

A Decision Support Framework for Extension of Time Claims

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Delays to contractors' progress, often resulting in time and cost overruns, are a major source of claims and disputes in the construction industry. The assessment of extension of time (EOT) claims as part of a construction project can have far-reaching consequences for the financial success of the project. The proper and transparent assessment of EOT claims is therefore an essential component in the success of any project. In the study an action-research approach, a very specific qualitative approach, was followed to develop a user-friendly guideline, to assist practitioners to navigate this potential minefield of complexities in the process of the assessment of EOT claims. Focus groups, consisting of industry practitioners, with specialist knowledge in construction contracts, contributed to the development of the decision-support frameworks, and ultimately to the findings. The iterative process followed assisted in producing a tool that can be used in practice as a guideline for the analysis of EOT claims.

Keywords: construction delays; decision-trees; delays; delay analysis methods, EOT

Introduction

Delays and disruptions to contractors' progress, often resulting in time and cost overruns, are a major source of claims and disputes in the construction industry. Various analytical methodologies have been developed over the years as aids to determine the extent of the delay, but there is limited information on the extent of use of these methodologies in practice, and their impact on the construction process (Braimah, 2008). Many problems are encountered in practice in the application, preparation and assessment of EOT claims. The lack of clear guidance on how to assess EOT claims can be seen as a major contributing factor to disputes (Danuri, Othman & Lim, 2006). Limited information is available in terms of an overall framework or procedure to guide practitioners in the assessment of EOT claims. Previous research in terms of the various issues to be considered is fragmentary in nature and it would typically investigate one of the aspects in isolation of the others.

Moselhi and El-Rayes (2002) developed a computer-based system, named WEATHER, to quantify the impact of weather conditions on construction productivity, project schedule and associated delays. Although this system will be helpful in the assessment of weather-related claims, it cannot be utilized as an overall decision-support system for claim evaluation because of its narrow focus on only one cause of delay.

Bubbers and Christian (1992) made use of a hypertext-information system to assist in the analysis of claims by informing contractors, owners, and their representatives of the contract provisions. The main purpose of the utilization of hypertext in this study was to organise the data; and thereby to enable users to focus quickly on only the relevant material. The hypertext-based system indeed acts as a decision-support system; but it does not provide a framework to guide practitioners through the claim-evaluation process.

Braimah (2008) developed a model for the selection of an appropriate EOT claim-assessment method. The aim of the model was to serve as a tool for assisting practitioners in justifying their choice of delay-analysis method. Scoring multi-attribute analysis, a multi-criteria decision-making method was utilized as the basis for the model. Although this model is a helpful tool in deciding on which of the many delay analytical methods should be utilized for a specific delay, it does not provide guidance on each step in the claim-assessment process.

The UK's Society of Construction Law is a body comprising highly experienced engineers, architects, quantity surveyors and lawyers. It has developed a Delay-and-Disruption Protocol. The purpose of the protocol is to provide good practice guidance for construction delays and disruptions. Section 3 of the protocol offers high level guidelines on dealing with EOT during the course of the project (SCL, 2002).

It is evident from the literature that there is a need for guidance to simplify the many complexities associated with the EOT claim-assessment process. However, a very limited number of guidance tools are available at this stage for practitioners.

The main objective of this study is to develop a framework with the use of a decision tree analysis to provide guidance for the assessment of delay claims. The framework would assist in providing a platform to standardize the assessment of delay claims. This approach will contribute to expediting the evaluation process; and it will limit the negative impacts associated with any prolonged process for concluding delay claims. As a result of the standardisation, it would also contribute to an improved perception of fairness in the evaluation of delay claims, which would, in turn, hopefully lead to the reduction in claims being subjected to dispute resolution.

Literature review

At the heart of any claim for extension of the contract period is the presence of an event that could cause a delay. Therefore, an in-depth understanding of this primary building block of the claim-evaluation process is essential.

Types of delays

The evaluation of construction EOT claims is, to a large extent, influenced by the type of delay. A number of studies have attempted to categorise delays in terms of the impact, risk and cause of the delay. Figure 1 provides an overview of different types of delays and the impact each has on time and extra cost.

