

**Critical factors for private-public partnership (PPP) in urban and
environmental infrastructure in Jilin Province, China**

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Abstract:

With rapid economic growth, industrialization, and urbanization, industrial and household waste gradually degrades the living environment, which leads to the need to increase the quality and quantity of urban and environmental infrastructure. Public Private Partnership (PPP) is perhaps one of the most innovative developments in helping to reduce the fiscal burden of governments, and to speed up building or updating urban and environmental protection infrastructure, and then to meet the need for environment protection. It provides a sound basis for a “win-win” and synergistic teamwork. PPP in urban infrastructure has become more popular since it was introduced into China in the mid-1990s. However, less developed cities, such as Baicheng in Jilin Province, are still lacking of PPP experience. This thesis presents a review of critical factors for partnering projects in general and specially for Jilin Province perspective. The results indicate that certain requirements must be met for PPPs to succeed. In particular, thoughtful project analysis, clear definition of responsibilities and obligations, willingness to share risks among project participants, commitment to a win-win attitude, and regular monitoring of partnering process are the significant factors. A full-fledged legal system and dedicated PPP departments or organizations are the foundations for promoting PPP development.

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Chapter 1

Introduction

1.1 Background

Early in the mid-1990s, local governments in China have started to introduce public-private partnership (PPP) model in the construction of urban infrastructure. Since then, PPP model has been increasingly gaining acceptance and been adopted widely in practices in Chinese cities (Yang, 2013). In 2002, six bus lines were built by the way of auctioning to private participants under the supervision of the Chengdu Municipal Public Utilities Bureau. The city of Shenzhen involved private participants in sectors ranging from water supply, gas supply, and power generation to public transport (Wu, 2009). By the end of 2004, individuals and private entities are allowed to invest and operate public utilities in Guangzhou through Build-Operate-Transfer (BOT), Joint Venture Operation, Minority Share Investment, and Public Bidding. The sector coverage has expanded, but not limited to, regional rail network, urban public transport, garbage disposal, sewage treatment and pipelines transport. A notable example of that year was in Shanghai, with Youlian Consortium obtaining the largest sewage treatment PPP project in the city, granted with 20 years' concession rights (Yuan, 2012). This phenomenon became further developed in the city of Beijing during the Olympics, with both domestic and international investments in 55 infrastructures PPP projects worth 22.3 billion Yuan (Wang, 2013).

This local practice has gradually obtained policy support from the national level. In 2010, a central government policy document, *the Opinions of the State Council on Encouraging and Guiding the Healthy Development of Private Investment*, called for non-governmental capital participating in public utilities construction, and encouraged private capital entering fields ranging from water supply, gas, heating, sewage treatment and garbage disposal, to public transport and urban greening. It further stated that property and operating rights could be transferred to non-governmental capital if a market-oriented mode can be met in these infrastructure and public utilities projects. Later in mid-2013, a State Council Executive Meeting chaired by Premier Li Keqiang stated to encourage governments to use private entities to assist in providing public services and building urban infrastructure, which further enhanced the signal of promoting PPP Model in urban infrastructure projects (Kong, 2013). The central government has recognized the benefits of PPP model, not only to alleviate limited budget from the government by channeling non-governmental capital into public infrastructure, but also to reduce inefficient government capital being consumed in providing public services (Xie, 2012).

Another reason why the PPP model has been extensively applied is, the huge demands for capital investment in infrastructure due to the rapid and large-scale urbanization in China. Since the reform and open in 1978, China's urbanization has experienced a rapid development period. In 1978, the urbanization rate was 18%, with urban population of 170

million. By the end of 2013, according to the economic data issued by the National Bureau of Statistics, urbanization rate has increased up to 54%, with the total number of permanent urban residents reaching 730 million (Xinhua News Agency, 2014). According to the experience of urbanization in developed countries, rapid urban development occurs as countries urbanize. Therefore, it is expected that China's urbanization process will continue at least another 20 years. Looking ahead, Chinese cities will probably need to accommodate another 250 million inhabitants - more than the entire population of Indonesia (OECD, 2013).

Urbanization often entails a range of environmental costs associated with geographic concentration of people and economic activities upon the city. These include congestion and high emissions from the use of automobiles, more wastewater discharges from industries and urban residents, as well as accumulation of both industrial and household solid waste, which is often inappropriately disposed. Let's take wastewater discharge as an example. Wastewater discharged from urban residents has increased over 2005-10 amid declining industrial wastewater (NBS, 2011, 2006). The increase has been largely correlated with higher per capita GDP, e.g. per capita residential wastewater discharge in wealthier Shanghai (92 t) were over three times larger than that in Chongqing (29 t), as well as growing urban population size in cities. Serious water pollution further constrains the availability of clear water. Cities are in need of update on the wastewater treatment infrastructures, in order to deal with the growing amount of residential wastewater discharges (MEP, 2011).

Therefore cities have begun to increase their investment in infrastructure construction in connection with environmental protection, mostly initiated by local governments. These include but not limited to wastewater treatment, waste treatment, heating, gas, and landscape conservation. A number of research works have defined these infrastructure projects targeted environmental protection in cities as Urban Environmental Infrastructure (Luo, 2009; Ji & Yuan, 2010), thus this thesis follows the definition. From 2000 to 2007, the accumulated investment for constructing these types of urban environment infrastructure totaled RMB 822.3 billion Yuan in China, translating into 11% annual rate of growth on average (Luo, 2009). The surge of investment has reflected not only growing appetite for urban environmental infrastructure to address environmental problems associated with urbanization, but also the need of rapid catch-up with long-term demand in the wave of urbanization.

Sufficient financial capital is the key for successful development of urban environmental infrastructure. Nevertheless, capital shortage might be a significant obstacle for infrastructure improvement, given that construction and operation of the infrastructure always requires huge capital (Deng, 2007). In other words, there could be a huge gap between the demand and supply of infrastructure, caused by previously low and outdated infrastructure capital stock, and increasing demand for infrastructure resulted by rapid economic development. Local governments had been the main provider of capital investment to urban environmental infrastructure, with funding primarily from the lease of land use rights (Wang & Herd, 2013). However, land lease revenue fluctuates over the years and cannot provide a sustainable

income source for capital investment (Lou & Wang, 2009). As a result, diversification of funding is curial to achieve stable and long-term development in the construction of urban environmental infrastructure.

A clear way out is to introduce non-governmental capital investing and compensating the shortage of capital, meanwhile having private sector to improve investment and operation efficiencies. Private sector could typically invest in urban environmental infrastructure that generates cash flows, including urban water supply, sewage disposal as well as garage treatment and etc. This approach will result in a series of changes in local government roles and the function within the private capital market, in line with the policy objectives to allow the market plays the decisive role in the economy (Wang, 2003; 3rd Plenum of the 18th Party Congress, 2013).

There are two main PPP investment approaches for private sector involvement: one is direct investment and most of them belong to Build-Operate-Transfer (BOT), while the other is to transfer assets or concession right, mostly in Transfer- Operate- Transfer (TOT) mode. In June 2005, the Ministry of Housing and Urban-Rural Development (MHURD) conducted a study regarding the construction projects of urban environmental infrastructure, which has shown that BOT and TOT projects accounts for 49% and 9% respectively. There are some forerunners in private sector participation in investing and financing urban environmental infrastructure projects such as Shenzhen, Beijing, Dalian, Shanghai, Xiamen and etc (Luo,

2009).

Nevertheless, PPP models for the success of urban environmental infrastructure projects are not guaranteed. Sufficient experience has not been accumulated in adopting PPP models in China yet, given relatively short implementation time. Recent research on the experience of PPP implementation has primarily focused on the infrastructure in general, rather than the urban environmental infrastructure in particular (Zhang & M. ASCE, 2005; Yuan, 2009; Chan, Tang & Ho 2004). This thesis therefore focuses on PPP models in urban environmental infrastructure, and tries to explain why certain PPPs succeeded while others failed in environmental infrastructure projects in cities. The thesis will also attempt to develop a set of critical factors (CFs) through analyzing both successful and failed PPP projects in urban environmental infrastructure. Another contribution of the thesis is filling the gap in analyzing such cases in Jilin Province of China, where similar research has been scant.

Jilin Province is at the center of the Northeastern China with an area of 187.4 thousand square kilometer, accounting for 1.95% of the total land area of China; its population is 27.504 million accounting for 2.03% of the total population of China in 2012; while its GDP reaches RMB 119.38 billion Yuan account for 2.31% of the total GDP for the same period. Jilin Province is a major industry base and also a grain product base. Jilin Province has relatively developed processing and manufacturing industry with automobiles, petrochemical and processing of farm produces as the three main pillar industries as well as medicine and

optical-electronic information industry as advantage industries. Jilin Province is also in the center of Northeast Asia composed by Democratic People's Republic of Korea, Republic of Korea, Japan, Mongolia and Russia's East Siberia. Meanwhile it occupies an important place in international cooperative development area of Tumen river supported by United Nations Development Program, namely it enjoys the advantage of location in the development of regional cooperation in Northeast Asia (The People's Government of Jilin Province. 2013).

In accordance with *Jilin Province' 12th Five-Year Plan or FYP (2011-2015)*, Jilin Province planned to advance in strategic urban development and set targets for urban environmental infrastructure. In order to speed up the integrated optimization process of natural and human resources in Jilin Province and promote the development of central city clusters, one new urban pattern will take advantage of the large crossing traffic of Hada and Hun Wu highways. This will establish Changchun-Jilin cities as a provincial core and surrounded by medium and small-sized cities. Under the new development pattern, the construction of infrastructures or public facilities include public transport, water, gas, treat, electricity, landscaping, environmental sanitation as well as sewage and garbage disposal, through which their corresponding carrying capacity will be enhanced for meeting needs of future. For instance, the Provincial 12th FYP has specified targets for improving sewage disposal plants and supporting pipeline network to reach 70% sewage treatment rate, which was 60% in 11th FYP, and for upgrading solid waste treatment plants to achieve 80% household solid waste treatment rate, which was 60% in 11th FYP. (12th Five-Year Plan Outline for Jilin Province's

National Economy and Social Development).

