

AN OVERVIEW OF CHINA'S CONSTRUCTION PROJECT TENDERING

Patrick X.W. ZOU

Faculty of the Built Environment, The University of New South Wales, UNSW Sydney 2052 Australia. Email: P.Zou@unsw.edu.au

Abstract

In order to achieve a fair, probity, transparent and open competition environment in the construction industry, the Chinese government has developed and applied a multi-criteria competitive tendering system for the procurement of construction projects. However in many cases, the system only works on compilation of requirements and problems still frequently occur. The aim of this paper is to review the current construction tendering system and practice and propose strategies for improvement. A number of methods have been used to obtain research data, including focused group workshops and discussions, on-site observations, desk top study of relevant regulations and policies and review of three actual project tendering cases. It was found that China has gone a long way from project assignment to the current competitive tendering practice. However, the current tendering system has prevented bidders from focussing on value for money and construction innovation. Furthermore, the tender evaluation processes were rather formal and compilation of procedures and requirements than in-depth and project-specific. In addition, the time (half a day) given for evaluating tender submissions was insufficient. In some cases, the tender evaluation criteria was set after the bidders had been selected and there was no mechanism in place to review or audit the contract award decisions made by the tender evaluation committees. Based on these findings, it is suggested that as part of the market economic system, the Chinese government should allow bidders to calculate project cost on the basis of market price information and the company's technical and management capabilities, instead of following quotation books and regulations and guidelines issued by the government. It is also suggested that detailed evaluation criteria be prepared prior to calling for tender and more time be given to evaluate tender submission documents. Finally, it is suggested that random audit of archived cases be conducted to ensure the decisions made were fair, open and probity.

Keywords

China, construction industry, tendering, value for money

INTRODUCTION

Since the 1980s, China has implemented many national economic reform policies aimed at speeding up its economic growth. The government's strategy to achieve this aim is to change its planned economic system into a market-oriented economy system within a socialist context, which in turn will promote competition among economic sectors. This change, no doubt, has a significant impact on the operation of the construction industry which employs a workforce of approximately 50 million. An obvious impact of such reform is the procurement of construction projects that has been changed from government assignment to competitive tendering. From an external environment perspective, China has been the largest construction site in the world and this situation will last for at least several more years given the boom of the Chinese economy and its needs in the development of infrastructure. Furthermore, China has joined the WTO (World Trade Organization), which means many new opportunities have been presented to the world. Some construction companies have established business in China while many more are looking for opportunities there. This also requires China to further develop its construction tendering system. With the aim of promoting a fair, probity,

transparent and open competition industry environment, the Chinese government developed its multi-criteria competitive tendering system for procurement of construction projects in the 1990s (Ministry of Construction 1991, 1992, 1993 and Jiangsu Provincial Construction Commission 1997, 1999). However in many cases, the system only works on the surface and there are several problems in construction such as the running over of cost and time, poor quality, and corruption which still occurs frequently.

The Chinese government has worked with the Australian government on the joint project “Promotion of Honest Administration in China’s construction industry” as a part of a larger project “China Capacity Building Program”. The Australian government provided funding for the project execution. As such, an Australian technical advisory group was established. The group consisted of 7 members, two academic researchers (including the author) and one project co-ordinator from the University of New South Wales, two senior managers from the New South Wales State Government Department of Public Works and Service (now called the Department of Commerce), an officer from Australia Federate Police and a lawyer. The Chinese counterparts included officials drawn from the Ministries of Construction and Supervision at various levels – State, Province and City with more than 50 officials participating at different stages of the project. This paper is written based on the information gathered in discussions and workshops held between the joint project teams, on-site observations and study of archived cases.

RESEARCH AIMS

There are two aims of this paper. The first is to conduct a comprehensive review of the tendering criteria and processes, and propose strategies for future improvements. The second aim is to provide useful information to all parties concerned, including the Chinese construction personnel and international companies who are planning to enter the Chinese construction market.

The information presented in this paper should be of interest to all parties concerned including Chinese construction personnel and foreign companies which plan to enter the Chinese construction market in the near future. For Chinese construction personnel, the strategies and suggestions presented in this paper may help achieve continuous improvement in its current tendering practice. For foreign companies planning to enter the Chinese construction market in the near future, this paper would be useful for them to better understand the Chinese tendering policies, systems and their operation as well as construction culture, and to develop business strategies accordingly. For other developing countries, the information presented in this paper maybe a useful reference.

RESEARCH METHODOLOGY

A number of research methods have been used to obtain research data, including focused group workshops and discussions, on-site observations, desk top study of relevant regulations/policies and review of three actual project tendering cases. Surveys and interviews were also held with government officials and contractors in China in four cities – Beijing, Nanjing, Suzhou and Wuxi. The joint project team met many times and held many discussions and workshops in both Australia (Sydney) and China (Beijing and Jiangsu province). In addition, the Australian

technical advisory group have also had opportunities to observe the actual tendering operation and checked in details some archived tendering cases/projects.

The project team members and survey/interview samples were chosen carefully to reflect their expertise and capabilities in the field of construction tendering. As mentioned previously, the Australian group included seven members drawn from both academic and industry practitioners. Likewise, the members of the China side included construction personnel who have direct responsibilities and experience in construction tendering. In total, there were more than 50 Chinese officials and contractors who participated in the project and they came from three different government levels – the Ministry central level, Provincial level and local municipal level. As such, the data and information generated from these groups/people is representative.

