Legal Risk Impact in Public Private Partnerships (PPPs): The Case of the Chinese Water Sector

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China is currently experiencing a rising demand for water, combined with limited funding availability for water project procurement. Consequently, local Chinese governments have sought procurement solutions by experimenting with public private partnerships (PPPs). However, the legal risk in PPPs, particularly in the water sector, remains high. Legal risk refers to risk arising from the legal and regulatory systems surrounding PPPs. Past research have identified legal risk in PPP projects in China as critical, however the stages at which they are significant have not been studied. This paper examines the legal risk associated with PPPs in the water sector in China and measures the degree of risk across three key stages: 1) Procurement, 2) Construction and 3) Operation. The interrelationship between legal risk at these three stages is also investigated. The significance of the risk was measured by determining the probability and severity of the risk. Correlation analysis was used to investigate the relationship between legal risks across the three stages. Our findings are that legal risk is present at all three stages, at close to moderate levels, with risk significance greatest at the operational stage. Moreover, while no correlation was identified for legal risk at the operational stage with those of earlier stages, it was found that legal issues arising during the procurement stage significantly exacerbated any further legal issues that emerged during the construction stage of water projects. The findings from this study will be significant in providing practitioners with the information to manage this risk at different stages of PPP projects.

Field of Research: Risk Management

1. Introduction

China is in need of water. Increasing industrialization combined with increasing urban densities are sources of pressure on authorities to meet fast growing demand. The China Daily (The China Daily 2011) reported that investment demand in water facilities across Chinese cities over the 12th five year plan, from 2011 to 2015, is estimated to be around US$77.4 billion. This investment is to procure some 2,358 new water plants, around 2,000 water plant upgrades, and includes the addition of 150,000 kilometers of water pipeline infrastructure.

In tandem with this, the Chinese Ministry of Environmental Protection (Ministry of Environmental Protection 2000) has announced a policy agenda setting out the parameters by which anticipated water demand is to be met. The Ministries circular focuses on: 1) Improving water supply and promoting water conservation, 2) Improving urban wastewater treatment, 3) Promoting market-oriented tariff reforms to attract private capital, and, 4) Improving governance and regulation in the water sector. Similarly, the Chinese State Council’s decision on "Reforming the investment system" (State Council

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2004), aims directly at promoting private investment in areas such as municipal public utilities, and encourages the raising of capital through debt and equity markets.

Forecasts of strong growth in demand for water, along with associated reforms within the water sector, as well as government ambitions to lift standards in water safety, reliability and waste water treatment, have all created an emerging market interest in the Chinese water sector. However, difficulties remain. Water management is a complex system in China involving many national level ministries and commissions; who are interacting without robust legal frameworks by which rights and responsibilities are clearly identified. Moreover, with diminishing internal funding to procure water, the Chinese government is increasingly looking to the marketization of water supply and waste-water treatment. All in all, government hopes to improve efficiencies, attract more investment and meet growing demand, while foreign and private investment groups see involvement in Chinese water infrastructure as potentially lucrative. All in all, government and private enterprise have been bullish on mutual participation through PPPs in water procurement. Private investment is growing and competition is increasing (ISBSWorld 2012), but the legal environment in which these projects take place remain immature, if not untested.

The theme of PPPs in China is well documented in the literature; and legal risk is particularly well covered. Legal risk refers to risk arising from the legal system and includes the ambiguity and uncertainties of immature laws, lack of precedence, changes in regulations, or the very absence of relevant laws (Akintoye, Beck & Hardcastle 2003; Chan et al. 2011). Previous studies have identified the presence of legal risk as impacting on PPPs in China. However the shortfall in these studies is that the risk is not assessed for their magnitudes at different points in the project lifecycle. This study aims at filling that gap by measuring the significance of legal risk at different project stages and identifying any association that exist between them. This study will contribute in providing practitioners with the knowledge to comprehend the nature of the risk. Legal risk at each stage can be independently assessed to prepare for risk mitigation through which the adverse effects can be minimized.

