SUITABILITY OF THE TIME IMPACT METHOD OF ANALYSIS FOR USE BY THE AUSTRALIAN CONSTRUCTION INDUSTRY

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Abstract:
The application and use of inappropriate delay analysis techniques for quantifying the effects of delays on construction projects leads to protracted disputes and increased costs. In October 2002, the United Kingdom (UK) Society of Construction Law (SOCL) published a delay and disruption protocol aimed at addressing the issues associated with delay and disruption on UK construction projects. One of the recommendations of the protocol was that the “Time Impact Analysis” (TIA) method of analysis be used for the contemporaneous and retrospective analysis and quantification of the effects of delay events on construction projects. Semi-structured qualitative interviews with representatives from the SOCL who were involved in the drafting of the protocol, and representatives from the Australian construction industry and legal profession involved in the resolution of construction delay and disruption disputes, was undertaken to determine their opinions of the suitability of the TIA method of analysis for use by the Australian construction industry.

Keywords:
Claim, Delay, Disruption, SOCL Protocol

1. Introduction

When an event occurs on a construction project that results in delay and/or disruption to the project completion date, entitlement to compensation in the form of an extension of time (EOT), claim for loss and/or expense due to prolongation, or liquidated and ascertained damages (LAD’s) is normally dependant upon establishing who is responsible for that event, proving the effects of that event (causation), and quantifying the effects of that event (in terms of time and/or money). Typically, if the contractor is responsible for the event, and they have agreed to accept the contractual risk associated with that event, and provided the contract stipulates, the contractor would incur LAD’s in accordance with the contractual provisions as a result of any delay to the project completion date.
caused by that event (inexcusable delay, Marrin, (2002)). If the client is responsible for the delaying event, and it is one in which the client has agreed to accept the contractual risk associated with that event, and provided the contract stipulates, the contractor would be entitled to an EOT in accordance with the contractual provisions for a period equivalent to the delay caused to the project completion date (excusable delay, Marrin, (2002)), ensuring that the time for completion of the project does not become “at large”. The contractor may also be entitled to claim for any loss and/or expense incurred as a result of the prolongation of the project due to the delaying event (compensable delay, Marrin (2002)). Where the delaying event is the responsibility of neither party (a neutral event), and one where they have both agreed to share the contractual risk allocation associated with that event, and provided the contract stipulates, the contractor would normally be entitled to an EOT equivalent to any delay to the project completion date, but not a claim for any loss and/or expense (excusable delay, Marrin, (2002)), enabling the entitlement of either party in terms of time (in the granting of an EOT) and money (in the awarding of LAD’s or compensation for prolongation) to be ascertained.

1.1 Establishing Entitlement Due to Delay

To establish entitlement due to a delaying event the claimant needs to:

(i) Establish or prove that the contract enables a party to make a claim as a result of the delaying event(s);

(ii) Comply with the procedural requirements of the contract with regard to notices and notification of the party’s intention to make a claim;

(iii) Prove that the claimed event(s) was the cause of the delay;

(iv) Quantify the resultant period of delay; and

(v) If the contract allows, establish and quantify the damages suffered as a result of the delaying event(s).

Most Australian standard forms of construction contracts contain provisions that allow the date for completion to be extended should certain delaying events occur (Rochester, 2003). This relieves the contractor from liability for LAD’s, and also benefits the client by preventing the time for completion of the project from becoming “at large”.

The giving of the appropriate notices under the contract provisions can be a condition precedent for the granting of an extension of time. Failure to comply with the contractual requirements for the giving of notices (concerning procedure
and timing) can prevent a claimant from obtaining the benefit of the contractual provision (Turner Corporation Ltd v Austotel Pty Ltd (1992) 11 ACLR 156).

To prove that the claimed event was the cause of the delay evidence normally has to be presented (in the form of records and/or witness statements, often from poorly kept, disorganised project files, and disbanded project teams) as proof that the event(s) in question actually happened as and when claimed. The cost of the retrospective identification, collection, validation, and collation of suitable evidence can be excessive. The complex nature of the construction process, where “few events … occur in a way or at a time they were intended to occur” (Pickavance, 2000), and because “the construction industry is notorious for not documenting procedures and transactions... [with] … most of the information being of a cost accounting nature … [that] … does not contain information relating directly to resource usage on scheduled project activities but only indicates apparent fluctuations in the cost of the project” (Vidogah and Ndekugri, 1997) is considered to be a major factor contributing to the increased costs.

