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Unbalanced Bidding in the Jordanian Construction Industry

Khaled Hesham Hyari
Professor, Department of Civil Engineering, Faculty of Engineering
The Hashemite University, Zarqa, Jordan
hyari@hu.edu.jo

Thamer Alamayreh
Mostaqbal Engineering & Environmental Consultants
Amman, Jordan

Abstract

Unbalanced bidding is a widely used practice in competitive bidding and is often associated with unit price contracts. This practice has attracted the attention of researchers for more than seventy years due to its impacts on the owner and the contractor. This paper presents the results of a survey targeting construction contractors in Jordan to ascertain the root causes of this practice, common forms of unbalanced bidding, owner's prevention strategies to mitigate this practice, and detection methods for unbalanced bidding. The study indicated that discrepancies in the owner-provided quantities of work and the utilization of unit pricing for items that are difficult to estimate their quantities accurately are the most enabling circumstances for unbalanced bidding. The study also revealed that the most common types of unbalancing bids in the Jordanian construction industry are front-end loading and increasing the unit prices of items that have underestimated quantities while simultaneously decreasing the prices of items that have overestimated quantities. The survey respondents indicated that the top-ranking strategies that owners can utilize to reduce the extent of this practice are ensuring accurate estimating of quantities in the bill of quantities, and timely processing of progress payments. The findings of this study are beneficial to both owners and contractors. Owners will be better aware of the current utilization of unbalanced bidding by contractors and can improve bidding rules and instructions to mitigate this practice. Contractors will also have a better understanding of their competitors' utilization of the imbalance in their submitted bids.

Keywords

Unbalanced Bidding, Contractors, Competitive Bidding, Unit Pricing, Contracts.

1. Introduction

Unbalanced bidding refers to the process of modifying the item rates of a bid while keeping the total bid price unchanged, and involves increasing the price of an item or a number of items while simultaneously reducing the price of an item or a number of items. The standard specifications for roads and structures of the North Carolina Department of Transportation (NCDOT 2012) define an unbalanced bid as "a bid that includes any unbalanced bid price." The same standard (NCDOT 2012) defines an unbalanced bid price as "a unit or lump sum bid price that does not reflect reasonable actual costs that the bidder anticipates for the performance of the item in question along with a reasonable proportionate share of the bidder's anticipated profit, overhead costs, and other indirect costs." This practice has several forms, such as front-end loading, quantity error exploitation, back-end loading, and others. In front-end loading, the contractor increases the rates of the items that will be performed during the early stages of the project and decreases the rates of the items that will be performed at the end of the project. This form is utilized mainly to reduce the financing costs of the project and offset mobilization costs. On the other hand, quantity error exploitation is based

on identifying errors in the quantities of work in the bill of quantities and involves increasing the unit rates of items that will require higher quantities during construction and reducing the unit rates of items that will require lower quantities during the performance of the work. A number of studies promoted unbalanced bidding as a useful practice for contractors (Cattell et al. 2010; Christodoulou 2008). On the other hand, a number of studies completely condemned unbalanced bidding as a practice that has negative consequences for project owners (Polat et al. 2018; Hyari et al. 2016; Yin et al. 2010; Arditi and Chotibhongs 2009).

Despite widespread interest in unbalanced bidding, all published research has focused on either theoretical models to support unbalanced bidding (Afshar and Amiri 2010; Cattell et al. 2008; Christodoulou 2008) or the detection of such an imbalance in bids (Polat et al. 2018; Hyari et al. 2016; Arditi and Chotibhongs 2009). Few research efforts have focused on examining previous projects to investigate the spread of unbalanced bidding (Gransberg and Riemer 2009). There is a need to investigate the perception of contractors themselves regarding this practice. This paper presents the results of a survey that targeted construction contractors in Jordan to present their opinions on this practice and its impacts. This survey was possible in Jordan because public bidding regulations do not include any provisions regarding this practice, and therefore contractors will not be embarrassed to share their thoughts on unbalanced bidding.