This paper is organised in 5 sections. The next section uncovers the issues surrounding legal risk in China and discusses the problem in the current literature in regards to measuring risks in PPPs. Section 3 presents the research design and explains how the data was collected and analysed. The findings from the analysis are reported in section 4 and finally section 5 provides a summary of this paper highlighting its limitation and proposes recommendations for future studies.

2. Literature Review

Legal issues have been a major concern with regards to implementation of PPPs in China. The State Council itself recognizes that there are significant barriers to legal compliance (Li 2007). In response, China’s State Council and the Environmental Protection agency have been busy framing a variety of environmental laws and regulations over recent years in an effort to catch up. Nevertheless, given the unfamiliarity of these laws or the lack of means to implement these or enforce them at lower levels of government, much of the legal structure that has been crafted remains without traction or force. Accordingly, the effective implementation and enforcement of these laws remains a challenge (Chan et al. 2015).
Much research has highlighted the problems besetting PPPs. There are many such concerns; joint venture arrangements, financing, procurement, project management, knowledge transfer, and so on. Among the many papers that have been produced in recent years, a solid body of work has identified the lack of a working legal apparatus as an enduring challenge to the success of PPPs in China.

Chen and Doloi (2008) find China specific impending factors to participation in PPPs to include, regulatory constraints on market entry, complex approval systems, and opaque and weak legal systems. Ho (2006) points out that even foreign investors with substantial overseas experience in PPPs may not be able to understand all the relevant practices and procedures in China since China has only had a relatively open market for only a short period of time. Li (2007) identifies two types of risk embedded in the Chinese legal system; institutional and behavioural. Institutional risk includes risk related to ambiguous, non-existent and changing laws, whereas behavioural risk is associated with non-normative behaviour under the conditions of institutional risk. That is, on the one hand, the legal landscape may be unclear, while on the other hand, how people respond to that lack of clarity may also be unpredictable.

Legal regulatory barriers from implementation all the way through to repatriation of project profits have been identified by as a major factor in withdrawal of participation in Chinese PPP water projects (Choi, Chung & Lee 2010). Regan, Smith and Love (2012) compared the PPP market in several countries, including China, based on several parameters. The findings were instructive in that while it was shown that China did have a wealth of experience in implementing PPPs, with regards to its regulatory and institutional framework, China scored the lowest.

The risk management process involves identifying, assessing and mitigating risks (Flanagan & Norman 1993). Risks are assessed based on their level of significance. Measuring risk significance allows comparison between risks to determine the ones that are critical. Risk significance is defined as a function of two risk components: Probability of risk and the severity of the risk. Several studies have identified the significance of legal risk in PPP projects in China, and have ranked them based on their significance. For example, Ke et al. (2010) rank “Change in law” at number 1; Chan et al. (2011) rank “Imperfect law” at number 5, and Xu et al. (2011), who specifically look at PPP risks in the water sector, rank “Legal risk” at number 2. Such studies, however, fail to mention the relationship between degree (or magnitude) of risk and project stage. PPPs run their course over great lengths of time and undergo changes that will certainly respond differently to differing risks. The nature of legal risk, the probability of the risk manifesting, as well as the potential impact of legal risk on various stages of a PPP project will vary as the project unfolds.

Rahman and Kumaraswamy (2004) highlights that it is difficult to foresee risks at the earlier stages of the project due to the tendency of the risks to change during the later stages. Rashid et al. (2009) have also noted that construction projects are associated with different aspects of risk throughout the entire life cycle of projects. In regards to PPPs, Grimsey and Lewis (2002) suggest that risks need be analysed independently at developmental and operational stages. Xu et al. (2011, p 284) find that legal risks specifically in the water sector in China manifests mainly in three aspects:

1. Adjustment of land policy increases the expense for the land acquisition, dismantling, and relocation
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2. Adjustment of industrial policy, such as preferential policy on the water project, results in cost overrun or income reduction
3. Adjustment of service standard leads to operation cost overrun

Moreover, these aforementioned aspects occur at different stages of the PPP. They also have discrete impacts on the project. This goes on to show that assessment of legal risk entails independent analysis at different stages of the project.