The focused group workshops first reviewed China's current tendering practice, and then identified the advantages and disadvantages of the current tendering system and practice. In the third step, survey questions were prepared and distributed to Chinese government officials and contractors. At the fourth step, the joint project team met to develop strategies aiming to improve China's construction tendering system and practice.

BRIEF HISTORY OF CHINA'S CONSTRUCTION TENDERING

Tendering has been used in Western countries for more than 200 years. In China, the practice of procuring building and civil engineering works through tender dates back to the turn of the last century (Wang *et al.* 1998). Following the Opium War (1839 –1842), China was forced to open to Western countries and the tendering procedure was brought into the country. It was mainly used in the coastal areas and major urban centers. Table 1 provides a brief summary of the major progress and reform events related to the construction market and operation in China.

Tangible Construction Market (TCM)

TCM is a physical venue (i.e., buildings, offices and facilities) managed by the government, where all project information is released and all tendering procedures and processes are carried out. At this stage, the TCM is mainly used for managing the tendering of government-funded projects with a scale of \$500,000 RMB or more. The operation and underlying philosophy of the TCM is quite unique and complex. For this reason, the workings of the TCM are described in some detail in this paper. The TCM provides the following three services to companies and government departments involved in construction industry:

- *Information service* -- List all government-funded projects for open tendering purpose;
- *Venue service* -- the TCM provides venue (offices) for all project stakeholders to carry out tendering processes.
- *One-stop service* -- All government departments and agencies involved in the tendering processes have an on-site office within the TCM (note more than 10 government departments are involved in the approval of development or construction permits). This arrangement allows contractors and designers to be able to obtain relevant approval within the TCM which improves their work efficiency.

Table 1 Major reform events in the Chinese construction industry

Time period	Major reform event
1 Oct 1949	<ul style="list-style-type: none"> • Founding of People's Republic of China
1949 to 1957	<ul style="list-style-type: none"> • The tendering approach was replaced by government contracting construction works to local construction enterprises. • This contracting system worked quite well during this time period (Wang <i>et al.</i> 1998).
1957 to 1978	<ul style="list-style-type: none"> • The Chinese construction industry suffered severe setbacks from many political fluctuations including "great leap forward" in the late 1950s, and the "cultural revolution" in the 1960s and 1970s (Mayo and Liu 1995, Shen and Song, 1998). • The contracting system was abandoned. The government assigned projects and reimbursed project cost to state-owned construction companies. • No competition among construction companies and no motivation to maximize profits. Construction management staff had no responsibility for overrun of budgets and construction time. • No system for project cost or construction time control. • The construction industry was known for its low efficiency and ineffective (Chen 1997, Shen and Song 1998, Luo and Gale 2000).
1978 to 1980	<ul style="list-style-type: none"> • China's economic reforms and open-door policies was declared by the Third Plenary Session of the 11th Central Committee of the Communist Party of China. Radical changes took off. • The State Construction Commission (the predecessor of the Ministry of Construction) prepared and issued the Recommendations on Contracting Capital Construction Projects in April 1979. It required that a contract be entered into between the client and construction company who was to build a state project.
October 1980	<ul style="list-style-type: none"> • The tendering system was adopted formally in Shenzhen Special Economic Zone for construction works. • The government's first document "provisional regulations on developing and protecting the socialist competition through competitive bidding systems" was issued. • The government provided guidelines and regulations to change two key issues: (1) the project financing arrangement from traditionally free allocation of government funds to loan from commercial banks and (2) the project procurement system from governmental assignment to competition through a tendering process.
May 1984	<ul style="list-style-type: none"> • A tendering system was adopted nationwide as a measure for reforming the Chinese construction industry during the Second Plenary Session of the Sixth National People's Congress. • the State Planning Commission and the Ministry of Construction jointly issued the first official regulation promoting and governing the application of competitive tendering methods in Chinese construction (<i>Provisional 1984</i>) (Shen and Song 1998). • A number of research works about tendering was conducted to meet the demand of education and training for construction professionals, including "Competitive tendering methods for construction project contracts" (Lu, 1985), "Tendering manual for construction projects" (Lu and Zhang, 1987) and "Working manual for tendering international construction projects" (Yang and Zhao 1990). • Tendering system has become popular in Chinese construction market (Shen and Song, 1998 and Wang <i>et al.</i>, 1998).
late 1980s to early 1990s	<ul style="list-style-type: none"> • Cost was the only measure of the tender submission. The assumption was that time and quality requirements would be met by all companies submitting tenders. • Due to the lack of control measures, the problem of unfair competition quickly grew to become the most serious problem in the construction market. • Many complaints made by state-owned firms for being not able to find jobs and problem of bribery for purposes of obtaining project contracts occurred (Shen and Song 1998). • Significant doubts were raised about the applicability of a competitive tendering approach where state-owned firms are in the majority. • Because some of these firms could not secure jobs, many construction personnel found themselves unemployed and this situation became critical which presented a strong and urgent need for the introduction of a proper management system governing the tendering practice.
1992	<ul style="list-style-type: none"> • The Ministry of Construction (MOC) issued formal regulations specifying management measures for controlling tendering practice (MOC, 1991, 1992 and 1993), specifying the tendering procedures and regulates the management roles and functions that various government departments should take to ensure fair competition in the market (Shen and Song, 1998, Bajaj and Zhang 2003, Shen <i>et al.</i> 2004) • The regulations implementation was effective in controlling many problems expressed in the market. However, the government action gradually appeared to become an administrative barrier for further development of the competitive tendering system. • Some studies indicated that higher project cost and delayed project were again developing (Wang and Jiang 1994, cited in Shen and Song 1998). • This shows that the administrative interference in the tendering process could maintain a reasonable market practice for a short time but it would become a barrier to its long-term development (Shen and Song, 1998).
1995	<ul style="list-style-type: none"> • The establishment of a legal system for tendering procedure has become one of the most important reform programs. The government has developed relevant regulations and laws. • Tangible Construction Markets (TCM) was introduced.
Aug 1999	<ul style="list-style-type: none"> • The Ninth National People's Congress approved the tendering law which was enacted from 1 Jan 2000. • At the same time, education and training has become an important channel to promote tendering legislation.

