

Understanding Key Bidding Factors Considered by Top Jordanian Contractors

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ABSTRACT

One of the most crucial decisions that is regularly exercised by construction contractors is to determine whether to bid or not to bid on a certain project. The purpose of this paper is to understand key factors that are considered by top Jordanian contractors in their bid/no-bid decision making. Previous research in the Jordanian construction market reported the importance weights of 53 bid/no-bid factors (El-Mashaleh, 2013). Based on that work, this paper discusses the top bidding factors and compares them with international related work. Additionally, the paper examines the reliability of El-Mashaleh's (2013) study based on Cronbach's alpha reliability test. Furthermore, the paper tests the degree of consensus among the respondents of El-Mashaleh's (2013) work regarding the ranking of the 53 bid/no-bid decision factors based on Kendall's coefficient of concordance. Finally, analysis of variance (ANOVA) is conducted to test statistical significant differences in the importance weights of the 53 bidding factors between public and private bidders. Cronbach's alpha reliability test proves that the adopted scale of measurement for the importance of the bid/no-bid factors has excellent internal consistency reliability. Kendall's coefficient of concordance reveals a significant degree of consensus among the respondents regarding the ranking of the bid/no-bid decision factors. Analysis of variance (ANOVA) indicates statistical significant differences in importance weights between public and private bidders for 6 factors out of the 53 factors considered.

KEYWORDS: Bidding, Bid/No-bid, Contractors, Jordan.

INTRODUCTION

One of the most crucial decisions that is regularly exercised by construction contractors is to determine whether to bid or not to bid on a certain project. Contractors usually consider tens of bidding factors when evaluating different bidding opportunities.

Several surveys have been conducted across several countries to identify factors that affect the bid/no-bid decision. Ahmad and Minkarah (1988) conducted a survey questionnaire to determine bidding factors in the US construction industry. The study identified 31 factors that were thought to influence the bidding decision. Shash (1993) utilized a modified version of Ahmad and Minkarah's (1988) survey and identified 55 bidding factors in the UK construction industry. The

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need for work, number of competitors and experience in similar projects were identified as the top three factors that affect the bid/no-bid decision.

Wanous et al. (2000) ranked 38 factors that are considered by Syrian contractors in their bid/no-bid decision. The authors indicated that the most important factors are fulfilling the to-tender conditions imposed by the client, financial capability of the client and relation with/reputation of the client. Chua and Li (2000) gathered a set of factors from the literature that affect the bidding decision and conducted a survey questionnaire across 19 contractors in Singapore.

Chua and Li (2000) utilized the analytical hierarchy process to identify the key determining factors for the bidding decision. Among the top factors are the need for continuity in employment of key personnel and workforce, current workload of projects and relationship with the owner. Egemen and Mohamed (2007) identified the key bidding factors along with their importance weights based on surveying 80 contracting organizations that operate in Northern Cyprus and Turkey construction markets.

El-Mashaleh (2013) conducted a survey questionnaire that targeted top Jordanian contractors. The study reported the importance weights and standard deviations of 53 bidding factors from the perception of 43 Class 1 contractors. Based on a (1-5) Likert scale, respondents were asked to rate the importance of the 53 bidding factors. As shown in Table 1, these 53 factors were grouped under 7 categories: project characteristics, project bidding and contracting, project requirements, project expected benefits, client characteristics, consultant characteristics, and firm and environmental characteristics.

This study complements El-Mashaleh's (2013) study. In particular, this paper:

- (1) discusses the top 15 bidding factors within the Jordanian construction industry, justifies their high ranks and compares them with other studies;
- (2) examines the reliability of El-Mashaleh's (2013) study based on Cronbach's alpha reliability test;
- (3) tests the degree of consensus among the

respondents of El-Mashaleh's (2013) work regarding the ranking of the 53 bid/no-bid decision factors based on Kendall's coefficient of concordance; and

- (4) conducts analysis of variance (ANOVA) to test statistical significant differences in the importance weights of the 53 bidding factors between public and private bidders.