For such huge need for construction capital, non-government capital shall be introduced by PPP mode in order to achieve the win-win situation between private enterprises and corresponding governments. As the result, PPP application in urban environmental infrastructure will become larger and larger.

1.2 Questions To Be Explored In The Thesis

1) What CFs are important for the success of PPPs in urban environmental infrastructure projects in Jilin Province?

The CFs will be identified from literature review and real cases of Jilin Province. According to related research, researchers consider there are a number of factors that have significant influence on the success of the private-public partnering in infrastructure projects. Literature review includes various views about those factors, while those factors are examined and determined to be critical to Jilin Provinces UEPI projects through real case analysis.

2) What can be done to further promote PPPs among urban and environmental infrastructure projects?

The purpose is to point out problems in the current Public-Private Participation process design, such as the incomplete laws and policies, and then to provide suggestions for improvement.

1.3 Methodology

There are two main methods employed in this research: literature review and case study.

The literature review is conducted to identify critical and successful factors as observed in previous research either from the private or the public sector's perspective. The literature review and data gathering from secondary sources: some studies discuss the definition and classification of PPP. They provide basic knowledge for understanding PPP. They have described that the CFs for private-public partnership (PPP) in urban and environmental infrastructure projects are the fundamentals for this research.

Secondly, experience will be extracted from successful PPP urban and environmental projects, together with the lessons learned from failed ones through case studies of real projects in Jilin Province, including Baicheng Waste Incineration Power Station Concession Project, Baicheng Municipal Wastewater Treatment Plant Concession Project and CWC Changchun Wastewater Treatment Plant Concession Project. The reason of choosing these three projects is that they represent projects in different stages and they are all typical PPP

projects concerning urban and environmental protection. The first project is in the beginning stage, for which preparation and bidding issue are important. The second project is in the construction stage, for which more attention is being paid on PPP agreement and construction related issues in this thesis. The third project was completed and ended with failure, for which reasons for failure are discussed.

1.4 Organization Of The Thesis

There are five chapters in this thesis. Chapter 2 introduces basic ideas, such as the definition and classification of PPP, and the advantage and disadvantage of PPP in urban and environmental infrastructure. The literature review also identifies CFs based on previous researches. Chapter 3 examines the CFs through analyzing the three cases. Chapter 4 discusses strategies for implementing successful PPP projects based on the CFs. Chapter 5 is the conclusion, proposing short-term and long-term recommendations for future research of PPPs in urban and environmental projects.

Chapter 2

Literature Review

To ensure the success of PPP models is no doubt a complex process. During the past few years, a number of PPP projects have been practiced in China, with mixed results. Internationally, the topic of infrastructure PPP has been profoundly discussed among scholars and practitioners. In China, scholars appear to focus on analyzing the topic of infrastructure PPP in general, yet with limited attention to urban environmental infrastructure in particular.

Given the similar nature of urban environmental infrastructure as a subset of the infrastructure sector, the thesis attempts to emphasize literature review of PPP in infrastructure development in general, by researching both international and Chinese researches, to ensure a more comprehensive picture on this topic. Analysis could be found in the following two sections of this chapter, with the first one synthesizing general characteristics of PPP that have obtained shared views from experts and international institutions. The second section introduces a summary of CFs for successful PPP, extracted from both academic literature and professional reports.

2.1 Definition and Major Characteristics of PPP Model

PPP is an openly defined term that shares a number of commonly agreed principles. The

phrases of PPP definition vary from a succinct sentence emphasizing cooperative relation between the public and the private (*e.g.* European Commission), to ones that provide longer descriptions for scope, structure and stakeholders involved in the process (Savas, 2002). My effort in reviewing existing literature suggests that PPP contains some of the following general characteristics: cooperation, providing of public product or service, profits sharing, and risk sharing.

Arguably, cooperation is the mostly agreed principle in almost all literature and acts as the precondition for the partnership (Jia & Sun, 2009). The United Nations Development Program (1998) refers it to a cooperative partnership formed among government, for-profit enterprises or not-profit organizations based on a certain project, while United Nations Institute for Training and Research (2000) expanded the scope to cover the institutional cooperation modes of all social system advocates. Cooperating partners could include, for instance, enterprises, community leaders, and local government officers in order to improve urban situation in particular (Savas, 2002). Coming to the case of China, Ye & Xu (2014) further specified that three groups of stakeholders could get involved: firstly the public sector, which includes local government, public utilities management departments, institutions and so forth; secondly, the private sector, referring to the enterprises, companies or other personal investment participators; and thirdly the surveillance party, which contains public, independent surveillance organizations specialized consulting organizations and government oversight agencies.

In terms of how cooperation is formed, Allan (1999) describes a partnership as a “cooperative venture” between the public and private sectors, while a number of others specify it out to be a kind of formal process such as signing long-term contracts, reaching legally binding agreements or other sorts of complex contractual arrangements (Savas, 2002; Peirson and McBride, 1996; Ye & Xu, 2014; State Council, 2010).

The second characteristic is taking public product or service providing as the goal of cooperation. This idea has been elaborated by quite a number of researchers. Public product or service delivery is generally delivered via specific projects, which are conventionally provided by public departments (European Commission, 2003). In the PPP case, it refers to the task arrangement for public products and services providing passing to private participants (Savas, 2002). The change of provision body here does not imply the change of policy goal of satisfying public product and service demand (United Nations Institute for Training and Research, 2000). Peirson and McBride (1996) further explained the mechanism like letting private entities to perform construction or management of public infrastructure, or to provide various services to the society on behalf of a public department entity. More specifically, through outsourcing or privatization, private resource could be used, to perform project design, construction, investment, operation and public infrastructural facility maintenance, and provide relative services to satisfy public demand (National Council for PPP USA).

The third is emphasizing of profit sharing meaning public-private win-win in the cooperation process. Probably the most promising feature of PPP is the benefits being rendered through cooperation, as supported by the statement from UNDP (1999) that all parties concerned can obtain better results than anticipated independent moves. This is because the collaboration built on the expertise of each partner, e.g. private construction companies to construct, expand, or rebuild the infrastructure, which best meeting clearly defined public needs through the appropriate allocation of resources, risks and rewards (Allan, 1999). The State Council of China (2010) also recognizes the benefits, *i.e.* to improve the efficiency of resource allocation and productivity of public projects, therefore to increase public goods supply effectiveness, in order to achieve “value for money” of public projects.

And the fourth is risk sharing, which also represents one of the basic elements of PPP concept. At the time when parties participate in certain projects, it doesn't mean that governments transfer all project responsibilities and risks to private participators; instead, it makes all participated parties share responsibilities, risks and rewards together (UNDP, 1998). The idea is linked with profit sharing, given that both public and private achieve a better outcome in the scenario of cooperation, hence requiring appropriate allocation of risks (Allan, 1999). The participation of multiple parties also provides the enabling ability for the sharing to be possible (Savas, 2002). In general the design of sharing both risks and benefits could be defined in the contracts between public and private participants (Peirson & McBride, 1996;

Savas, 2002).

2.2 Critical Success Factors of PPP

To increase the likelihood of success for PPP projects is imperative. By far, cooperation with the private sector appears to be a trendy topic for infrastructure development, especially given reduced spending from local government financing platforms resulted from the efforts to rein in mounting local government debts. However, PPP approach itself is not a panacea. Successful cases go hand in hand with failed ones. To further facilitate PPP development, a number of researches have put forward several critical factors, which have great influence on the result of PPP infrastructure projects, and their advices to achieve the success of PPP (World Bank, 1996; Chen & Doloi, 2008; Abdul-Rashid & Abdul-Aziz, 2001; Zhang, ASCE, 2005; Xia, 2009; Chan et al, 2004).

Through reviewing the literature, the author has come up with a table below to synthesize CFs (Table 2.1). The rationale is that macro, local and project based factors matter, *e.g.* a particular private sector participated project needs to be viable and profitable in a stable and predictable environment. The macro factors are pertinent to the legal environment and government involvement; the local factors focus more on local government activities; while project based factors include aspects related to risks, finance, and profits. From the table, it is obvious that political, legal, risk and finance, law and government related issues have been

discussed more frequently.

Table 2.1 CFs for PPPs

	Critical factors	Source
Macro Factors	sufficient competition among private companies	Abdul-Rashid and Abdul-Aziz(2001); Xia Yuan (2009)
	Full-fledged legal system	World bank (1996); Chen and Doloi(2008);Sai Chen and Weidong He (2004); Xia Yuan (2009);Xueqing Zhang, M. ASCE (2005)
	Financial market	Esther Cheung and Albert P.C.Chan;Xia Yuan (2009);Xueqing Zhang, M. ASCE (2005); The world bank;Xueqing Zhang, M. ASCE (2005)
Both Macro and Local Factors	Policy stability	Sai Chen and Weidong He (2004);Xueqing Zhang, M. ASCE (2005)
	Government credibility	World bank (1996); Chen and Doloi(2008),Esther Cheung and Albert P.C.Chan
	Well-organized public agency	Yi Sha (2004); Yun Ding, 2004;Xia Yuan (2009); Xueqing Zhang, M. ASCE (2005)
	Public support	Abdul-Rashid and Abdul-Aziz(2001); Gupta and Narasimham (1998)
	Right government decision-making	Xia Yuan (2009);Xueqing Zhang, M. ASCE (2005)

	Efficient approval systems	Chen and Doloi(2008); Xia Yuan (2009);
Local Factors	Government monitoring	Chan et al. (2004)
	Political support at local level	Linshen Jia 2006; Siqi Wang, Qingji Shen. 2012; Esther Cheung and Albert P.C.Chan;(Levy 1996).Guofu Zhao and Shouqing Wang (2007); Xia Yuan (2009)
	Efficient approval systems	Chen and Doloi(2008); Xia Yuan (2009);
	Transparency of tendering	Chen and Doloi(2008); Abdul-Rashid and Abdul-Aziz(2001)
	Direct interests to local government and its subordinates	Chen and Doloi(2008)
Project Based Factors	Appropriate risk allocation and risk sharing	Esther Cheung and Albert P.C.Chan; Lixian Jin, and Xiaohong Dong(2008); Xiping Liu(2006); X.Q.Zhang and M.M.Kumaraswamy; Xueqing Zhang, M. ASCE (2005)
	Risk identification	Esther Cheung and Albert P.C.Chan;Lixian Jin, and Xiaohong Dong(2008);Xueqing Zhang, M. ASCE (2005)
	Project technical feasibility	Xueqing Zhang, M. ASCE (2005); Chan et al. (2004); Xueqing Zhang, M. ASCE (2005)
	Rate of return	Liming Bian, Jianji Yang, Guo'an Yu (2003);Xueqing Zhang, M. ASCE (2005)
	Commitment/responsibility	Chan et al. (2004); The world bank;Chan et al.

