

POTENTIAL BEST VALUE CONSTRUCTION IN CHINA

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ABSTRACT

Due to the development of Chinese economics, the construction industry has experienced the largest expansion in the last two decades. In order to encourage free enterprise and competition within both the national and international environment, the construction delivery mechanism in China was changed from traditional government allocation to competitive or price based bidding. The problems encountered in this transfer have been similar to other countries utilizing the competitive award system. This paper proposes that through analyzing the lessons learned from countries that have matured in the low bid award process, China can avoid common errors and accelerate the benefits of the system. Education of professionals in the US identifies that one of the primary reasons for poor performance is the client's professionals' misunderstanding of the source of construction nonperformance. The results of a survey that was given to US construction personnel before and after facilities education on the source of construction nonperformance shows that the professionals' misunderstanding is a major issue in industry performance, and can be addressed through facilities education (20% alteration). The authors propose to test the Chinese perception for similarities, to determine if the educational program that was successful in the US can also increase the level of construction performance in China.

Keywords: low bid, facilities education, best value, construction procurement, Chinese construction industry.

Introduction

Since open-door policy was practiced, China shifts from a rigidly planned economy to a more vibrant market-oriented economy (Chan, Wong, and Scott 1999). Meanwhile, construction delivery shifted from traditionally government allocation to state-owned contractors to competitive bidding (Lai, Liu, and Wang 2003). After "Temporary Regulation Construction Bidding and Tendering" was enacted in Nov 1984, China attached more importance in a legalized procurement system of construction due to increased amount of foreign investment and funding from World Bank and Asian Development Bank, most of which required China to follow international practice (Chan, Wong, and Scott 1999).

Besides the regulation mentioned above, there were other nine milestones with regarding to Tendering & Bidding practices in China (Huang 2005).

1. 25, Feb 1991, "The Notice of Intensifying Tendering & Bidding Regulation on Key National Construction Projects and Large-Scale Construction Projects" was issued.
2. 1 Jan 2000, "The Law of Tendering & Bidding" was implemented. Through this law the government requires that fundamental facilities, public facilities, construction projects (including the project's survey, design, construction and supervision) and important equipment and materials relevant to the projects be awarded through the system of inviting bids as long as the criteria prescribed by state are met (Chan, Wong, and Scott 1999).
3. 1 May, 2001, "Opinion on Different Responsibility on Administrative Supervising

- of Tendering & Bidding by State Council's Relevant Departments" took effect.
4. 1 July, 2000, "Provisional Measure on Issuing Public Notice" by the original National Planning Commission was released.
 5. 1 Feb, 2002, the original National Planning Commission issued "Provisional Measure on Supervising Bidding and Tendering of Key National Projects."
 6. 1 Jan, 2003, "Government Procurement Law" was implemented.
 7. 12 July, 2004, "Opinion on Further Standardizing Tendering & Bidding Practice by The General Office of State Council" was issued to decrease corruption in bidding and tendering.
 8. Most recently, 1 Sep, 2005, "Provisional Measure on Tendering & Bidding Coordination Agency" was implemented. Eleven China Ministries formed this agency to minimize the inconsistencies in tendering & bidding practices between industries, as well as regulations and policies enacted by different ministries.
 9. 10 Sep, 2005, "China Tendering & Bidding Association" was the only national corporative organization across different trades and districts found in Beijing.

Low-Bid In China

Since the implementation of, *The Law of Tendering & Bidding*, the scope of delivery was expanded to include construction delivery, mechanical equipment importation, and government procurement. The government claims that the cost of government funded projects has decreased about 500 Billion RMB compared with the budgeted estimates. (Lai, Liu, et al. 2003).

In the past decade, three most popular means to evaluate tenders are centesimal grade evaluation, two stage evaluation, and tendering with and without evaluation of tender price with base price or actual cost.

The Law of Tendering & Bidding specified two bid methods: Open Bid and Invitation Bid. It also stipulated that the awarded bid should at least meet one of these two requirements:

1. The bid should satisfy various evaluation standards specified in the tendering document.
2. The lowest bid should satisfy the essential requirements of the tendering document, and cannot be lower than actual cost.