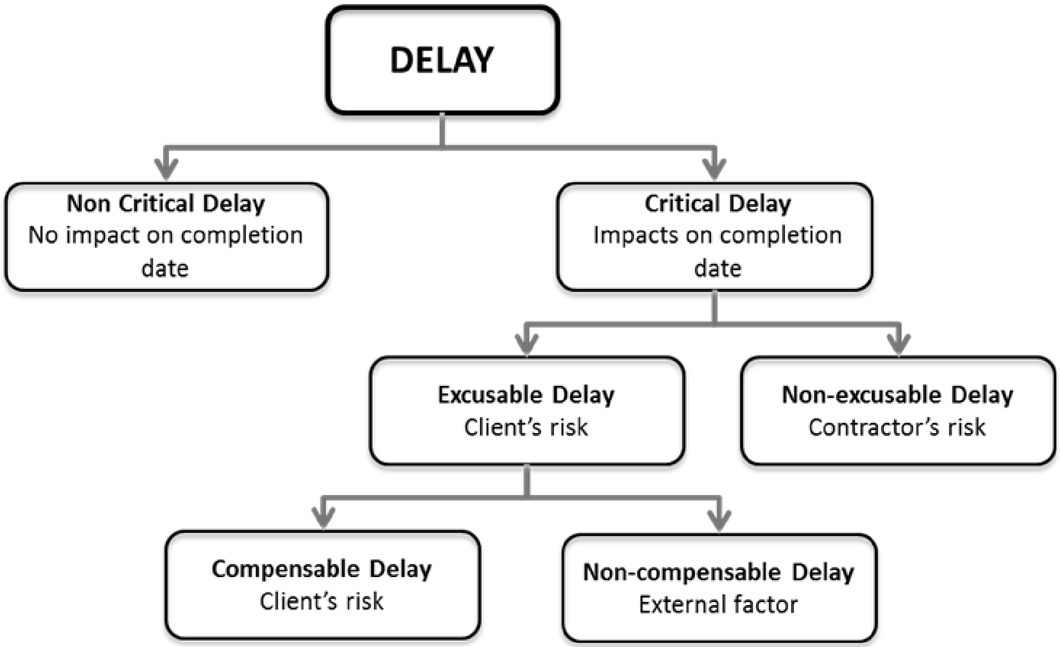

Figure 11: ***Types of delays***

An in-depth understanding of the different types of delays is essential for the successful execution of delay-claim analysis.

Critical delays

According to Pickavance (2000), a delay in progress is not the same as a delay in completion. A delay in progress is a significant shift in the planned timing of a specific activity or activities that could occur at any time. Although the start and/or finish of the activity might differ from the original intent, it is irrelevant, unless it ultimately impacts on the completion date. On the other hand, a delay in the completion date occurs only when the completion date has passed; this can only be caused by a delay to the progress of an activity, which is in the critical path to completion.

The criticality of a delay can be defined as follows in terms of the ultimate impact on completion:

- Critical delay – a delay on the critical path of the project, resulting in the final completion date of the project being delayed, and
- Non-critical delay – a delay that is not on the critical path and that would, therefore, not impact on the overall completion date. (Ndekugri, Braimah & Gameson, 2008)

Excusable delays

A non-excusable delay is defined as a delay caused by the contractor, or any aspect that is within the contractor's sphere of control. The contractor would not be entitled to any additional time or compensation for this type of delay (Tumi, Omran & Pakir, 2009).

An excusable delay, on the other hand, can be described as a delay caused by either of the following two factors:

- Third parties or incidents beyond the control of the client and the contractor, and
- The client or the client's agents. (Alaghbari, Kadir & Salim, 2007).

Compensable delays

Compensation will have to be considered if a delay is found to be excusable, and it should be established whether the delay can be defined as follows:

- Non-compensable delay – an excusable delay caused by factors beyond the control of the client and the contractor. Although most forms of contract make provision for the extension of the contract-completion date, the contractor will not receive compensation from the client; and
- Compensable delay – an excusable delay caused by the client or the client's agents. The contractual completion date will be extended, and the contractor will receive compensation from the client (Tumi et al., 2009).

Contractual compliance in terms of delay claims

In order to assist contracting parties in dealing with claims that might arise during the execution of the construction contract, the majority of the standard construction contracts contain provisions, under which the contractor can recover compensation from the employer for various losses suffered – where the project is prolonged or disrupted by certain specified causes. However, the majority of contractual regimes, and even general conditions of contract, do not provide details of the principles governing the assessment of claims for EOT; this is left to the professionals involved in each project (Yogeswaran, Kumaraswamy & Miller, 1998).

Delay-claim clauses in the majority of the standard construction contracts can be classified into the following two main categories:

- Clauses dealing with the notification of a possible delay, and
- Clauses dealing with the claim itself.

Compliance with all contract provisions in regard to claims is a prerequisite for the claim to be considered for approval.

