



Non-profit Public Infrastructure Development and the Application of Build-Transfer (BT) Financing Model

KEYWORDS

Urbanization; Non-profit Infrastructure Project; Project Financing; Build Transfer (BT); Project Management

Yelin Xu

Associate Professor, Department of Engineering Management, Zhejiang Sci-tech University, Hangzhou, China.

ABSTRACT

With the growth of urbanization and industrialization, there is a huge demand for infrastructure development in China.

The fund invested in infrastructure, especially the non-profit infrastructure, places a great burden on the local government. The Build-Transfer (BT) procurement model can effectively relieve financial pressure on local governments, and therefore has been widely adopted in the development of non-profit infrastructure projects. However, a comprehensive literature review indicate that early studies mainly focused on Build-Operate-Transfer (BOT) projects while few studies investigated the application of BT model. To deepen the understanding of the underlying philosophy of BT model in developing non-profit public infrastructure, a detailed case study of a BT expressway project in China is investigated (with focus on preliminary phase). Critical issues on the successful implementation of the BT expressway project are discussed, including the *procurement process, selection of BT investor, fund management, and potential risk analysis*. The findings can provide valuable experience and management implications for future BT projects.

1. Introduction

Infrastructure is the foundation of sustainable economic and social development. With the acceleration of urbanization, rapid increases in the demand for infrastructure services and limited financial resources have led governments to resort to private investment (Sobhiyah et al., 2009; Shen et al., 2011; Bao et al., 2015). In this context, the build-transfer (BT) procurement model has been increasingly adopted in developing infrastructure in mainland China (Li 2012a; Peng et al., 2014a; Bao et al., 2017). Typical BT projects include the Beijing Olympic Metro Extension, Kunshan Central Expressway, Chongqing Jialing River Bridge, Tianjin Nancangdao Flyover, and Shenzhen Metro Line 5. BT is a form of project financing in which a private entity receives a concession from the public sector (owner) to finance and construct a facility stated in the contract. After the completion of the facility, the public sector repurchases the project and pays a repurchase fee to the private entity according to the contract (Li, 2012a; Peng et al., 2014b). The BT financing model varies from the build-operate-transfer (BOT) procurement model in terms of investment recovery (Yin and Jiang, 2011; Gao, 2009; Peng, 2015; Bao and Peng, 2016). In the BOT model, the investment is recovered through the project's operating income during the concession period, whereas in the BT model, the investment is recovered through project repurchase by the public sector (Gao, 2009; Peng et al., 2015).

Moreover, the BT model can assume a "government mortgage" function, relieve financial pressure on the government, and accelerate infrastructure construction (Lin 2010; Peng et al., 2013). BT is mainly applied to non-profit government investment projects, such as toll-free roads, toll-free bridges, and parks (Jiang, 2010). A comprehensive literature review was conducted on well-known academic journals in construction management (CM) journals including *Construction Management and Economics*, *ASCE's Journal of Management in Engineering*, *ASCE's journal of Construction Engineering and Management*, *International Journal of Project Management*, *Building Research and Information*, and *Engineering Construction and Architecture Management*. The review results indicate that previous studies mainly focused on BOT projects, such as the Hong Kong Cross-Harbor Tunnel (Kumaraswamy and Morris, 2002), Laibin B Power Plant (Wang and Tiong, 2000), Huaibei Power Plant (Smith et al., 2004), Chengdu No. 6 Water Plant B Project (Chen, 2009), and Nanzih BOT Wastewater Treatment Project (Zheng and Tiong, 2010). Studies on BT projects are rather limited.

The current paper presents a detailed study of a BT expressway project (with focus on preliminary phase) and provides an insight into the *selection of BT investors, fund management, and risk management*. The current research is believed to provide valuable

experience and management implications for future BT projects.