2. Methodology and Respondent's Demographics

The objectives of this research were achieved by analyzing the responses of 86 contractors in Jordan to a questionnaire designed to get their viewpoints on un-balanced bidding. The distribution of the questionnaire was preceded by a review of previous studies on defining, analyzing, and evaluating unbalanced bids and how unbalanced bids can be detected and handled. The questionnaire focused on several issues related to unbalanced bidding. The survey targeted experienced contractors (75% of the respondents have more than 10 years of working experience, and 60% have more than 15 years of experience). 90% of the respondents have at least a bachelor's degree in engineering. All of the respondents are personally involved in pricing bids, and more than 80% have more than 15 years of experience in pricing bids. The respondents were actively involved in the construction industry, as 65% of them have completed more than ten projects in the last five years, while 31% have completed between five and ten projects in the last five years. The survey respondents were actively involved in public sector projects, as 34% of them had worked only with the public sector, while 66% of the respondents had worked in both the public and private sectors in the last five years. This suggests the familiarity of respondents with unbalanced bidding be-cause this practice is internationally associated with public construction projects. (10 font)

3. Results

3.1 Project Circumstances that Encourage Unbalanced Pricing of Bids

We asked the respondents to rank the circumstances that provide opportunities for contractors to practice unbalanced pricing in their bids. Table 1 illustrates the mean and ranking of these circumstances. As shown in Table 1, it is obvious that errors in estimated quantities listed in the bill of quantities are the most important factor that provides an opportunity for contractors to manipulate bid prices. Owners provide prospective bidders with estimated quantities for bid line items in the bidding documents (i.e., bill of quantities). These quantities should be ac-curate and reflect an accurate estimate of the actual quantities during construction. Large differences between the owner's estimated quantities and the actual quantities facilitate the manipulation of bid prices. This result agrees with the study by Gransberg and Riemer (2009), who highlighted the consequences of and risks associated with errors in the estimated quantity produced by the engineer during the design phase of the project.)

The second-ranked factor, with a mean of 3.87, is also related to the bill of quantities. This factor involves selecting a unit price rather than a lump sum as the pricing format for items whose quantities are difficult to estimate in the de-sign phase. This result aligns with those of Cattell et al. (2010), who reported similar conclusions in their research. The other conditions ranked relatively low in comparison to the two factors mentioned above. "Lack of fair competition rules that provide equal opportunity for all competing bidders" had the lowest average ranking, with an average of 2.69. The second-lowest ranking factor, with an average of 2.70, was poor bid evaluation practices and a lack of personnel with sufficient knowledge to analyze and evaluate submitted bid offers. The relatively low ranking for those two factors reflects reasonable credibility for the bid evaluation procedures and the fairness of the competition rules in the public construction sector.

Table 1. Project circumstances that encourage unbalanced pricing of bids

Project Conditions	Mean	Rank
Errors in the quantities of work items provided by the owner in the bidding documents.	3.91	1st
The use of unit pricing rather than lump-sum pricing in the bill of quantities for items whose quantities are difficult to estimate accurately	3.87	2nd
When the contractor is aware of the ballpark price, the owner will accept for a certain item, he will adjust his pricing accordingly.	2.94	3rd
Owner's lack of sufficient knowledge about updated market prices of materials and the resources needed to perform the work.	2.87	4th
Poor bid evaluation practices and a lack of personnel with sufficient knowledge to analyze and evaluate submitted bid offers	2.70	5th
Lack of fair competition rules that provide equal opportunity for all competing bidders.	2.69	6th

3.2 Common Types of Unbalanced Bidding

The survey respondents were asked to rank the types of unbalanced pricing utilized in the Jordanian construction industry according to their frequency of use. For each type, respondents were asked to select an answer from 1 to 5, where "5" means "always" and "1" means "never". As shown in Figure 1, eight types were listed in order to provide detailed information about the practice of unbalanced bidding in the Jordanian construction industry, although unbalanced pricing is normally divided into only three main types: front-end loading, quantity error exploitation, and collusive bid unbalancing.

Rank		Mean
1st	The contractor increases the unit prices for items that will be completed earlier in the project in order to get a higher payment from the owner during the early phases of the project (front-end loading)	4.28
2nd	The contractor increases the unit prices for items that have underestimated quantities and/or decreases the unit prices for items that have overestimated quantities (quantity error exploitation)	3.82
3rd	The contractor decreases the unit price for items that will be subcontracted and increases the unit price for items that will be used by his own workforce (subcontracted items unbalancing)	3.20
4th	The contractor increases or decreases the unit prices for items that have design mistakes (design error unbalancing)	3.01
5th	The contractor offers unrealistically low prices for items that will not be needed during the construction of the project based on collusion with personnel from the owner's or consultant's side (collusive bid unbalancing, omissions)	2.58
6th	The contractor decreases the unit prices of items that will be subject to change orders during construction by making collusive arrangements with personnel from the owner's or consultant's side (collusive bid unbalancing, changes)	2.54
7th	The contractor increases the unit prices for line items that will be used in later stages of the project in order to take advantage of price escalation provisions specified in the contract, (back-end loading)	2.33
8th	The contractor offers some items for free or even leaves some items unpriced (zero-unit price unbalancing)	1.93

Figure 1. Types of unbalanced bidding.