In analysing risk at different project stages, it may also be important to consider their interrelationship. The existence of risk at an earlier stage may contribute to increased risk manifesting in subsequent stages; or it may not. Chapman (2001) examines the process steps involved in conducting risk identification and assessment in which the inclusion of correlation analysis between risks is used as part of the risk assessment strategy. Tah and Carr (2001) apply fuzzy approximation to identify and quantify the relationship and influences of various risks on project performance. In this study risk interdependency chains between legal at different stages are examined.

3. Methodology

In this study, we look at identifying the significance of legal risks in China in regards to PPP water projects. In doing so, project stages are first identified, and the significance of legal risks is measured at each of these different stages. We look at legal risks at three important stages of the PPP cycle: 1) Procurement stage, 2) Construction stage, and, 3) Operation stage. Some PPP mechanisms, such as 'transfer operate transfer' (TOT), do not involve construction, but with others, like 'build operate transfer' (BOT), construction is a very distinct and important stage that is significantly different in its characteristics from both the development and operation stage. These three identifiable stages thus warrant independent analysis when considering the impact of legal risk significance on projects. Correlation analysis is then undertaken in order to discover relationships between legal risks at different project stages.

Questionnaire surveys were used for the collection of data. Questionnaires are a well-recognised technique for collecting identical information from a large number of people, particularly when they are spread over a wide geographical region (Kumar 2010). Since the same information was sought from the target sample, this was the method chosen for data collection. Consultants to the PPP water procurement industry were chosen as the target; as such people are recognised as the experts in the field. Candidates were initially identified through business registries, with further subsequent candidates being nominated by industry insiders: A sampling technique described by statisticians as 'snowballing.'

A pool of 115 such experts was collated and questionnaires were sent out to all. A total of 35 valid responses (30%) were received, and their content subjected to data analysis. The questionnaire focused on aspects of legal risk within the Chinese PPP water procurement sector. Specifically, it was designed to examine the probability and the severity of legal risk at various project stages. It also sought to determine the degree of influence the emergence of risk at one stage would have on the emergence of risk at subsequent stages.

The questionnaire consisted of two sections. The first part provided demographic information on the respondents. The main purpose of this section was to collect background information on the candidates experience in PPP water projects in China, and
in so doing, to validate candidates as suitable informants. Respondents to the questionnaire survey were found to be highly experienced. They averaged nine years experience in China based PPPs, and on average, had directly engaged in six PPP projects. Among the respondents, the greatest number of years of experience was 20, with the lowest at two years. The respondent with the least number of completed projects had only one, while the respondent with the most involvement had completed 23 projects. Despite this range of experience those respondents whose results were included all showed themselves to be experienced managers, qualified to provide expert opinion on the matter.

The second section was designed to evaluate the legal risks at the procurement, construction and operation stages of PPP projects, based on their probability and severity. Risks are generally measured in terms of their 'likelihood' of occurrence along with the 'consequence' of impact should they occur. In the questionnaire instrument, likelihood as well as consequence are measured numerically, for the three stages. Likelihood was determined using the proxy term 'probability,' captured using a standard 4-point 'Likert Scale' (1=Negligible, 2=Low, 3=Moderate, 4=High). Consequence was similarly determined using the proxy term 'severity.' And similarly, severity was established with the identical 4-point Likert Scale.

With the data collected, the statistical means of the probability and the severity ratings were calculated. Risk significance was extracted from the data as a function of risk probability and risk severity. Risk significance is essentially the arithmetic product of probability and severity. Generally however, in calculating an arithmetic product from a Likert Scale, and in calculating risk significance specifically, there are precedents in applying square roots in order to arrive at more manageable numbers. For example, Xu et al. (2010) applied square roots to each of the observed risk significance values. Square roots are typically used in statistics to bring data closer to normal distribution (Howell, 2007). Thus, this study too, uses the following formula to calculate the risk significance:

\[
\text{Risk Significance} = \sqrt{\text{probability} \times \text{severity}}
\]

The mean value of the risk significance was calculated which then provided a numerical value that could be compared for the three different PPP stages.