TCM operates at the Provincial, Municipal and County Government levels. Provincial TCM provide services for the provincial government funded projects, while the Municipal TCMs and County TCMs provide services for projects funded by corresponding bodies. The TCMs are subject to the Provincial Government Ordinances and Regulations, and as such, have similar operation procedures and structures and these regulations in turn regulate the tendering activities and decision-making to be within the TCMs. The author has investigated the operation of TCMs in three cities and noticed that they operate on similar levels, and carry out equivalent functions. Differentiation between the observed TCMs lay mainly in the method of use of information technology, particularly in the use of web-based technology to publicize and distribute project information to the market such as call for tenders, expressions of interest and project details. Issues like the current workload and supplier performance information of the contractors are also kept in the database. Out of the three TCMs in these cities, one TCM used a prepaid smart card to allow clients and contractors access to more detailed project information which is kept in the TCM's database.

Related Previous Research

Topics related to the Chinese construction industry have received academic interest in the English-language literature since the commencement of the country's economic open door policy in 1978 (Xu *et al.* 2005). There have been various publications related to the construction industry reform, evolution and tendering system used in China, such as Mayo and Liu (1995), Shen *et al.*, (1996); Shen and Song (1998); Chan *et al.* (1999); Wang *et al.* (1998, 1999, 2000); Chen *et al.* (2000); Shen *et al.* (2001), Lai *et al.* (2004), Shen *et al.* (2004), Lam and Chen (2004) and Xu *et al.* (2005) as well as Shen *et al.* (2006).

Mayo and Liu (1995) discussed the reform agenda of the Chinese construction industry and so did Lu and Zhang (1997) who have reviewed the research on allocation of construction works through competitive tendering. Similarly, Chen (1997) studied the impact of Chinese economic reforms upon the construction industry including the relationship between construction and investment and national economics. Luo and Gale (2000) introduced the evolution of the Chinese construction industry with a specific focus on the construction management and administrative system and the roles and functions of the Ministry of Construction while Bajaj and Zhang (2003) discussed management issues in relation to the construction industry development in China including the traditional construction management, the formation of project supervision, organizational structure and its key activities. Wang *et al.* (1998, 1999, 2000) conducted a series of research (mainly based on case studies) on China's BOT (Built, Operate and Transfer) projects including the processes of evaluation and competitive tendering, government's initiatives, the related unique but critical risks involved in BOT projects. Shen and Song (1998) examined the development and characteristics of competitive tendering practices in the Chinese construction market through postal surveys and interviews. They pointed out that a number of key issues required the Chinese government's attention such as partial competition, inconsistency of procurement documentation, construction triangular debt, challenge to the state-owned construction enterprises and legal control. Chan *et al.* (1999) also reviewed the tendering system in China and the management difficulties encountered. More recently, Shen *et al.* (2004) examined the issue of awarding construction contracts on multi-criteria basis in China where they examined the construction business environment there and criteria used in assessing contractors' competitiveness followed by developing a contractor competitiveness parameter model which consisted of 7 components. Lam and Chen (2004) reviewed China's Construction Law and Bidding and Tendering Law. Lai *et al.* (2004) discussed in detail the tendering method used in Beijing Municipal Construction

Committee with a real case study and they pointed out that the current method is insensitive to the important criterion “bid price”. They also pointed out that different cities were using different criteria with different components. However, they stated that with the introduction of competitive tendering, corruption in the industry has been whittled down (but they did not provide any evidence apart from the number of detected and reported cases). They finally commented that China’s tendering system still has a long way to go to match international best practice. More recently, Shen *et al* (2006) discussed and identified the contractor key competitiveness indicators (KCI) in the case of China and listed 45 indicators. They then used Analytic Hierarchy Process (AHP) technique and cluster analysis method to analyse these indicators together with conditions in China to support their framework. They claimed that the identification of KCI provides valuable information for helping contractors prepare themselves effectively when they consider competing for works.

Current Tendering Processes: A Case Study

Table 2 shows the key steps and procedures for tendering, contract award and obtaining construction permits. The processes shown in Table 2 are the ones used in Nanjing City but other cities have similar processes/procedures. It is clear that the process is quite complicated and involves many government departments. The following sections describe the tendering processes in details.

