IMPROVING THE EFFECTIVENESS AND IMAGE OF THE BUILDING AND CIVIL ENGINEERING PROCESS BY USING AN AWARD POINT SYSTEM IN THE AWARD OF CONTRACTS

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ABSTRACT

One of the main causes leading to the perceived ineffectiveness and poor image of the building and civil engineering process seems to be the fact that clients often use lowest price as the only selection criterion in the award of contracts. One of the main recommendations of the doctoral research thesis of Grobler [1] is the introduction of an award point system that not only compares bidders on price, but also on their previous records of: quality of work, management ability and relations with other role players.

OPSOMMING

Een van die hoof oorsake wat aanleiding gee tot die persepsie dat die bou-en siviele ingenieursweseproses oneffektief is en ‘n swak beeld het, is die feit dat kliënte gereeld laagste prys as die enigste maatstaf gebruik in die toekenning van kontrakte. Een van die hoof voorstelle van die doktorale proefskrif van Grobler [1] is die instelling van ‘n toekenningspuntesisteem wat nie net tenderaars beoordeel op prys nie, maar ook op vorige rekords van: kwaliteit van werk, bestuursvermoë en verhoudinge met ander rolspelers.

RESEARCH OBJECTIVES

The research study of Grobler [1] investigated several problem areas leading to the perceived ineffectiveness and poor image of the building and civil engineering process. This paper however only concentrates on one area, namely project procurement and more specifically on the award of contracts. The objectives of this part of the research study can be summarised as follows: (1) To determine whether clients often use lowest price as the only selection criterion in the award of contracts. (2) Whether specialist / trade contractors / subcontractors are doing most of the actual work on building projects in South Africa and that main contractors have subsequently become managers of trade contractors. (3) Whether quality of work, management ability and relations between the role players should become important selection criteria in the award of contracts. (4) To evaluate fixed price and cost-plus compensation.

RESEARCH METHODOLOGY

The following methodology was used in abovementioned research study to research the objectives: (1) An extensive literature review supplemented by many years of experience at the coalface formed the foundation and assisted in steering the research in the right direction. (2) Emphasis was on finding solutions to problems and not to determine the extent of problems. It was therefore decided to obtain quality primary information through a comprehensive survey process by targeting leading role players in the industry – primarily in the Gauteng area (powerhouse of the South African economy). As a consequence of the statistical limitations the required size of the sample was set on not less than thirty responses.

The primary data survey process consisted of: (1) Conclusions and recommendations flowing from the secondary data were included in a main questionnaire, which was delivered to fifty two leading role players, who were asked to rate various statements on a five-point rating scale. (2) Respondents were also given the opportunity in an open-ended format to express in their own words their opinion on the different issues and to make recommendations, some of which were included in a second questionnaire and rated by the respondents of the first questionnaire. (3) Telephonic and personal interviews were used to clarify uncertainties, to explore the reasoning behind answers and to probe deeper into important issues.

LITERATURE REVIEW

It is generally accepted that competitive bidding is the most economic way for clients to award and construct a project. Dozzi et al [2] confirm that the public sector in Alberta, Canada, employs for all practical purposes only “open tendering” (competitive bidding).

One of the main problems of competitive bidding seems to be the fact that lowest price is often the only selection factor in the award of contracts. This is especially critical on projects where main contractors subcontract a substantial portion of the work and where they have become in essence managers of subcontractors. Hinze and Tracey [3] report that subcontractors in the United States of America are doing 80 – 90% of the actual construction work on building projects. This figure was confirmed by Haltenhoff [4], whilst more than 90% was tabled in 1989 in the United Kingdom by Gray and Flanagan [5]. This emphasizes

the importance of the management ability of the main contractor in the award of building projects.

In recent years the method of negotiating a price has gained field, especially in the private sector. This approach is especially suited when the lead-time available is critical, thus a rapid start is essential and although costs are usually important on any project, it is not normally the over-riding factor.