Once the occurrence of the events in question have been agreed and accepted by both parties as having happened in the way claimed, their affect upon the project completion date is determined by carrying out a delay analysis, normally using some form of critical path method of analysis (CPM). A delay analysis is a “forensic investigation” into the effects that the agreed issues (such as variations, late information, excessively inclement weather, poor performance, remedial works, etc) have had on the project completion date. Analysts distinguish between critical and non-critical delay for evaluating extensions of time (critical delay affects a project’s completion date, whilst non-critical delay affects progress but not overall completion). The analysis establishes lines of investigation, demonstrates entitlement, and assists in the presentation of the case to be proved (Farrow, 2001). A number of delay analysis techniques are recognised as being suitable for this purpose, such as the global impact technique, net impact technique, adjusted as built CPM technique, ‘but for’ or collapsing technique, snapshot technique, time impact analysis (TIA) technique, and the isolated delay type technique (Pickavance, 2000, Alkass, Mazerolle, and Harris, 1996, Reams, 1990), but no single method or technique is considered to be suitable for all situations or recognised as a “best practice” approach.

Difficulties arise due to the application and use of inappropriate methods and techniques for the quantification of the effects of a delaying event with regard to the specific project circumstances and situation. Contradictory results are often obtained from the disputing parties experts as a result. This provides a means of challenging and disputing any claim, prolonging the dispute, and increasing the costs further. If there is no agreement between the contracting parties as to the exact use and application of a particular method and technique for the resolution
of a delay claim in specific circumstances, conflicting results can always be produced in favour of the party employing the delay expert carrying out the analysis. In the UK and Australia there is also limited knowledge and understanding by the courts, arbitrators, and adjudicators, of the methods and techniques used, and their relevance and suitability for application in specific project circumstances, resulting in conflicting and inconsistent judgments and precedents, exacerbating the problem further.

2. The Delay and Disruption Protocol

In October 2002, the UK SOCL published a Delay and Disruption Protocol (the protocol) aimed at addressing the issues associated with delay and disruption on UK construction projects in the context of the UK legal system and standard forms of construction contracts. One of the recommendations of the protocol was that the TIA method of analysing and quantifying the duration of an extension of time be used. The SOCL are an organisation founded in 1983 with over 1700 members from all sectors of the construction industry who promote for public benefit, the education, study and research in the field of construction law and related subject’s in the UK and overseas, who undertook the production of the protocol of their own accord following their experiences and involvement with delay and disruption events on construction projects. The protocol is not put forward as a benchmark of current good practice, but as a general statement and guide whose recommendations are to be applied with common sense.

McCredie (2002), investigating how the protocol was likely to be received by the UK construction industry identified the main issues associated with delay and disruption as being the:

- “Preparation, approval and updating of the contract programme;
- Entitlement to an extension of time;
- Ownership of float built into the programme;
- Concurrent delays attributable to separate employer and contractor risk events;
- Delay analysis techniques;
- Compensation payments”.
The protocols objective is to “provide useful guidance on ... the common issues that arise in construction contracts” (Society of Construction Law, 2002), whilst its purpose “is to provide a means by which the parties can resolve these matters and avoid unnecessary disputes” (Society of Construction Law, 2002).

The protocol is not intended to be a contract document, and its contents are not meant to take precedence over the express terms of a contract, nor is it intended to be a statement of law. It is a proposed “scheme for dealing with delay and disruption issues” (Society of Construction Law, 2002) in a balanced and viable way that is available for:

- “Adoption by the parties to a construction contract, in order to provide the means to avoid extension of time disputes;
- An aid to deciding issues that are not clearly covered by an existing contract;
- An aid to decision makers … in dealing with delay issues” (McCredie, 2002).

Implementation of the protocol is intended to be by agreement between the parties by whatever administrative procedures they consider suitable and acceptable. Where the parties have agreed to use the protocol as an aid to the management of the contract, the protocol is to prevail over any conflicting case law, but where the protocol is in conflict with any of the terms of the contract, the contractual terms are to take precedence.

Adoption and use of the entire protocol as a single document by the UK construction industry has been limited. The aims and philosophies of the protocol have been received favourably, with many of the individual provisions being successfully adopted, used and implemented. This has resulted in “protocol compliant” clauses and agreements being developed and used. A process acknowledged by the SOCL as being in line with the overall philosophy of the protocol.