Tender Preparation by Clients

A tender evaluation committee must be formed for every construction project with a value of more than \$500,000 RMB (Chinese currency). The committee’s responsibilities include call for tender, deciding eligible companies (ie qualification check), selecting companies for bid submission, releasing tender documents and project drawings, organizing site visits, answering questions, developing evaluation criteria, opening tenders, evaluating bid submissions, and determining which company should be awarded the contract. There are strict requirements/guidelines/rules set by the government on the formation of a tender evaluation committee: (1) the committee must have the required technical, economical and management abilities; (2) the committee should have the ability to calculate or audit the estimated project cost/price (it is called “Biao-di” price in Chinese), and to verify the contractors’ qualification; (3) the committee should comprise members of: client representatives, the client’s parent company’s representatives, qualified economic or technical experts, and representatives from the tender management office (a department of the construction commissions); (4) the number of experts should be at least two-thirds of the total number in the committee and (5) the experts should be randomly chosen by computer from the expert database.

Calling for Tender and Bidder Selection

Clients implement a significant portion of the work involved in “Call for Tender”: (1) Within 30 days after receiving all necessary government approvals, clients must register their project for bidding through the TCM’s electronic notice board and white board. (2) The client calls for expressions of interest from registered contractors. (3) The client prepares bid documents by themselves or a professional agent (ie a qualified quantity surveying company). The bid documents are then vetted by construction commission staff in the TCM prior to actual bids being invited by the client. Interested companies expressed their interest and formally lodge an application for submitting bids.

According to technical capability, financial capacity, past performance (reputation) and company asset, every construction company is qualified as either Grade 1, Grade 2 or Grade 3

Table 2 Tendering Processes of Construction Projects in China

Phases	Procedures	Concerned bureaus or offices	Contents
Preparations before tender call	Licence of land	Nanjing Municipal Administrative Bureau for National Land	Check the licence of land
	Licence of town planning	Nanjing Municipal Bureau for Town Planning	Check the licence of town planning
	Auditing before commencement of construction	Nanjing Municipal Audit Bureau	Check and handle the auditing before commencement of construction
	Registration of construction project	The information division of NCPTC (Nanjing Construction Project Transaction Center)	Register and publicize information of public tender
Tendering of construction project	Tendering of construction supervision company and the tendering of construction equipment	Division 3 of NMAOT (Nanjing Municipal Administrative Office of Tender)	Handle affairs about the tendering of construction supervision and the tendering of construction equipment
	Tendering of construction	Division 1 of NMAOT	Countercheck the qualification of bidder and handle the project of direct contracting
		Division 2 of NMAOT	Check the tender call documents, supervise the procedures of opening and evaluation bids, countercheck the notification of tender award
		The director's office of NMAOT	Countercheck the notification of tender award
Other related procedures	Notarization of tendering	Nanjing Municipal Notarization Bureau	Notarization of the procedures on inviting and submitting tender
	Registration of local tax	Nanjing Municipal Local Tax Bureau	Registration of local tax
	Management of construction cost	Nanjing Municipal Administrative Office of Construction Cost	Countercheck the kinds of calculating construction cost
	Authenticate the contract	Nanjing Municipal Administrative Bureau for Industry and Commerce	Authenticate the contract on project construction
	Registration of construction enterprises	Nanjing Municipal Administrative Office of Construction Nanjing Municipal Administrative Office of Municipal Engineering	Registration of the construction enterprises of tender award
	Supervising quality of construction project	Nanjing Municipal Administrative Office of Supervising Quality of Construction Nanjing Municipal Administrative Office of Supervising Quality of Municipal Engineering	Draw the "Application Form of Supervising Quality of Construction Project"
	Supervising safety of construction project	Nanjing Municipal Office of Supervising Safety of Construction Nanjing Municipal Office of Supervising Safety of Municipal Engineering	Draw the "Application Form of Supervising Safety of Construction Project"
	Management of solid garbage	Nanjing Municipal Administrative Office of Solid Garbage	Handle affairs on solid garbage
Construction Permission	Licence of construction commencement	The construction office of the Construction Committee of Nanjing Municipality	Grant the licence to the owner for according with conditions for commencement of construction

(source: Nanjing Municipal Construction Commission)

by the Ministry of Construction. To be eligible to participate and submit tenders, all contractors/suppliers of construction services are required to register with the Municipal Construction Commission. Registration is a relatively straightforward process, requiring the provision of details of relevant financial data, organisational experience and expertise, as well as key staff and their past experience.

The qualification (i.e. Grade 1, 2 or 3) and past performance of each interested company is checked against the selection criteria. When too many qualified companies express interest in submitting bids, two methods may be used: (1) random selection using a computer program or (2) by scoring -- scores are given to each company based on their past performance in terms of quality and safety, capability etc. The selected companies are notified by the committee to submit bids.

Tender Receipt, Open and Evaluation

The tender submissions (with company seal) are lodged in a double locked tender box. The keys are kept separately by the client and officials of the construction commission department (or Notary Department). According to the Tendering Law of the People's Republic of China, the deadline for tender submissions and the time of opening tenders is at the same time. The tender opening is conducted in the TCM tender opening room under the supervision of construction commission official or a person from the Notary Department, generally the day after tenders are lodged. The bidders must also be present, or their bids become invalid. All key processes are notarised by an official from the Notary Department.

