18th International Conference in Knowledge Based and Intelligent Information and Engineering Systems - KES2014

Fair ranking in competitive bidding procurement: A case analysis

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Abstract

Fair and transparent procurement procedures are a cornerstone of a well functioning free-market economy. In particular, bidding is a mechanism whereby companies compete for contracts; when functioning well, the process rewards both the quality of the proposal, and the "reasonableness" of the quote. This way, both the company and the public win. The bidding process requires a fair and transparent ranking procedure. Once the parameters of the competition are established, the company issuing the bid is required by law to abide by those parameters. Not surprisingly, opposing interests may try to "game the system." The more complex the service, the harder it is to rank competing bids. Complex services require complex ranking, which in turn makes undue influence more difficult to uncover. In this paper we analyze the case of two companies, Reilly Security and Contemporary Security, bidding for the contract of providing security during the Pan American games ([1]) in Toronto 2015: The Pan Am Games are the world's third largest international multi-sport Games; they are only surpassed in size and scope by the Olympic Summer Games and the Asian Games. We argue that the ranking procedures did not reflect the quality of the bids, resulting in one of the companies submitting a substantially more expensive bid, and still winning the competition. The reader may gain information on this contentious matter by reading a number of newspaper articles: [2, 3, 4, 5]. Article [5] mentions the results presented in this paper. For the sake of full disclosure, it should be noted that the author works as a consultant, and in fact is on the board, of Reilly Security.
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Selection and peer-review under responsibility of KES International.

Keywords: Ranking; Weight Assignments; Pairwise Comparisons; Reilly Security; Contemporary Security; Pan Am Games Toronto 2015

1. Introduction and background

Fair and transparent procurement procedures are a cornerstone of a well functioning free-market economy. In particular, bidding for contracts is a way to bring about the best deal for the least money.

Competitive bid procurement[1], as the name implies, involves suppliers of services competing for a contract. The traditional method involves the Owner issuing an Invitation, which can be directed to a select group of suppliers (invitational bidding) or to the general contracting community (public bidding). Bidders who wish to

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[1]As we are describing a situation in Ontario, Canada, we are basing the explanation given in this section on [6].

participate submit binding offers to do the required service by a fixed rate and time and in accordance with the Owner's requirements. The Owner then reviews and evaluates all on-time bids and (usually but not always) chooses one Bidder to do the work. The Owner and that Bidder then sign a contract to do the work[2].

Within this basic system, there are many variations but the basic features:

1. Invitation to bid issued
2. Binding bids submitted
3. Owner chooses one for award

are common to all types. In the Courts, what turns a procurement into a competitive bid are these three features: a competition for award, binding bids and the Owner choosing from the competitors.

The law does not control which method of competitive procurement is chosen. Most often, an organization's policies will dictate which is used and more importantly how it is used. However, the law does becomes deeply involved in the process once any method of competitive bidding is chosen by the Owner.

In competitive bidding, Bidders put in their best offer, which is binding upon them after the close of bidding. They are competing for the award of a contract but they are not in control of the process by which they are chosen. In particular, the Bidders often do not know the details of the bids of their competitors. In terms of fairness, something must be created to control that process.

An Owner can correct or add to the Invitation prior to closing by issuing an addendum to the Invitation (if the original Invitation gives them the right to do that). But, after close of bidding, the Owner can not make up new rules, add or subtract from what exists or ignore any particular rule. They are contractually bound — to each and every Bidder — to do exactly what they said — no more, no less.

For the Owner, the implied obligations or terms of the Bid Contract will be:

1. A duty of full disclosure
2. A duty of fairness and good faith

For the Bidder the implied term of the Bid Contract will be:

1. Honor the rules of the Invitation.

If any of these implied obligations are broken, then the wronged party has grounds for a lawsuit for breach of contract. Note that in the case that we examine in this paper we make no claims whatsoever of a breach of contract. Rather, we claim that the rules put in place to rank the bids did not adequately select the best bid.

What is interesting is that the law says nothing about the rules employed for ranking the bids, except that they have to be disclosed, and that once they have been advertised, they cannot be changed (or rather, changing them is very difficult since all Bidders must agree to the changes). This leaves a lot of room for the Owner to set up any ranking process they see fit. This is the correct approach as no generic set of rules can possibly describe all the possible contracting situations; the principle of subsidiarity dictates that the Owner should develop a set of rules that is adequate for a given competition.