2.1 Aim

The aim of this research was to obtain the opinions of members of the protocol drafting committee, Australian legal practitioners, and Australian construction industry professionals of the suitability of the TIA method of analysing and quantifying the effects of delaying events on construction projects, for adoption and use by the Australian construction industry.
2.2 Proof of Causation

Pickavance (2005) states that a satisfactory proof of causation is that which the court or tribunal accepts as adequate in the circumstances to demonstrate on a balance of probabilities that the event(s) alleged to have caused the effect is acceptable. The philosophy and recommendations of the protocol are that all delaying events should be analysed contemporaneously during the life of the project. Where this is not done, guidance section four of the protocol identifies a number of methods and techniques that it considers suitable for the effective retrospective analysis of delays, the choice of which is dependent upon:

- The relevant conditions of contract;
- The nature of the causative events;
- The value of the dispute;
- The time available;
- The programme available; and
- The programmer’s skill level and familiarity with the project (Society of Construction Law, 2002).

The methods and techniques identified are:

- The as planned v as built technique;
- The impacted as planned technique;
- The collapsed as built technique;
- The TIA method.

The TIA method is considered to be the most suitable method for both the contemporaneously and retrospective analysis of delay and disruption events on construction projects. Table 1 identifies the types of analysis and the records required for their effective application.
Table 1: Method of Analysis and Records Required (SOCL, 2002)

<table>
<thead>
<tr>
<th>Type of analysis</th>
<th>As planned programme without network</th>
<th>Networked as planned programme</th>
<th>Updated as planned networked programme</th>
<th>As built records</th>
</tr>
</thead>
<tbody>
<tr>
<td>As planned v as built</td>
<td>X</td>
<td>or X</td>
<td>and X</td>
<td>or X</td>
</tr>
<tr>
<td>Impacted as planned</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collapsed as built</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Time impact analysis</td>
<td></td>
<td>X</td>
<td>or X</td>
<td>and X</td>
</tr>
</tbody>
</table>

2.3 The As Planned v As Built Technique

This method can be applied to simple bar charts as well as to critical path networks. When applied over the total construction period the method is known in the US as a “total time” claim method. It compares the durations of activities in the tender or first prepared planned programme with the time the activities actually took on site. The two are then compared and inferences are drawn from the differences. It normally relies on the assumption that the difference between the two is the delay the aggrieved party is entitled to. The method is suitable provided the exploration of the individual effect of serial changes to the critical path are not necessary, and should only be considered adequate proof of entitlement (without further analysis or rationalization) provided:

(i) The effect of the various contingencies which affect the planned programme, the built programme or both (whether or not the effect is adverse), can be identified; or

(ii) There are no such contingencies in the planned programme and the only contingency in the built programme is the discrete event of which is to be identified (Pickavance, 2005).
2.4 The Impacted As Planned Technique

The impacted as planned technique is a static method of calculation that relies for its baseline on a single programme, to which is added the factual representation of events in order to calculate their effects on the programme. The effect of the causal event(s) on the key or completion dates is then the difference between the date calculated before the event(s) were added, and that calculated after they were added (Pickavance, 2005). The method has commonly been applied by the construction industry as a means of demonstrating delay, but is considered to have limited use where as built records are available because:

(i) The baseline must be a programme which is relevant to the contractors intentions at the time the relevant event occurs; and

(ii) The effects of the events calculated are not related directly to the time the events actually occurred (Pickavance, 2005).

2.5 The Collapsed As Built Technique

This is a slightly more complex method of analysis and is suitable where there is more than one type of delay or reimbursable event. The technique requires the grouping of the delaying activities into their constituent parts at the end of the as planned programme. The delaying events are abstracted to identify those that are reimbursable and excusable, excusable but non reimbursable, and those that are neither excusable nor reimbursable. This provides guidance as to whether (and for what period of time) the aggrieved party is entitled to an EOT and loss and/or expense, an EOT only, loss and/or expense only, or LAD’s. For this method to reliably infer a causal relationship (without further rationalization and analysis), and as an indication of its limitations, it must be possible to demonstrate:

(i) The events giving rise to the delay can be clearly identified;

(ii) There are no consequential delays to be taken into account;

(iii) There was no concurrent or parallel delays;

(iv) There was no acceleration;

(v) The activity durations have been accurately calculated, without any float; and