RESEARCH METHODOLOGY

Cronbach's Alpha Test

Cronbach's alpha test is used to measure the reliability of the criterion scale. It gives the lowest estimate of reliability that can be expressed for an instrument (Lehman et al., 2005). Based on the adopted (1-5) Likert scale, Cronbach's alpha test verifies the internal consistency among responses regarding the importance of the bid/no-bid factors. The test aims at finding the reliability coefficient based on the average correlation among criteria and on the number of criteria. A high value for Cronbach's alpha indicates good internal reliability consistency of the items in the scale. George and Mallery (2003) provide the following rules of thumb for Cronbach's alpha reliability coefficient values:

- Alpha > 0.9 – excellent
- Alpha > 0.8 – Good
- Alpha > 0.7 – Acceptable
- Alpha > 0.6 – Questionable
- Alpha > 0.5 – Poor
- Alpha < 0.5 – Unacceptable.

Kendall's Ranking Consensus

Kendall's coefficient of concordance (W) is used to test the overall consensus of the factors by the respondents. It aims at determining the agreement among raters. W values range between 0 and 1, with increasing values reflecting an increasing degree of agreement among the rankings. A value of 0 represents no agreement among the rankings and a value of 1 represents perfect agreement (Gibbons, 1993).

Table 1. Descriptive statistics for the importance weights of factors that affect the bid/no-bid decision.
Source: El-Mashaleh (2013)

Category	Factors that affect the bid/no-bid decision	Mean	Standard deviation
1. Project characteristics	1.1 Project type	4.36	0.88
	1.2 Project location	3.53	1.35
	1.3 Project size (contract price)	4.40	0.73
	1.4 Project duration	3.67	1.16
	1.5 Site accessibility	3.56	1.35
2. Project bidding and contracting	2.1 Specified time frame for submitting tenders (bidding period)	3.60	1.16
	2.2 Contract type (i.e., measured contract, unit price, cost plus)	3.77	1.51
	2.3 Quality of bidding documents (i.e., drawings, specifications,... etc.)	4.21	0.99
	2.4 Terms of payment (i.e., minimum amount of interim payments, specified time periods for applying and issuing interim payment certificates,... etc.)	4.00	1.15
	2.5 Amount of delay damages	3.14	1.23
	2.6 Percentage of retention money	3.24	1.23
	2.7 The contract includes an advance payment	3.69	1.47
	2.8 The contract includes a bonus for early completion	2.44	1.44
	2.9 The contract includes an "Adjustment for Changes in Cost" sub-clause	4.21	1.10
	2.10 The contract requires appointing a Dispute Adjudication Board (DAB) for the project	3.36	1.16
	2.11 The contract requires appointing arbitrators for the project	3.21	1.34
	2.12 Security requirements (i.e., bid security, performance security,... etc.)	3.47	1.26
	2.13 Warranty requirements	3.21	1.35
3. Project requirements	3.1 Cash flow requirements of the project	4.31	1.07
	3.2 Availability of labor required for the project	4.30	0.99
	3.3 Availability of materials required for the project	4.23	1.00
	3.4 Availability of equipment required for the project	4.02	1.14
	3.5 Availability of subcontractors required for the project	3.57	1.17
	3.6 Proportion of work that will be subcontracted	3.19	1.01
	3.7 Required methods of construction for the project	3.57	1.29
	3.8 Possibility of facing safety hazards during project execution	3.90	1.16
	3.9 Possibility of facing environmental issues during project execution	3.36	1.19
4. Project expected	4.1 Profit made in similar projects in the past	3.93	1.10

benefits	4.2 Promote the reputation of the firm	4.33	0.97
	4.3 Improve the experience of firm's personnel	4.05	0.97
	4.4 Increase the possibility of entering new markets	3.93	1.09
	4.5 Increase the possibility of building a long-term relationship with the client	4.09	1.11
	4.6 Increase the possibility of building a long-term relationship with the consultant	3.81	1.22
5. Client characteristics	5.1 Identity of the client	4.49	0.86
	5.2 Amount of work that is regularly carried out by the client	3.84	1.11
	5.3 Financial capability of the client	4.88	0.50
	5.4 Reputation of the client regarding his commitment for making timely payments	4.79	0.47
	5.5 Influence of the client in making recommendations in the construction market	4.07	1.12
6. Consultant characteristics	6.1 Identity of the consultant	3.90	1.08
	6.2 Amount of work that is regularly carried out by the consultant	3.10	1.25
	6.3 Reputation of the consultant regarding his independence in making "fair determinations" between the contracting parties	4.02	0.99
	6.4 Influence of the consultant in making recommendations in the construction market	3.70	1.10
7. Firm and environmental characteristics	7.1 Amount of work currently at hand	4.37	0.90
	7.2 Current workload in bid preparation	3.70	1.08
	7.3 Current financial standing of the firm	4.26	0.90
	7.4 Experience of the firm with similar projects	3.98	0.83
	7.5 Having enough number of qualified technical personnel	3.67	0.99
	7.6 The need for continuity in employment of key personnel	3.93	0.88
	7.7 The need for continuity in employment of workforce	3.51	1.03
	7.8 Expected number of competitors	3.63	1.20
	7.9 Competence of the expected competitors	3.74	1.07
	7.10 Current workloads of firm's major competitors	3.60	1.16
	7.11 Availability of other projects in the market	4.00	1.07