In the case of this paper the Owner is the Ministry of Community Safety and Correctional Services, and we consider two Bidders: Reilly Security[3], and the second Bidder was Contemporary Security. While Reilly is an Ontario based company, Contemporary Security is a Vancouver-based subsidiary of an American company. There were other Bidders, but they did not go past Stage I, an initial stage where companies were selected to participate in the next stages of the competition based on satisfying a set of minimal criteria. All companies (a.k.a., proponents) were bidding for a contract to provide security during the Pan American games to be held in Toronto in 2015. Since the Owner is the Ministry, the party concerned regarding the $-value of the bid are the tax payers of Ontario; indeed, the rules of the bid should satisfy the tax payers that they are getting the most competitive bid that can fulfill the obligations of the contract.

In the next section we explain in more detail the evaluation of the proposal of the two Bidders.

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[2]Our description is necessarily brief; the contracting law in Canada has been heavily influenced by a 1981 Supreme Court decision, known as *The Queen (Ontario) v. Ron Engineering*, which stipulates that a tender process involves two contracts: the so called "Contract A" which arises from the submission (by the Bidder in our case) of a tender, and "Contract B" which arises from the acceptance (by the Owner) of the tender.

[3]As mentioned in the abstract, the author is on the board of Reilly Security, and a consultant on this matter.

2. Reilly vs. Contemporary in the Pan Am games security bid

The Request for Proposals (RFP) was an invitation to prospective proponents to submit proposals for the provision of Private Security Services for the 2015 Pan American Games. This RFP is issued by Her Majesty the Queen in right of Ontario as represented by the Minister of Community Safety and Correctional Services[4].

The Ministry conducted the evaluation of proposals in the following stages:

Stage I consists of a review to determine which proposals comply with all of the mandatory requirements. Proposals, which do not comply with all of the mandatory requirements, may, subject to the express and implied rights of the Ministry, be disqualified and not evaluated further. There were only two proposals left at the end of this stage: Reilly and Contemporary.

Stage II consists of a scoring by the Ministry of each qualified proposal on the basis of the rated criteria. Only proponents meeting a minimum score of 65% will proceed to Stage III. Stage II will be worth 35% of the proponent's overall score.

Stage III consists of a scoring by the Ministry of each qualified proponent meeting the minimum score in Stage II on the basis of a presentation. Stage III will be worth 25% of the proponent's overall score.

Stage IV consists of the sealed pricing envelope provided by each proponent meeting the minimum score in Stage II and completing Stage III will then be opened and Stage IV will consist of a scoring of the pricing submitted. The evaluation of price/cost shall be undertaken after the evaluation of mandatory requirements and any rated requirements and presentation requirements have been completed. Stage IV will be worth 40% of the proponent's overall score.

At the conclusion of Stage IV, the scores from Stage II, Stage III, and Stage IV will be added, and the highest scoring proponent will proceed to Stage V— where they will undergo a security investigation. Thus, a bona fide contender who proceeds to Stage V is the de facto winner.

As it turned out, Stage IV was to be the crucial criterion, in that lower bids were not given a proportionate higher score. That is, as is shown in the conclusions in the next section, by scoring high in Stage II and Stage III, it was possible for a contender to have a substantially higher bid in Stage IV, and still win. Some details on how the $-value of the bid was evaluated were given in [7, Section 3.5] but not sufficient details to assuage concerns of the losing party: Reilly Security.

The matter became political as can be seen in a flurry of newspaper articles on the subject — three by Richard J. Brennan: [2, 3, 4], and others such as: [5], stating that "the Ontario auditor general will launch a probe into a controversial Pan Am Games security contract." The audit will also review the format used to rank companies that submitted bids. This creates an interesting problem for mathematicians and computer scientists who work in the field of ranking and comparisons; what is a fair bidding process? How to convince the public, and oneself, that a given ranking process is fair?

In our analysis (see the next section), we were able to conclude that with the numbers given, Contemporary must have won Stage II, and and the combined score for Stage II and Stage III must have been at least 50 points out of 60. This is evident without knowing Contemporary's score in Stage II and Stage III. It follows from the numbers and the setup and the (reasonable) assumption that Reilly earned 40 in Stage IV and Contemporary earned 33 in Stage IV (since we know the $-values of their bids).

We were also able to conclude that we can argue that the $-value of the bid is not given enough weight in the score. We can argue this point with the graph in Figure 1. Basically, we can plot the bid in millions of $ as a function of how many points Contemporary is missing out of the 60 points in combined Stage II and Stage III. If they miss 9 (they could not miss more and still win), then they cannot bid more than $81 million. But if Contemporary scores perfect (i.e., miss 0), then they can bid $111 million and still win! The graph in Figure 1 shows the scores in between.

The arguments supporting the above two conclusions can be found in the next section, where we prove our claims.

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[4]The entire RFP can be read here: [7].