(vi) The completion of each activity is a prerequisite of the commencement of its successor (Pickavance, 2005).
2.6 The Time Impact Analysis Method

The TIA method (also known as the “snapshot” or “time slice” method), is a CPM based method that calculates the effect of a defined causal event rather than relying on inference of a cause from the perceived effect. When used correctly it is considered to produce the most thorough and reliable technical proof of the effect of a causal event (Pickavance, 2005). The analysis examines the delay effects during the progress of the project. The impact of each delaying event is determined at the relevant construction stage, with the intention of obtaining a “stop action picture” of the project before and/or after a major delay. The difference between the projected completion dates at these two stages is determined as the delay to the project that occurred during the period, with the total delay to the project being the sum of all delays during the project (Kumaraswamy and Yegeswaran, 2003). The contemporaneous approach to delay analysis involved in the TIA method allows the assessment of:

(i) The actual state of progress at the time the event was initiated;

(ii) The changing nature of the critical path as a result of delays to progress and acceleration; and

(iii) The concurrency of delays to progress and to completion (Pickavance, 2005).

3. Methodology

The research was conducted in accordance with the Commonwealth of Australia’s National Statement on Ethical Conduct in Research Involving Humans (1999), following procedures approved by the University of Newcastle’s Research Ethics Committee.

A literature review to determine current industry practice, together with semi-structured qualitative interviews, with five of the protocols drafters, three Australian legal practitioners specialising in construction delay and disruption disputes, and two Australian construction industry professionals experienced in the administration, negotiation, and resolution of delay and disruption claims were carried out to obtain their opinions of the suitability of the TIA method of analysing and quantifying the duration of an extension of time for adoption and use by the Australian construction industry.

Background details of those who were interviewed are contained in Table 2.
4. Results and Discussion

The responses obtained from the members of the SOCL are considered to be representative of the views and opinions of the UK construction industry due to the extensive two years industry wide consultation process that was undertaken during the production and drafting of the protocol. The responses from the Australian participants are considered to be indicative of those who are likely to be involved in the negotiation and resolution of delay and disruption disputes on Australian construction projects due to the small number interviewed.

Each participant was given a clarifying statement explaining the protocols recommendation concerning the use of the TIA method and asked:

“What is your opinion of this method of analysis?”

Edited comments of the responses from the members of the SOCL drafting committee, the Australian legal practitioners, and the Australian construction industry professionals are included in the discussions below.

4.1 Members of the SOCL’s Responses

The protocol drafters exhibited mixed responses to this question. It was considered to be “the fairest method” (SOCL1), and that “for most disputes ... is the most appropriate method of analysis” (SOCL4), and “… the only sensible way of managing time” (SOCL5). It was emphasized that providing the correctness of the logic of the original plan was taken into account when the analysis was being carried out it provided “… the best forward visibility, and the proper way of analysing the effect of a change to the project” (SOCL4).

The TIA method of analysis was acknowledged as having limitations. It was considered to be “... the most onerous approach (most expensive forensically)” and “… a pretty labour intensive approach” (SOCL3), and that “if you do not have the right data then it is not worth doing because without the right data it will be garbage in and garbage out, or nothing in and nothing of worth out” (SOCL2). It was also considered to be “… pointless setting up to do a time impact analysis if you have no as built records, or a competent CPM programme” (SOCL5).