Negotiations are however often with more than one entity and on a competitive basis to ensure cost effectiveness. Gordon [6] stresses that this award method can produce better relationships between the contractor and the client or his representative. To this one must add that a prerequisite for success of this award concept is mutual trust between the parties.

Seeley [7] argues that there are situations in which negotiating a contract may have advantages to the client, some of which are: (1) The client has a business relationship with the contractor. (2) The client has recently completed a similar project through competitive bidding. (3) A specialist contractor is required and a specific contractor is the only one available with the required expertise and resources. (4) When a rapid start with the project is essential and competitive bidding will take too long.

Lack of detailed drawings at the tender stage can be added to the list of Seeley [7]. In such cases it makes sense to negotiate a contract especially if guaranteed maximum price or cost-plus is used as the compensation approach. It should be noted however that insufficient tender details should be avoided wherever possible, as this often leads to misunderstanding, disputes and claims.

Gordon [6] however highlights that negotiating a contract with only one contractor fails to determine the market price for the project. The client might employ the contractor he wants, but ends up paying more than he should.

In practice fixed price, guaranteed maximum price and cost-plus are the most commonly used compensation methods. With fixed lump sum compensation the total project price is known right from the start and the financial risk lies with the contractor – Pilcher [8].

The fact however remains that clients pay at the end of the day for this as contractors allow for these risks, whether real or imaginary and fixed lump sum does not necessarily produce the most economical project price. In fact, this compensation approach can be very profitable for experienced contractors, as the competition is usually less on fixed lump sum tenders. Gilbreath [9] goes so far as to say that the concept of financial risk can be viewed as “profit opportunity.” Gordon [6] notes that by absorbing some of the risk, the financial advantage might be much larger for owners.

This paper needs to stress the importance of well-detailed drawings and specifications on fixed lump sum contracts, as contractors need to know exactly what to allow for, and secondly, to avoid misunderstandings, disputes and claims during the construction phase. Fixed lump sum contracts require skilful tendering and this paper recommends that only skilled and experienced contractors should tender when this compensation approach is employed.

Fixed unit prices are less risky for the contractor and Seeley [7] states that it is the most Commonly used compensation approach for building and civil engineering projects in the United Kingdom. Tumblin [10] notes the secondary benefit from unit price bidding, namely the relative ease of making preliminary estimates for future projects of a similar nature.

It should be remembered that fixed unit price compensation also has its fair share of disputes and claims during the construction phase. Ignoring for the moment the problem associated with insufficient details at tender stage, disagreement in quantities and especially items that need classification often lead to disputes, mistrust and bad relations. Classification of excavated material into hard, intermediate and soft material, often leads to disputes and soured relations.

Guaranteed maximum price is less risky for the contractor than fixed lump sum. Some contracts allow for a sharing of cost saving in the event that the project is completed below the guaranteed maximum price – Gordon [6].

However, as far as sharing of cost is concerned, it needs to be stressed that with insufficient control from the client or his representative there is a possibility that some contractors may be tempted to save on materials, labour and supervision costs by for example using inferior materials in an attempt to produce a total cost saving which he / she then shares in.

Gordon [6] notes that as a reimbursement method with a maximum limit, guaranteed maximum price compensation "can be very useful", but warns against false expectations if the ceiling price is unrealistic.

Griffis and Butler [11] argue that the following two reasons cause owners to shy away from cost-plus compensation: (1) The total project cost prior to commencement of construction is unknown. (2) The owner basically carries most of the risks. There is however a positive element in this – the owner only pays the actual audited costs and not for imaginary risks and this should lower the costs of projects, assuming of course that there is good control of costs from the owner's side.

The following hypothetical statement may be the real reason why owners shy away from cost-plus: Owners do not trust contractors fully. This statement amongst others was tested in the primary data collection process – Grobler [1].