The bid process is generally in two envelopes where the first envelope contains price details and company information. This envelope is opened first and information is placed on a notice board in the tender opening room to be reviewed by all present, including bidders. The second envelope, containing the information of company profile, qualification, past performance, safety accreditation, proposed project team and technical plan, subject to the non-price evaluation criteria, is then opened in the presence of the bidders and notary officers. The bidders then leave the room and independent evaluation experts are brought in to conduct their evaluation, scoring each bidder without knowing the bidder's identify. When the experts have completed their tasks, the scores are then computed, verified by the construction commission's officials and the results read out, and posted on TCM notice boards for the next two days. For most contracts, this process takes half a day, hence bidders know their status on the day tenders are opened.

The Expert Evaluation Panel

The Provincial Guidelines state that engineers and economists in the construction field with five years working experience, together with support from the company he/she works for, can apply to be registered as experts. (However, in most cases, the approval is only given to senior engineers and economists who have 8 or more years work experiences). There is a training section and test held to test the applicants' ability and suitability to be experts in examining the tender submissions. An expert database is created and maintained and each expert has an identification number. The expert database is divided into different classes according to professional majors: structural engineering, plant/equipment installation, hydraulic engineering, electrical engineering etc. The selection of experts to evaluate a particular project is done by computer on a random base. The computerized random selection of experts is done half a day before tender evaluation. The selected experts are then informed to come forward almost immediately and evaluate the construction strategies/plans. The reasons for such short lead-

time and tight arrangement are to prevent possible collusion between the selected experts and bidders.

Tender Evaluation Criteria

The selection of a best suitable company for the construction work is not based on the rule of “lowest price wins” but a multi-criteria including price, time, quality and construction plan and company’s profile, past performance as well as proposed project team. A detailed tender evaluation criterion is normally specified in the tender document but in some cases prepared by the tender committee one day before the opening of the tenders. A score system, normally a 100-point system, such as the ones shown in Table 3 (adapted from Jiangsu Provincial Construction Commission 1999, No. 335 Document) is used. Table 3 means the points allocated to price components should not be less than 50 while the points for construction plan/strategies should not be more than 20. Likewise, the composition of the project team may gain up to 10 points (but no more than 10 points), and so on so forth. The total maximum points should not exceed 100. Normally, the company obtaining the highest score will be awarded the construction contract.

Two major criteria – “price” and “construction plan” are discussed in detail below since they are the most complicated and important components.

Table 3 Tender evaluation criteria used in Jiangsu Province, China (1999)

Component	Points Allocation
Price	≥ 50
Construction plan/strategy	≤ 20
Project team (Project manager’s qualification and performance)	≤ 10
Company past performance, financial capacity	≤ 10
Quality and time guarantee/assurance	≤ 5
Company reputation and qualification	≤ 5
Total	= 100

Price Component

The price component includes both the client’s own estimated project price (it is called “Biao-di” price in Chinese) and the bid prices submitted by all bidders. Each of this is validated and then combined using a weighted average and percentage methods to derive a so-called “Reasonable Price”. Based on this “Reasonable Price” another price called “Optimal Price” is then derived and used as the contract award price. Detailed discussion is provided in the following sections.

The clients’ estimated project price (ie “Biao-di” Price) -- “Biao-di” price is the price prepared by the client as a reference price or base line price for the project. The “Biao-di price” is normally calculated by a qualified company based on drawings, price index, and “price and quantity quotation books” released by the government and in accordance with relevant regulations and laws. The only items that can be varied with a small margin are the management fees and the profit margin. This “Biao-di” price must be audited by the Construction Bank (or equivalent) and approved by the tendering office. The “Biao-di” price must be kept strictly confidential in TCM.

Bid prices validation -- All submitted bid prices must be validated by comparing each bid price to the “Biao-di” price. A bid price is not qualified/valid if it is outside a range of 92% - 108% of the “Biao-di” price.

Reasonable price -- After validation of bid prices, Equation (1) is used to determine what is called a “Reasonable Price” ($P_{reasonable}$). This formula combines “Biao-di” price (P_{client}) and the average of the bidders’ prices (P_{bidder}) using two weighting factors.

$$P_{reasonable} = \alpha P_{client} + \beta P_{bidder} \quad \text{Equation (1)}$$

Where

$$P_{bidder} = (\sum P_i)/n$$

$P_{reasonable}$ is the weighted reasonable price,
 α is a factor set by tendering committee with the value between 0.3 -- 0.7
 P_{client} is the “Biao-di” price determined by the client or its delegates who have the license/certificate in cost estimation.
 $\beta = 1 - \alpha$
 P_{bidder} is the average of the bid prices submitted by all bidding companies.
 P_i is the individual bid price submitted by each bidding companies
 n Number of companies who submitted bids

It should be noted that in some cases, two other methods have also been used for determining the Reasonable Price: (1) the “Biao-Di” price prepared by the client or its agent is used as the reasonable price and (2) No “Biao-Di” price was prepared, instead, the average price of the submitted bid prices is used as the reasonable price. But in this case, the highest bid price and the lowest bid price are discarded.

All submitted bids are then compared to this “Reasonable Price” ($P_{reasonable}$), and a score is given to each bid on the basis of how close the bid is to the “Reasonable Price”. The bid that is the closest to this “Reasonable Price” gets the highest point. Points are deducted for those bids that are either above or below this “Reasonable Price”. In other words, the bid that is equal or closest to the “Reasonable Price” gets the highest mark, and 3-4 marks are deducted for every 1% increase or decrease (i.e. above or below) the “Reasonable Price”.