It was stated that the TIA method was not the only method for consideration, in that the protocol “… doesn’t recommend a particular method of retrospective delay analysis. It says there are four principal methods … and they all have their foibles, merits, and demerits.
<table>
<thead>
<tr>
<th>Identifier</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCL1</td>
<td>An independent claims consultant with over twenty years experience of working in the construction and civil engineering industry.</td>
</tr>
<tr>
<td>SOCL2</td>
<td>A solicitor and Partner with a leading UK law firm with over twenty years experience of resolving national and international construction and engineering disputes.</td>
</tr>
<tr>
<td>SOCL3</td>
<td>Managing Director of a specialist risk, programming and dispute resolution organization with over fourteen years experience of civil engineering and building disputes.</td>
</tr>
<tr>
<td>SOCL4</td>
<td>Head of a large UK organizations forensic engineering and construction disputes team with over twenty years experience as a chartered quantity surveyor and over fourteen years experience as an arbitrator and adjudicator.</td>
</tr>
<tr>
<td>SOCL5</td>
<td>Director and Senior Vice President of a leading international consulting organization who practices world wide as an arbitrator, adjudicator and expert in delay related disputes.</td>
</tr>
<tr>
<td>PART1</td>
<td>A lawyer and arbitrator who is a Partner in a leading Australian law firm whose areas of expertise are Construction, Dispute Resolution, and Litigation.</td>
</tr>
<tr>
<td>PART2</td>
<td>A lawyer and Partner in a leading Australian law firm with over seventeen years legal experience who specialises in construction law.</td>
</tr>
<tr>
<td>PART3</td>
<td>A director and co-founder of a specialist Australian construction and asset cost consulting Quantity Surveying Practice with expertise in commercial construction, procurement, and dispute resolution.</td>
</tr>
<tr>
<td>PART4</td>
<td>An assistant contracts manager in the Legal and Contractual Department of one of the Australian States Department of Public Works.</td>
</tr>
<tr>
<td>PART5</td>
<td>A lawyer and arbitrator who is a Partner with a leading Australian law firm, a Fellow of the Institute of Arbitrators Australia, and a Member of the Australian Institute of Judicial Administration, whose areas of practice include construction law and ADR.</td>
</tr>
</tbody>
</table>
The first criteria in selection of an appropriate method is “what does it say in the contract?”, secondly, “what materials have you got to work with?” (SOCL5). Other methods may be appropriate “… depending on the information you have, that would then dictate the method you could use” (SOCL2).

There was evidence of disagreement as to the suitability and effectiveness of the technique for use in all situations. One of the protocol drafters was critical of the method stating “I think it is over-rated ... the reason it is useful at the time is because it is the best information you have and allows agreements to be struck on that information. It is not as precise and accurate as people believe it to be because it projects pure entitlement, but not necessarily the actual delay ... I think the method has been used and given too much prominence over the others in terms of forensic analysis” (SOCL3).

4.2 Australian Participants Responses

The representatives of the Australian legal profession and Australian construction industry generally appeared to be in favour of the TIA method. Comments such as “it is far superior to any other method I have seen ... When done properly by both sides it seems to come up with a fairly consistent answer, not identical but close” (PART2), “I think it’s probably the most reliable” (PART3), “I think it’s probably the more typical approach, certainly during the administration of the contract, so I’m not opposed to the idea. Given the level of record keeping called for by the protocol, a contemporaneous analysis is the preferred approach” (PART4), and “I think that’s a sound approach” (PART5) indicated their approval.

Of those interviewed, two participants indicated that they didn’t feel they knew enough about the method to make comment, stating “I’m probably not all that well equipped to answer that question, I’m not a programmer” (PART1), and “It’s probably a bit outside of my scope because I’m a Quantity Surveyor” (PART3). However, both went on to state “… it sounds reasonable, but there’s a lot of people in Australia that use various methodology for programming, and I guess time impact analysis is a standard approach. I don’t know if there would be any better approach” (PART1), and “…I think time impact analysis is certainly helpful when you are doing claims because it gives you an idea of where the critical paths were and weren’t, and how that affected the programme, so I think it’s one of the tools that would be used, but it would depend on what you are trying to prove at that time, but yes I think it’s probably the most reliable, certainly if you’re doing it constantly updating as the protocol suggests then that’s probably the best way to go” (PART3).
5. Conclusions

Most of the protocol drafters considered the TIA method of analysis to be the fairest and most appropriate method of analysis that provided a reliable and sensible way of managing time, giving the best forward visibility of the effects of a change on a project.

Despite a limited knowledge and understanding of the application and use of the TIA method the Australian participants considered it to be a suitable means of quantifying the effects of delay on Australian construction projects.

Both the protocol drafters and the Australian participants considered the TIA method of analysis to be the most onerous, labour intensive, and expensive approach, that was only suitable provided the appropriate project data and project as built records and information were available.

The TIA method of analysis was not to be considered as the only appropriate method available for consideration. The choice of an appropriate method was dependant upon the contractual provisions for the project in question, and the project information and data available for the analysis.

The TIA method of analysis was perceived to be the most suitable for a contemporaneous delay analysis due to the levels of record keeping required.

The Australian participants considered the TIA method of quantifying the effects of delay events on construction projects to be a suitable method already commonly in use in Australia.

References:


Pickavance, K. (2000). Delay and Disruption in Construction Contracts, 2nd Ed. LLP.

Pickavance, K. (2005). Delay and Disruption in Construction Contracts, 3rd Ed. LLP.