Pilcher [8] supports the target cost-plus system arguing that it can be effective in cost savings. The target cost-plus system involves prior to the start of any work the agreement of a target for the costs as well as a basic fee, which is usually a percentage of the agreed target budget. Provision is made to adjust the basic fee, for example, should the actual audited prime cost be less than the budget target cost, then the basic fee is increased, and vice-versa.

Some of the advantages of cost-plus as noted by Griffis and Butler [11] are: (1) The owner has much closer control over a cost-plus project than is the case with fixed price. (2) Cost-plus has the potential to deliver a better quality end-product. (3) It can be superior when a rapid start of the project is critical. (4) It is fairer to the contractor on very large and complex projects where it becomes practically impossible to estimate the total prime cost and the cost associated with risks, especially those that fall beyond the contractor's control. (5) Disputes

and claims are usually less on projects compensated by cost-plus.

PRIMARY DATA: RESPONSE TO THE MAIN QUESTIONNAIRE

As noted earlier, conclusions and recommendations flowing from the literature review process were included in a main questionnaire, which was delivered to fifty two leading role players – primarily in the Gauteng area. A breakdown of response from the different sectors on the first / main questionnaire is listed in Table I.

Table I: Response from the different sectors on the main questionnaire

	Owners	Designers	P/C Managers	Contractors
Number of questionnaires delivered (Total = 52)	14	16	6	16
Number of valid responses received = 36, (69.23% response rate)	7	12	5	12
Valid response rate of the sectors	50.00%	75.00%	83.33%	75.00%

Legend: P/C Managers = Project / Construction Managers.

The high response rate can be attributed mainly to three reasons. Firstly, it appears as if respondents appreciated the personal delivery of the questionnaire. Secondly, telephonic calls and faxes were used to remind respondents. Thirdly, during follow-up calls to clarify uncertainties and / or conflicting answers, several respondents noted that they found the topics (different problem areas identified for the perceived ineffectiveness and poor image of the industry) most relevant and enjoyed participation.

PRIMARY DATA: RESULTS OF THE MAIN QUESTIONNAIRE

Listed in Table II are the mean values (M), standard deviations (SD) and 95% confidence intervals of the ratings of all four sectors combined (all thirty six respondents) on various statements regarding award and compensation methods. A rating of "5" means respondents strongly agree with the statement, "4" - agree, "3" - undecided, "2" - disagree, whilst a rating of "1" indicates strong disagreement.

Table II: Results of the main questionnaire on ratings of all sectors combined on statements regarding award and compensation methods

Statement	M	SD	95% confidence interval
1. The main problem with competitive bidding is that clients use lowest price in many instances as the selection criterion in the award of contracts.	4.25	0.84	(3.98 ; 4.52)
2. Selecting on lowest price fails to exploit management ability.	4.33	0.68	(4.11 ; 4.55)
3. Selecting on lowest price fails to consider quality of work.	4.19	0.89	(3.90 ; 4.48)
4. Specialist contractors / subcontractors are doing most of the actual work on building projects.	4.00	0.89	(3.71 ; 4.29)

5. Quality of work of subcontractors should be an important selection criterion in the appointment of this sector.	4.50	0.51	(4.33 ; 4.67)
6. Main contractors in the traditional method have become managers of subcontractors.	4.17	0.70	(3.94 ; 4.40)
7. Management ability of the main contractor in the traditional method should be an important selection criterion in the award of contracts.	4.67	0.53	(4.50 ; 4.84)
8. Relations with other role players should be an important selection criterion in the appointment of the different sectors.	4.19	0.71	(3.96 ; 4.42)
9. Fixed price is the most popular compensation method with clients.	3.58	1.16	(3.20 ; 3.96)
10. The reason why cost-plus is not popular with clients in the construction phase is because of lack of trust.	3.78	1.10	(3.42 ; 4.14)
11. Control of costs is very important in cost-plus compensation.	4.67	0.53	(4.50 ; 4.84)
12. A well-controlled cost-plus system can be more economical for clients than fixed price compensation.	3.06	1.15	(2.68 ; 3.44)
13. Cost-plus should be considered when tender drawings are insufficient.	3.33	1.15	(2.95 ; 3.71)
14. Cost-plus compensation is recommendable on complex projects.	3.00	1.12	(2.63 ; 3.37)
15. Fixed price can lead to lower quality work.	3.33	0.93	(3.03 ; 3.63)
16. Cost-plus can lead to better quality end-products.	3.31	1.12	(2.94 ; 3.68)