Decision trees

A decision tree is a flowchart-like structure that shows the various outcomes from a series of decisions. It can be used as a decision-making tool, for research analysis, or for planning a strategy. A primary advantage of using a decision tree is that it is easy to follow and understand (Murthy, 1998). Decision trees are currently one of the most popular methods used for data modelling. Decision trees have many uses, such as, for example, predicting a probable outcome, assisting in the analysis of problems, and aiding in making decisions. When formulating and configuring decision trees, the results of real-world factors are analysed and compiled, so that the specifics of the previous factors and the related results are used to predict the results of future factors (Smith & Tansley, 2003). There are several types of decision trees; but of these, just two types are probably the most significant:

- Classification tree – As the name implies, decision trees are used to separate a dataset into classes belonging to the response variable. Usually, the response variable has two classes: Yes or No (1 or 0).
- Regression trees – These are needed when the response variable is numeric or continuous, for example, when you need to predict the price of a consumer good, based on several input factors. Thus, regression trees are applicable for the prediction-type problems, as opposed to classification (Deshpande, 2011).

Decision trees would be of great assistance as a guidance tool for the evaluation of EOT claims for a number of reasons. Decision trees can guide decision-making during the EOT process by providing a simplistic tool to assess claims; since decision trees are simplistic in nature. When an EOT claim is being considered, sequential decision-making is required to ultimately decide if the claim should be awarded. Decision trees are conceptually structured in such a way as to allow for sequential decision-making. The diverse nature of delaying events would necessitate a high degree of flexibility in the assessment of EOT claims. One of the benefits of decision trees is that they provide for a high degree of flexibility. Another benefit of decision trees is that they provide for clarity and conciseness in decision-making – a critical requirement in the process of the assessment of EOT claims.

Methodology

In considering the choice of the research design, one should keep in mind that the research is undertaken in the built environment. Built-environment disciplines are primarily applied sciences, focusing on the application more than on the mere generation of knowledge (Klosterman, 1983), (Knight & Ruddock, 2009). Several possible research designs were considered. Upon further investigation, it became evident that action research, a very specific qualitative approach, would be the most appropriate choice for the research design. Action research is an approach to knowledge creation that results from a context of practice; and it requires researchers to work with practitioners, (Reason and Bradbury, 2001 and Huang, 2010). The action research process required to develop a decision tree support framework for the assessment of EOT claims was executed as depicted in Figure 2:

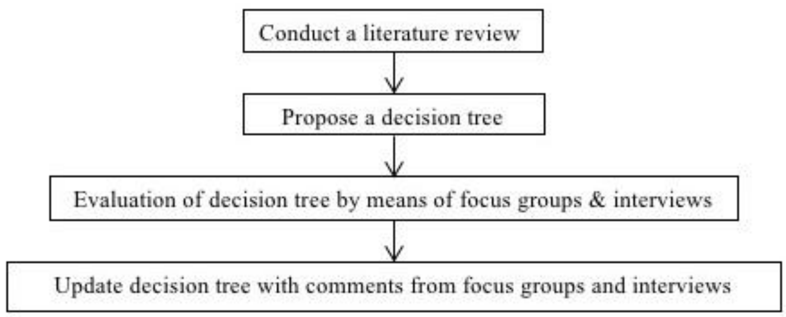

Figure 2: Action research process to develop a decision tree support framework

The focus-groups and interviews with industry specialists were deemed the most effective to gather the required data. The absence of a specific grouping structure of construction industry specialists knowledgeable and experienced in EOT claims has necessitated the use of non-probability sampling. Purposive sampling, one of the most common non-probability sampling strategies, was deemed to be the most appropriate approach. Purposive sampling calls for the participants to be selected on the merits of their specific involvement and the experiences central to the phenomenon being studied (Greig, Taylor & MacKay, 2012).

The level of knowledge required excluded some possible participants, who would only have a basic knowledge of contract clauses – as a result of the utilization of the specific contract in a project. As a result, it was decided to target those members serving on the technical committees of the organisations responsible for the compilation of the construction contracts. To ensure that meaningful participation of all the group members was possible, it was decided to keep the number of participants as low as possible.