Optimum price -- Before the contract is awarded, the “Reasonable Price” is converted to a so called “Optimum Price”. The “Optimum Price” is determined using a deduction factor k as shown in Equation (2). The factor (k) is not greater than 1 and is normally in the range of 0.93 to 1 depending on types of construction projects determined by the tender evaluation committee. There seems to be no reason why such factor is applied.

$$\text{Optimum Price} = k (P_{reasonable}) \quad (k \leq 1) \quad \text{Equation (2)}$$

The “Optimum Price” is used as the contract price for the contract award.

Construction Plan

The construction plans should include the main strategies that will be used for construction and this plan is worth up to 20 points. The construction plan is evaluated by the experts according to the following criteria:

- If the construction method is advanced and reasonable/logical;
- if the construction plan is scientific, reasonable/logical, and reliable;
- if the quality and safety strategies are reliable;
- if site layout and occupational measure is reasonable/logical and reliable;
- if main construction plant and equipment and labour allocation is reasonable; and
- if the project team (including management and technical personnel) is capable.

The government guidelines recommend that, unless there are major mistakes in the construction plan, the points given to each bid should not be less than 60% of pre-determined total points. The time given to the experts to evaluate all bid submissions (mainly the construction plans) is normally half to a full day.

Contract Award and Record Archiving

The tender selection committee combines the points for each bid and ranks the bidders according to the total points they received and hands them to the client to make a contract award decision. Normally, the bidder with the highest points will be awarded the contract. Following the conclusion of the tender evaluation process, the client is required to obtain all necessary pre-construction approvals before a contract can be executed. The contract must be signed within 30 days from the time of tender opening. Once the contract is signed, an archive file is made up, consisting of all key relevant transaction documents for the project to this stage. This goes back to copies of the registration of the project with TCM to the actual letter of acceptance. It also includes copies of all relevant approvals obtained from the various “competent” authorities that have jurisdiction over the project. Other information on the archived file includes: list of registered contractors who expressed interest; copy of client’s request to the TCM to call tenders; public tender notice; report on interested registered contractors; copies of all correspondence between the client and TCM; evaluation report of the experts. The file is archived in the TCM for two years, and is then forwarded to the Municipal Archives. The file is readily accessible to MOC staff who would deal with the complaint if indeed any arise about the bidding process.

DISCUSSIONS AND PROPOSED STRATEGIES FOR IMPROVEMENTS

In the following sections, the current construction tendering system and practice is discussed and a number of improvement strategies are proposed.

Conformation with Tendering Polices and Regulations

It is found that the bidding and tender evaluation processes carried out inside the Tangible Construction Markets (TCMs) appeared to conform with the published procedures, and reflect the principles of probity, fairness, transparency, as outlined in the various State, Provincial and Municipal Ordinances and Regulations. The various laws, regulation ordinances and procedures governing the procurement of capital works establish a sound framework for the operation of TCMs. Critical issues such as probity, conflict of interest, transparency, fairness to all parties and a consistency of process are properly addressed in these documents. However, while roles for the relevant administrative departments are listed in these documents, they are not detailed in areas of project supervision post-contract award despite the clear mandate through the Provincial Ordinance for such a role. Furthermore, while regular performance reports are required to be made on registered contractors, no mechanism was identified which linked these reports to ongoing registration status. A proper linkage could result in incentive for better performance due to potential threat to registration status which is a prerequisite for bidding on contracts.

Tender Prices versus Value for Money: Review of Three Archived Cases

Whilst probity issues are soundly dealt with, the issue of value for money is somehow a different story. There is some concern in the way the bidders’ prices are evaluated. The concern centres on the practice of deducting points from bidders whose price falls below the established reasonable price. Since the “Biao-di” price is calculated according to the price index, quotation books

and guidelines provided by government, one can predict it quite accurately for a given project. It appears that this validation process is a major problem that burdens cost saving and hence forces bidders to be innovative or focus on value for money since all bidders will try to match the “Biao-di” price rather than focus on lowering the tender price, improving management efficiency or shortening construction time. The tender price evaluation process on basis of nearness to some sort of reasonable price (which can be pre-determined) mitigates against the efficient contractor, as bids below the pre-set “reasonable price” are scored down.

Three actual cases were examined/reviewed by the author. The first one was a piling contract worth some \$4 million RMB. All bids received were very close (within 2% from highest to lowest). Obviously, this method works against any bidder who is more efficient, as the contractor is discouraged to bid a price below the “Reasonable Price” due to the fact that he will lose points and is therefore unlikely to be the winning bidder. As in piling case, it was set at 92% of the “biao-di” price, the published evaluation criteria will lead all bidders to bid a sum of 92% of the “biao-di” price which is prepared using published national standards, and this can be calculated by the bidders.

A similar situation occurred in the other two cases examined. In the second case (the interior fitout of a convention center), all bids were less than the “Reasonable Price” in the range 4% to 7% (the “Reasonable Price” was \$10,426,966 RMB with the lowest bid being \$9,633,788 RMB and the difference was \$793,178 RMB which is a substantial amount of money). Unfortunately, this lowest bid was not awarded the contract, due to its bid price was lower than the “Reasonable Price” and in fact the lowest one. Had this lowest price been awarded the contract, the client could have saved almost \$800,000 RMB which is a 7.6% saving.