However, these values of W are applicable when the number of factors is less than 7 (Siegel and Castellan, 1988). Recall that there are 53 bid/no-bid factors. For cases that involve larger number of factors (i.e., >7), the sampling distribution is approximated to a chi-square (χ^2) distribution with degrees of freedom (df) = number of factors – 1 (Gibbons, 1993).

Under Kendall's concordance analysis, we test the

following hypotheses (Sheskin, 2007):

$H_0: W = 0$ (No agreement among the respondents' rankings);

$H_a: W \neq 0$ (Agreement exists among the respondents' rankings).

Note that H_0 is rejected if the obtained value of χ^2 is equal to or greater than the tabled critical χ^2 value at the specified level of significance (Sheskin, 2007).

Analysis of Variance (ANOVA)

El-Mashaleh's (2013) study classified contractors as either public bidders or private bidders. The former group bid more for public projects, while the later group bid more for private projects. Accordingly, 47% of contractors in El-Mashaleh's (2013) sample are public bidders, while 42% of them are private bidders.

An analysis of variance (ANOVA) is conducted to examine whether there are statistical significance differences between public and private bidders in rating the importance weights of the 53 bid/no-bid decision factors. In particular, for every bid/no-bid decision factor, the F-test is used to test the following hypotheses:

$H_0: \mu_{\text{Public}} = \mu_{\text{Private}}$ (public bidders and private bidders' ratings are the same);

$H_a: \mu_{\text{Public}} \neq \mu_{\text{Private}}$ (public bidders and private bidders' ratings are different).

Associated with the F-test is the p-value, which is the probability of getting an F-value that is larger than the calculated one (Ott and Longnecker, 2001). This p-value depends on our assumption of level of significance. For example, if our level of significance is 10%, then we reject H_0 if the p-value is less than 10%.

RESEARCH FINDINGS

Top 15 Bidding Factors

Table 2 summarizes the top 15 bidding factors in the Jordanian construction industry. As illustrated in the table, Jordanian contractors place great emphasis on client characteristics. The top three factors are dominated by this category; namely, "financial capability of the client," "reputation of the client regarding his commitment for making timely payments" and "identity of the client" are at the top of the list. This is a clear and strong indication of the impact of client characteristics on the bidding decision. This result is consistent with previous research. "Financial capability of the client" was ranked as the

second and the fifth bidding factor according to Wanous et al. (2000) and Egemen and Mohamed (2007), respectively.

Table 2 shows that "project size (contract price)" is ranked fourth. This result is identical to the one obtained by Wanous et al. (2000). Egemen and Mohamed (2007) ranked "project size" as the top bidding factor. Clearly, "project size" is an important bidding consideration as firms relate that to the size of projects that the firm usually executes.

"Amount of work currently at hand" is ranked fifth as indicated in Table 2. Depending on the classification of the contractor, Jordanian regulations cap the amount of work that a contractor can undertake at any point in time to prevent a contractor from becoming overextended in reference to the contractor's resources. As a consequence, "amount of work currently at hand" appeared as one of the most important bidding factors. This result is consistent with previous research. This factor is ranked second, fourth and tenth by Chua and Li (2000), Egemen and Mohamed (2007) and Wanous et al. (2000), respectively.

Table 2 shows that "project type" is ranked sixth. The bidding decision is obviously impacted by the type of work involved. "Current financial standing of the firm" is ranked seventh reflecting the importance of financial liquidity and working capital on the bidding decision. This factor is ranked fifth by Chua and Li (2000), sixth by Egemen and Mohamed (2007) and Wanous et al. (2000).

"Promote the reputation of the firm" is ranked eighth indicating that Jordanian contractors are eager to be involved in projects that highlight and publicize the image of their firms. "Availability of labor required for the project" is ranked ninth. This is an important consideration for Jordanian contractors because they rely heavily on workforce from neighboring countries. Additionally, the Jordanian labor market is subjected to unforeseeable changes in legislation that governs and organizes employment and residency of foreign labor in the country.