Since low-bid was legalized, the low-bid or price-based bid has been widely used. As a result, the awarded prices have significantly declined. Along with the perceived benefit of getting a low price, professionals saw the drawbacks of low bid: low quality, not completed on time, corruption, illegal competition, and increased final project price. In the districts near the coast, low bid was applied for almost every project regardless of size and type. Many projects were awarded far below project budget. As a result, some contractors gave up the bid bonds after they got the awards rather than accept the project award. It also gave owners the opportunity to use the low bid award as a tool to collude with the contractors after the award of the project. Under these circumstances, municipals and state government, clients, and contractors began to be concerned about the undesirable results of low bid (Huang 2005, Zhou 2004). A senior expert who took part in building the *China Tendering & Bidding Association* stated, "The marketing share of construction procurement can be equivalent to the stock market, and is still in the ascendant. The construction procurement will be even hotter in the future. Only the regulation system was not as good as the stock market (Huang 2005)."

In the *New China 50-years Serial Analyses Reports* issued by state statistical bureau in 1998, it stated that although the percentage of construction industry increased value in GDP had been over 6% these years, the quality of construction was lagging. The representative projects of construction in China reached the international standard, and the fine-rate of

quality was around 30%. This low level of quality and performance has resulted in the collapsing of buildings and bridges from time to time. In the 1990s, the fine-rate of quality remained below 40%. The peak was reached by 38.8% at 1993, but has suffered annual declines. There is room for improvement (National Bureau of Statistics of China 1999).

Another weakness of the Chinese construction industry is the number of safety accidents. According to the statistics of Construction Ministry, the number of deaths from construction was 1,297 in 2002, a higher mortality rate than every other industry except transportation and mining. A lack of consciousness of safety, unfulfilled responsibility, poor management, and illegal practices are practices identified on construction projects.

Fujian is an example of poor performance in the low bid environment (Cao 2005, Sun 2005). The vice secretary-general of Xiamen construction association, Jianghuai, Zhu, stated that since Low-Bid was carried out in Xiamen, the fine-rate of quality had dropped more than 70%. This phenomenon was present at different cities of the Fujian province. Local contractors estimated that the majority of awarded prices were lower than the contractors' actual cost.

The harmful consequences of the under-cost competition induced by low bid were not only limited to the project quality, but brought severe influence to the local contractors. Many contractors could not make profit due to the high competition and the growing price of materials. Contractors gave up their bid bonds after being awarded projects. Many contractors moved from the Fujian province, to places where low bid was not as popular (Cao 2005, Sun 2005).

Possible Solutions To The Low Bid Award Issues

The authors propose that China is using the low bid process because they are unaware of the disadvantages of the system and do not have the technology for a more successful process. The authors also propose that they can learn how to solve the issues of China's low bid award by analyzing the results of the process in more mature construction industries such as the United States. The US construction industry has practiced the low bid for the last 40 years and has not been able to solve the performance issue (Kashiwagi and Gardner 2002). Research into the low bid award system has resulted in the understanding of the Construction Industry Structure (CIS), the performance of the low bid environment, and the supply and demand issue of the construction industry (Kashiwagi 2004). The CIS identified the client makes the decision to use either the low bid (minimal requirements) or the best value (high performance and price) procurement process (Figure 1.)

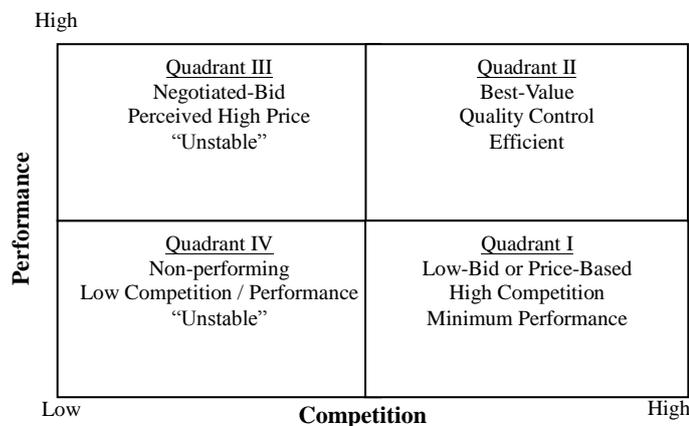


Figure 1: The Construction Industry Structure (CIS) model (Kashiwagi 2004)