	of public/private sectors	(2004)
	Suitable transfer package	Gupta and Narasimham (1998); Xueqing Zhang, M. ASCE (2005)
	Appropriate market prices for infrastructure products and services	Chen and Doloi(2008); Xia Yuan (2009)
	Reliable concessionaire consortium	Chan et al. (2004); Xueqing Zhang, M. ASCE (2005)
	Reliable contractual arrangements	Chan et al. (2004); Xueqing Zhang, M. ASCE (2005)
	Concessionaire Management efficiencies	Abdul-Rashid and Abdul-Aziz(2001); Xueqing Zhang, M. ASCE (2005)

At the macro level, quite a number of researches have pointed out the significance of governments' role on affecting PPP success. In particular, local governments which used to provide infrastructure need to take a step backward, and promote private capital participating in infrastructure finance process (Wang & Shen, 2012). Zhao and Wang (2007) suggested that the responsibilities of local governments are laws and regulations, policy support, environmental protection, finance support, political assurance and credits. Those responsibilities are upon the shoulders of local governments, whereas private companies cannot share. When handing over to the private sector, appropriate public relation strategies and activities are needed to win public understanding and support (Levy 1996). Therefore, on one hand, local governments need to strengthen the power of regulation and to safeguard the

public interest of using urban infrastructure. On the other hand, the local governments should try to create the necessary conditions for private capital participation (Jia, 2006)

The need to facilitate PPP development requires improved efficiency of both central and local government sectors. The system of government is too large and too complicated, thus prone to generate unclear or even contradicting instructions. Carrying out internal reforms among government institutions and compressing the size of government are necessary, so that government functions will adapt to the requirement of the future market economy. (Ding, 2004). Sha (2004) suggested to set up a special department to be responsible for PPP projects in Department of Commerce or the MOHURD and to set up inter-ministerial or inter-provincial team to promote PPP projects and coordination.

Meanwhile, some other researches have given their voice on the importance of laws and regulations. Almost all of them are not satisfied with current situations and underlined the need for improvement of legal system, related regulations and policies. Application of PPP in urban infrastructure is commonly constrained by unsound Chinese laws and regulations. There are a number of laws and regulations related to urban infrastructure PPP projects, including the Bidding Law, unified Contract Law, Security Law, and Project Finance Measure. Those laws constitute legal basis for PPP mode, but the completeness and operability of these laws need to be further strengthened. A comprehensive legal framework is needed to consolidate the various pieces of legislation.

Chen and He (2004) pointed out critical impacts of the legislation on urban environmental BOT infrastructure projects. They are currently facing legal limitations, such as security policy, environmental protection, and taxation related legal risks. For example, the BOT projects feature in long operating period, long payback period, high overall systematic correlation, and high risks. Therefore, legal guarantee is the basis for achieving the success of BOT projects. However, the Security Law contains few guarantee types and lacks provisions for transferring security rights, making it unable to fulfil the needs of urban environmental BOT infrastructure projects.

Determining a reasonable rate of return (ROI) on investment is a key matter of concern for local governments and investors in infrastructure PPP projects. There are plenty of failed PPP cases caused by unrealistic ROI assumption. Local governments may receive strong opposition and condemnation from users because of the infrastructure overprice. Investors and operators may also suffer from overall economic losses due to the fact that, the actual ROI is lower than the guaranteed one. (Bian et al, 2003)

Mitigating project related risks is a guarantee for the rate of return for PPP projects. Most PPP projects on infrastructure are large scale, requiring huge capital investment upfront, with long construction and payback period, generating risks for the participation of the private sector. Those risks could exist in macro level, as well as in the operational and project level

(Savas, 2002; Jin and Dong, 2008; Song). A useful way out is to share risks among public and private stakeholders. Liu (2006) provided a principle for sharing: 1) the party who manages certain risks well could bear those types of risks, 2) risk sharing could be connected to the division of responsibilities. In determining how to share risks, perhaps government sector could provide a more important role (Zhang & Kumaraswamy, 2012). According to Albert P.C.Chan et al (2004), government intervention was ranked on the top of the PPP risk list in China, including risks associated with government intervention, public credits, and poor public decision making process.

2.3 Summary

This review of literature points to a few lessons that could be applied to PPPs in urban environmental infrastructure in Jilin Province.

Firstly, the application of PPP model provides a useful approach to substitute government's role to upgrade UEPI in Jilin province. This is in line with the main objectives of public private participation. PPP may reduce construction costs of local government in providing that infrastructure, and to meet higher standard environmental protection requirement amid rapid urban population growth.

Secondly, private sector could be more efficient in using project funding. To reach the

anticipated economic profits of project, private stakeholders will prefer to expand the project scale gradually according to the project profit status from the view of commercial operation. With comparably less restrictions of governmental purchase clauses in project operation, private entities can flexibly operate in planning and construction processes. Along with introducing in capital, PPP mode also brings governments with advanced operation ideas and management systems learnt from private entities. (Sha, 2004)

Thirdly, a range of CFs could be used to examine and enable the success of PPP projects in urban environmental infrastructure in Jilin province of China. The list includes macro factors, local factors and project specific factors discussed above. Currently, BOT (build-operate-transfer) is the most common one in use among UEPI PPP projects in Jilin Province. A more pertinent way to analyze PPP implications for Jilin province is to rely on case studies of these BOT projects. The following real case analysis in Chapter 3 will be based on this list to further explore the critical success factors from practice side.

Chapter 3

Case Analysis

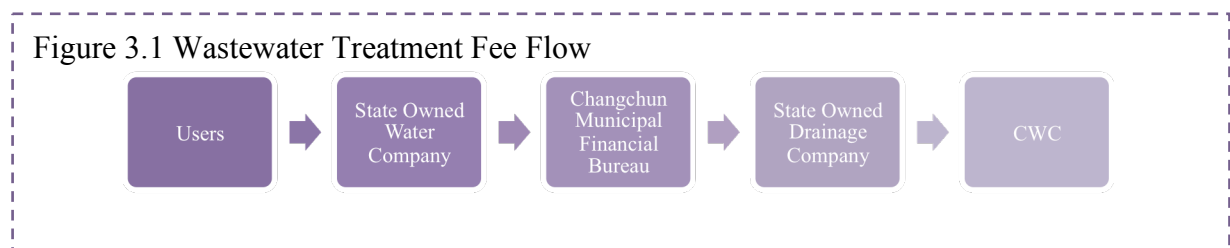
CFs are discussed in this chapter based on three UEPI concession projects in Jilin Province---- China Water Company Ltd. (CWC) Changchun Wastewater Treatment Concession Project, Baicheng Municipal Wastewater Treatment Concession Project, and Baicheng Municipal Garbage Treatment Concession Project. The information about the cases is collected from news, bidding materials, and related concession contracts. News and report can be access online or published newspaper and articles. Bidding materials and concession contracts are collected from private companies.

In general, there are six main steps of a concession project: pre-stage preparation, bidding process, concession agreement signing, project constructing, project operating, and project transferring. The order of these steps may be changed according to different concession forms. For example, in the Baicheng Municipal Wastewater Treatment Plant Project, project is transferred from the government to the private department before the project construction.

3.1 CWC Changchun Wastewater Treatment Plant Concession Project

Changchun Municipal Government started to attract investment for municipal wastewater treatment projects in 1999. Hong Kong CWC invested 32 million USD in 2000 and

constructed the first wastewater treatment plant in Changchun. The project becomes the first urban BOT wastewater treatment plant project, which is directly invested by foreign capital, in Jilin Province. On July 14th, 2000, Changchun People's Government issued the *Administration Method on Changchun CWC Wastewater Treatment Concession*, which required that: Changchun municipal government to authorize the state owned drainage company (SDC) to sign a cooperation contract with CWC. SDC should supply wastewater to CWC. CWC had the concession right to engage in the construction and operation of the wastewater treatment company and be responsible for wastewater treatment. Changchun municipal government instructed state owned water company (SDC) to charge water user for wastewater treatment fee and to submit the collected wastewater treatment fee to Changchun Municipal Financial Bureau. The financial bureau should pay to SDC and SDC ought to pay wastewater treatment fee to CWC.



Sources: Quan, 2003; Anonymous, 2011; Anonymous, 2013; Anonymous, 2014.

The wastewater treatment plant had kept good running since the year of 2000 when it was put into production. However, from the beginning of the mid 2002, the SDC started failing to pay the wastewater treatment fee because the contracted treatment fee was too high. On February 28, 2003, Changchun municipal government abolished the *Administrative Method*. Since

March 2003, the SDC totally stopped the payment to wastewater treatment for the reason that the administration method was cancelled. And from August 2003, CWC Changchun Company started legal dispute regarding the concession project with Changchun municipal government. The lawsuit last for more than two years and was finally ended with the verdict that Changchun municipal government shall pay 280 million yuan to purchase back the project in August 2005. (Quan, 2003; Anonymous, 2011; Anonymous, 2013; Anonymous, 2014)

Lesson learnt

1) Inaccurate project evaluation:

Most urban wastewater treatment concession projects have the feature of indirect fixed return rate in different degrees. This is mainly because that the charging for wastewater treatment fee is commonly secured by government guarantee based on the consideration of the wastewater treatment industry characteristics---- large investment, and long capital return term, as well as the feature that the right for charging and using the wastewater treatment fee is in the hand of the government.