2. Chinese BT: An overview

In 1984, the first BOT project in China was awarded to the Shangjiao B Power Plant in Guangdong (Wang and Tiong 2000). In 1995, China continued to take the Laibin B Power Plant and the Chengdu Sixth Waterworks as pilot projects to further promote the BOT pilot range and acquire experiences in project practice (Chen, 2009). After 2002, the BOT model was gradually popularized in China. In 2004, the former Ministry of Construction officially promulgated the *Administrative Measures for the Franchise Operation of the Municipal Public Utilities*. In 2005, *Several Opinions of the State Council on Encouraging, Supporting and Guiding the Development of Individual and Private Economy and Other Non-Public Sectors of the Economy* emphasized allowing private capital to enter the electricity, telecommunications, railways, civil aviation, oil, and other monopoly industries. This approach aimed to accelerate the improvement of the government franchise system and support non-public capital to participate in the investment, construction, and operation of public utilities and infrastructure. This strategy resulted in the large-scale use of private capital for infrastructure development (Deng, 2007).

To meet the diversities in the properties of investment projects, return on investment, as well as project ownership and operation right configuration, private capital has derived a number of variations of the BOT model (Lu 2008; Deng 2007). These variations include transfer-operate-transfer (TOT), design-build-transfer-operate (BTO), build-own-operate-transfer (BOOT), and build-own-operate (BOO). As one of the variations of the BOT model, the BT model provides an important direction for the development of the BOT model. Compared with the BOT model, the BT model attracts more private investors because the latter omits the operational phase of the project with a shorter payback period (Qiao et al. 2001). From the government's perspective, a BT investor integrates the handling of investment, financing, and construction of the project. This set-up can reduce construction management and coordination costs of government, as well as achieve integration advantages (Wang 2005).

In 2003, the Ministry of Construction of China promulgated the *Guidance on Fostering and Developing General Contracting and Project Management Enterprises*, which regulates in Clause VII of Article IV "to encourage contractors with investment and financing capacity to participate project construction with the model of build-transfer (BT), build-operate-transfer (BOT), build-own-operate (BOO), build-own-operate-transfer (BOOT) ...". The concept of BT was introduced for the first time into Chinese policy documents.

Subsequently, the BT model was immediately applied in many cities in China (Jiang 2010).

In the past several years, China's real estate industry gradually declined under the government's macro-control (Liu 2012). Construction enterprises with a certain financial strength have gradually shifted their investment field to BT projects to expand business and improve profitability (Wang 2008). Local governments are actively sourcing legislation for the BT model to regulate BT projects (Wang 2012). However, given the imbalanced local political, economic and legal conditions, BT legislation in different areas varies greatly in investment volume, entrance method of private investors, operational process, repurchase period, and return rate of investment. The application of the BT model in China remains at the exploratory stage as well as lacks comprehensive and systematic understanding (Guo 2010). A specific national BT law has yet to be enacted.

Moreover, compared with the direct government procurement model, the BT model requires an additional payment of return on investment at a certain percentage to the BT investor (Jiang and Yin 2011). The return rate of investment of the BT investor's self-owned funds and financing cost is usually higher than the owner's direct financing cost (Jiang and Yin 2011). The construction cost of the BT model is higher than that of the traditional procurement model. Thus, the BT model applies only to infrastructure projects that the government immediately needs constructed (otherwise, the local economic and social development are affected) in case of a temporary inadequate funding (i.e., funds cannot be gained from other sources) (Gao, 2009).

The remainder of the paper is organized as follows. The third section presents research methods. The fourth section provides the case background. The fifth section presents the selection of BT investor including selection method and selection criteria. Afterwards, fund Management and risk management of BT expressway are discussed in the sixth and seventh section respectively. This is followed by the conclusion remarks.

3. Research Methods

The complexities of BT projects may vary according to specific project condition and circumstance (Zhang and Tiong 2010). Yin (2009) opine that a case study is regarded as an effective approach to investigate BT model to capture specific project features, gain detailed understanding of its implementation, and draw useful implications. Case study also allow the utilization of multiple data collection methods, including in-depth interviews, document analysis and direct observation, to investigate the prospects of using BT model for infrastructure development (Yin, 2009; Liu 2013). It has been widely adopted in the researches of BOT/PPP projects including wastewater treatment project (Zheng and Tiong 2010), water plant (Chen 2009) and power station (Sobhiyah et al., 2009).