The low bid process requires the client to use a specification. It requires the client to direct the contractor on what to do, how to do it, and by asking for the lowest price and the

minimum requirement, to manage and inspect the contractor. The best value process requires the client to identify the requirement, but forces the contractors to compete based on the highest performance and the best price. This forces the contractor to practice quality control, and to minimize the risk of nonperformance before the construction instead of during construction by client management and inspection. The biggest difference between the two environments is that construction risk is transferred in the best value environment. This is the definition of outsourcing (PriceWaterhouse 2005).

These concepts are not well understood by the construction owner's personnel in the construction industry. Research has identified that the client controls the selection of the procurement process. Best value tests show that when the client uses a performance based environment, the contractors perform, and problems are minimized. The research has shown that the low bid structure is the source of construction nonperformance. When the low bid structure is used, the occurrence of the following is increased:

1. Client and contractor collusion for change orders and changing the specification.
2. Minimum amounts and performance of construction products.
3. Opportunities and the competitive advantage of the nonperformers.
4. Adversarial climate between the client and contractor resulting in inefficiencies.
5. Client's management and inspection costs.

The American federal government also has had difficulty with construction performance over the past ten years through the low-bid, design, bid, specification, procedure. Federal procurement directives (FAR 37) identify that the low-bid award process is (Kashiwagi and Gardner 2002):

1. Inefficient.
2. Has not provided quality construction.
3. Gives the risk to the government instead of contractors and designers.
4. Is not to the advantage of the government.

Data from Engineering News Record, 1998 shows (Post 1998):

1. 42% of projects completed late;
2. 33% of projects were over-budget;
3. 13% of projects have claims and litigation; and
4. 53% of owners would use the contractor again.

Research has shown that the counterintuitive solution for increasing value and construction performance is to move from the low bid environment to the best value environment. The largest obstacle is the understanding of the differences between the two environments by the client's personnel (Kashiwagi, et al 2005). This hypothesis was tested by conducting survey questions to client's professionals before and after the education of the CIS, the low bid delivery structure and its results, and performance information of best value tests. The research test had two objectives:

1. Confirm that the construction owners and their representatives do not understand the source of construction nonperformance.
2. Identify if the client's personnel are open to the concepts of best value and if education will improve their understanding of the concepts.

Client's personnel were questioned before and after education sessions. The questionnaires were designed to identify understanding of best value and low bid environments, CIS, transfer of construction risk, and effectiveness of management and inspection of low bid contractors. 226 owners, designers, consultants, and general contractor

personnel were educated. The attendees were asked to rate 21 questions based on a scale of (1-10) with 10 as strongly agreed and 1 as strongly disagreed. They were instructed that if they did not know, to rate the question a 5.0. A rating of 10 indicates that the industry personnel completely understood the concepts. A result of 1 indicates a complete misunderstanding of the concepts. A 5 indicates that they are confused about the concept and do not know (Kashiwagi, et al 2005).

Figure 2 shows the responses before the education for ten seminars. The average rating was a 5.2, indicating a basic confusion of the delivery of construction performance. The results show that the educated personnel do not know the source of construction nonperformance (not on time, not on budget, not meeting the clients' expectations).

In order to assess the impact of the best value education, the personnel were surveyed again at the end of the conferences. Figure 2 compares the average scores at the beginning and the end of the conferences. The average score was 6.9, with an improvement of 1.7 points. The results suggest that with adequate education, the industry personnel are open and capable of increasing their understanding of the concepts.

