

Contractor Accountability Matrix (CAM)

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This work is based on the research study by Labban et al. According to Labban et al. (2013, p.1337), "addressing retention payment and its influence on the project progress became a critical issue in the construction industry." Therefore, further research was needed to propose and recommend solution for tackling retention payment in the construction industry. This paper recommends strategies to reduce the need for payment retention in the UAE construction market. The use of Contractor Accountability Matrix and its applications will be discussed.

Keywords: Payment Retention; Retainage; Construction Projects; Cash flow; United Arab Emirates (UAE)

Field of Research: Construction Management

1. Introduction

The main purpose of the article is to emphasize the importance of Retention and to recommend a proposal to reduce the amount of payment retention in United Arab Emirates Construction market. Contractor Accountability Matrix (CAM) is made to help owners decide on the percentage of retention based on the contractor's qualification. This paper suggests the use of Contractor Accountability Matrix (CAM) to ease the decision making process. It also helps in identifying the criteria required for this study. CAM evaluates the contractor using different criteria. Instead of having retention percentages set randomly, as from the survey, this matrix will be like a standard evaluation for any contractor not only in United Arab Emirates but all over the world.

This article is unique since it takes place in United Arab Emirates, which has an excellent construction market. Due to the high number of construction projects in UAE, this study will be more relevant and realistic. Thus, this study is noteworthy because it questions retention in an important construction market.

Section 2 incorporates the background and motivation behind studying retention/retainage in construction projects. It also provides previous papers addressed the same topic. Section 3 deals with the approach and applications of using Contractor Accountability Matrix (CAM) and gives a detailed description of the contents of criteria used in the matrix. Finally, all the findings and discussion will be summarized in Section 4: Conclusion and references will be Section 5.

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2. Literature Review

In many construction contracts, the contractor is required to provide the client with some sort of financial guarantee that the work will be brought to practical completion and that any defects will be rectified within the defect liability period which follows practical completion. The guarantee is often provided in the form of an unconditional guarantee letter from the bank. Bank guarantees in the construction industry are generally used for security for contracts performance, contract payments, in lieu of retention monies or to substitute for funds paid into court.

Retention, or Retainage, is a fixed percentage of the monthly pay request that is kept by the owner and in consequence by the general contractor with respect to the subcontractor. Most Construction contracts are subject to cash retention (Hughes et al, 2000) and (Hughes et al, 1998, p. 208). The main purpose of retention is to guarantee that the contractor will stay focusing on the completion of his/her project and assuring that the contractor will continue in the project until all close-out activities are completed including paperwork activities, such as as-built drawings, operation and maintenance manuals, and warranties (Labban et al, 2013). Furthermore, retainage amount acts as an immediate funds accessible for the owner if the contractor fails to complete the project on time and in accordance with the agreed upon time (Barat and Bobotek, 2006).

Retainage is not a tool for faulty work (Stockenberg, 2001). If the problem arises because of performance-related work, the owner or client has the authority to retain more than retention amount.

In the research done by Labban et al (2013), the amount of retention/ retainage (percentage) and the release time were questioned in order to reach a conclusion and help determine the reliable contractor. This contractor is the contractor with a significant amount of retention percentage and a suitable retention length.

Stockenberg (2001) showed in his article that veteran contractors believe retention is being reserved as substitute for their revenues. However, owners should not withhold retention for the purpose of financing the project. In addition, Stockenberg (2001) proposed different alternatives to ask for retention for the sake of protecting the owner and without abusing contractors and affect their finance. One way is what is called "substitute security," by allowing the owner to sustain safe negotiable instruments, e.g. certificates of deposits, treasury bonds or notes or a letter of credit as a protection and alternative for withholding retainage amount (Stockenberg, 2002). Through this way, contractors would not feel that they are assisting to fund the owner's project. Contractors used to engross in "front loading" for the reason of covering their loss in withholding retention amount.

Labban et al (2013) show in their paper that the outcome of the survey is 50% of respondents agreed that retention affects the progress of the project. Due to this high percentage, various studies were made on the risks that might occur from a contractor. The reason was to know what criteria will make the owner pleased from his/her contractor. The aim was to help the owner choose the appropriate amount of retention for a selected contractor.