The results indicate that the most common type of bid unbalancing was front-end loading, which was the highest-ranked factor with a mean of 4.28. In this type, the contractor increases the rates for early-performed items in the project to receive a larger payment from the owner during the earlier stages of the project. A number of scholars (Polat et al. 2018; Arditi and Chotibhongs 2009) also re-ported this type as the most common type of unbalanced bidding. The second most common type of bid unbalancing was quantity error exploitation, with an average score of 3.83. In quantity error exploitation, the contractor increases the unit prices for items that have underestimated quantities and/or decreases the unit prices of items that have overestimated quantities. This finding agrees with the results reported by Polat et al. (2018). The third most common type of bid unbalancing was manipulating prices for items that the contractor plan to subcontract them. This type received an average score of 3.198. Unbalanced pricing in this case intends to facilitate negotiating a low price with the subcontractor who will perform the work. Furthermore, "back-end loading" had a low rank with a mean of 2.33, which suggests that it is not a widely used type to unbalance bids.

3.3 Prevention Strategies for Unbalanced Bidding

We asked the respondents about the possible strategies that can help mitigate the widespread practice of unbalanced bidding. Figure 2 illustrates the means and ranking of eight possible mitigation strategies according to the respondents. The highest-ranking strategy, with a mean score of 4.65, was ensuring the accuracy of the engineering design and the meticulous and correct preparation of the bidding documents. This strategy reduces the window for exploiting errors in quantities, which leads to unduly higher costs for the owners. Christodoulou (2008) indicated that the owner must provide an accurate set of bid quantities to bidders in order to minimize the owner's risk. Gransberg and Riemer (2009) also emphasized that the quantities of work listed in the bidding documents should be accurate in order to reduce mathematical unbalancing. Renes (2011) suggested that unbalanced bidding comes because of the exploitation of quantity errors. Thus, to mitigate this problem, he suggested obscuring the quantities in the bidding documents or providing the bidders with a quantity range for each cost item rather than a single estimate.

Rank		Mean
1st	Ensuring the accuracy of the engineering design and the meticulous and correct preparation of the bidding documents.	4.65
2nd	Processing certified payments to the contractor without delay.	4.05
3rd	Preparing an accurate owner cost estimate for each line item before releasing the invitation for bids, and then disqualifying bids that significantly deviate from the owner's cost estimate.	3.86
4th	Declaring that bids that are deemed imbalanced will be rejected and expressly prohibiting unbalanced bidding in the bidding regulations and instructions to bidders.	3.84
5th	Specifying that the contractor will get an advance payment once the contract is signed to help financing the mobilization and the initial stages of the project.	3.81
6th	Assessing submitted bids cautiously to guarantee that they are in line with current market rates.	3.62
7th	Including a changed quantity provision in the contract to ensure that line item unit prices are modified if actual quantity deviations from owner estimated quantities surpass a predetermined threshold.	3.48
8th	Establishing a process for accepting complaints from competing bidders who have credible proof that the unit prices given by the lowest bidder are unbalanced, as well as disclosing the unit rates submitted by all bidders for project line items.	3.14

Figure 2. Prevention strategies for unbalanced bidding.

The second-ranked prevention strategy, with a mean score of 4.05, was processing certified payments to the contractor without delay. This reflects the importance of providing timely progress payments to the contractor as a mitigation measure against front-end loading. The third-ranked prevention strategy, with a mean score of 3.86, was preparing an accurate owner cost estimate for each line item before releasing the invitation for bids, and then disqualifying bids that significantly deviate from the owner's cost estimate. This stressed the importance of having a reliable owner's estimate for the work items to facilitate bid evaluation and guide the negotiations around valuing variation orders during construction. The lowest-ranked strategy has a mean score of 3.14 (i.e., a ranking above 3) and was establishing a process for accepting complaints from competing bidders who have credible proof that the unit prices given by the lowest bidder are unbalanced, as well as disclosing the unit rates submitted by all bidders for project line items. The respondents' evaluation suggests that all listed prevention strategies are valid and worth adoption by owners to reduce motivation and the opportunity for unbalanced bidding. The grand mean also indicates that there were positive attitudes toward all the statements included in this section.