This research aims to present several critical issues on the successful implementation of the BT road project including the *procurement process, selection of BT investor, fund management, and potential risk analysis*. This study was conducted by: (1) literature review on the current regulations for BT projects, (2) close examination and analysis on a BT implementation plan approved by Tongren municipal government, and (3) face-to-face discussion with related professionals and government officials in Daxing District Management Committee. All professionals and officials involved held senior positions at executive level and can provide rich information on the subjective matter. The first author was once worked in the Daxing District Management Committee as a deputy director for assisting in charge of constructing infrastructure from July 2011 to June 2012 and participated in the drafting of BT proposal and negotiating with the potential BT investors.

4. Description of the Case Study

4.1 Project background of the Daxing BT expressway

The Daxing Industrial Zone is located in the northeast suburb of Tongren City, Guizhou Province, with 5.06 square kilometers of developed area in Phase I and a planning area of 40 square kilometers in Phase II. The territory includes the Hangzhou-Ruili Expressway, Chongqing-Huaihua Railway, S201, and Fenghuang Airport for convenient transportation. The development objective of Daxing Industrial Zone is to build a modern industrial city of 400,000 people. The Tongren municipal government plans to build an expressway through BT procurement model to connect the Daxing Industrial Zone and the urban expressway, thereby strengthening the link between the industrial zone and the urban areas, and hastening the development of the industrial zone. The expressway is 1.79 km long (two-way, four-lane), with an estimated total investment of RMB 100 million Yuan. The BT procurement model is proposed for the 12-month construction of the expressway. Daxing District Management Committee is, in charge of the Daxing Industrial Zone and the construction of expressway, an agency of Tongren municipal government.

4.2 Procurement process

The Daxing expressway had been shelved for several months due to budget shortage, but was immediately revitalized upon the adoption of the BT model. Its specific procurement process can be divided into five stages (see Fig. 1).

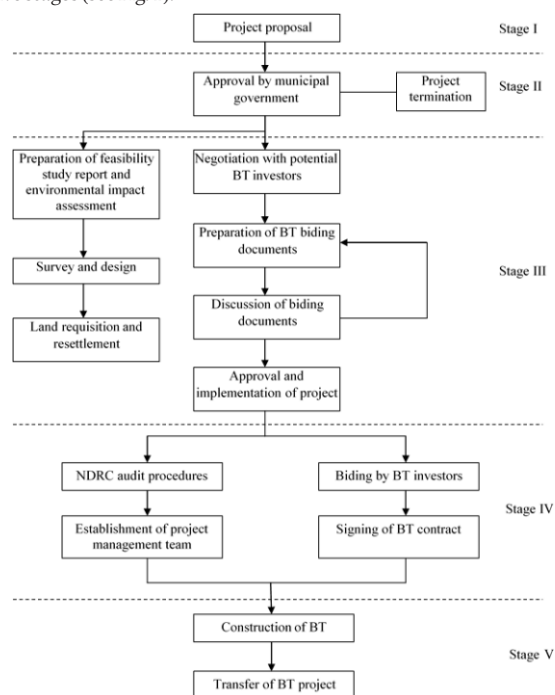


Figure 1. Procurement process of BT projects

Stage I: Project proposal. The Daxing District Management Committee prepares the project proposal for approval of the Tongren municipal government. This proposal aims to verify the necessity and possibility of project construction, investigate the project market (traffic forecast), study the project content (construction scale and grade), analyze technical and economic indicators, estimate the investment, investment model, and funding sources, as well as analyze the project financing model (whether or not to use private capital).

Stage II: Examination and approval of the project proposal. The proposal is reviewed and approved by the municipal government. Then, the Daxing District Management Committee selects the qualified design company to design the project (including schematic and construction drawing designs) and organize land acquisition. The committee also contacts and negotiates with potential BT

investors for the project value, construction period, payment mechanism, and repurchase guarantee.