"Cash flow requirements of the project" is ranked

tenth as shown in Table 2. This factor is ranked sixth by Egemen and Mohamed (2007) reflecting the importance of balancing available cash against required cash. "Availability of materials required for the project" is ranked eleventh in Table 2 and ninth by Wanous et al. (2000). During the last few years and as a result of the increased construction activity in the country, Jordanian contractors faced occasions of lack or unavailability of major construction materials such as cement and reinforcing steel. Consequently, this factor appeared at the top 15 list.

"Quality of bidding documents (i.e., drawings and specifications,... etc.)" is ranked twelfth. Chua and Li (2000) ranked this factor ninth. Quality of bidding documents has a direct impact on progress in the field. Poor quality documents suffer from omissions, contradictions, ambiguities or insufficient information. Fisk and Renolds (2006) considered poor quality plans and specifications a major source of claims and disputes. Jordanian contractors rank this factor high indicating their concern with the associated consequences of poor/good quality bidding documents.

"The contract includes an 'Adjustment for Changes in Cost' sub-clause" is ranked twelfth as shown in Table 2. The importance of this sub-clause lies in the fact that it balances the risk between the contracting parties for cases of rises or falls in the cost of labor, material, equipment,... etc. Sub-clause 13.8 [*Adjustment for Changes in Cost*] of FIDIC 99 Conditions of Contract for Construction is an excellent example on such sub-clause. This sub-clause provides a formula to determine the adjustment in cost (FIDIC, 1999).

"Increase the possibility of building a long-term relationship with the client" and "influence of the client in making recommendations in the construction market" are ranked fourteenth and fifteenth, respectively. According to Jordanian contractors, these two factors are important considerations in the bid/no-bid decision because they provide the potential for future work with a client in particular and/or in the construction market in general.

Table 2. Top 15 factors that affect the bid/no-bid decision

Rank	Factor	Mean	Standard deviation	Category
1	5.3 Financial capability of the client	4.88	0.50	5. Client characteristics
2	5.4 Reputation of the client regarding his commitment for making timely payments	4.79	0.47	
3	5.1 Identity of the client	4.49	0.86	
4	1.3 Project size (contract price)	4.40	0.73	1. Project characteristics
5	7.1 Amount of work currently at hand	4.37	0.90	7. Firm and environmental characteristics
6	1.1 Project type	4.36	0.88	1. Project characteristics
7	7.3 Current financial standing of the firm	4.26	0.90	7. Firm and

				environmental characteristics
8	4.2 Promote the reputation of the firm	4.33	0.97	4. Project expected benefits
9	3.2 Availability of labor required for the project	4.30	0.99	3. Project requirements
10	3.1 Cash flow requirements of the project	4.31	1.07	
11	3.3 Availability of materials required for the project	4.23	1.00	
12	2.3 Quality of bidding documents (i.e., drawings, specifications,... etc.)	4.21	0.99	2. Project bidding and contracting
13	2.9 The contract includes an "Adjustment for Changes in Cost" sub-clause	4.21	1.10	
14	4.5 Increase the possibility of building a long-term relationship with the client	4.09	1.11	4. Project expected benefits
15	5.5 Influence of the client in making recommendations in the construction market	4.07	1.12	5. Client characteristics

Cronbach's Alpha Reliability Test

Cronbach's alpha coefficient for the scale used to determine the importance weights of the bidding factors in the Jordanian construction industry is 0.933. Consequently, it can be inferred that the adopted scale of measurement for the importance of the bid/no-bid factors has excellent internal consistency reliability.

Kendall's Ranking Consensus

Table 3 summarizes Kendall's concordance analysis statistics. Clearly, H_0 is rejected since the obtained χ^2 value (301.932) is larger than the tabled critical χ^2 value (78.6) at the 0.01 level of significance. As a result, Kendall's concordance analysis provided sufficient evidence to conclude that there is significant degree of consensus among the respondents regarding the ranking of the bid/no-bid decision factors.