Table 11
Focus group participants

	Designation	Years of experience
1.	Architect; CEO JBCC technical committee	More than 40 years
2.	Contractor; Construction contract specialist	More than 30 years
3.	Contractor, Construction contract specialist	More than 30 years
4.	Construction contract consultant	More than 30 years
5.	Quantity Surveyor; Construction contract specialist	More than 40 years
6.	Architect; attorney; Construction contract specialist	More than 40 years
7.	Engineer; Construction contract specialist	More than 40 years
8.	Quantity surveyor; Senior government project manager	More than 40 years

9.	Quantity Surveyor; Construction contract specialist	More than 20 years
10.	Attorney; Claims consultant	More than 30 years
11.	Quantity Surveyor; Construction contract specialist	More than 40 years

Findings – Universal Decision Tree Framework

To be able to apply decision tree principles to EOT analysis it was necessary to identify the decisions taken as part of the evaluation process. The literature, focus groups and interviews identified the following essential decisions required when an EOT claim is to be analyzed:

- Was the delay critical?
- Was the delay excusable?
- Were the contractual provisions complied with? and
- Was the delay compensable?

Many of the construction contracts do not specifically mention the term 'critical delay', but rather a delay to the contractual completion date. For a delay to impact on the contractual completion date, it would necessarily have to be critical. An important decision in the EOT assessment process would be to determine if the claim event delayed the contractual completion date; and therefore, it can be categorised as critical. An important consideration in the decision tree would therefore be whether the delay is critical.

Excusable delays are fairly well-defined concepts in the literature. However, although the notion of excusable delays is captured in some of the clauses of the construction contracts, the term 'excusable delay' is often not explicitly mentioned. Perhaps for this reason most of the focus-group participants found the term foreign. After highlighting the fact that, in essence, the term alludes to the process of determining whether the contractor is responsible for the delay, consensus was reached that it should be considered during the EOT assessment process.

One of the main considerations in the EOT-assessment process is to determine whether the contractual provisions were complied with. There are instances where contractual compliance to specific clauses does not lead to an outright rejection of the claim. These instances were highlighted in the focus groups and were considered in the decision trees for the different forms of contract. If it was established that an EOT should be awarded, an important consideration at that stage would be whether a compensation was payable to the contractor.

Decision trees address decisions in a sequential manner. As a result, it is necessary to determine the sequence in which the above decisions should be made. The decision on whether the delay is compensable can only be made once all the other decisions have had a positive outcome and it is established that an EOT should be awarded. Therefore, this decision should be considered last. A logical approach would be to sequence decisions in terms of the consequence of the outcome of the decision. If a specific decision would lead to the rejection of the EOT, it would make sense to consider this decision first. However, it is not possible to decide which of the three remaining decisions should be addressed first, by merely looking at the outcome of the decision; because a negative response to any of the first three decisions would result in the EOT not being awarded. The degree of effort required in making a decision in each of the three questions differs. In practical terms, it would make sense to consider the decision that would require the least amount of effort first. Should this first decision result in the claim not being awarded, time would not unnecessarily be spent on decisions that require more effort to consider.

To determine whether a delay is critical is normally the most complex and time-consuming part of an EOT claim analysis. A practitioner would not want to embark on this cumbersome process without knowing the contract provisions were complied with and the delay is indeed excusable. For this reason it is proposed that criticality should only be considered after contractual compliance was assessed and the question if the delay is excusable has been addressed. To determine whether a delay is excusable (beyond the contractor's reasonable control) can sometimes be complex. It is reliant on evidence presented by the contractor and the verification by the person responsible for the EOT claim analysis. This can become a time consuming process.

To determine whether the general contract clauses were complied with would normally not be a very involved process; as the facts presented in the EOT claim submission would be evaluated in terms of the relevant contract clauses. It is therefore proposed that the compliance with contract clauses should be considered before a determination is made on whether the delay is excusable. The following sequence of decision making is therefore proposed:

- Decision 1 – Were the contractual provisions complied with?
- Decision 2 – Was the delay excusable?
- Decision 3 – Was the delay critical?
- Decision 4 – Was the delay compensable?

If the decisions required in the EOT claim analysis process are translated into a decision tree, the decision tree can be formulated as follows (refer to Figure 3):