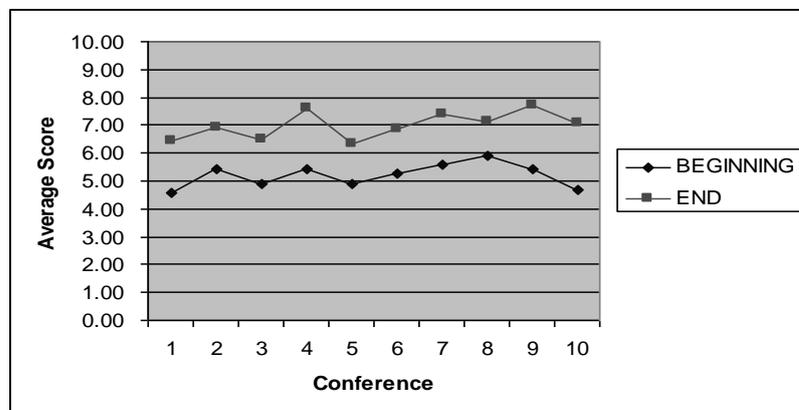


Figure 2: Average score the beginning and the end of the conferences

The results of the test support the hypothesis that the client's personnel do not understand the source of construction nonperformance, that they are open and can understand the concepts of the best value environment. Twelve years of testing show that the client's personnel must understand the source of construction nonperformance before the best value environment can be used (Kashiwagi, 2004). The proposal of this paper is to use the same questions to identify if the industry personnel in China understand the concepts of construction performance and nonperformance. If the industry does not understand the concepts, the next step would be to educate the personnel and see if the results are similar to the results in the United States. If they are, the third step would be to run best value tests in China.

Survey Results Of Chinese Construction Industry Personnel

The questionnaire was designed based on the same reasoning as the surveys for the US participants. The attendees were centralized in Shanghai where the booming real estate market and location of the "2010 Shanghai EXPO." By identifying the attitude of construction personnel, the possibility to promulgate education of best value procurement in China can be identified. Questionnaires were sent out to 200 personnel, with 110 returned (55% return rate.) The surveyed included different roles in the construction industry: owners, contractors, designers, consultants, and government officers.

The survey is comprised of five sections: statements 1-6 are related to concepts of logic

and business, statements 7-12 are intended to identify current construction practices, and statements 13-19 related to Best Value concepts. The surveyed were asked to rate the questions based on the scale of (1-10) with 10 as strongly agreed and 1 as strongly disagreed. The responses to each criterion were divided into three groups: agreed (1-4), neutral or don't know (5-6), disagreed (7-10). A multiple answer question was also asked.

Analysis Of Results

Table 1 shows the statements and results. Ninety-three out of 107 respondents tend to agree that people take risks without enough information, and 59 of 109 also agree that all information can predict the outcomes. But as to why expectation does not match outcome, only 36 of 109 respondents tend to believe it is due to inadequate information. Actually since each event has only one input and one output, given "all" information at the input, each event becomes predictable. If expectation does not match the outcome, it is because there is inadequate information at the input. In the construction environment, if the contractor cannot meet the client's expectation, it may be because the owner does not get enough information when the bidding was conducted. The way to utilize information would be to somehow consider the performance information or the ability of the contractor to understand the requirement of the client. In the low bid environment, this information is not considered. It is a part of the best value process. In the best value environment, contractors are forced to preplan, look ahead and identify risk as a part of the procurement process.

Table 1 shows only half respondents agree that a high level information is related to a leadership or efficient process that has less client decision making and control (outsourcing.) The result shows that respondents consider decision making, control, and management as the means to force the contractor to perform. Client decision making is caused by a lack of information. Also by making decision, using control and management, the clients actually assumed the responsibility of their decision and take the risk which should have been transferred to the contractors.

Forty-four out of 109 respondents agreed that the current environment of construction industry is a "win-win," and 80 out of 109 respondents are inclined to regard low bid as an environment of high competition, low performance and causing change orders which lead to higher price. Eighty-five out of 109 respondents tend to agree that the low price contractor does not always result in performance. These responses imply that the majority of respondents consider the current low bid award resulting in poor performance and conflicting to best value. This outcome also confirms that people in the Chinese construction industry recognized the deficiencies of the low bid environment.