Table 3. Kendall's ranking consensus

Kendall's coefficient of concordance (W)	0.181
Obtained χ^2 value	301.932
Tabled critical χ^2 value at the 0.01 level of significance (Ott and Longnecker, 2001, p.1101)	78.6
Degree of freedom (df)	52
Asymptotic level of significance	0.000

Differences in Importance Weights of Bidding

Factors between Public Bidders and Private Bidders

Table 4 shows 6 factors with statistical significance differences between public and private bidders. The table also illustrates number of responses from private/public bidders, means of bidding factors for

private/public bidders, F-test and the associated p-values. Note that only the first bidding factor is significant at the 0.05 level of significance. The rest 5 bidding factors are significant at the 0.1 level of significance.

Table 4. ANOVA results

Factor	N (private/public)	Mean (μ) (private/public)	F-test	p-value
2.7 The contract includes an advance payment	19/18	4.361/3.333	5.20	0.029*
3.1 Cash flow requirements of the project	18/19	4.556/3.947	2.89	0.098 ⁺
5.4 Reputation of the client regarding his commitment for making timely payments	19/19	4.947/4.684	3.36	0.075 ⁺
6.1 Identity of the consultant	18/19	3.611/4.263	3.82	0.059 ⁺
6.2 Amount of work that is regularly carried out by the consultant	19/18	2.789/3.500	3.04	0.09 ⁺
6.3 Reputation of the consultant regarding his independence in making "fair determinations" between the contracting parties	19/19	3.842/4.368	3.8	0.059 ⁺

*Significant at 0.05 level.

⁺Significant at 0.1 level.

"The contract includes an advance payment" is rated statistically significantly higher by private bidders compared to public bidders ($\mu_{\text{Private}} = 4.361$; $\mu_{\text{Public}} = 3.333$). The reason behind this result lies in the fact that most public projects in Jordan contain an advance payment sub-clause in their contract, while this is not the norm in private bidding. As a result, private bidders rated this factor higher than public bidders.

"Cash flow requirements of the project" is rated higher by private bidders compared to public bidders. Both timely payments to contractors and the existence of advance payment sub-clause in public bidding make

public bidders less susceptible to the usual financial squeeze suffered by contractors in relation to the project. Consequently, private bidders expressed higher importance rating for this factor.

"Reputation of the client regarding his commitment for making timely payments" is rated higher by private bidders compared to public bidders. Public owners are usually committed for making timely payments to contractors as specified in the contract. On the other hand, there is diversity within the private owners' population regarding their commitment of timely payments. Consequently, this factor is rated more important by private bidders compared to public

bidders.

The following 3 factors are rated statistically significantly higher by public bidders compared to private bidders: identity of the consultant, amount of work that is regularly carried out by the consultant, and reputation of the consultant regarding his independence in making "fair determinations" between the contracting parties. Consultants play a major role in administrating the contract between the parties. These consultants are more authorized in the case of public bidding compared to private bidding. Private owners impose more constraints on the consultant's authority requiring the consultant to get the owner's approval before exercising his/her authority. As a result, public bidders are more impacted by consultants compared to private bidders. This justifies the higher importance rating for factors related to the consultant by public bidders compared to private bidders.

CONCLUSIONS

The purpose of this paper is to understand key factors that are considered by top Jordanian contractors in their bid/no-bid decision making. Past research in the Jordanian construction industry reported the importance weights of 53 bid/no-bid factors (El-Mashaleh, 2013). This paper highlighted the top bidding factors and compared them with related international research. Additionally, the paper examined the reliability of El-Mashaleh's (2013) work based on Cronbach's alpha reliability test, which

showed that the adopted scale of measurement for the importance of the bid/no-bid factors has excellent internal consistency.

Furthermore, this paper tested the degree of consensus among the respondents of El-Mashaleh's (2013) work regarding the ranking of the 53 bid/no-bid decision factors based on Kendall's coefficient of concordance. Kendall's coefficient of concordance provided sufficient evidence to conclude that there is significant degree of consensus among the respondents regarding the ranking of the bid/no-bid decision factors.

Finally, ANOVA analysis revealed statistical significant differences in importance weights between public and private bidders for 6 factors out of the 53 factors considered. These factors are: the existence of an advance payment in the contract, cash flow requirements of the project, reputation of the client regarding his commitment for making timely payments, identity of the consultant, amount of work that is regularly carried out by the consultant, and reputation of the consultant regarding his independence in making "fair determinations" between the contracting parties.

Future extension of this work includes examining the relationship between bidding factors and the bid/no-bid decision. Such examination requires larger scope of data collection that utilizes a database of real life bidding decisions along with their associated factors. Plans are underway to build the required database.

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