This technique of evaluating is similar to *Prequalification Method* applied in the selection of construction project contractors (Huang, 2001). Project owner or their agents have to evaluate construction contractors based on pre-determined set of classification considered as factors for project's success. Moore (1985) designed this method for the reason of judging on the choosing the appropriate contractors that are able to take part in the project bid. Through this way, owners will allow construction companies to participate in the tendering process if they passed prequalification. Moreover, Hatush and Skitmore (1997) highlighted the importance of collecting, analyzing, and evaluating specific information for the purpose of defining tangibly set of criteria used in prequalification process. In summary, the information used for evaluation is classified into five categories general information that is used mainly for administrative purposes, financial information, technical information, managerial information and safety information.

The purpose of prequalification is also reducing the number of possible bidders. The key is to determine not only the specific contractor performs the tasks rather than to what extent he/she performs. This will lead the owner to highlight the main criteria. The basic issue is assigning the right weights to the criteria (Huang, 2001).

On the other hand, certain studies presented to assist the owner to make intelligent and economical decisions that include retaining or avoiding the risk of contractor default (Al Sobiei et al, 2005) and (El-Sayegh, 2008). Al-Sobiei et al approach artificial neural network (ANN) and a genetic algorithm (GA) to forecast the prospect of contractor default. Through the use of this model, the owner can decide whether to retain, transfer, or avoid contractor's risk (Al Sobiei et al, 2005).

3. Methodology

3.1. Application

CAM will be useful if owners have enough information about the contractors that will be taking the projects. Owners need to have enough background about the contractors' history and present.

This matrix should be used before signing the contract. Before signing the contract, if the owner asked a contractor to construct his project, then he should fill out the CAM and give to the contractor. This way the contractor can do his estimates based on the specified percentage. On the other hand, if the owner wanted to choose a contractor using bidding, then the owner needs to fill out the CAM to all contractors in his short list. So, after receiving the proposals from the contractors, the owner chooses the contractors based on the proposals. In this case, the owner has a short list. All the contractors in the short list should receive the filled out CAM in order to do their detailed estimates after knowing the retention percent.

3.2. Instructions to Use

CAM divided the evaluation score into three categories:

- 1) Less than 25 out. This group of contractors is a poor group that did not score more than half of the possible score. The owner should consider with this group the maximum amount of retention, which is 10%.

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- 2) Between 25 and 40. This group of contractors is good group but did not reach excellence in the scores. For this group, the owner has the choice to choose between 5% to 10% retention.
- 3) More than 40. This group is the best among all. A contractor from this group deserves a percentage lower than or at least equal to 5%. A contractor, who scores 41 on the matrix, has at least one excellent score on a certain criteria. The owner has the choice also to choose a percentage between 0% and 5%.

Finally, CAM is designed to be flexibly used by the owner to help him take decisions. It is the evaluator's sole responsibility to choose the right score for each criterion since the scores will affect the total score.

3.3. CAM Layout

Figure 1: Layout of CAM form

CONTRACTOR ACCOUNTABILITY MATRIX (CAM)							
Name of respondent: _____		Position: _____		Company: _____			
Contractor Name: _____							
Project: _____							
Type: _____							
Instructions: -CAM contains ten criteria. -Score ranges from zero to five. -Circle the number that best evaluates the contractor's score for the specified criteria. -Write the number in the score column. -Add the scores of all criteria. -Total score should be equal to or less than 50.				Contractor Evaluation: -Score < 25 Consider 10% retention -25 < Score < 40 Consider 5-10% Retention -Score > 40 Consider 5% or less Retention			
Notes: UR: Unavailable record Retention Lengths is constant							
Criteria	Evaluation Scheme						Score
	UR	Poor	→			Excellent	
1. Similar Projects experience (local & Inter.)	0	1	2	3	4	5	
2. Local Experience & Knowledge of Culture	0	1	2	3	4	5	
3. Bank Guarantees (Financial Statements)	0	1	2	3	4	5	
4. Operating Capital	0	1	2	3	4	5	
5. Available Resources	0	1	2	3	4	5	
6. Staff Qualification	0	1	2	3	4	5	
7. Safety Records	0	1	2	3	4	5	
8. Environmental Records	0	1	2	3	4	5	
9. R&D Facilities	0	1	2	3	4	5	
10. Legal Claims History	0	1	2	3	4	5	
Total Score:							

3.4. Cam Criteria

3.4.1. Similar Project Experience (Local &International):

This factor plays an important role in determining the acceptability of the contractor in the market. If the contractor is performing a great number of projects, this is a great indicator of the contractor reputation as well as the level of responsibility he/she carries. In order to quantify this factor, certain obstacles would be faced. First, the comparison should be based on same level of contractors (similar resources and sizes). However, as an estimation of the level on constructability in this region, an ideal contractor should not have less than 4 projects on progress. High amount of retention will be applied upon unreliable contractor which have 4 projects or less while less amount will be applied on contractor have more than 4 projects in progress.