3.4 Identifying unbalanced bids

Identifying unbalanced bids during the bid evaluation stage is a challenging task because owners do not have the cost data of bidders and because the submitted rates of bidders include indirect costs and an intended profit margin as well as the bidder's perception of risks involved in the performance of work. Several studies have highlighted this difficulty in identifying unbalanced bids (Hyari et al. 2016; Skitmore and Cattell 2013). The common practice used by owners to identify unbalanced bid offers is to compare the item rates submitted by construction bidders with the engineer's estimate prepared before advertising the project for bidding (Alhyari and Hyari 2022; WisDOT 2022; NJDOT 2019). We also asked the respondents about the possible baseline measure that can help owners in detecting unbalanced bidding. Figure 3 illustrates that, the top-ranked baseline for identifying unbalanced bidding is comparing the rates provided by the lowest bidder with the average rates submitted by the next three lowest bidders. Two-thirds of the respondents have selected this baseline as the best measure to identify unbalanced bids. It is noteworthy that only 20% of the respondents selected the use of the engineer's estimate as a baseline for comparison, which indicates that the common practice utilized by owners to spot unbalanced bids is not convincing to contractors. Owners may utilize the method selected by the majority of the survey respondents and evaluate the performance of this method.

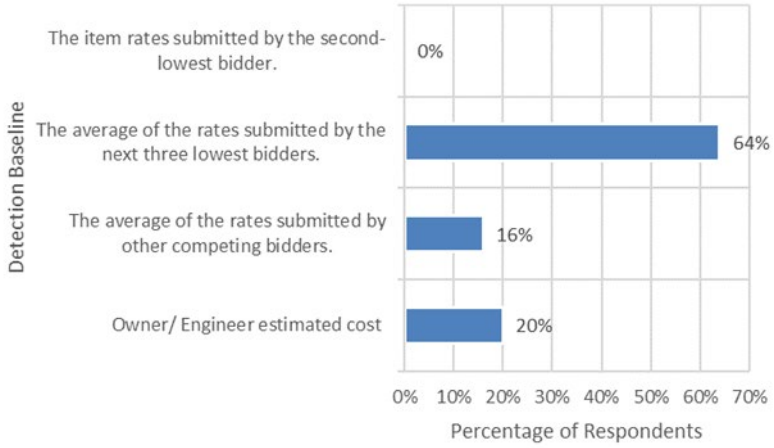

Figure 3. The most suitable baseline for detecting unbalanced bidding.

4. Conclusion

Unbalanced bidding is a common tactic adopted by contractors bidding competitively for unit price contracts. This practice is controversial because it is promoted in a large number of research publications, although it is an undesirable practice in many public bidding regulations and may lead to the rejection of the sub-mitted bid as a nonresponsive one. This paper presented the results of a survey that targeted construction contractors in Jordan to obtain their perspective on unbalanced bidding. The respondents ranked errors in the quantities of work provided by the owner in the bidding documents as the most important factor that enables bid unbalancing. The two most commonly used types of unbalanced pricing are front-end loading and quantity error exploitation. According to the survey's respondents, the

most suitable approach for owners to detect unbalanced bidding would be to compare the item prices submitted by the lowest-bidder con-tractor to the average of the prices submitted by the next three lowest-bidder contractors. The results indicated that ensuring accurate quantities of work and eliminating delayed payments were the top ranked prevention factors that could reduce the extent of unbalanced bidding.

The outcomes of the survey are useful as they provide insight on the perceptions of the contractors themselves regarding this controversial practice. Bidding regulations should establish clear rules regarding their policy on unbalanced bidding in order to provide competing bidders with an equal opportunity to win the contract. Further research is needed to develop guidelines that draw a line between acceptable levels of unbalanced bidding and unacceptable ones.

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Biographies

Khaled Hesham Hyari is a professor of construction engineering and management at the Hashemite University in Jordan. . His academic career includes more than 19 years as a professor at Hashemite University in Jordan and a lecturer at the University of Illinois in Urbana-Champaign. His scholarly output comprises more than 45 peer-reviewed publications that have been published in renowned international journals and conference proceedings. His research is focused on managing public construction projects and protecting the integrity of the public bidding process and multi

objective optimization of construction processes. He has served as the Vice President for Academic Affairs at the Hashemite University for three years. In addition, he has served as Dean of Graduate Studies at Hashemite University and Dean of Student Affairs at Alhosn University in Abu Dhabi. Professor Hyari worked also as a project engineer at the Ministry of Public Works and Housing in Jordan for 8 years.

Thamer Alamayreh is a senior quantity surveyor at a consultant office in Amman. He earned a Bachelor's degree in Surveying and geomatics Engineering from Al-Balqa' Applied University in 2014, and a Master degree in Engineering projects management from the University of Jordan in 2019. His work experience extends for about 9 years and includes working as a site engineer and quantity surveyor. His work experience includes cost estimation for projects, preparing tender documents and providing engineering supervision for projects.