The third case examined was a residential building project. One of the bids was 4.9% less than the “Reasonable Price” while the other one was 2.2% more than the “Reasonable Price”. Under the current regulation, the bid which is higher than the “Reasonable Price” won the contract (because the regulation says “the bidder who is closer to the ‘Reasonable Price’ wins”) and this means the government has actually paid 7.1% more than what it could have paid.

It is respectfully suggested that consideration be given not to punish the bidder who has bid below the “Reasonable Price”. A possible approach would be to either not to deduct points but to give extra points at a set scale for the amount they fall below the “Reasonable Price”. However, it is also necessary to understand why a company will bid such a low price. The bidders who bid below the “reasonable price”, by say more than 5%, should be interviewed and questioned on how they arrived at their price to see whether they left some part of the work out when pricing the bid, or let them prove that they are able to do the work using some form of greater efficiency than their competitors without infringing State and Provincial laws. This way, there would be a greater incentive for contractors to improve their efficiency by working out the lowest price (with reasonable profit) they can bid, rather than trying to estimate the “reasonable price” which is what they appear to be doing now.

The Expert Evaluation Panel and Their Work

The government regulations that specify the roles and responsibilities of the experts were examined. It appears that the roles and responsibilities are loosely defined and the application form is only one page long which does not provide sufficient space to show the applicants’ experience and capability. Furthermore, each expert may only be rewarded for as least as \$50 RMB for a half-day work which is far too little for what they have to do (i.e. evaluating 4 or 5 construction plans comprehensively). Furthermore, the time period (i.e. half a day or up to

one day) given to evaluate the construction plans is insufficient. It would need much longer just to know what kind of project it is and what are the most difficult issues for construction of the project and so on (note the experts were not given any project information prior to conducting the assessment), not to mention the time needed to evaluate the construction plans. Only by reading the drawings and specifications and the construction plans in full detail within sufficient time can the experts assess each construction plan in detail and give proper points more objectively. In other words, to do this work in enough detail needs more time than half a day.

Another issue is that the number of experts registered with TCM are not sufficient to achieve a truly random selection from a statistical point of view. (In one city, there were only about 300 experts stored in one TCM computer database and these included different work types. Hence for each type of work, there was less than 50 experts). The following suggestions are made to improve the situation:

- Clearly spell out the responsibilities of the experts.
- Allow more engineers and economists to apply as experts to build up the database with sufficient numbers.
- Use a comprehensive exam to select suitable and capable experts rather than depending on their company's approvals. The exams should include cost control and management, project management, construction planning, contract management, construction law and regulations etc.
- Give more time to the experts to evaluate the documents (particularly construction plans)
- The experts should be rewarded more in terms of payment or in kind according to the amount of work involved in assessing the construction plans and other duties.
- A system should be set up to deal with the highest point and lowest point given by the experts to avoid possibly biased marks.
- The experts' work should be checked regularly and randomly and their performance be recorded in the computer system.
- Proper systems be established to monitor experts' conduct and behaviour with penalty applied in case of misconduct.

Construction plan

Under the current tendering guidelines and regulations, points given to the price component would be very similar for each bidder/company because the calculation is based on government guidelines and regulations and therefore everyone can calculate the cost very accurately (as discussed in previous sections). This makes the points obtained from the construction plans the most important and critical component. However, the quality of construction plans submitted are quite similar. Furthermore, there is no detailed criteria for assessing construction plans. It is suggested that detailed guidelines for preparing construction plans be introduced and more detailed assessment criteria be used.

Quality and Time Issues

Quality and time are two items in the golden triangle rules (time, cost and quality) for any construction project. These two components each contribute up to 10 points in tender evaluation criteria but it was noticed during the review of some archived cases that there were insufficient details to explain how the project quality and time will be achieved i.e. there is no deliverable measures on how bidders will be able to deliver their promises in terms of quality and time as they have stated in the bidding documents. It is suggested that a more detailed and comprehensive schedule and quality assurance program be included.

Bidders' Past Performance and Reputation

It is appropriate to check a company's past performance and allocate points according to its past performance. But at the moment, there seems no deliberate mechanism has been designed to capture contractors' performance reports and use them to review registration status. The current tendering systems only focuses if the company has won some sort of award and its financial capabilities. More specific items should be included in this component. Typical performance measures could be tender price versus final price, original contract time versus final completion time and departures from specified quality, safety and environmental standards. From such reports, projects/contracts with anomalous performance measures could be targeted for further detailed audits.

Bidders' Oral Presentations

In order to identify which company is best prepared for the bid and best suited for the construction of a project, oral presentations by the bidders to the tender evaluation committee may be helpful. Just reading the construction plan by the committee members (experts) is not enough and it is also time consuming. As mentioned previously, the time given to the experts to evaluate the construction plans is too short (only half a day). Therefore, oral presentations by each bidding companies on their construction plan and strategies in front of committee members may be a good way to proceed. The bidders' oral presentations will allow the committee members to get a better understanding of the background and capacity of the company, and more importantly the oral presentations will allow the committee members to ask questions so that they know what particular strategies the construction company will adopt for that particular project. By doing so, the company best suited for the construction of the project can be selected with the best price, quality and within the construction time frame.