As far as the target cost-plus system is concerned, twenty seven of the thirty six respondents had experience of this compensation approach. Sixteen of the twenty seven respondents (59.3%) are positive towards this hybrid form of cost-plus.

The mean values of ratings of the different sectors on statements 10, 12 and 14 are listed in Table III.

Table III: Mean values of ratings of the different sectors on statements 10,12 and 14

Statement	O (7)	D (12)	M (5)	C (12)
10. The reason why cost-plus is not popular with clients in the construction phase is because of lack of trust.	3.29	3.58	4.20	4.08
12. A well-controlled cost-plus system can be more economical for clients than fixed price compensation.	2.43	3.50	3.20	2.92
14. Cost-plus compensation is recommendable on complex projects.	2.00	3.33	3.00	3.25

Legend: Owners (O), Designers (D), Project / Construction Managers (M), and Contractors (C).

PRIMARY DATA: RESULTS OF THE SECOND QUESTIONNAIRE

Listed in Table IV are the results of some of the statements referring to award and compensation methods which were made by respondents in an open-ended format in the first / main questionnaire and rated on the five-point rating scale in the second questionnaire. Thirty three of the thirty six respondents of the first questionnaire responded. The response rate is

91.67%, which is excellent and once again having in excess of thirty responses is advantageous in terms of statistical requirements.

Table IV: Results of the second questionnaire on ratings of all sectors combined on statements regarding award and compensation methods

Statement	M	SD	95% confidence interval
a. Contract documents must allow better for adjustment of price due to variation of design.	3.88	0.99	(3.54 ; 4.22)
b. Tender periods need to become longer. This can ensure more consistency.	3.58	1.06	(3.22 ; 3.94)
c. European tender system where average price gets the contract should be implemented in South Africa.	3.52	1.03	(3.17 ; 3.87)
d. If cost-plus is used, avoid spending on a total scale, limit the work in stages.	3.67	0.82	(3.39 ; 3.95)

PRIMARY DATA: ANALYSIS OF THE RESULTS

The sample of all four sectors combined (of both questionnaires) is sufficiently large and conclusions that are drawn from the results should be of significance. However, conclusions from the results of the sectors on a separate basis (Table III) should perhaps only be of descriptive nature since the samples are relatively small (especially owners and project / construction managers).

As far as the main questionnaire is concerned, the sample of all sectors combined is in agreement with all the statements, except statement 14 where the mean value of ratings is 3.00 (undecided).

Confidence intervals make it possible to estimate the population mean on results. The probability is high that the South African building and civil engineering population should agree with the majority of the sixteen statements. Chances appear to be even that the industry may agree or disagree with statement 14. Whilst there is a definite possibility that the industry may disagree with statements 12,13 and 16, the probability of agreement appears to be somewhat larger.

The results of the second questionnaire indicate that the probability is reasonably high that the industry should agree with all four statements.