However, local governments make promise under certain circumstances in order to attract investment, such as offering higher return, guaranteed usage volume or price. In this case, the Administration Method issued by Changchun Municipal Government is a type of promise. In order to reduce enterprise's risk, Changchun municipal government made promise of certain

daily minimum wastewater treatment volume, and fixed price, exchange rate and pricing conditions in the concession agreement. However, later report indicates that the promise was unreasonable, for example, the wastewater treatment volume is not stable and the promised minimum treatment volume was too high according to the sewage treatment situation of Changchun during that period. (Anonymous, 2013).

The result reflects one fatal error that the local government didn't seriously estimate the potential wastewater treatment volume based on the actual condition of the period. In another word, the project failure is caused by inaccurate project evaluation by the local government. Project evaluation is a systematic method for collecting, analyzing, and using information to answer questions about projects, policies and programs, particularly about their effectiveness and efficiency. (Office of Planning Research and Evaluation, Administration for Children and Families, 2010) Here, it refers to that local government do a series of research, collect sufficient and adequate information to give a description of a project and to provide answers to important considerations, such as how much average wastewater treatment volume will be in this case. Throughout the PPP project cases mentioned in the literature review articles and three cases studied, in general the first crucial step is project evaluation, which is done by local government in the beginning.

2) Government credit deficiency:

The establishment of the cooperative enterprise had been through legal procedures. The

cooperation contract also had obtained approval from municipal and provincial government, and was recorded by the national Ministry of Commerce (MOFTEC). The project was not defined as one with fixed return and had conformed to the various rules, regulations and legal terms. However, when *the State Council [2002] 43 notice* is issued in 2002, Changchun government unilaterally abolished the *Administration Method* according to the requirements of the relevant regulations of the State Council. The water company began to default the wastewater company treatment fee.

The attitude change of the local government on whether there is guaranteed fixed returns for foreign investors shows the lack of municipal government credibility.

If the project can be characterized as a fixed return project, it could still smoothly pass layers of legal examinations and get approval of the governments at all levels before putting into operation. The rigor and honesty of related government departments should be suspected. If the project cannot be defined as a fixed return project, then why the city government abolished the *Administration Method*, and determined the project is with fixed return and provision of the national regulation according to the notice of the State Council, along with the water company's refusal of paying the treatment fee. The inconsistency attitude of the local municipal government toward the project from time to time reflects government credit deficiency.

3) Risk identification and appropriate risk allocation

CWC Changchun Wastewater Treatment Concession Project's legal dispute reflects an important risk, political risk. Political risk is described as the risk of government actions that may endanger a project. The governments can be the central, provincial, or local levels of government. Primary political risks include change in law, corruption, delay in approval, expropriation, and reliability and creditworthiness of Chinese entities. (Wang, Tiong, Ting, Ashley,1999). In the CWC case, The fact that local municipal government cancelled the Administration Method, and cause the CWC great loss is an illustration of political risk. When signing the concession agreement, the CWC should have a second thought on whether Changchun municipal government will truly fulfill the promises and what measures should have been taken to minimize the risk in order to secure its benefit. Actually the political risk should be considered seriously by a project company not only during the concession agreement signing phase, but also throughout the whole concession period. The project company needs to figure out how to secure its own benefit by dealing with political risk properly.

4) Policy stability:

In this case, the local government supported the wastewater project through issuing the *Administration Method*, and also held no brief for the project by cancelling the method. It is obvious that policy is an important political tool which heavily affects the success of a project in government hand, and how much the policy stability matters to a project.

3.2 Baicheng Municipal Wastewater Treatment Plant Concession Project

In order to accelerate the marketization progress of wastewater treatment plant and improve wastewater treatment efficiency, Baicheng Municipal Government adopted "Transfer-Build-Operate-Transfer" mode to authorize the concession right of Jilin Baicheng Wastewater Treatment Plant to a private company, namely Baicheng Sanda Water Affairs (BSWC), Ltd. The project is designed to achieve 100,000t daily wastewater treatment capacity, and to be implemented in two phases. Phase-I is implemented first to have 50,000t per day wastewater treatment capacity.

The plan of Baicheng Municipal Wastewater Treatment Plant Project was set up in 1998. The oxidation ditch process was adopted as the main wastewater treatment technique. The preliminary construction for this plant was accomplished in June 2004. And up to now, the civil engineering work for this project has been completely finished. Most pipelines have been laid. However, the electric equipment, valves, and street lamps haven't been purchased or installed.

In 2009, Baicheng Municipal Government signed the concession agreement with BSWC for Baicheng Municipal Wastewater Treatment Plant Concession Project. The agreement stipulates that Baicheng Municipal Government authorizes BSWC the concession right to

design, to construct, to own, and to operate the facilities in Baicheng Municipal Wastewater Treatment Plant in order to provide wastewater treatment services to Baicheng City and charge users for wastewater treatment service fee, and to transfer the project facilities back to Baicheng Municipal Government or its designated institute when the concession period expires after 30 years. The wastewater treatment fee shall be charged by method of: "Measuring per month, billing per month, paying per month". Since the date on which the commercial operation starts, the wastewater treatment service price is 0.83 yuan/m³ (excluding tax and subject to any adjustment (if any) in the future) (Baicheng Municipal Wastewater Treatment Plant Concession Project Contract, 2009).

Lesson learnt

1) Proper decision and project planning by municipal government

Correct government's decision is vital to the successful implementation of the concession project. A list of works, such as project planning, site selection, geological reconnaissance, mapping and flood-control certification were done properly by Baicheng municipal government or designated institutes before the construction. In Addition, project proposal, environment impact evaluation report, feasibility study report, preliminary design, as well as land use right certificate were handed in and replied by higher levels of governments. These items of work are all based on the correct valuation and prediction of relative government departments to the project.

Especially, the technical decisions in this case were made based on the consideration of regional features, feasibility and stability of technology, economical performance, as well as the experts' suggestions. The construction scale is designed and formulated by China Northeast Municipal Engineering Design and Research Institute, which is entrusted by Baicheng municipal government. According to the prediction of local wastewater volume, the wastewater treatment plant construction scale is determined to be 100,000m² per day. To avoid under-utilization of the treatment capacity, this project is designed to be constructed in two phases: Phase-I project would have 50,000m² per day wastewater treatment capacity. If the daily influent water volume to the wastewater treatment plant keeps 20% more than the designed capacity for three successive months, the Phase-II project would then be started.

A rational project scale is not only decisive for the success or failure of the overall project design, but also has important impact on project investment. All forms of construction capital from the investors will be eventually reclaimed in form of wastewater treatment fee. If the designed scale is too small, it would not only unable to satisfy the demand of urban wastewater treatment, but also unable to achieve economies of scale. On the contrary, if the designed scale is too large, the actual wastewater volume couldn't reach designed treatment water volume, there would be no doubt resulting in wastewater treatment capacity waste. Hence, the wastewater treatment price would be raised and in the end paid by residents.

Treatment standard and treatment method selection also show the significance for successful

implementation of the concession project. The effluent of this project is designed to reach Grade-II standard of *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. According to this standard, if the urban wastewater treatment effluent is drained to surface water, other water area with similar functions, seawater or similar water area, Grade-II standard would be executed.

The effluent standard of wastewater treatment not only directly affects the project investment, but also affects the operating cost of wastewater treatment. Under-achievement of treatment standard could not satisfy the requirements for drainage and reclaim; but over-achievement of standard would directly increase the treatment cost, which would surely increase the overall concession price and finally become the burden of residents in form of wastewater treatment fee.

Project investments, energy consumption, and operating costs could vary seriously by different process. Adoption of proper treatment process could directly affect the wastewater treatment price. Baicheng municipal government chose to adopt the oxidation ditch process for this project mainly because that Baicheng city locates in Northeastern China, which can be -30 centigrade degrees in winter. Oxidation ditch process is the only treatment method, which functions well in cold weather for now.

However, Baicheng municipal government agrees to let Sanda change the wastewater

treatment process after the plant transferred according to practical need. And moreover, the Baicheng municipal government would be responsible for the transaction and coordination for the approval procedures concerned in process change. The technical update or upgrade brought by the project company in general can improve the wastewater treatment efficiency and cost conservation, so that it should be supported by government in proper situation.

2) Clear definition of the rights and obligations of both parties

The goal of defining the rights and obligations of both parties is to achieve a win-win scenario to carry out effective risk allocation. Defining the rights and obligations of both parties is the core content of concession agreement. The lesson is that concession agreement should list potential risks, related rights and obligations, and punishments in details for both parties.

The *Baicheng Municipal Wastewater Treatment Concession Project Contract* (2009)

stipulated that:

In order to reduce political risk, if the changes of government laws or policy result in seriously harming the interests of the project company, and the loss cannot be eliminated or compensated by concession agreement, then the case shall be determined as the government default. The project company shall be allowed to terminate the concession period in advance, and the government should purchase the project assets according to the price of 120% the fair market value of the project assets.

In order to assure the service quality of the UEPI, the Contract prescribes that if the quality of effluent water after treatment does not meet the standards stated in the agreement, given that the quality of influent water complies with the agreement, BSWC has the obligation to pay

100% of the daily wastewater treatment fee as penalty due to breach of contract at the date of the non-compliance emission.

3) Quality inspection and control by the government

In general, the nature of private company is profit maximization. Because the government is unable to gather and audit all the information of the private company, the private company might falsely overstated the project construction costs and operating costs in the business for extra earnings or government subsidies. To avoid that, governments' quality inspection and control are used.

In this case, according to the *Concession Agreement*, in order to regulate the private company, Baicheng municipal government has the right to check the work of BSWC to ensure it meet the requirements of the concession agreement throughout the concession period. If there is sufficient evidence to prove that the quality of the project or the actions of BSWC are seriously inconformity with the quality or safety requirements prescribed in the *Agreement*, BSWC need to make rectification within 5 working days after receiving the notice. If there is no timely action, then the government has the right to make necessary corrections and all risks and costs would be borne by BSWC.

Until now, the project has been successfully put into service and functions well. It is not necessary to give the credit of the success to the clause mentioned above, but it does serve as

a base to urge BSWC to pay great attention on project quality and Baicheng municipal government to execute quality inspection and control on the latter.