The obtained data was also used in determining the relationships between the significance of the legal risk across project stages using the precedence of correlation analysis. Correlation analysis is a quantitative measurement of the strength of a relationship between variables (Chapman 2001). 'Pearson’s "r"' was used to identify both the existence of a relationship as well as the strength of the relationship. The statistical software package SPSS was used in making the calculations. Pearson’s "r" measures correlation coefficients ranging from −1 to +1. This range describes the strength and direction of the correlation. A value of +1 indicates an absolute positive correlation between the two variables, while a value of −1 indicates an absolute negative correlation. A value of 0 indicates the absence of any correlation (Field, 2012). The significance of the association is measured using a 'p-value,' set at ≤ 0.01.
4. Results and Analysis

Table 1 shows the means and standard deviations for the probability and severity ratings, together with the risk significance value at the three different stages. It was found that the probability of legal risk was lower at the construction stage (at 2.71), and highest at the operation stage (at 2.89). Standard deviation was also highest at the operation stage (at 0.76), compounding uncertainty. Severity of legal risk was particularly high at the operation stage (at 3.40), suggesting that should a legal problem arise, its negative impact on the project would be high. Consequently, risk significance also comes in highest for the operation stage (at 3.09). Here, however, standard deviation is the lowest of the three stages (at 0.59), suggesting a relatively greater likelihood of legal damage eventuating. A graphical representation of the results is Figure 1 showing the measurement of factors of across procurement, construction and operation stages. The findings confirm that the significance of legal risk varies between the three PPP stages. The inference is that risk managers in PPP water projects need to add emphasis on developing efficient mitigation plans for legal risks during the operation stage.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Probability</th>
<th>Severity</th>
<th>Risk Significance = (\sqrt{\text{probability} \times \text{severity}})</th>
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<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Procurement</td>
<td>35</td>
<td>2.74</td>
<td>0.70</td>
</tr>
<tr>
<td>Construction</td>
<td>35</td>
<td>2.71</td>
<td>0.71</td>
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<tr>
<td>Operation</td>
<td>35</td>
<td>2.89</td>
<td>0.76</td>
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Table 2 shows the results of the correlation analysis. The results revealed that there was significant positive correlation between legal risks at the procurement and at construction stages (at 0.560). The inference is that when legal risk significance is found to be high during the procurement stage it is also likely that legal risk materializing to the detriment of the project at the construction stage. The corollary is that where legal risk can be mitigated during the procurement stage it can be expected that less legal risk will emerge during the construction stage. Interestingly, while legal risk significance was shown to be highest at the operation stage, such risk does not correlate with risk found at the two earlier stages of PPP projects.
5. Conclusions

The demand for water in China has been and continues to be on the rise. In order to fund procurement of water projects in a climate of reducing government infrastructure budgets, the Chinese government has resorted to increasing use of PPPs. Private enterprise, too, has been attracted to the prospects of solid rates of return from participation in PPP water projects. However, the legal environment in which PPPs play out has not developed nearly as rapidly. Consequently, uncertainties about what jurisdictions hold legal power, what they have to say on the matter, how laws might change and evolve over time, or indeed how and by whom laws are to be interpreted and enforced, all contribute to dampen the attractiveness of the market. This is in nobodies interest; government, private enterprise nor the end users.

Earlier research has identified the presence of legal risk. Yet earlier research has not made clear how such risks vary between the different stages of PPP water procurement.
projects, nor indeed how they might interact across stages. This study has addressed this short-fall. Legal risk is to be found across all three stages of procurement, construction and operation. Its probability of occurrence is strongest at the operation stage, as is its severity. Consequently the risk significance is greatest in the operation stage. However, it is only between the procurement and construction stages of PPP projects that correlation of risk can be shown to exist. That is to say, while legal risks are most threatening to a project in its third and final stage, they are closely linked in its first and second stages.

These findings highlight the peculiar characteristics of current PPP water projects in China. As such, these findings should better equip practitioners to confront legal risks by assessing them at different stages. Moreover, these findings may well direct academics wishing to further explore this phenomenon. At this stage, this study limits itself by focusing on legal risks in general. Future studies in this area can involve performing a more comprehensive analysis of the risk by breaking it down into more detailed aspects. Further, investigations can be done to explore the causality of the correlations between legal risks at different stages of PPP lifecycle.

References