Stage III: Competitive negotiation. The Daxing District Management Committee selects interested BT investors through competitive negotiation. The committee prepares the BT implementation plan according to the negotiation conditions with the interested investor and presents the plan to the municipal mayor office meeting for discussion. The key clauses of the BT implementation plan are inserted in the notice of open tender.

Stage IV: Open tender. The Daxing District Management Committee officially determines the BT investor through open bidding. The investor with the greatest financial capability, abundant project experience, and creditworthiness is selected. Once the BT investor is determined, the committee negotiates and confirms the terms of the BT contract and then signs it with the successful bidder.

Stage V: Project implementation. The BT investor sets up a project company to handle project financing, building, construction management, and transfer.

The Daxing District Management Committee is in charge of getting related approvals from government. The municipal government convened the heads of government department to strength coordination for accelerating the approval process. The Daxing District Management Committee spent about 6 months to complete the first three stages.

5. Selection of BT investors

A strong private consortium is one of the key factors that lead to the success of a BT project (Cheung et al., 2012). "The government should ensure that the private investor is sufficiently competent and financially capable of taking up the projects (Cheung et al., 2012; Chan, 2010)." A suitable selection method and project-specific tender evaluation criteria are two important issues to ensure selecting qualified BT investors (Zhang, 2004). Given the lack of cooperation experience and trust between local governments and private investors, both sides need effective communication and negotiation to design equitable risk-sharing and guarantee structure. Previous practices indicated that an open tender can easily result in a failed bidding, as the BT procurement model is generally applicable to public infrastructure projects with large amounts of investment and often subject to high government credit risks. For instance, the potential BT bidders for the Shenzhen Metro Line 5 gave up the tender at the last minute because of the high-risk profile of the project. The local government had to switch from an open tender to a direct negotiation. The Quangang 2nd Water Plant and Fuan Community Centre experienced the same in its selection of BT investors.

Reducing the possibility of a bidding failure and ensuring project procurement at an acceptable price is a complex issue for the local government. Commonly used selection approaches in China include competitive negotiation, selective bidding, and open bidding (Zhang, 2004). The Daxing District Management Committee creatively combined competitive negotiation and open tender to select BT investors, as demonstrated in the following steps.

(1) Prequalification was conducted to select potential qualified investors (with sufficient funds and rich experience) through a competitive negotiation after the project proposal was approved by the Tongren municipal government. The BT implementation plan was prepared accordingly based on the negotiation conditions with the potential investors. The plan was then submitted to the mayor office meeting for further discussion.

(2) Open bidding was then performed by the Daxing District Management Committee to determine BT investor after the BT implementation plan was approved by the municipal mayor's office.

The key provisions of the BT implementation plan were inserted in the tender notice.

Competitive negotiation allows for enhanced flexibility and leeway for potential investors to propose innovative financing solutions for project development. Officials are encouraged to enhance their association with private investors (to invite as many investors as possible to participate the negotiation) and required to acquire project management knowledge and experience for competitive negotiation. A competitive negotiation is vulnerable to political corruption because of its poor openness. Government officials may use their power for illegal private gain. Thus, an open competition mechanism is further necessary for exposing the bidder's internal information, including profit expectation and the average construction cost of the project. Open tender is then adopted to reduce the excess profits of BT investors, meanwhile avoid legal risks. The former Ministry of Construction issued *the Administrative Measures for the Franchise Operation of the Municipal Public Utilities* (2004), which specifies the selection procedures of the concessionaires. Open tender is regarded as legal selection model for BT investors. BT investors selected by open tender are usually those who can most likely offer the best price in a competitive negotiation. The combination of competitive negotiation and open tender reduces the possibility of a bidding failure as well as explores the bottom line of the potential BT investors and their lowest acceptable price. The combination of competitive negotiation and open tender maximizes the realization of value for money. The project-specific selection criteria of the DX expressway are as follows:

- The private investor should be legally registered and exists as a valid corporation in China, with a registered capital of at least RMB 50 million Yuan and a financial capacity corresponding to the total investment of the DX expressway.
- The private investor needs to provide a deposit proof of at least RMB 50 million Yuan or the letter of commitment issued by a financial institution at the provincial level or higher. The private investor should also demonstrate a good financial position in the past three years, with no non-performing assets or bad investments. Major properties should not be in the status of receivership, bankruptcy, or other adverse conditions.
- The private investor should possess a general contract qualification of class I or higher for municipal public works issued by the construction administration department.
- The private investor should have a good business reputation, with no record of illegal activities or breach of contract.
- Consortium bidding can be accepted.
- The selected private investor needs to register a new enterprise with independent legal qualification in Tongren City. The registered capital should not be less than RMB 10 million Yuan.

Potential BT investors were evaluated against these criteria. Any tender that failed to satisfy any of these criteria was rejected. The remaining tenders were evaluated through comparison with the tender price of the BT project.

6. Fund Management of the DX expressway

Project financing is intended to use government credit and the project's future cash flow as guarantees to obtain equity capital and debt capital. BT is a form of project financing in which a private sector receives a concession from the public sector to finance and construct the facility stated in the contract. After the completion of the facility, the public sector repurchases the project and pays the repurchase fee to the private sector according to the contract (Li, 2012a). Project valuation and construction fund raising, arrangement of repurchase fund, and repurchase guarantee are the three

core issues for the fund management of BT projects.

6.1 Project valuation and construction fund raising

The government promotes and owns BT projects, with a strong motive for investment control. The private investor has the driving force to pursue interests through its professional advantages (knowledge and experiences) and project control right. Project valuation and project repurchase constitute the interface between the government and the private investor for the settlement of a BT project. In this project, project valuation and construction financing has the following clauses:

(1) The engineering settlement of the DX expressway is based on the *2004 Construction Valuation Fixed Amount of Guizhou Province* (the 04 fixed amount). Labor costs and machine fees should follow the Guizhou Province 04 fixed amount adjustment file. The cost of the main material (i.e., steel, cement, sand, and gravel) should be adjusted according to the average cost in Tongren City within the same period. Pipes and other bulk materials should cost the same as the average price within the same period in Tongren City or follow the review result of the audit department with the approval of the municipal construction cost station. The government in the open tender prefers BT investors with a high floating rate below the 04 fixed amount. All incurred project construction costs, including fund occupation fee, interest, financing costs, and other fees, shall be borne by the private investors.

(2) The construction fund of the project is totally funded by the private investor. The private investor borrows an additional 13 million Yuan to the Daxing District Management Committee for the payment of site survey, design drawings, supervision tendering, land acquisition, and relocation expenses. The loan interest is not accrued. Site surveying, design, and supervision should be entrusted along with or tendered by the Daxing District Management Committee.

(3) The municipal government repurchases the BT project by leasing three plots in the Tongren City planning area. The shortfall of the repurchase fund is paid by financial fund of Tongren municipal government.

6.2 Repurchase fund (land auction)

The Tongren municipal government takes land leasing of three plots in the city planning area as the repurchase fund for the DX expressway. With the high commercial value of these three plots considered, BT investor exhibited great interest in developing real estate in this land. The BT implementation plan thus presents the following regulations on land auction.

(1) The government ensures the completion of land assessment, land auction, and other related formalities within three months to five months from the construction commencement date of the DX expressway. This condition is in accordance with the *Provisional Regulations of the People's Republic of China on Assigning and Transferring the Urban State-owned Land-use Right*. After the contract signing for the compensated use of land, the successful bidder is required to pay the appropriate fees, and the government shall complete the land use permit within two months.

(2) The successful bidder for the DX expressway must unconditionally participate in the land auction while an investor participates in land auction. If investors participate in the land auction, and the land price exceeds the appraised value, the excess land price is completely owned by the tenderer (i.e., the government) rather than returned to the bidder.