4) Reliable contractual arrangements

The operation period of UEPI is usually long, which covers lots of variable risks. A series of contracts and agreements are signed in this case to ensure that all potential risks can be uniformly dispersed in various stakeholders, which is useful to minimize the overall risks of project operation.

For example, BSWC signed the wastewater treatment agreement with the water supply company authorized by the local government. The agreement prescribes the wastewater treatment payment and tax details. The wastewater treatment fee has to be able to cover basic operation cost of the treatment infrastructure and the financing cost of BSWC.

The concession agreement also includes methods of solving disputes between two parties, and mechanism for guaranteed compensation. In the CWC wastewater treatment concession project case, the dispute is the refusal for paying wastewater treatment fee by the water supply company. At the same time, under the authorization of BSWC, the rights of loan bank are stipulated in the agreement. It effectively reduces the lender's risk of collecting the loan, and the project company's risk of obtaining wastewater treatment charges.

To guarantee the wastewater volume being treated by the treatment company, the agreement formulates the daily amount of wastewater treatment and promises corresponding volume adjustment according to the change of environmental laws and regulations.

The delays, cost overruns and quality defects are the main risk factors for successful project completion. To manage these risks, BSWC and the construction contractor signed a contract to make clear completion plan and various compensation policies due to delays and unqualified quality.

3.3 Baicheng Waste Incineration Power Station Concession Project

Baicheng Waste Incineration Power Station Concession Project, which is with 32 years concession period, started from November 11, 2011. The project tender was issued in October of 2011, and Changchun RBC Ltd. was selected to be responsible for building and operating the infrastructure during the concession period. The project will be transferred back to the local government when the concession is expired. Its construction land use area is 100,000m² and the estimated total investment is 50 million yuan, which mainly comes from the project company's self-owned capital and financing. On top of that, the loan interest is fully paid by the project company. Mechanical grate incineration technology is adopted to realize daily treatment capacity of 1000 tons. Its main treatment materials are not classified living garbage of the service area. (Baicheng City Waste Incineration Power Station BOT

Lessons learnt

1) Tender selection right before preliminary designs:

According to the current practices in UEPI concession projects, there are two options in selecting tenders: first is to select the tenderer and authorize it with the concession after the approved feasibility study but before the start of the preliminary design; and the second is to select the tenderer and authorize it with the concession after the preliminary design, but before the start of construction design.

In this case, tenderers were selected before the preliminary design. The feasibility study report was used for setting up proposal and instruction for project design. The construction scale, treatment standard, treatment process, and project investment were all determined when publishing the feasibility study report. Comparatively, the preliminary design is aimed to provide practical details of the feasibility study. Therefore, conditions for investor selection could be all satisfied after the feasibility study approval. Meanwhile, under such condition, RBC Ltd. can directly participate in the project from design, construction, to project check after the project is done. The advantage of this option is that the project company could complete the project design and construction as a whole without intermediate disturbance.

By contrast, under the condition of selecting the investor after the preliminary design but before the construction design, the investor cannot join the preliminary design, since it has already been accomplished. The preliminary design is performed based on the approved feasibility study report and its main tasks are to make clear about the project planning, design principles and construction standard, to perform necessary partial solution design comparison, to solve major engineering technical problems and to propose land expropriation scope, as well as main engineering material, equipment and budgetary estimation.

It is obvious that preliminary design involves more details of project construction, operation and maintenance. Some local municipal governments will choose this option because of some considerations: first is that it allows local municipal government to control the project more comprehensively, instead of giving the winning bidder power to decide how to design and to construct the project, and to make inspection and management easier; second is that local governments consider the commissioned project design unit often provides a better design than the winning bidder company.

However, the method of selecting investors after preliminary design can greatly limit their initiatives for optimizing solution, reducing engineering cost, and shortening construction period. Meanwhile, since the preliminary design fee is usually charged equal to certain proportion of project budget, the design unit would highly likely increase the total cost of the

project. Under the condition that the construction design and the preliminary design are done by different companies, conflicts in the future are inevitable, which may affect the project progress and quality.

2) Appropriate pricing:

Pricing infrastructure service is one important commercial clause in the concession agreement. Baicheng municipal government constitutes multiple enterprises to compete for concession right by form of bidding. Project company which provides the "best price-quality ratio" obtains the concession right.

The charging price needs to be reasonable from the consumer's point of view but also adequate to compensate investors and lenders. Meanwhile, the service price should be able to stimulate the enterprises to improve the technical and managerial levels, and to cover the operation cost. The rational charging price is the basis for guaranteeing the commonweal performance of UEPI, and the benefits of the consumers.

In this case, tenderer only bid for the waste treatment service fee under the condition that project investment and asset which in total is 10 millions yuan, is treated as fixed, and the assumption that treatment fee will not affect waste treatment volume. The decision-making purpose of bidding evaluation committee is to maximize the consumer's welfare. The valuable point of the case is that the arithmetic average of all prices offered by valid bidders

is treated as the benchmark price. The winning bidder was the one who provides price really closer to the benchmark price. The waste treatment service fee would be the same as the price proposed by the winning bidder. Using arithmetic average of all prices as a standard to select investor instead of choosing one who offer the lowest price is helpful to avoid sacrificing UEPI construction quality and service quality, which would harm the benefits of consumers. Under-pricing may also lower the ROI and extend the return period, which may harm the investment return of the concession operators.

3) Technology transfer to ensure smooth future infrastructure operation:

In order to ensure related department from the Baicheng municipal government can smoothly operate the infrastructure after transfer, the project company should provide all technical documents necessary for facility operation and maintenance of the project. The technical documents include the existing design, planning, feasibility study, construction, inspection records and other technical documents and technical files. Because operating waste incineration power station need appropriate engineering professionals, it is helpful that the project company is required to provide technical training for the technical personnel of the government, in order to ensure the technical personnel's operation and maintenance abilities for the equipment.

3.4 Summary

In the chapter, eleven factors, which are critical for the three cases, are mined and analyzed. These CFs are interrelated. Among the factors, accurate project evaluation ensures municipal government access to sufficient project related information, and to make reasonable forecast of a project. As a result, the municipal government would be able to provide a bright directions for a UEPI project, and hence to make proper decision and project planning.

Policy stability reflects one aspect of government credibility, which should be maintained not only for UEPI development in the future but also for the benefit of the public and the public faith in government. Risk identification and appropriate risk allocation is helpful to recognize potential risks and solutions against those risks. It is also useful to minimize the risk of government credit deficiency. Clear definition of the rights and obligations of both parties is the base of appropriate risk allocation.

Reliable contractual arrangement, tender selection right before preliminary design, appropriate pricing, technology transfer to ensure smooth future infrastructure play important roles in protecting UEPI project quality and the benefit of the public.

Chapter 4

CFs for Urban Environmental Protection PPP Projects

Based on the CFs discussed in Chapter Two and the cases, this chapter indicates the problems and CFs reflected in the UEPI PPP projects in Jilin province and other Chinese cities, which are at the beginning stage of PPP development. On the basis of those elements, this chapter puts forward recommendations on how to improve related procedures, rules and regulations related to the PPP process of UEPI.

The classification of CFs follows the rules of Chapter 2, but not all of the CFs in Table 2.1 are discussed here, and some CFs are analyzed together, for example, *Sufficient competition among private companies* is talked together with *Enough concession pool*; *Policy stability* issue is combined with *Full-fledged legal system*; *Appropriate risk allocation and risk sharing*, *Risk identification* and *Reliable contractual arrangement in project based CFs*, are all further researched together. *Political support* and *financial market*, which are belong to *Macro CFs*, are not discussed in the chapter because the limited coverage for this thesis. Some CFs in Chapter 2, such as *Direct interests to local government and its subordinates*, which are the base of setting up a UEPI project, are not discussed as well. Generally UEPI projects in China are proposed by government first and contribute to tax revenue, government performance, and some other interests of both local and central governments. CFs studied in this chapter is from the perspective of the three real cases in Jilin province which are

influenced more by local government, so that the analysis angle of this chapter pay more attention on local level.

4.1 Macro Factors

A full-fledged legal system

The application of PPP model in UEPI projects isn't to change the public attribute and the aim to serve society of UEPI; it is to introduce certain market principles in the project construction and operation. However, since there are relatively independent interests of the public sector, general public, investors and operators, there is a need to balance and manage the interests of all parties. So setting up and perfecting relevant standards in the legal system is an institutional condition to implement PPP model efficiently. Through the restriction of legal system, the government's improper administrative interference and the phenomenon of damage or change of the operation objectives of public project caused by private enterprises' profit motivation, can be prevented.

Table 4.1. China's current legislations on environmental protection infrastructure PPP projects:

Legislation Classification	List of Laws and Regulations
Laws:	<i>General Principles of the Civil Law of the People's Republic of China</i> (passed in 1986, adopted in 1987) <i>The Contract Law of the Republic of China,</i> <i>Company Law of the Republic of China,</i> <i>Guaranty Law of the Republic of China,</i> <i>Tender Bidding Law of the Republic of China,</i> <i>Environmental Protection Law of the Republic of</i>

	<p><i>China,</i> <i>Government Procurement Law of the Republic of China,</i> <i>Administrative License Law of the Republic of China,</i> <i>Construction Law of the Republic of China,</i> <i>Law of the republic of China on Commercial Banks;</i></p>
Administrative rules:	<p><i>Decision of the State Council on the reform of investment system(2004);</i> <i>Several opinions of the State Council on encouraging, supporting and guiding the development of self-employed or private enterprises and other non-public sectors of the economy(2010);</i></p>
Ministry rules:	<p>Ministry of Construction <i>Interim Provisions on the Use of Foreign Capital by Municipal Utilities</i> (2000) Ministry of Construction's Notice on Issuing "On the Opinions of Accelerating the Market-oriented Reform of Municipal Public Utilities"(2002); Ministry of Construction <i>Administrative Measures for the Concession Operation of the Municipal Public Utilities(2004)</i> Notice on Issuing <i>Model Texts of the Concession Agreements on Municipal Water Supply, Pipeline gas and the Handling of Municipal Solid Waste(2004)</i></p>
Rules of local governments:	<p><i>Administrative Measures for the Concession Operation of Urban Sewage Disposal of Jilin</i> (2006) <i>Concession Operation Methods of the Municipal Public Utilities of Jilin</i> (2007) <i>Changchun Administrative Regulations on the Municipal Public Utilities</i> (2010)</p>

Sources: C Xiao, 2010; L Shuguang, 2011; Tao, 2002.