Risk Assessment during Tender Evaluation

All construction projects involve risks, be it in terms of political, financial, time, quality, technical, site and soil conditions or force majeure. It is not uncommon in China that construction projects encounter problems in terms of cost overrun and time delay. Such problems cause major economic loss to all parties involved in the project procurement processes. One way to minimize the chances of cost overrun or/and time delay is to conduct risk assessment during tender evaluation process. The risk assessment should be conducted by both parties - the client and the bidders. From a client's perspective, the risk assessment should focus on the risks associated with individual bidders that may hinder the achievement of the project objectives (such as time, cost and quality). A score may be given to individual bidders according to the assessed level of risks. The client may follow the comprehensive methodology proposed by Zou *et al* (2006) for identification and assessment of construction risks from stakeholder and life cycle perspectives. It is obvious that from the bidders' perspective, the objective of participating in the tender is to win the construction contract and at the same time be capable of completing the construction which meet the requirements of time, cost and quality and generates reasonable profit. Bidders may refer to the risk assessment model proposed by Fang *et al* (2004): the risk factors should be considered include "project built-up area, height of building, contracted project time limit, project budget, confirmation (before construction begins) of clients' finance capability, bidder's financial capability required by the client, number of bidders, current workload, experience in similar projects, and degree of technology innovation/ advancement required for the project". Only by conducting risk identification and assessment during tender evaluation, the sources and ownership of risks can be identified and parties who are in the best position to bear the risks will be identified. Only by assessing all risks from the perspective of both client and bidders, the contractors who are in the best position to bear the

risks will be identified. Only by awarding contracts to such best or suitable contractors, the risks of cost overrun or time delay can be eliminated/minimized.

Audit of Archived Tender Evaluation Decisions

Under the current tender evaluation practice, no review or audit is conducted but rather it is a single call by the tender evaluation committee. As such no control is placed on the first evaluation. It is suggested that a review committee be set up to audit and review the work done by the tender evaluation committee and, when necessary, to ask the committee to explain why a particular company is recommended (in writing and/or in oral presentation). Depending on the scale and significance of the project, a second audit and review may be needed. Furthermore, it is necessary to also review randomly the closed cases. With these measures in place, the aims of developing a transparent, fair and probity competitive tender culture will be achieved.

Collection of Project Life Cycle Data and E-tendering

An important aspect in improving tendering processes and achieving value for money is the collection and analysis of accurate project data. This requires the application of information technologies and careful identification and collection of project key data. It is suggested that as an initial step, the tender prices, the contract price at contract award and the final contract price at contract completion should be collected and compared. This data will enable the monitoring of cost growth, possible signs of corrupt behaviour from unusual cost increases and will also ensure the Chinese government is able to judge whether it is obtaining value for money from their contracts. The next set of data would be the collection of number, type (eg client changes, unforeseen site conditions and so forth) and value of contract variations. Again, this data is a good indication in measuring value for money. Another set of data is to monitor cost and time overruns on contracts. Those that exceed a predetermined standard could be the subject of further review. The data should be collected locally at a municipal level and be capable of analysis at provincial and national levels to provide comparisons between projects, municipalities and provinces. Such analysis will enable trends to be monitored across China. All key data collected should be used as benchmark and references for tender price, value for money, construction time of future construction projects. In the long term, a secure e-tendering system should be developed and used. The e-tendering system should meet certain security and functional requirements including “non-repudiation and authentication, secure time (time integrity, closing/opening time of tender box and time of receipt of e-communications), and secure record keeping (Du *et al* 2005). The application of e-tendering system will help prevent subjective influence on tender decision and help achieve a more objective tender evaluation process.

SUMMARY AND CONCLUSIONS

This paper has described the historical development of the Chinese construction tendering system and reviewed its current practice. The review has found that the current tendering system provides some restrictions and limitations that have prevented bidders from submitting tenders that could truly reflect their capabilities. The review has also found that the price component of the current system did not have a focus on value for money and the construction plan component did not allow technical/technological innovation. Furthermore, the review has found that the tender evaluation processes were a formality rather than in-depth and project-specific and the time given for tender evaluation (particularly construction plans) was insufficient. In addition, the review has found that the tender evaluation processes and contract award decision has never been reviewed or audited.

Based on this analysis, a number of comments and suggestions have been put forward on future directions and improvement for the Chinese construction industry. It is suggested that since China has moved from a planned economic system to market economic system, it should allow the bidders to calculate the project cost based on real market prices and the company's technical and management capabilities, instead of following quotation books and price/fee index set by the government. This is because the quotation books and fee index are often outdated and information does not reflect the market situation or the company's capability. By allowing a company to price according to the market situation and its capability, this is a reflection of the market-driven economic system and also allows value for money, as well as allowing companies to strengthen their competitive advantages.

It is also recommended that it is necessary to set the tender evaluation criteria prior to call for tender, and more time should be given to the tender evaluation committee members and expert panel members to assess the construction plans and other documents. Oral presentations may be provided by the construction companies when necessary. Conducting risk assessment during tender evaluation to identify the contractor who is in best position to bear the project/construction risks is also necessary. It is suggested that details on quality and time measures be included in construction plans. In addition, it is suggested that random review/audit of decisions made by tender evaluation committee, to avoid a "one-man" decision. Furthermore, the application of information technology should be considered with a focus on collection of project data from a life cycle perspective and development of e-tendering systems.

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