Only 24 out of 110 respondents are inclined to agree that quality standards actually cap the highest possible quality an owner can achieve. This shows that most of the surveyed personnel do not understand that standards and specifications are always based on the minimum, and when combined with low price, are the cause of a decrease in performance, value, and increased risk.

Contractors and designers are deemed as the experts in construction by the respondents. This shows the misunderstanding that designers are experts in construction. In an efficient environment, designers should be experts in identifying requirements and translating the requirements into construction documents, and contractors are experts in construction. This misunderstanding is a major obstacle in moving from a low bid environment to a best value environment as designers have not been recognized for their core expertise. Research has shown that this confusion exists in inefficient environments where management is maximized.

Forty-four out of 109 agree that the majority of owners outsource projects to contractors, and 92 out of 109 agree that owner representatives should have technical expertise in what

they are trying to buy. The definition of outsourcing from MSN Encarta is “*The purchase by a company of labor or parts from a source outside the company rather than using the company's staff or plant* (MSN Encarta).” Instead of using technical expertise to manage and control contractors who are the real technical based experts, the clients should minimize their management by really outsourcing their projects to contractors (best value environments). This shows that the surveyed personnel do not understand the sources of construction nonperformance.

Table 1: Questionnaire Results

#	CRITERIA	Responses			
		Total	Not Agree	Neutral	Agree
1	Event has one outcome and can be predicted.	107	19	29	59
2	A person without enough information will take the risk.	109	2	14	93
3	When expectation does not match outcome, not enough information was used.	109	31	42	36
4	The person who has high information level makes less decision and control.	109	21	28	60
5	The person with low information level uses management instead of leadership.	108	25	25	58
6	The less control and management the owner does the more risks are shifted to contractors.	109	43	25	41
7	The majority of owners outsource projects to contractors.	109	42	23	44
8	The current environment of construction is a “win-win”.	109	37	28	44
9	Low bid is an environment of high competition, low performance and causes change orders leading to higher price.	109	15	14	80
10	The contractor awarded does not always perform.	109	8	16	85
11	The quality standards actually cap the highest possible quality an owner could achieve.	110	57	29	24
13	A professional wants high perceived risk and no real risk.	109	14	24	71
14	Long term partnerships build trust and relationships and decrease performance and value.	110	47	30	33
15	The time/cost to measure the performance of individuals is often worthwhile.	110	11	37	62
16	Owner representatives should have technical expertise in what they are buying.	109	5	12	92
17	Contractors should be selected based solely on Performance (and not price)	110	46	38	26
18	The owner should never give their budget to the	110	26	32	52
19	It will be good to try a new delivery method based on Best-Value System.	109	4	17	88
202	Who is the real expertise in construction industry? Owner,4; contractor,40; consultant,22; inspector,20; designer,45;				

81% are willing to try a best-value based procurement delivery method. This shows that, 1) The current processes are not optimal, 2) There are problems, and 3) The problems are severe enough to consider another process.

Although the respondents did not show high understanding of Best Value concepts, they are open to try best value procurement. The average scores (once adjusted based on the optimal scores) is 6.1 which is higher than the U.S. average before education. The results also show that the personnel surveyed were very open to new concepts.

Conclusions And Recommendations

The United States construction industry has gone through an extensive period of using the low bid construction delivery process. The results show low performance. This can be validated by:

1. The performance numbers of the US construction industry.
2. The search for different delivery systems.
3. The importance of client project and construction management in the industry.

It has been identified that the construction client or owner controls the level of performance of the industry by the type of delivery system being used. It has also been identified that the client's personnel do not understand the sources of construction performance. Tests have shown that the client's personnel are open to education, and the education can improve their understanding.

The construction industry in China is not as mature as the US industry. Lessons learned from the U.S. industry may assist the Chinese industry to improve performance. Questionnaires show that the Chinese industry personnel are similar to the U.S. personnel. They lack an understanding of the source of nonperformance, but can identify that there are issues, and are open to new processes. The authors propose that the best value technology that has been tested for the past 12 years can be taught to Chinese industry personnel, and if understood, best value tests can be conducted.

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