A PROPOSED AWARD POINT SYSTEM

The results emphasize that quality of work, management ability and relations between the role players should be important selection criteria in the award of contracts. This was confirmed in the interviews (telephonic and personal). From the primary data results Grobler [1] developed the following award point system:

$N_{total} = N_{q,m,r} + P = 50 \text{ max} + 50 \text{ max} = 100 \text{ maximum points}$ Equation 1

$N_{q,m,r}$ considers: q (quality of work on previous three projects); m (management ability / performance on previous three projects), i.e. co-ordination of subcontractors / different trades, to complete projects on time, on budget and in accordance with safety requirements; and r (relations with other role players on previous three projects). The proposed ratio of q:m:r = 25:15:10, thus a maximum of 50 points.

$$P \text{ (price)} = 50 \left[1 - \frac{P(t) - P(\text{lowest})}{P_{(\text{lowest})}}\right] \quad \text{Equation 2}$$

The maximum points recommended for price is 50, which is achieved by the lowest valid tenderer. P(lowest) is the price of the lowest valid tenderer. P(t) is the price of the tenderer under consideration. Equation 2 allows for a reduction in the points for price (P) as the tender price, P(t), increases. [This equation is often used on public sector projects, except that the coefficient is normally 90 (thus price counting 90%); the remaining 10% represents the affirmative action component].

For a tender price to be valid Grobler [1] argues that it should fall within a certain price interval. It is recommended that too low bids should be excluded. The argument is that too low prices are excessively risky for the client. Excluding high bids may however be unreasonable. A bidder with a high price (thus a low point on the price component) may receive high points on quality of work, management ability and the relations component and end-up with the highest award points. However, others may argue that too high bids are just not affordable and should also be excluded. It is further suggested that the price interval should be flexible to allow for the sample size of tenders received and the size and complexity of projects.

Whilst checking the validity of prices, proposals should also be checked as to whether they comply with the contractual conditions of the tender document. Only on completion of these two tests should the process of evaluating bidders on the proposed award point system start.
Prior to award the entity with the most award points should be checked for financial soundness, experience and capacity to complete the particular project successfully. These financial risk criteria are of course very important on large and complex projects.

On construction projects the main contractors (assuming the traditional procurement concept) that have valid prices and conform to the contractual conditions should be compared on the proposed award point system. Main contractors should however compare subcontractors in a similar manner. This award point system can of course be used with any of the project procurement approaches (traditional method, design-build, construction management, etc.) and also with the professional entities, i.e. design consultancies, construction management organizations, etc. It can be used for example to great effect where designers are not appointed from a panel, which appears to be happening more often in South Africa with the shift in work from the public sector towards private clients.

CONCLUSIONS AND RECOMMENDATIONS

Fixed price seems to be the most popular compensation method with clients. It can however lead to lower quality work. This emphasizes the importance of having quality of work as one of the selection criteria of main contractors and that too low prices should not be evaluated.

One of the main reasons why cost-plus is not popular with clients in the construction phase is because of lack of trust. It appears however as if the hybrid form of cost-plus (target cost-plus) is more acceptable to clients - it has less financial risk for the client.

A high level of design (well-detailed tender drawings and specifications) is recommended, but it is not always possible or feasible. Cost-plus should be considered when tender drawings are insufficient.

Cost-plus can lead to better quality end-products. It can be argued that the possibility should be less of cutting corners on a cost-plus contract than on a fixed price project. After all, the contractor is paid for all prime costs.

In South Africa main contractors have become in essence managers of subcontractors on building projects, as the latter are doing the bulk of the actual work. This stresses amongst others the importance of management ability of main contractors.

Price often seems to be the only selection factor, except for the affirmative action component, which is employed on most public sector projects. The affirmative action drive can however be encouraged by giving a tax deduction in accordance with certain requirements.

The tender system where the bid closest to the average tender price is awarded the contract is an option. It is an easy method to apply in practice. However, there is an argument that with this concept, price is again used as the measure.

An award point system is recommended that not only considers price, but also previous records of quality of work, management ability and relations with other role players. The proposed award point system should give clients value for money. It rewards entities with good records of quality of work and management ability. The relations component can assist amongst others towards addressing the problems of cultural differences between the professionals and contractors and the contentious problem of unethical and unsound practices between main contractors and subcontractors. Better relations should result in improved teamwork with positive spin-offs for some of the main project success criteria, namely time, cost and quality of end-products. The building and civil engineering process should become more effective and chances are good that its image should also improve.

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