All this raises some questions regarding the fairness of the bidding process: First, how were the score point allocations in the RFP determined? For example, it is quite evident that the scoring for the security guard recruitment, retention, licensing, and training is weighted extremely low in relation to Proponent and Project Team. Even though this is a security guard contract and all the performance penalties are based on security guard criteria, including deliverable dates with recruiting target numbers. Given the high profile of sporting events, this service is of growing importance in the post 9-11 world.

And second, how was the weight/formula for Stage IV of the RFP determined? The current formula is questionable, since its application shows how insignificant pricing really is in the overall scoring matrix. As was already pointed out, in the current scenario where there are two competent bidders, Reilly being \$67 million, Contemporary could have a price submission of up to \$111 million and still be awarded the contract. Since the Owner is paying with public money, this can be of concern to the tax payer.

3. Analysis of the bid

For the sake of clarity of presentation, in the following analysis we round up the numbers to the nearest integer. This has a negligible effect on the conclusions. Table 1 summarizes the variables representing the scores of Reilly and Contemporary, as well as the maximum score possible in each stage.

Table 1. The bidding stages.

Stage	Reilly	Contemporary	
Stage II	$r_2/35$	$c_2/35$	min 65%
Stage III	$r_3/25$	$c_3/25$	
Stage IV	$r_4/40$	$c_4/40$	

Fact 1. *Since to pass stage 2 at least 65% is needed, in terms of points we know that:*

$$35 \geq r_2, c_2 \geq 35 \cdot 0.65 = 22.75 \approx 23.$$

Assumption 1. *In Stage IV the points are given based on the bid's \$-value. Assume that the distribution is inversely linear; that is, lowest bid (Reilly's \$67) is given 40 points, and since Contemporary's bid was \$81, and $81 = 1.21 \cdot 67$, we assume that Contemporary gets $40/1.21 = 33$ points. This assumption is consistent with the explanation [7, Section 3.5].*

Given that Contemporary obtained more points, and given Fact 1 and Assumption 1, we have the following:

$$r_2 + r_3 + r_4 < c_2 + c_3 + c_4$$
$$\Rightarrow \quad r_2 + r_3 + 40 < c_2 + c_3 + 33$$
$$\Rightarrow \quad (c_2 - r_2) + (c_3 - r_3) > 7 \qquad (*)$$

On the other hand we know that $|c_2 - r_2| \leq 12$, because the highest possible score is 35 and the lowest possible score is 23 (Fact 1), so the largest difference possible in the scoring in Stage II is $12 = 35 - 23$.

So we consider the two possible scenarios under the assumption that Contemporary scored higher overall.

Scenario 1. *Suppose Contemporary won Stage II. Then $c_2 - r_2 \leq 12$. But then using line $(*)$, we have that*

$$(c_2 - r_2) > 7 - (c_3 - r_3)$$

and so we know that it is impossible to have $7 - (c_3 - r_3) \geq 12$, which in turns means that it is impossible to have $r_3 - c_3 \geq 5$. In other words, if Contemporary won the bid, and Contemporary won Stage II, then it is impossible for Reilly to win Stage III by more than 5 points.

Scenario 2. *Suppose Contemporary lost Stage II. Then $(c_2 - r_2) \leq -1$, so again using $(*)$, we get that $(c_3 - r_3) \geq 8$. In other words, if Contemporary won the contest, but Contemporary lost Stage II, then Contemporary must have won Stage III by at least 8 points.*

Conclusion 1. *When the actual scores showing that Contemporary won are made public, we can check that they are consistent as follows: if Contemporary won Stage II, then Reilly cannot lead Contemporary by more than 5 points in Stage III. If Contemporary lost Stage II, then Contemporary must lead Reilly in Stage III by at least 8 points. If neither is true, then the results are inconsistent. (Of course, this is the case under Assumption 1, which is reasonable.)*

This was our conclusion, which provided a framework for understanding, as well as checking the coherence of the bid computations. A few days later we were given the Reilly scores, while the Contemporary scores were not released. This allowed us to draw some stronger conclusions. In particular, we were given the scores in Table 2.

Table 2. Reilly's scores released.

Stage	Reilly	Contemporary
2	25/35	?
3	18/25	?

Plugging those into $(*)$, we obtain:

$$(c_2 - 25) + (c_3 - 18) > 7,$$

which means that $c_2 + c_3 > 50$. On the other hand, $c_2 + c_3 \leq 60$, so together we get:

$$50 < c_2 + c_3 \leq 60.$$

In other words, Contemporary must be within 9 points of the maximum possible for both Stage II and Stage III. In particular, this means that Scenario 2 (Contemporary lost in Stage II) is not possible: for suppose that it did lose in Stage II, $(c_2 - r_2) \leq -1$, so $c_2 \leq -1 + 25 = 24$. So $c_2 \leq 24$, but then Contemporary is not within 9 points of the maximum possible. So Scenario 2 is not possible.