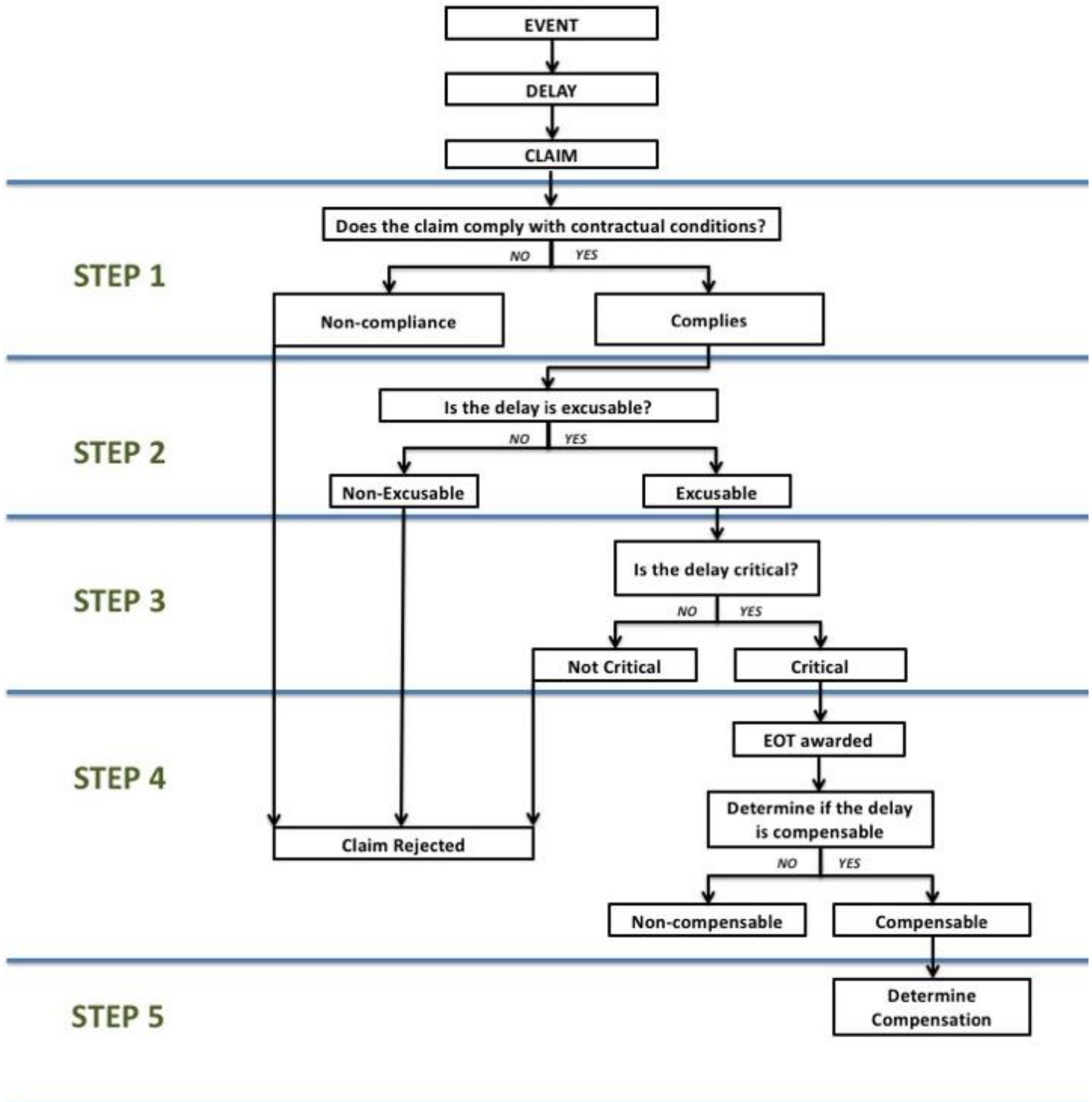

Figure 3: Universal decision tree framework

The principles defined as part of the universal decision tree framework can be applied in the process of assessing EOT claims by developing decision trees for each step informed by the provisions of the construction contract utilized.

Conclusion

According to the literature, one of the common causes of disputes in construction projects is the assessment of EOT claims and that very limited guidance is available for the assessment thereof. Information, in terms of the different considerations relating to EOT claims, is available to some extent; but is insufficient to act as a guideline of what steps are required in the assessment EOT claims.

One of the main contributions of the study to original knowledge was the development of a universal decision tree framework for the assessment of EOT. The decision tree framework is unique in that it would assist practitioners holistically in terms of all considerations in the assessment process. Other forms of guidance produced to date are mostly focussed on assessment of the criticality of the delay.

The decision tree would assist in eliminating uncertainty in the assessment process of EOT claims by providing clear guidelines. It is possible that the decision trees could, to some extent, assist in the standardization of the assessment of EOT claims. Standardization would have a number of benefits. One of the significant benefits would be that this could possibly reduce the number of disputes in EOT claims. The main benefit of the decision-support framework is that it would provide a guideline with clear and easy to follow steps to assess any EOT claims. This could be of assistance to practitioners that are responsible for the assessment of EOT claims on projects. The decision-support framework would also provide insight for contractors into the process of the assessment of EOT claims. This would lead to a better understanding of what is required to substantiate EOT claims, and to better quality claims being submitted.

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