(3) If the land is unsold during auction, the tenderer should list the second auction according to relevant regulations within 15 working days. If the second auction fails as well, the tenderer pays a progress payment (80%) in cash according to the civil construction contract

and settles the balance (deducting 5% of the quality warranty amount) within 15 working days after quantities is qualified in the completion audit of the project.

(4) The floor area ratio, building density, and green rate of the three plots must meet the planning requirements of Tongren City.

An auction will be held in three months to five months from the commencement date of the DX expressway. An auction held earlier allows more time for BT investors to recover the fund and presents reduced risk for the government. The government commits to issue a land certificate within two months. The winning bidder of the land can promptly use the land certificate to apply for bank mortgage, thus reducing the pressure of self-financing. Article (3) provides a re-auction interval of 15 days in the event of a bidding failure. A short interval helps bidders to acquire the land at a low price because the price of land does not increase significantly within a short period. If the second bidding fails again, the government also ensures cash payment to BT investors, further reducing the risk of investment recovery of BT investors.

6.3 Repurchase guarantee

Early project practices indicate that government guarantee enhances the enthusiasm of private capital to participate in BT projects and improves the financial feasibility of a BT project (Liu 2012). The repurchase guarantee for BT projects includes four types: (1) financial capital or land collateral, (2) state-owned investment company's assets, (3) guarantee letter issued by the bank or other financial institutions, and (4) credit from the government. In the DX expressway, the government has only agreed to use the land lease of the three plots as the repurchase fund but has not mortgaged the land to the BT investor. The BT investor thus faces a large government credit risk. Liu (2012) suggested that if valuable land or asset collateral is not obtained, the BT investor can require the government to provide appropriate administrative files to lower the government credit risk. These documents include the mayor's meeting minutes, the BT project repayment plan issued by the Finance Bureau, and the funding plan resolution to repurchase the BT projects approved by the National People's Congress.

7. Risk management of the DX expressway

7.1 Risk sharing scheme

Risk sharing for BT projects can be divided into three stages, as shown in Figure 2.

Stage I: Initial risk-sharing. The government determines the interested BT investors through negotiation and prepares the BT implementation plan in accordance with negotiation conditions/results. The BT implementation plan is the initial risk sharing file of the BT project.

Stage II: Formal risk-sharing. An open tender is conducted to select the BT investors and determine the most qualified bidder. The BT contract has a comprehensive and clear allocation of risks.

Stage III: Risk-sharing adjustment. The risk sharing model defined in the concession agreement may need further modification during implementation when unpredictable risks occur or the importance of estimated risks change.

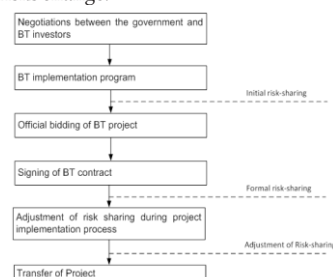


Fig. 2. Stages of BT project risk-sharing

According to the BT implementation plan, the project construction fund was fully raised by the BT investor because the local government failed to provide any financing guarantee. Project construction costs, including fund occupation fee, interest, financing costs, and all other fees, shall be borne by the BT investor. The government shall conduct tender or/and commission the design unit on its own and be responsible for electricity, water, and road access outside of the planning red lines of the DX expressway. This condition is set to control the project cost. All infrastructure systems in the project area shall be undertaken by the BT investors themselves. The government assists to obtain the project commencement procedures (including planning and construction permit) and ensure that the project started on time.

The BT contractor is required to mobilize within 15 days after signing the contract. If the individual project is suspended for 30 days during the delivery of the BT contract for reasons attributable to the BT investors (other than force majeure), the government reserves the right to terminate the contract. Only 90% of the completed project cost audited by the audit department shall be paid, and the BT investors shall demobilize unconditionally. If the individual project is delayed for 30 days or more for reasons attributable to the BT contractor (other than force majeure), 5% of the price of the unfinished project (individual project) shall be paid as default payment for each 30-day extension. The penalty shall not exceed 10% of the price of the outstanding work. If the project is delayed for more than 60 days, the government has the right to terminate the contract. Only 90% of the completed project amount audited by the audit department shall be paid, and the BT investors shall demobilize unconditionally. The project construction period is tentatively scheduled for 12 months. The specific risk allocation is illustrated in Table 1.