For Contemporary not to win Stage III, it must be the case that $c_3 \leq 18$, which means that it lost at least $7 = 25 - 18$ points in Stage III. Thus, if Contemporary lost more than 2 points in Stage II (i.e., Contemporary won Stage II, but scored at most 33/35), it must have necessarily won Stage III.

Conclusion 2. *Therefore, we know that Contemporary must have won Stage II, and either won Stage III as well, or lost no more than two points in Stage II. Overall, Contemporary's combined score in Stage II and Stage III must have been very close to the maximum number of points possible:*

$$51 \leq c_2 + c_3 \leq 60.$$

What is interesting is that Contemporary can lose Stage III and Stage IV, but by scoring nearly perfect in Stage II (i.e., at least 33/35) it can still win the competition. This seems to be an aberration.

3.1. The $-value of the bid not given the proper weight

Let $x = 60 - (c_2 + c_3)$, that is, x tells us how far Contemporary is from a perfect score in Stage II and Stage III. That is, if $x = 0$ then they got the maximum possible number of points ($c_2 + c_3 = 60$). On the other hand, if $x = 9$ then they got the lowest possible score and still win ($c_2 + c_3 = 51$).

We now compute the size of the bid of Contemporary as a function of x. That is, we know that if $x = 9$ then Contemporary's bid, denoted c_{bid}, is \$81 million, and we want to know how high a bid Contemporary could make and still win (the higher c_{bid}, the smaller the x must be):

$$\frac{40 \cdot 67}{c_{\text{bid}}} = 33 - (9 - x),$$

which means that $c_{\text{bid}} = \dfrac{2680}{24 + x}$. In other words, if Contemporary scored perfect in Stage II and Stage III, i.e., $x = 0$, then it could bid $c_{\text{bid}} = 2680/24 = 111$ million and still win!
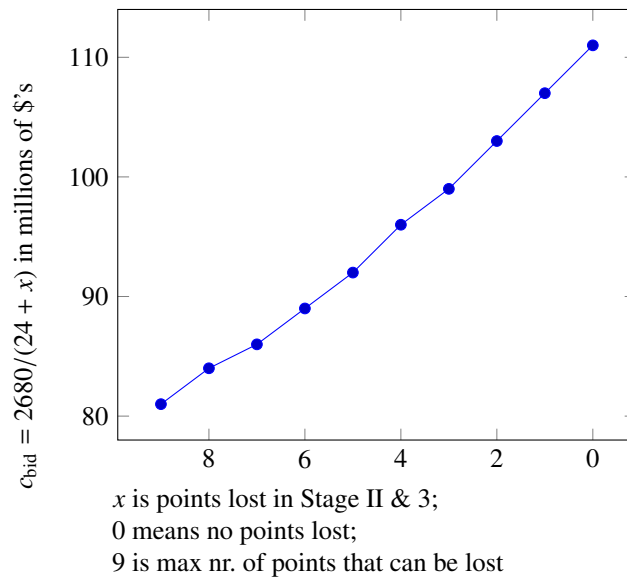
Fig. 1. Relationship between points lost and the height of the possible winning bid.

Conclusion 3. *In the above graph, x counts missing points of Contemporary in Stage II and Stage III. So, for example, if x = 0, then Contemporary is not missing any points (perfect score in Stage II and Stage III) and so Contemporary can win with a bid of $111 million. On the other hand, when x = 9, this is the max number of points that Contemporary can miss in Stage II and Stage III and still win, so in that case it cannot have a bid of more than $81 million. The plot shows the $-values in between. Again, it seems to be an aberration for Contemporary to be able to have a much higher $-value bid than Reilly, and be awarded the contract.*

Conclusion

In a certain sense, a bidding competition is a multi-player game with incomplete information. It is akin to playing chess, where the the size of the chess-board is known, and the number of pieces on the board at any given time is also known, but their exact positions are not.

Bidding parties accept the terms of the game, and are usually aware that there are risks involved: a company may spend vast resources in preparing a competitive bid, only to come in second. However, it is absolutely essential, once the positions are disclosed, to be able to determine a winner by a process that is acceptable to all the parties. This means that the ranking process employed by the Owner has to be clear, unambiguous, and fair (also *perceived* as being fair!).

This is a tall challenge when inviting bids for complex services that requires complex ranking procedures. Thus, a good ranking not only picks out the rightful champion, but also submits to a proof of correctness that demonstrates that it always picks a rightful champion. This type of reasoning, algorithms and their proofs of correctness, is the domain of Computer Science.

Acknowledgments

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