price. However, these evaluation indicators did not consider the uncertain characteristic of PPP projects (Hong, 2006). Both the government and the private investor cannot arrive at complete agreements on all future risk events because of unpredictable changes in the environment and insufficient information (Iossa and Martimort, 2012). Re-negotiating or adjusting the concession price is inevitable during the implementation period.

Further discussion on criteria and methods for concessionaire selection

The concessionaire selection criteria and methods adopted reflect different charging mechanisms, profitability, and technical characteristics of different projects. The construction and operation of the expressway project is relatively simple and has a clear profit model. The investors only need to have a certain financial strength to build and operate the project. Thus, the length of the concession period is designed as the only criterion for concessionaire selection by the tenderer of the Leshan–Yibin Expressway Project. Moreover, the characteristics of the “seller” market of the expressway project are evident, and the public sector is in a strong position (Liu, 2010), leaving small negotiation space for private investors (even no post-bid negotiation) and transferring significant risks to the private investors.

The design of a sports park requires unique ideas and creativity. The project construction and maintenance costs are

high, and the operation of the project requires a complex and complete business plan and strong property management capabilities (Liu and Wilkinson, 2013). The government is unable to provide careful and detailed description of the project construction and operation (Liu and Wilkinson, 2013). This type of project has low return on investment and thereby less attractive to investors. Its operating income comes from ticket sales, stadium advertising, stadium naming rights, broadcasting rights, gym membership income, luxury rooms and club seats, and food and beverage (Du, 2011). Therefore, the concessionaire selection for this type of project is more flexible. In Case 5, the selection criteria and methods focus more on the creativity and operational capabilities of the bidders instead of concession price. The tenderer needs to encourage private investors to develop more innovative solutions in design, construction, and operation programs to optimize and maximize the asset operation. Thus, in addition to the conventional indicators, such as the financing and financial management capacities, construction operation and management ability, technical skills, and public safety, the concessionaire selection for the Liaocheng Sports Park also considered the design innovation and flexibility, resource efficiency, waste disposal, recycling, the organizational values and attitudes of organization members, and other indicators. The price index, however, was not included.

Unlike the sports park project, the sewage treatment project need not focus on innovation. The government tends to choose a concessionaire with a mature and stable technology. Projects like sewage treatment have strong monopoly characteristics, and bidders are not required to have strong innovative ability. As long as the concessionaire meets the basic financing, technological, organizational, operational, and financial requirements, the bidder offering the lower concession price is more likely to win the concession (the weight of the concession price of Huai'an City Wastewater Treatment Project accounts for 60% of the total weight).

The Chengdu No. 6 Waterworks Project also uses similar assessment indicators and methods, and its concessionaire selection has two stages. The first stage aims to evaluate the feasibility, reliability, and quality of project design, construction, operation, transfer, and project financing structure. In the second stage, the annual changes in water price, the water price structure, and the additional water price are evaluated using NPV of the expected income in the entire 18-year concession period. The comprehensive score of the bidder comprises 70% of the weight of water price, 15% of the weight of technical program, and 15% of the weight of legal and financing structure.

PPP project concessionaire selection indicators include economic, technical, and management aspects. A consortium consisting of different investors could share risks and improve the bidding competitiveness (Deng, 2007). Both the concessionaire of Laibin B Power Plant and Chengdu No. 6 Waterworks Plant B are consortia. The members of the consortium can take what they need. For example, Veolia Water has established cooperative relationships with several enterprises in China, including Beijing Capital Co., Ltd., China Ever bright Group, and Ping'an Firm (Hong 2006). Cooperation with Veolia Water allows these Chinese enterprises to use the expertise of the former to facilitate their

venture into the water management industry. Moreover, the partnership can help the latter minimize operation risks and ensure a stable income. Veolia Water can also obtain more competitive financial support through the establishment of long-term partnerships with these companies rather than only bank loans (Hong, 2006).

CONCLUSIONS

Previous studies have indicated that a lengthy bidding and negotiation process impedes the application of the PPP model. This paper presents the process and duration of concessionaire selection of six PPP projects. The comparison between the official PPP pilot projects and the local project reveals that insufficient bidding and negotiation time restrict the site survey, information collection, and risk analysis of bidders, which may induce disputes during the project implementation period. Concessionaire selection requires a reasonable period, including the project preparatory time (approximately three months), the pre-qualification time (two to three months), the time for bidders to prepare tender documents (approximately four to six months), evaluation of tender documents (approximately one month), and contract negotiation (approximately two to four months).

Prequalification can filter unqualified investors as well as reduce the average loss of bid failures and the workload of the tenderer to evaluate the bid documents. Having four to six bidders per project is ideal. Three commonly used methods for concessionaire selection, namely, single-index evaluation method, comprehensive evaluation method, and two-stage evaluation method, are presented and discussed. The single-index evaluation method is suitable for projects with clear service quality standards and does not apply to technically complex projects, such as waste incineration and sewage treatment projects. The comprehensive evaluation method can balance the price and non-price factors but is weak in terms of officer corruption control. The two-stage evaluation method combines the advantages of those two methods as it not only ensures that the successful candidate has sufficient management capacity to deliver high-quality public service but is also beneficial to obtaining a reasonable concession price. However, the adoption of the concessionaire evaluation criteria and selection methods should consider project characteristics, such as profitability and technology complexity. The findings can facilitate concessionaire selection in future PPP projects in China, which also can provide references for PPP projects in other countries and regions.

Acknowledgement

The work described in this paper was supported by the Humanities and Social Sciences Project of Universities in Zhejiang Province (14056133-F/2013QN007).

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