

**LEGAL ANALYSIS OF CONCURRENT DELAY CLAIMS IN
CONSTRUCTION PROJECTS AND EVALUATION OF
ENTITLEMENT USING APPORTIONMENT PRINCIPLE**

**التحليل القانوني لمطالبات التأخير المتزامنة في مشاريع الإنشاء وتقييم
المستحقات باستخدام مبدأ التقسيم**

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ABSTRACT

Concurrent delays in construction are complex and often matter of dispute in construction industry. The law is unclear in this issue and the parties generally use concurrency as an excuse to escape from their responsibility to compensate the other party. In different cases related to concurrency the judges have provided rulings based on which different principles have developed on concurrency. This indicates that there cannot be a single general principle to deal with concurrency. In this research project noted English cases related to concurrency and the rulings of the judges have been reviewed. The “Society of Construction Law (SCL)” and “Association for the Advancement of Cost Engineering International (AACEI)” have developed guidelines to deal with concurrency. A legal analysis of SCL and AACEI recommendations has been carried out with the case laws in order to arrive at best possible way to deal with a concurrency situation.

As the construction projects are generally large in size and lasts for a longer period of time the delay events and the critical path of the project changes over the period of time. Therefore it is important to establish the varying dominant cause of delay and understand the relevance of each event during the span of the project duration. It is rare that two concurrent delay events overlap exactly without a dominant cause. In such an instance where a dominant cause cannot be established, it is appropriate to apply the principle of apportionment to arrive at a fair entitlement for the parties.

Even though apportionment principle is generally accepted as the best recommended solution for a true concurrency it is often difficult to evaluate entitlement under apportionment. This research project by means of a case study establishes that “Window Analysis” with “Time Impact Analysis (TIA)” provides best solution to apportion the entitlements under concurrency. The results of interviews with experts on this subject have been discussed at end of this document which provides better understanding of concurrency and evaluation of entitlements and liabilities of the parties.

خلاصة

إن التأخيرات المترتبة في الإنشاء أمر معقد وموضع خلاف في صناعة الإنشاء. إن القانون غير واضح في هذه المسألة ويستخدم الأطراف بشكل عام التزام كذريعة للتهرب من مسؤولية تعويض الطرف الآخر. وفي حالات مختلفة تتعلق بالتزام إصدار القضاء أحكام والتي على أساسها تم وضع مبادئ مختلفة بخصوص التزام. وهذا يشير إلى أنه لا يمكن أن يكون هناك مبدأ عام واحد للتعامل مع التزام. في هذا المشروع البحثي تمت الإشارة إلى حالات إنجليزية تتعلق بالتزام وتم الإطلاع على أحكام القضاة الصادرة. وقد وضع "قانون مجمع البناء (اس سي ال)" و "جمعية تطوير التكلفة الهندسية المدنية (أيه أيه سي إي)" مبادئ توجيهية للتعامل مع التزام. وقد تم إجراء تحليل قانوني لتوصيات "قانون مجمع البناء" و "جمعية تطوير التكلفة الهندسية المدنية" مع قوانين الحالة من أجل التوصل إلى أفضل طريقة ممكنة للتعامل مع الوضع الراهن.

وبما أن المشاريع الإنشائية كبيرة في الحجم بشكل عام وتطول لفترة أطول من الزمن، فإن أحداث التأخير والمسار الدقيق للمشروع يتغير خلال فترة من الزمن. لذلك، فمن المهم تحديد السبب المهيمن المتغير للتأخير وفهم أهمية كل حدث خلال فترة زمنية لا تتجاوز مدة المشروع. فمن النادر أن يتداخل حدثين تأخير متزامنين دون سبب مهيمن. وفي مثل هذه الحالة عندما لا يمكن تحديد السبب المهيمن، فمن المناسب تطبيق مبدأ التقسيم للوصول إلى مستحقات عادلة للطرفين.

وعلى الرغم من قبول مبدأ التقسيم بشكل عام باعتباره أفضل حل موصى به للالتزام الحقيقي، فإنه في الغالب من الصعب تقييم المستحقات بموجب مبدأ التقسيم. وينص هذا المشروع البحثي بواسطة دراسة حالة على أن "تحليل النافذة" مع "تحليل أثر الزمن (تي أي أيه)" يقدم الحل الأفضل لتقسيم المستحقات في ظل التزام. وقد تم مناقشة نتائج المقابلات مع الخبراء بخصوص هذا الموضوع في نهاية هذا المستند، والتي تبين فهم أفضل للالتزام وتقييم مستحقات ومسؤوليات الأطراف.

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DEDICATION

I dedicate this research project to my father who encouraged me on the importance of acquiring greater qualifications and knowledge and to my mother whose inspiration and love is always there.

I extend the dedication to my wife and two daughters Angela and Bettina for their love, constant support and patience.

I pass my sincere thanks to my family and friends, in particular to my sister and brother for their motivation.

