Modelling Arbitration: Evaluating Risks and Settlements of Disputes Using Regret Theory

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Abstract. This paper presents a mathematical model to evaluate the risks of arbitration in contractual disputes to decide whether or not to raise an arbitration case for a claim. It adds the ingredient of a regret theory approach for taking that decision, if an amicable settlement amount is not agreed. Many other models that are based on decision trees, game theory, and neural networks lack a regret theory approach. The inclusion of regret theory in this model may be adaptable to any other models available making the decision more realistic through a stochastic approach of optimizing the maximum benefit for the minimum regret.

Keywords: arbitration, construction contracts, dispute, modelling, project management, risk, settlement agreements

1. Introduction

Disputes are natural in any human relationship, whether it is a dispute in marriage contracts or in construction contracts. The world is not perfect, and therefore, it is expected that things do not always go as planned. Actually, due to the multivariate nature of construction contracts, things never go as planned. Since problems may arise from either of the contractual parties, many minor disputes are resolved amicably. However, few disputes do go to arbitration. In this paper, a mathematical model is built to identify the variables and the risks that force either party to raise a claim case against the other. It provides a numerical matrix for evaluating those risks in determining the decision whether or not going to arbitration is suitable.

The philosophy of this model is revolves around the notion that if the parties can predict the possible risks and outcome of an arbitration case, then they may be able to take the necessary decisions beforehand. Unlike typical models, which are based on decision theory, this model specifically considers the use of regret theory. This means that the best decision is not based on the probability of the positive outcome, but based on the probability of regretting the decision for its negative outcome [1]. In other words, it is the least costly, if the decision is regretted due to a negative outcome. This is important, since arbitration may be deemed a costly endeavour for the losing party. Thence, an alternative dispute resolution may become the best approach. It may also be important to note that a contractor taking large clients to arbitration may have an adverse effect to the future and potential business of the contractor with that client. It is possible that a client may not take lightly an arbitration case from a contractor, and therefore, barring the contractor from future tenders. Consequently, the contractor may forgo certain rights and provide concessions, even if the contractor has a basis and the predicted outcome of the arbitration would go to his favour. However, when compared with the loss of opportunity by the contractor from the client, it may sometimes be essential that the contractor drops the concept of going to arbitration, and utilise alternative means to resolve the dispute amicably.

Many of the available models consider a decision theory approach, but do not combine a factor of regret in the decision tree. The model presented in this paper dives into the concept not of decision theory in its generic form, but more specifically, regret theory. Sometimes people do not simply take a decision, because it is the best, but because it provides the optimum benefit with the least regret if the outcome was negative.

2. Arbitration

Taking another party of a contract to arbitration carries many risks. It may risk the future relationship between both parties, which may be translated as the loss of future opportunities to do business together and therefore make profits. Hence, going to arbitration is more of a commercial decision than a technical decision. There are many trade-off risks that the party taking the other to arbitration needs to consider [2]. Sometimes to avoid any negative outcomes of going to arbitration, it may be wise to negotiate and accept a settlement instead, even if a party has the full rights and the evidence proving a greater claim amount.

Predicting the outcome of construction claims is an important factor to identify whether or not to proceed with arbitration. There are existing models using decision theory that predict construction litigation with different means, such as neural networks [3], decision trees [4], and reasoning approach [5]. However, these models are based on court cases. For the model described in this paper, a similar method as these may be used to identify the probability of winning (P_e), by having strong evidence or based on precedence. The majority of existing predicting models are for litigation and not much are available for arbitration cases. Nonetheless, in this paper, a regret approach is included to the decision theory model for predicting an outcome. Hence, the model is stochastic in nature and attempts to optimize the maximum benefit that provides the minimum regret. Hence, it is usually imperative to reach an amicable settlement to eliminate or diminish any risks that could cause a decision to arbitrate that eventually has negative consequences.

3. Dispute Modelling

3.1. Model Flowchart

The model presented in this paper provides five different steps, as also shown in Figure 1.