The involved legislations and related policy issues of the current environmental protection infrastructure PPP project:

At the present, as we can see in the list, those laws are related to UEPI PPP projects but not specialized for the projects; Notably, measures and regulations have effect to direct and regulate the application of PPP in UEPI projects, but they are updated easier compared to laws, especially at municipal level. The cancellation of the *Administration Method* in CWC Changchun Wastewater Treatment Plant Concession Project case reveals the instability of local policy. In a certain extent, it hurts the trust from investors on government.

Besides, the contents of ministry and local rules are succinct summaries and they only provide principal guidance for the implantation of PPP model. There are lack of detailed directions for the operation procedure of the PPP project, the functions of both parties, risk distribution or contract management, etc.

Therefore, a full-fledged legal system to secure a good environment for the application of PPP in UEPI project is a target, which can be achieved by long time effort of both government and private sectors. Related government should draw lessons from practice every time, and hear the voice from private companies to further perfect existing policy and to build a strong legal system in the end.

When it comes to optimize the policy preparation and formation of the application of PPP in UEPI projects, designating departments or organizations composed with PPP professionals at

both national and local level is highly recommended over requesting all relevant government departments to promote the development of PPP in general. At national level, the current operation of a PPP UEPI project involves National Development and Reform Commission, Ministry of Housing and Urban-Rural Development, Ministry of Environmental Protection and other different administrations. Each organization has devoted more or less to promote the application of PPP. However, a dominant PPP organization which can synthesize different institutions' efforts, rules and interests, plus further research and practice thinking, will be more effective to provide PPP application in Chinese infrastructure market with unified and comprehensive support.

At local level, government departments which propose the UEPI PPP projects are responsible for investment attraction, project negotiation and contract signing, and projects secure and supervision. Generally, they are local construction bureaus or local development and reform commissions. In their eyes, PPP is only a method to use on UEPI projects instead of treating it as a revolution to change the cooperation between government and private companies. After building a project, they will no longer study the application of PPP on UEPI project and will not consider related local policy perfection. As a result, in the exploration of promoting PPP application, local specialized organizations are recommended to continue researching on local PPP development environment and gradually perfect local PPP policy system.

4.2 Local Factors

4.2.1 Proper government decision-making

Proper government decision-making implies that the local government defines the necessity of a project, and predicts the benefit of the project and how a project develops. Since the UEPI PPP project proposal and the feasibility study work are carried out by the government, the government's overall evaluation and prediction of the project in the early period is directly related to the success or failure of the project. During the process, the government should consider the function of experts and should employ professional experts of technology, finance and law and other aspects of environmental protection infrastructure and professional talents who are familiar with the operation of PPP projects to be the consultants of the governments. They can help to conduct the investment budgeting, technology selection, the standard-making of bidder's qualification and other work, and to prepare for the writing of bidding documents.

In the project evaluation process, choosing the right location is of great significance. During the process of project locating, the government should integrate planning ideas of the local Urban and Rural Planning Department and ideas from the Bureau of Geology, Tax Bureau and other departments, and should take all the influencing factors of local planning, environmental protection, treating technology, treating requirement, flood and disaster prevention and the whole investment cost into consideration and combine with the local

actual situation to ultimately decide the optimal site.

4.2.2 Public support

A municipal government should consider public support as an important factor which is often ignored by the government. The ignored factor often leads residents to protest against the local government and other related departments during or after the construction and causes social chaos. For example, on July 13, 2013, a group of residents sat outside the MOHURD to protest the construction of a waste incineration power plant besides their residential buildings, because the smoke caused by the waste incineration would flow with the wind to their living area. To ensure that the new urban and environmental PPP project would not affect the residents' lives, the government should hold a public meeting to take people's opinions and suggestions after planning the site. In America, the municipal government usually emphasizes great importance to the response of residents within the affected area of project. The essence of UEPI is to serve the general public, so that Chinese local government is supposed to pay closer attention on the needs of people and how to secure their normal lives will not be bothered by new UEPI location and construction.

4.2.3 Transparency and fairness of bidding

Government will put a concession UEPI project "out to bid" and then issue invitation for bids online. Potential bidders will make proposals to compete for the concession right. An

evaluation team will go through the bids and decide which party will get the concession contract. The process should be supervised to ensure the competition for the use of the public is open, fair and free from bribery and nepotism. No parties should have the unfair advantage of separate, prior, closed-door negotiations for the contract. How to optimize the process and provide a fair, just, and transparent competition environment is vital to the concession project development.

Effective request for tenders (RFTs) dissemination ensures all parties who have interests in investing a UEPI concession project, are equally informed. This is a premise to guarantee the bidding fairness. RFTs releasing test is recommended to help to improve bidding information publicity. Before formal RFTs is published, local government can apply RFTs releasing test, which is used for collecting feedbacks from public about whether the bidding information is clear or contain errors and whether the information release channels are reasonable. It can assist local government in collecting the public opinions about calling for bid process to make necessary improvements (Kang, 2012).

In order to avoid collusions driven by bidders, the information about how many bidders in total and which parties they come from, should be confidential. Any organized collective action is not appropriate. It is the responsibility of the bid inviting party to hold all of the bidding meeting separately. Closed bidding can be used, that is, names of bidders won't be shown but replace them with same code name. The code is known by only one person who

doesn't participate in the bidding. The format of bidding documents should all be the same (Unbeaten Flower, 2009). During bidding evaluation, the phenomenon of bid collusion can be discovered from the quotations offered, for example if the general quotations exceed the reasonable quotation and there is only one bidder provides appropriate quotation, then the situation perhaps is related to bid collusion (Purise Training and Consulting Company, 2011).

4.2.4 Government monitoring

Since government and private enterprises have their own value pursuit and responsibility division, government must carry out efficient supervision to private enterprises to avoid its sole pursuit of high profit at the expense of public interests. Efficient supervision helps to lead to a successful PPP project. (Hang & Wang, 2008)

During the financing, construction and operation stages of UEPI projects, it is possible that project companies have default behavior (see Table 4.2), which will lead to negative effects on UEPI serving the public. Therefore, their behaviors in each stages should be seriously supervised by government to ensure the timely supply of quality projects and safeguard the interests of the public.

Table 4.2 The project company's possible default behavior

Project stage	Project company's possible default behavior
Financing stage	Funds, which are used for the project construction according to the concession agreement, cannot be

	in place in time.
Construction stage	The investment cost exceeds the budget; unreasonable cost-saving; unable to construct according to the agreed construction schedule.
Operation stage	Failure in charging the provided products according to the agreed standard; Unable to carry out necessary maintenance for facilities in time; insufficient treatment of pollutants, which is lower than the agreed standard.
Transfer stage	Inadequate quality inspection and incomplete maintenance of environmental protection infrastructure for investment saving; negligence during the transfer process.

Sources: Wang, 2013; Zhang, Wang, 2010.

To prohibit those behaviors, this thesis argues that there are two focuses of the government supervision on a project company. One is that they pay attention to a company's operation cost, which is financial supervision, to master effective information of how a private company use its money and to provide reference for the decision-making of government public department, such as setting the price, and providing financial subsidies. The other one is quality supervision on the construction and operation of the project.

Financial supervision

The first step of financial supervision is to inspect the availability of funds. For UEPI projects, whose construction term are long and investment are huge, ensuring sustainable and stable cash flow is a key factor for smooth operation. The financing requirements should be specified in the PPP contract. Private partners should make funds available in time according to PPP contracts, and report financing contracts and agreements to government public

departments and corresponding administrations for record. Otherwise it should be considered to be unable to fulfill PPP contracts and the contracts should be terminated. Meanwhile private departments should be required to open accounts in banks appointed by public department and receive supervision from government public departments and corresponding administrations. If necessary, public departments should require project companies to authorize to check their bank accounts in order to master capital operation status of private departments. (Shen & Liu, 2006)

Plans for the use of UEPI projects funds should also be under financial supervision. These plans concentrate on how private companies will use projects funds. Municipal government departments should require private departments to submit fund use plans and ensure those plans are good for UEPI projects construction, operation and maintenance. The plans can be analyzed in detail according to the related payment terms of contract. The plans can urge private departments to pay for project payment in time according to the relevant supervision of contract without default. For those funds that are organized and used against the plan, once it affects the construction implement of the project, the public department has the right to pursue legal actions against the private department.

Municipal government departments should require project companies to provide financial statements, prepared according to the relevant legal regulations, in monthly or quarterly. When project companies pay taxes, hard copies of the vouchers should also be submitted to

municipal government departments. After the end of each accounting year, project companies should delegate accounting firms, which are approved by government departments, to audit their annual financial statements and give audit suggestions. Project companies should provide municipal government with annual financial statements and audit reports.

Municipal governments should also require project companies to pay certain amount of project quality guarantee deposits to ensure the quality of project construction, operation and the maintenance of UEPI. When concession terms expires, municipal government will work out the deduction amount from the cash deposit according to asset status and agreed calculation formulas, and then return remaining cash deposits. Project companies would strike a balance on saving maintenance cost and losing cash deposit (Qin 2002.). The setting of the amount of cash deposit is the key. If the amounts of cash deposits are reasonable, project companies will have pressure to treat project assets well, and the assets transferred back to municipal governments will have satisfied quality assurance. The amounts of cash deposits and the acceptance criteria for the transfer of assets should be specified in detail in UEPI concession agreements.

Quality supervision

The quality supervision of PPP often needs pre-set appropriate quality standards through contracts, and during the term of PPP contracts, continuous and effective supervision should be carried out by municipal governments, therefore, making and implementing the contract

terms are the base to carry out quality supervision. (Lai, Fei, 2010)

Sheng (2010) thinks that the government supervision on project companies can adopt the model of introducing an intermediary, in order to carry out project supervision on the basis of government supervision. In general, municipal governments and related departments currently are responsible for all the works for quality supervision, including collecting data, analyzing problems, establishing monitoring index, putting forward warning schemes or solutions. After introducing an intermediary, the main functions of municipal governments are to set incentive rules and to reward or penalize the project company according to the monitoring results submitted by intermediaries, and meanwhile to inspect whether intermediaries have illegal behaviors.