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ABBREVIATIONS

SCL - Society of Construction Law

AACEI - Association for the Advancement of Cost Engineering International

FIDIC - Federation Internationale Des Ingenieurs Conseils

EOT - Extension of Time

LD/LAD - Liquidated Damages/Liquidated and Ascertained Damages

TIA - Time Impact Analysis

CPM - Critical Path method

UAE – United Arab Emirates

UK – United Kingdom

US – United States

KEYWORDS

Employer Risk Event

Contractor Risk Event

Force Majeure

Concurrent Delays

Pacing Delays

Extension of Time

Prolongation Cost

Liquidated Damages

Apportionment

Dominant Cause

Critical Path

Window Analysis

Time Impact Analysis

Expert Witness

I. CHAPTER-01 INTRODUCTION

a. RESEARCH TOPIC

Construction projects often gets delayed due to a variety of reasons. When more than one delay event occur at the same time, essentially where the responsibility of the delays lies with different parties, then the delays are said to be concurrent delays. However, all the delay events which occur simultaneously are not supposed to be considered as concurrent delays for the purpose of evaluation of compensation and extension of time. True concurrency occurs in rare circumstances and it is important to understand what True Concurrency is. The concurrent delays are often confused due to improper understanding or wrong interpretations. This leads to disputes and controversies between the parties entering into construction contracts. The parties try to allege concurrency in order to excuse themselves from their liability to compensate the other party. Concurrency is one of the most complicated aspects of Construction Dispute Resolution. In UK evaluation of Concurrency is described as a “minefield”, in US it is compared to “untangling a knot” and in Canada it is expressed as “unscrambling the egg”¹. The many causes and sources of construction delays often makes it difficult to assess the liability of delays. Assessment and apportionment of entitlement is usually challenging when delays are concurrent. Similarly, it is important to establish the legal validity of the assessment and entitlement.

b. AIMS AND OBJECTIVES

Different approaches are in practice in order to evaluate/calculate the entitlement of parties in concurrent delays and is always matter of dispute due to improper understanding of the parties on 'true concurrency' and 'pacing of works (Deliberate delays by one party due to existing delays by other)'. For concurrent events, the apportionment of entitlement and liabilities of the parties are done based on the results of these calculations.

¹ Cocklin M, “International Approaches to the Legal Analysis of Concurrent Delay: Is there a solution for English law?” (SCL Paper number 182, April 2013) (1)

This Research Project aims at legal analysis of the different approaches in practice on concurrency and tries to establish the right approach. The project work also aims at establishing the best possible delay analysis methodology to evaluate entitlements under concurrency. The objectives of this project work can be summarized as follows

- Review different types of delay events and analyze different concurrency situations and define what “True Concurrency” is.
- Legal analysis of different principles on evaluation of entitlement and liabilities in Concurrency derived from famous cases and review the principles using the guidelines of SCL protocol and recommended practices by AACEI.
- Review different delay analysis methodologies in practice and difficulties in evaluation and apportionment of concurrency and recommend best practical solution in evaluation and apportionment of entitlement and liabilities using a case study.

c. RESEARCH STRUCTURE

The research structure of this project work can be divided into two parts. The literature review section and then connecting the theoretical principles established through literature review to practical application by means of a case study and interviewing experts in this field.

The literature review has been done in three sections, first to identify and establish true concurrency, second to review the legal principles on concurrency and then various methodologies used in evaluating concurrency has been discussed.

The second part aims at validating the theoretical principle to practical aspects. This has been achieved by using a case study which uses a real-time project scenario of concurrency and evaluates the entitlements of each party and discusses the strengths and weaknesses of the analysis. Further, five relevant questions related to the subject matter are prepared and discussed with four experts in this field. The discussions with the experts provides more clarity on the approach to be taken in dealing with concurrency situation.

II. CHAPTER 02 LITERATURE REVIEW

II.A LITERATURE REVIEW ON CONCURRENT DELAYS

This section provides a detailed review of various types of ‘Concurrent Delays’. In the beginning, a brief review of various types of delays and different terminologies used have been provided.

Delays in construction project, is defined as an event or act that extends the planned time to perform an activity under the ‘project programme’ or extends the time to perform a task under a contract. It is usually reflected as delayed start of activities or as additional days of work.

1. SOURCES OF DELAYS

As mentioned above a delays may occur due to additional time required to perform an activity. This may be due to various reasons such as:

- Variations instructed in the project such as additions/modifications to design and specifications, omissions, substitutions and resequencing of works by the employer
- Disruptions caused in performing the activities by external sources or internal issues of the contractor
- Re-works for non-conforming works
- Insufficient time allotted in the contractor’s programme of work

Similarly, as mentioned above delays may be caused by delayed start of activities. This may be caused due to following reasons.

- Delays in project design and late changes to design and specifications
- Late handover of the project site by the employer

- Unforeseen site conditions and adverse climatic conditions
- Delays by contractor in submissions and delays by employer/employer's representatives in approval of drawings, materials and method statements
- Delays in procurement of materials and mobilization of resources by the contractor
- Changes in legislation of the country/authorities
- Force Majeure

Accordingly the delays can be classified as follows:

Employer Risk Events

Employer Risk Events are the events for which the risk is allocated as the employer's responsibility in the Contract.²

Contractor Risk Events

Similarly, Contractor Risk Events are the delay events for which the risk is the responsibility of the contractor under the contract.³

Neutral Events

For certain events the risk is allocated to both employer and the contractor (such as adverse climatic conditions in FIDIC) in the contract and is sometimes referred as Neutral Events. For these events the time risk generally lies with the employer.