In addition, this criterion defines a scale for the contractors experience based on two measures. The first is based on the number of projects done by the contractor. The second measure is the number of projects done successfully by the contractor. Also, it is related to the contractor performance on these successful projects. This measure is considered important since the more successful projects the contractor did, the more likely this same contractor will succeed on new projects.

3.4.2 Local Experience & Knowledge of Cultures:

This criterion is based on the relevance of previous projects done successfully by the contractor in the same region to the current project being bid on. This measure is vital because it is a major determinant of the contractor ability to complete the project successfully. It is a major determinant since it is based on the past experience of the contractor regarding similar projects in the same area which they share same culture and traditions. For example, a contractor working on an airport project for the first time in one place, but he has experience in building airports in other regions is different than a contractor who did several airport projects successfully in that place. Moreover, this condition is significant since there are different types of projects which require different levels of experience such as infrastructure and industrial projects.

3.4.3. Bank Guarantees (Financial Statement):

This factor discusses the contractor's financial statement. In many construction contracts, the contractor is required to provide to the owner some documents of his/her financial statement. Hatush and Skitmore (1997) ran a study in United Kingdom. The study results in suggesting that the investigated financial documents should include details of the responsible person for financial affairs and the bank, copies of annual reports of the firm such as balance sheet, profit and loss account, director's report or auditor's reports etc. These documents will cover the contractor if there was any breach in the contract caused by him/her and acts as immediate source of funding. The amount of retention will be determined based on his financial records from the bank.

3.4.4. Operating Capital:

An understanding of operating capital is crucial to understanding and analyzing the financial position of construction contractors. The sureties base their bonding program to a great extent on the amount and quality of operating capital available to the contractor. Many contractors attempt to benchmark their key ratios to industry standards without understanding what the ratios or benchmarks mean. The amount of retention will be determined based on his financial records from the funds and profits from the previous projects' records

3.4.5. Available Resources:

Resources help to produce goods so they have economic value. In any construction project, a contractor defines his available resources. Resources can include people, equipment, machines, tools, facilities, and space. Among the people may be many different types, such as painters, designers, computer programmers, and assembly workers. On the other hand, the level of technology also influences the utilization of resources. Resources can be used differently depending on the standard of technology. The scale of this criterion is determined by the existence of resource management by the contractor. Low amount of retention will be applied if the contractor is up-to-date in term of resource management.

3.4.6. Staff Qualification:

Staff Qualification is important stone since putting this superstructure into place allows seeing what different qualifications really mean and how they compare. They also help trace learning pathways people can follow throughout their lives. No matter how far you get, the process of discussing staff qualification inevitably leads to review how they feed into the labor market. A certain amount of retention will be applied upon a contractor based on the diversity and the company's hierarchy tree.

3.4.7. Safety Records:

Safety has been an important issue to maintain among construction project. In the meanwhile, the cost of safety became higher. Contractors became aware of addressing this issue around the world. Furthermore, Occupational Health & Safety Administration OSHA establishes certain safety standards and enforces the contractors to practice them through inspection of the construction sites. Certain practices such as new employee training, safety training, job site surveillance, safety engineer on the job, weekly safety meeting, and toolbox meetings will define the percentage of retention which should be applied on the contractor. In addition, safety documents like job hazard analysis, project safety plan, and investigation report may play a role in determining this percentage.

3.4.8 Environmental Records:

Another criterion to concentrate on is the environmental procedures and regulation that the contractors are practicing in construction projects. Environmental practices became a significant issue since it involves on the foundation of our survival as well as it is directly involved to the human health. Nevertheless, the cost of environmental pollution is huge since it results in loss of health and lives, cost of treatment, loss of

effectiveness in work, and social disorder. The evaluation of this criterion will be based on whether the contractor is implementing an environmental impact assessment EIA on all of his/her projects or not. As a result, a certain percentage of retention will be applied.