1. Decision to raise a claim
2. Decision to negotiate
3. Decision to accept an amicable settlement
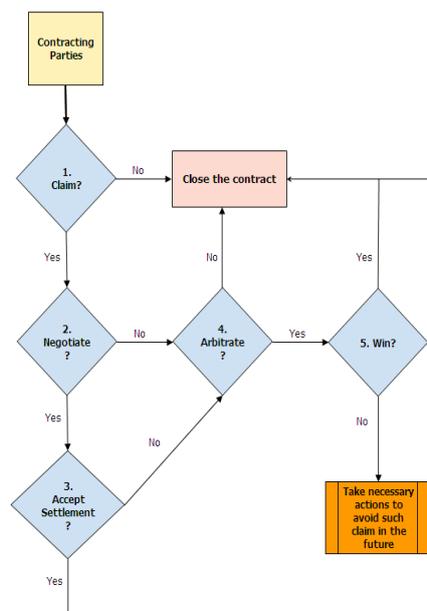4. Decision to arbitrate
5. Decision of arbitration

Fig. 1: Claim's Flowchart.

There are many variables that need to be input into the model so that the predicted outcome of the model allows the decision-maker to understand whether or not raising a claim is worth the risk. Understanding decision theory is basis of the model, and specifically due to regret.

3.2. Variables

There are several factors that are taken into consideration in dispute resolutions and arbitration cases. Since arbitration is costly and time consuming, then different factors need to be assessed to understand the overall risk of going through arbitration, the predicted results, and the benefits.

The following are the variables that need to be input into the model:

A = total contract amount

D = disputed claim amount

C = cost of arbitration

N = acceptable negotiated amount

P_e = probability of winning (having strong evidence and/or based on precedence)

f = amount of possible effects on current projects' losses

P_f = probability of current projects' losses

O = amount of future opportunity loss

P_o = probability of future opportunity loss with the same client or others, due to loss of market reputation

The probability of winning (P_e) and probability of current and future opportunity loss (P_f, P_{ff}) are all bounded between [0, 1]. The probability of winning depends on having strong evidence and also based on precedence, since it is unfortunate that legal structures have a high dependency on precedence than truthful equity. All costs within this model are dependent on present values of the future costs or benefits, as it is also determined for similar decision theory approaches that deal with quantitative costs [6].

3.3. Matrix

According to decision theory, the following would describe the typical decision flow of going to arbitration.

- STEP 1:

  $P_e(D) > C$? If yes, then

- STEP 2:

  $P_e(D) - C > N$? If yes, then

- STEP 3:

  Is $\dfrac{P_e(D) - C}{A}$ significant ? If yes, then

- STEP 4:

  $P_e(D) > C + P_f(f) + P_o(O)$? If yes, then proceed to arbitration.

However, when looking at it from a regret theory approach, the maximum regret coincides with the maximum loss, which would be due to losing the arbitration case or losing the opportunity of winning the claim if the case did go to arbitration. In such a case, the reputation of the organization falls through in addition to loss of future opportunity with the same client. Therefore, an additional step needs to be included to understand the cost that would be least regretted.

The best outcome is $P_e(D) - C - P_f(f) - P_o(O)$. The worst outcome is the total cost of $C + P_f(f) + P_o(O)$.

- STEP 5 (Regret Approach):

  $P_e(D) - C - P_f(f) - P_o(O) > (1 - P_e)[C + P_f(f) + P_o(O)]$? If yes, then proceed to arbitration.

In the extra step above, it is important to predict the outcome whether or not regretting the decision of proceeding with arbitration and losing or not proceeding to arbitration and winning. The last step for a regret

approach may be adaptable to any other model available, as the principle of regret is a major factor in realistic decision-making.

4. Conclusion

People understand that they would usually regret more not carrying an umbrella and it rains than regretting carrying an umbrella and it does not rain. Hence, if the chances for rain are equal, then according to decision theory, it does not truly matter whether or not to carry an umbrella. However, through a regret theory approach, it does matter, because the weight of regret is different, even if the chances of the outcomes are equal.

From a similar perspective, it is important to evaluate arbitration through a regret approach, because the consequences of making the wrong decision, whether it is to proceed to arbitration or to refrain from arbitration may culminate to significant amounts lost. Nonetheless, since contracts provide the basis of a relationship between a contractor and a client that relationship must continue to be flourishing to receive additional opportunities in the future. On the other hand, if that relationship turns bad because of an arbitration case even if the contractor has the full rights to it, that may cause loss of future opportunities. Hence, even if the contractor wins the claim, his future losses may become greater.

From within this concept, the model proposed in this paper adds the regret approach for deciding whether or not to go to arbitration. It is found to be necessary to add a regret approach to make the decision of going through arbitration more realistic and within the limitations of understanding the full risks involved by both parties, keeping in mind the optimized maximum benefit, given the minimum losses. More research is needed in the future to refine the model for regret through an empirical approach, as it is essential to understand the robustness of this model pragmatically.

5. References

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