Table 1. Initial risk-sharing scheme

Implementation stage	Risk factors	Explanation of risk factors	Risk allocation	
			Govern ment	Investors
Investment and financing	Financing fund	Delay or insufficient fund		√
	Financing guarantee risk	Provision of financing guarantee by the government		
	Interest rate change			√
Survey and design	Survey risk		√	
	Design risk		√	
Preparation	Land requisition and resettlement		√	
	Supporting facilities		√	
Construction	Delay of construction period	Delay caused by government	√	
		Delay caused by BT investor		√
	Overspending of cost	Rise in material cost	√	
Repurchase	Repurchase guarantee risk			√

7.2 Analysis of potential risk factors

Early practices indicate that the potential risks may compromise the value for money of BT projects (Du and Tang 2012). Local governments usually overemphasize the financing function of the BT model but ignore its operational risks (Li 2012b). The DX expressway may suffer the following risks during the implementation period.

(1) Government credit risk--BT project repurchase is based on the government's future revenue. Most cities in mainland China are currently in the stage of rapid urbanization, with a large number of infrastructure systems being built (Gao 2009). The government's financing platform incurs huge debts that are likely to result in the lack of repurchase funds for specific BT projects. The local government also lacks a clear funding repayment plan for BT projects (Sun 2008). Thus, project repurchase may face a high government credit risk.

(2) Project quality risk-- A BT project may have multiple subcontractors. Subcontractors usually assume loaning functions. Thus, the larger the number of subcontractors, the fewer funds the BT investor needs to raise. The investment in the BT model is recovered through governmental repurchase payment. Once BT investors invest funds, they must face government credit risk. Maximizing the use of subcontractors' money can help reduce the financial security risk of BT investors. However, a large number of enrolled subcontractors could enhance the coordination quantity of BT project managers but sacrifice construction standards and engineering quality. The project may subject to a great quality risk.

(3) Cost overrun risk--The DX expressway project adopts the unit price contract. BT investors have strong motives to expand input and increase profit by increasing the cost scale. Thus, the engineering cost can easily exceed its limit. Many scholars believe that "sum contract is more suitable for BT project in order to reduce the possibility of losing control of cost." For example, the 40-km long Shenzhen Metro Line 5 has an investment budget of 20 billion yuan applied in a lump sum contract (Du and Tang 2012). However, a fixed price contract does not always meet the actual conditions of BT projects. The investors with capital usually take the initiative during BT contract negotiations and can influence local governments to adopt a unit price contract. Runaway investments may also affect the balance of the overall urban construction fund plan, resulting in a shortage of funds for repurchasing other projects (Zhang 2011).

8. Conclusions

The BT model provides an alternative funding mechanism for delivering non-profit infrastructure projects and is increasingly being adopted in mainland China. Four conclusions are drawn based on a case study of the DX expressway in China.

(1) Procurement of BT projects consists of the following stages: project proposal, examination and approval of the proposal, competitive negotiation, formal tender, and project implementation. BT infrastructure projects involve large investments and high government credit risk. An open tender is likely to result in a bidding failure. The combination of competitive negotiation and open tender does not only reduce the possibility of a bidding failure but maximizes the realization of value for money as well.

(2) Investors with strong financing capability, construction expertise, experience in similar engineering projects, and credit-worthiness can promote the success of BT projects. Specific criteria for the selection of private investors of the DX expressway were presented, which can be referred to for BT projects in future.

(3) Three core issues in the fund management of the DX expressway were presented and discussed. These issues include project valuation and construction fund raising, arrangement of repurchase fund, and repurchase guarantee.

(4) Government credit risk, project quality risk, and cost overrun

risk are three potential risk factors that may compromise the value for money of BT projects.

The case studied may not precisely reflect the generalized features of BT projects. However, the findings of the study can provide valuable management implications for BT practitioners.

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