3.4.9. R&D (Research & Development) Facilities:

Research and development is investments in a company's future - companies that do not spend sufficiently in R&D are in a huge loss; that is, when their current product lines become outdated and overtaken by their competitors, they will not have viable successors in the industry. So how much is reasonable to spend on research and development? That is highly dependent both on the technology area and how fast the market is moving. Two percent of company revenue, not profit, might be enough in a fairly sedate market, but to keep up in rapidly changing markets, companies should expect to spend fifteen percent or more in research and development just to keep up with the rest of the pack. This criterion slightly affects the retention amount and length, but it is a great indicator of reliable and updated contractor.

3.4.10 Legal Claims History:

Claims history is any legal issues the contractor was involved in. This is considered a major influence on the rank of the contractor due to the following reason. If the contractor had problems with other clients or contractors before, there is a greater probability this same contractor will have problems with new clients. Therefore, we believe it should be one of the major determinants of contractor rank or excellence.

4. Conclusion

Contractor Accountability Matrix (CAM) is an evaluation matrix used to examine certain criteria in order to define the retention percentage. These criteria were precisely selected to evaluate the contractor past performance. The evaluator should be consistent while performing the evaluation. Nevertheless, there is certain flexibility in evaluating the provided criteria since it is the evaluator's decisions.

The study is significant as it the research went further to propose and recommend solution for tackling retention payment in the construction industry. The criteria are considered as an indicator for contractor's effectiveness in accomplishing the designated construction project. The need for payment retention will be substantially reduced based results come from Contractor Accountability Matrix (CAM).

Contractor Accountability Matrix (CAM) has not been implemented yet in UAE construction industry. Moreover, the study was mainly designed to give the evaluator a clear sign on the retention amount to be applied on the contractor without studying retention release time. Testing the matrix in UAE construction market and monitor the outcomes would serve as an improvement for further research. In addition, the results will reflect contractor's performance in general.

References

- Al-Sobie, O., Arditi, D., and Polat, G. (2005), 'Managing owner's risk of contractor default', *Journal of Construction Engineering & Management*, Vol.131 (No.9), Pp. 973-978.
- Barat, S. E., and Bobotek, J. P. (2006), 'Retainage 1. . . 2. . . 3. . . 4. . . Five Things You Need to Know', *Real Estate Forum*, Vol.5 (No.7), Pp.4-5.
- El-Sayegh, S. M. (2008), 'Risk assessment and allocation in the UAE construction industry', *International Journal of Project Management*, Vol. 4 (No.26), Pp.431-438.
- Hatush, Z., and Skitmore, M. R. (1997), 'Criteria for contractor selection', *Construction Management and Economics*, Vol.1 (No.15), Pp.19-38.
- Huang, X. (2001), 'An analysis of the selection of project contractor in the construction management process', *International Journal of Business and Management*, Vol.6 (No.3), Pp.184-189.
- Hughes, W. P., Hillebrandt, P., and Murdoch, J.R. (1998), *Financial Protection in the UK building industry: bonds, retention, and guarantees*, Taylor & Francis, London.
- Hughes, W. P. , Hillebrandt, P., and Murdoch, J. R. (2000), 'The impact of contract duration on the cost of cash retention', *Construction Management & Economics*, Vol.1(No.18), Pp.11-14.
- Labban, T., Beheiry, S., Obied, M., and Ali, M. (2013), 'Payment Retention in United Arab Emirates (UAE) Construction Projects', in S Yazdani & A Singh, eds. *New Developments in Structural Engineering & Construction*, Research Publishing Services, Singapore, Pp.1337-1342.
- Moore, M. J. (1985), 'Selecting a contractor for fast-track projects: Part I, principles of contractor evaluation', *Plant Engineering*, Vol.39, Pp.74-75.
- Schaufelberger, J., and Holm, L. (2001), *Management of Construction Projects: A Constructor's Perspective*, 1st. ed. Prentice Hall, USA.
- Stockenberg, R. A. (2001), 'Retainage reform makes headway', *Building Design & Construction*, Vol. 8 (No.42), p21.
- Stockenberg, R. A. (2001), 'Retainage uses and abuses', *Building Design & Construction*, Vol. 7 (No.42), p37.
- Stockenberg, R. A. (2002), 'Age-old question: Who owns retainage?', *Building Design & Construction*, Vol.4 (No.43), p23.