4.3 Project Based Factors

4.3.1 Reliable concessionaire pool

According to the general procedures of choosing project companies, stated by the British Guidance (HM Treasury, 2001), the five aspects are conducting market researches, main bidders' survey, setting evaluation standards, listing candidates and negotiation (Chen, 2010).

Among these steps, setting evaluation standards should be the base for selecting project companies, such as the related experience, technical skills and financial affairs. Specified and standardized the procedure could be outlined according to the requirements.

However, for many UEPI projects, the number of companies with operation and management experience is limited within the local area. To expand the UEPI concession market, new companies should be given chances to participate in the bidding and opportunities to grow into maturity projects companies. If the government strictly take project operation and management experience as the overriding criteria to choose a project company, it will exclude potential new competitive companies, and to some extent protect current project companies. The requirement of bidders' operation experience could be waived when the amount of investment involved in UEPI concession projects are relatively small or the duration of the projects are short..

In addition to the sole consideration of the bidders' qualifications and technologies, credit of enterprises should be included as the necessary standard for choosing a project company in the future. Enterprises credit reflects the operation and construction capability and reliability of an enterprise. Therefore, the establishment of an enterprise credit evaluation system is essential to promote the development of the future environmental infrastructure towards a more market-oriented path.

The preparing costs of the bidding—of large-scale UEPI are occasionally very high, which is a big burden for the losing team. To reduce the cost of losing in the bidding, it is best to divide the evaluation procedure into two stages. Pre-qualification evaluation should be done in the

first stage. Pre-qualification evaluation refers to formal pre-view of the applicants' qualifications and abilities. In second stage, the main work is to select qualified applicants for the next comprehensive review. Other bidding duties are also done in the second stage.

4.3.2 Risk identification and appropriate risk allocation and risk sharing

During the negotiation of environmental infrastructure PPP project agreement, comprehensive risk identification should be done, and the way how risk is shared should be confirmed as well. The risks in different stages should be written clearly in the agreement and the way of risk-sharing should be clearly defined through the rights and obligations of the two parties.

Risks are classified into controllable risks and uncontrollable risks. Controllable risks refer to those that can be controlled and managed by investors themselves. One example of controllable risk is completion risk, which reflects in the delay of construction time, cost overrun, the failure to achieve the planned goal after the project is put into operation, and the inability of putting into operation on schedule and achieving production index. These result in the insufficiency of cash flow needed for operation and even the inability of repaying debts. In the pre-qualification, it is important to fully study the strength of the bidders, and careful selection of contractor is the key to avoid completion risk. Controllable risks include completion risk, the risks of life safety and environmental pollution (Wang, Yu, Bing, 2007).

Uncontrollable risks refer to risks that can't be controlled by investors themselves, and such risks will generally affect the whole process of the PPP project. Uncontrollable risks mainly include political risk, legal risk, and financial risk. These risks exist in the whole cycle of the project in different forms. (X. Yang, 2005)

Generally, from the aspect of the entire interest of UEPI projects, the risk characteristic, the controllability, the risk-bearing capacity of the main participants in projects and their risk attitude should be all taken into consideration, and then define how to cope with risks. The basic principle is to channel the sector share more certain types of risks which are more suitable to bear them. Table 4.3 shows some basic risk types and suggestions about risk sharing.

Table 4.3: Risk Types and Suggestions about Risk Sharing

Risks	Govern- -ment	Project Initiator	Project company	Contractor	Insurance company	Guarantee Corporation
Controllable risks						
Project approved risk						
Project evaluation risk						
Bidding Risk						
Project finance risk						
Project design risk						
Cost overruns risk						

Schedule delays risk						
Construction techniques risk						
Environmental pollution risk						
Safety risk						
Construction material supply and price change risk						
Lack of demand risk						
Low management risk						
Uncontrollable risks						
Political risk						
Laws risk						
Inflation risk						
Force majeure risk						
	The party who mainly bears the risk.				The party who partly bears the risk.	

Sources: Wang;Yu; Bing, 2007; X. Yang, 2005; Yang, 2008; Feng, 2007; Yue, 2004; Fan, 2005.

Risk prevention refers to the entire process of risk minimization, diversification and transfer by various timely economic and technical means. The basic measures are risk avoidance, risk control, risk transfer, risk set, risk retention. Risk set refers to the coordinated action of investors to diversify the risk loss and reduce the occurrence cost under the condition that a large amount of the same kind of risks are likely to occur; Risk retention refers to the solution

for some risks that cannot be avoided and transferred. The one who face the risk bears the risk under the condition of not affecting the fundamental interests of investors and the common interests of the majority of investors. (W. Gao, Z. Yang, 2008)

Preventive suggestions for uncontrollable risks

1) Prevention of political risks:

In general, political risks are mainly caused by local governments and sometimes lead by central governments. These risks, which are related to central government are usually more complicated to deal with, thus the suggestions illustrated below is not suitable for this situation. Because in UEPI PPP projects, private companies and local government are partners, they share and cope with risks together for the sake of projects. There are some basic suggestions for private companies to transfer more political risks to local governments. Most of the time, local governments can control such risks easier comparing to private companies, and, so those risks should be borne by local governments according to the principle of risk-sharing.

In addition to the UEPI concession agreements, project companies can try to require municipal governments to share the political risks by the means of written agreement (related to the concession rights, license validity, guarantee of transferability, commitments of foreign exchange management, approval for special tax policies and other aspects). The main content of such agreement is that the government makes their stand for the UEPI PPP projects and provides project construction and operation with government supports. Project companies can

employ related counselors to help sign project agreements, such as service agreements, disclaimers, arbitration agreements and development agreements. It can also insure political insurance to business insurance companies and other official institutions (such as credit agencies and multilateral development institutions) to reduce political risk (Yang, 2005).

2) Prevention of inflation risk:

The construction and operation period of a UEPI PPP project is usually more than ten years or even decades, and there will be a long-term price fluctuation for material or human resources. Therefore, a system to avoid possible loss caused by inflation is necessary for the benefit of project companies and the public. For the influence of inflation, the government should make specified guarantees for inflation in the concession agreement. For example, the government should give the project company the right to adjust fees in a certain range, or to raise the service price of environmental protection infrastructure, or the government could subsidize the raised part of price. For the public, the price remains unchanged (Feng, 2007).

3) Compensation for the risk of irresistible force:

The risk of irresistible force cannot be included into assurance coverage at a reasonable premium and project companies are seldom willing to bear the risk of irresistible force. Usually, it needs some form of support from municipal governments to compensate the risk of irresistible force. One way is to allow investors to prolong the contract term. The term should be prolonged enough to compensate for the time that affected by the irresistible force,

but only suitable for a limited period of time. Another way is that project companies can insure with insurance companies to transfer the risk to the insurance company. The payment for the insurance should be shared by municipal governments and project companies. How the premium is shared should be agreed on when signing concession agreements (Fan, 2005).

4.3.3 Define rights and obligations of both parties

In a UEPI concession agreement, the specification of both parties' rights and obligations occupies a large space. Here it refers to the rights and obligations of both governments and project companies throughout the entire PPP processes and they are analyzed and decided on the basis of risk identification. The purpose of defining rights and obligations is to share risks. Using risk-sharing to relieve the pressure on each participant and to achieve mutual benefits are the core motivations for PPP.

Furthermore, land use, water, electricity, gas and other energies, delivery and other problems in projects construction are inevitably involved in UEPI projects. Local government should provide projects under construction with necessary logistics guarantees, such as providing construction area. The Chinese local government is the only legal entity which possesses land expropriation. Only when a piece of land is expropriated by the local government, then the project company can obtain the land use right through the mean of selling or transfer. The term of use or lease of land for construction should be the same as the term of the project. It

also includes the entire rights of use for the surrounding land properties, such as connection roads, water supply, energy transportation lines and other ground facilities which are needed to support the construction of project.

4.3.4 Reasonable Return on Investment

When negotiating the UEPI concession contracts, local government and the project companies should have a realizable ROI (return on investment) goal. When determining the ROI for a project company, the municipal government needs to consider two objectives: to ensure the balance of benefits sharing among projects related parties, to stimulate project companies development, such as improving public service quality. Setting reasonable ROI of UEPI projects is crucial for investors to breakeven and to get reasonable profits. Under-setting ROI will prolong the payback period and damage operators' investment profit. Furthermore, it will reduce their investment desires and affect the sustainable development of UEPI industry. Instead, over-setting ROI will harm the interests of users.

There are mainly three forms of the government's guarantee about ROI: The first one is "fixed ratio". No matter how well an operation does, the government will bear the investment return according to a pre-negotiated rate. The second one is "floating rate", in which government and investor determine an upper and a lower limitation of ROI together. The part of operation income that exceeds the upper limit of ROI belongs to the government and

the part of operation income that is lower than the lower limit should be subsidized by the government. The profit within the range belongs to investors. The third one is “self-financing”. Investors completely bear the risk of ROI. Since the total investment of a UEPI PPP project is often huge, the risk in the third form is often too big for investors, so it is seldom used. For Chinese concession projects, the central government explicitly forbids the government from guaranteeing the rate of return on fixed assets for projects. A floating rate can well mobilize the enthusiasm of investors and enable local governments to avoid bearing the business risks that should be borne by investors, so concession projects usually adopt floating rate (Zou, 2004). Because of the social welfare characteristic of UEPI, project companies cannot price independently. Also, since concession periods are very long, fixed prices may damage the interests of customers in some conditions, such as reduction of average household income. It perhaps will bring loss to investors if currency inflation happens. Therefore, it needs local governments and private companies to work out specified condition for price-adjusting in concession agreements to ensure that investors can get reasonable returns on investment and achieve a sound development of UEPI project.

To ensure the ROI for project companies, this paper suggests project companies to adopt the way of limited recourse project financing, rather than traditional corporate financing. There are two crucial features of limited recourse project financing: The project profit is mainly used for debt repayment; and it also requires other interested third parties, except the project company, to provide various guarantees. In most situations, since UEPI projects involves

large amount of money and they also have concession agreements for support, investors are willing to arrange in the form of limited recourse financing. Usually, lending banks require project companies to inject some equities into projects and make certain equity rate commitment for project loans to bear direct economic responsibility and risks of the projects. However, for investors, high equities mean high capital investment. The higher the equity is, the higher the corresponding investment risk will be, and it will need a higher ROI. The fee of UEPI, the concession term and government subsidies should be increased to keep the ROI reasonable. A good solution is that, when local governments and investors under the concession contract, the governments should bear appropriate risks and make certain commitments to enhance the confidence of the creditor and reduce equity investment. (Bian, J. Yang & G. Yu. 2003)

4.3.5 Choose qualified project contractor

Before contracting the construction of an infrastructure project, the project company should make the BOQ (Bill of Quantity) by itself or by a third budgeting company. The BOQ should be as accurate as possible and try not to miss out any required items. The BOQ is the exclusive basis for contractors to quote.

The achievement of contractors is of great significance as reference for choosing a highly-qualified project contractor. Usually, the construction practices of the construction

team have a great consistency with the past. Sometimes a project team will exaggerate their achievement in order to contract the project, so it is important to examine them, in order to identify the quality of the project contractor. The management team of a contractor is also one of the main target for inspection. There are two major components for the inspection of a management team: the stability of team members and their abilities of mutual consultation and coordination. Some engineering teams are temporarily assembled and will be dismissed after the project is finished. This kind of engineering team may have coordination problems and conflicts in the management, which are bad for the progress and quality of UEPI projects. The technical level of the engineering team can be reflected in such aspects as rapid response when problems occur during the construction, the understanding of design drawings and the ability to find mistakes in a timely fashion. Capital strength is also a standard to inspect contractors. Abundant capital can cope with requirement changes of material or labor payment flexibility, and can continue to construct under the condition that the quantity has reached the payment standard but the project quality hasn't reached the payment standard.

4.3.6 Suitable transfer package

If a UEPI concession project expires and need to be transferred back to local governments, project companies should transfer all the rights on the facilities and all the project facilities and venues back to the governments or other designated organizations, according to the content in PPP contracts. It also needs to train new employees with necessary skills. Defining

the transfer scope is the key. For some affiliated facilities, if they are not in the transfer scope of PPP contracts, they will be treated as companies' private property, and if those items are needed to be transferred to the government, then the government needs to evaluate and make appropriate compensation to the investors according to the evaluated price.

Before any transfer, project companies need to renovate the facilities to ensure the quality of transfer. But after a long-term operation of the facility, it is unnecessary to expect the facility will look like new ones, some extent of facility damages should be tolerated.

Whether municipal governments should undertake the tasks of technical transfer and maintenance of facility or not, is a problem to be solved. If municipal governments do not bear the responsibilities for technical transfer and maintenance, project companies may worry that maintenance investments cannot be reclaimed before the PPP term expires, so they may reduce necessary investment, especially when it is approaching to the term expiration. As a result, the infrastructure products and service quality are likely defected (Zhou, 2011). This paper argues that setting appropriate compensation principles can encourage and restrict the project company's normal maintenance for UEPI. As an incentive to project companies, certain financial compensation can help them bear all the required investments and to avoid over-investment. However, how much should be compensated relies on actual conditions: Under-compensation will reduce good investments while over-compensation will encourage operators to invest more than is appropriate for the project.

4.4 Summary

In the new generation of urbanization, the demand on UEPI projects has increased rapidly. PPP model gives more freedom and trust to private companies and relieve certain financial burden of local governments. The application of PPP in UEPI projects in developed cities of China has gradually grown into the mature stage. But in the developing cities, such as cities in Jilin province, it is still in the initial stage of accumulating experience. Diverse results have occurred in UEPI PPPs with both success and failures. There is an pressing need to develop an appropriate CFs list based on Chinese middle level cities to contribute recommendations for private companies and governments, in which macro, local and project based factors are brought into play for the benefit of public and private interests.

This chapter discusses CFs for UEPI concession projects. In this chapter, a full-fledged legal and policy system require both national and local governments endeavor. Local governments' overall forecast and valuation of UEPI concession projects are surely important for future success. To achieve a better result, many details should be paid attention and public opinions should be considered. The purpose of UEPI PPP projects bidding is to achieve transparency and fairness of choosing competitive private companies. In many cases, releasing bidding information affects on the bidding results. RFTs releasing test is recommended to be used in this thesis. To avoid bidder's collusion, bidding document confidentiality is in need. In some

condition, requirement on project experience can be relaxed to help new companies joining the market. Credit of enterprises should be listed as the necessary standard for choosing a project company in the future. UEPI concession projects are famous for their risk. The risks in different project stages should be clarified by involved parties. Risk sharing can be achieved through defining the rights and obligation in a concession agreement. Appropriate determination of ROI is helpful for balancing both private and public interests. In order to achieve a win-win, price adjusting method is better than fixed price. The stability of team members, technical level and capital strength are important standards to evaluate a project contractor. At the project transfer stage, setting appropriate compensation principles can encourage and restrict the project company's normal maintenance for UEPI. To avoid private companies' pursuit of profits at the expense of public interests, financial and quality supervision should be taken by municipal governments throughout the entire project period.

Chapter 5

Conclusions

5.1 Summary and Discussion of Findings

Since the early mid-1990s, China has started to introduce PPP model in urban infrastructure construction. From the thesis background, special system environment of China provides a support for the public and private cooperation development. Following with the fast urbanization, a range of environmental issues associated with geographic concentration of people and economic activities in cities bring the need of more UEPI. Insufficient government financial capital and potential private investment prompts the use of PPP model on UEPI construction. The PPP method has proclaimed as bringing a new age to urban and environmental protection infrastructure development in China. As the central government decided to further accelerate urbanization, the application of PPP on UEPI projects in the future will be more and more widely.

From literature review, the discussion by scholars and practitioners on what CFs effects the result of PPP application on infrastructure is drastic and most of them concentrate on international research view. But China's political system is different from western capitalism, the rights of the government is relatively larger. So the CFs in China situation will be slightly different. In some of China's first-tier cities, such as Beijing and Shanghai, PPP has begun put into use relatively earlier, but for some less developed cities, the development of PPP has just

begun. In the year of 1999, CWC Changchun Wastewater Treatment Plant Concession Project is the first but failed UEPI PPP project in Jilin province. Since 2004 MUHORD released the *Ministry of Construction Administrative Measures for the Concession Operation of the Municipal Public Utilities*, the application of PPP on UEPI projects has been gradually increased. The thesis particular emphasizes on searching CFs for UEPI PPP projects of less developed cities and provides recommendations to help to achieve public and private win-win result.

Therefore, three cases, China Water Company Ltd. (CWC) Changchun Wastewater Treatment Concession Project, Baicheng Municipal Wastewater Treatment Concession Project, and Baicheng Municipal Garbage Treatment Concession Project, are studied in the thesis to conclude what lessons can be learnt from them. And then CFs and recommendations are determined based on the CFs from previous research and three cases.

From the research, governments are responsible for project predetermination, cooperation with private investors, and supervision of projects' quality. Although central government pushes UEPI PPP projects for development, it is dangerous for local government to pursuit of the project quantity and work performance, and give promises to private companies without a second thought. Just like the CWC case, it is easier to give promises, but it is hard to keep them. Local governments play roles as cooperator and supervisor. They should be able to switch their roles flexibly through PPP processes to put forward success of UEPI PPP

projects. As a partner, a government should be careful to not to use political power to over-intervene a PPP project. When act as a supervisor, a government should be strict to employ financial and quality supervision, which are helpful to forbid private companies searching for benefits on the expense of public interests. Authorizing an agency to do the supervision is also a good way to keep the objectivity, because an agency does not involve in projects. If there is critical condition, establishing specialized PPP government departments or public organizations at both national and local level, to be responsible for PPP activities and support further development of PPP, are necessary.

For private investors, conducting indepth analysis on contractor companies and selecting qualified ones are important to achieve successful project construction. In order to protect their own rights and benefits, written agreements from local governments is a good method for insurance. Searching help from insurance company to avoid risks such as irresistible risk should be adopted.

PPP agreement between local government and private company at first should clearly list out all related risks in the UEPI project and then the rights and obligations of both parties. Risk identification and risk sharing are important component of concession agreement and play key roles in achieving public-private win-win results. Though there are agreement template, a concession agreement should be still paid attention on details and compiled based on project evaluation and specified situations. Price adjustment method should also be written to keep

public interests and to protect private companies' benefits, which is important to attract more private investment on UEPI projects and to promote the future development of PPP model. If transferal will be taken at the end of a UEPI PPP project, the details of what should be transferred is important to be clarified in the agreement.

For laws and regulations, the fact is that the more legal power the document has, the little chance it could be changed. Local regulations such as *Administrative Measures for the Franchise Concession of Urban Sewage Disposal of Jilin* (2006), should be updated to be given more legal power in the future. But it will take time and sufficient experience to perfect the regulations. When these two conditions are meet, it will be the moment to upgrade these local documents into ones with more legal power. Provinces, such as Jilin, who just have begun to adopt PPP method on UEPI should use experience of Beijing, Shanghai and other more developed places as reference, to form its own rules for the local gradually.

5.2 Further Research

1, Currently, the Baicheng Municipal Wastewater Treatment Concession Project, and Baicheng Municipal Garbage Treatment Concession Project have the support from local government, and progress smoothly. But until both of them transferred back to the hand of local government successfully, whether some factors will influence the smooth running of the projects, and how those two projects develop is still worthy to be paid attention to.

2 The Statistical data and information of less development cities are not collected systematically, and some of them are not transparent for the public. The facts will affect the research result of the thesis.

3. Because of the limited resources and insufficient related specified knowledge, the suggestion of these CFs and recommendations are only conceptual.

There are many entries of CFs and strategic suggestions and every entry need to be further researched by professionals from related field. These details are important to promote the UEPI PPP projects with sustainable development.

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