² "Society of Construction Law (SCL), Delay and Disruption Protocol October 2002" (p56)

³ "Society of Construction Law (SCL), Delay and Disruption Protocol October 2002" (p54)

2. TYPES OF DELAYS

To understand and comprehend the types of delays the following classifications can be used as point of reference. In the following section delays are classified into different types/groups and the terms may be used further in this document.

a. GENERAL CLASSIFICATION

Independent delays

Independent delays are isolated delays which have no relation to any previous delays. The impact of these delays to the project completion can be verified separately.

Concurrent delays

A Concurrent Delay is defined as the occurrence of two or more independent delay events occurring at the same period of time, one an “Employer Risk Event”, the other a “Contractor Risk Event”, the effects of which are felt at the same time.⁴ (Discussed in detail in Section II A (3) of this document)

Serial or Sequential Delays

Serial delays occur exclusively from other delays and does not overlap but occur sequentially with other delays.

Pacing delays

Pacing delays are delays which are conscious decision to slow down the progress of works as the project is already delayed due to other contemporaneous delays.⁵ This is usually a disputed as concurrent delay. The difference of ‘pacing delays’ with ‘concurrent delays’ is that the effect of concurrent delays are felt at the same time whereas pacing delays just consumes the float created by a parent concurrent delay event.

⁴ “Society of Construction Law (SCL), Delay and Disruption Protocol October 2002” (p53)

⁵ “AACEI International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)” (Section 4.2F, p111)

b. BASED ON ENTITLEMENT OF EOT/COST

Based on the entitlement of extension of time and compensation payable to the contractor, delays are classified as Excusable and Non-Excusable Delays.

1. Excusable Delays

“Excusable delays” are those ‘not’ caused by the contractor's lack of performance but occur as a result of events beyond the Contractor’s control. Such delays entitle the Contractor to an extension of time. Excusable delays might be Compensable or Non-Compensable.

a. Excusable and Non-Compensable Delays

Excusable delays which are caused by neither Contractor nor the Employer or caused by both parties as in the case of concurrency are referred as “Excusable and Non-Compensable delays”. In this case both parties are affected by the delay and only extension of time without compensation is generally recommended. This eliminates Contractor’s liability for Liquidated Damages.

b. Excusable and Compensable Delays

Delays caused by employer or his agents such as Project Manager, Engineer, Designer or other Contractors who are in direct contractual relation with the Employer is termed as “Excusable and Compensable Delays”. Most of the time in this case the Contractor is entitled to an extension of time and prolongation cost.

2. Non-Excusable Delays

Delays caused by actions and inaction of the Contractor or one of his Sub-Contractors, Suppliers or any other party who is in contractual relation with the Contractor. The Contractor will not be entitled for EOT. “Non-excusable delays” are those caused by the contractor's lack of performance or breach of contract and are caused by risk-events that are foreseeable or within the control of an experienced contractor.

3. CONCURRENT DELAYS

Two or more delays, one an Employer Risk Event and the other a Contractor Risk Event which shares the same period of time and causes critical delays to completion of project is referred as “concurrent delays” As stated in the guidance notes 1.4.4 of the SCL Protocol⁶, concurrent delay is defined as follows:

“True concurrent delay is the occurrence of two or more delay events at the same time, one an Employer Risk Event, the other a Contractor Risk Event, and the effects of which are felt at the same time. True concurrent delay will be a rare occurrence. A time when it can occur is at the commencement date (where for example, the Employer fails to give access to the site, but the Contractor has no resources mobilized to carry out any work), but it can arise at any time”.

As concurrency decides on the compensability of the delay period, it is very important to assess if two delays are truly concurrent. To establish that the delay events are concurrent the parties need to consider various factors as listed below:

1. The delays are independent and unrelated to each other.
2. Whether or not the delay impacts the critical path of the project or one delay would have impacted the critical path of the project in the absence of the other delays.
3. Pacing delays which are often misconstrued as concurrent delays should be identified.
4. Contractual risk responsibilities of the parties to be reviewed and checked whether an event is a neutral event.
5. The delay events should be significant and cannot be easily curable

⁶ “Society of Construction Law (SCL), Delay and Disruption Protocol October 2002” (p16)

There are two theories on concurrency which are explained below.⁷ A Concurrent delay can be ‘Co-extensive’ which is also known as “Literal Concurrency” or a concurrent delay can be ‘Concurrent-in-Effect’ which is also known as “Functional Concurrency”.

a. CO-EXTENSIVE CONCURRENT DELAYS (LITERAL CONCURRENCY)

In “Co-extensive Concurrent Delays” or “Literal Concurrency” the delays occur literally at the same period of time which results in same critical impact to the project completion as shown in Figure-01.

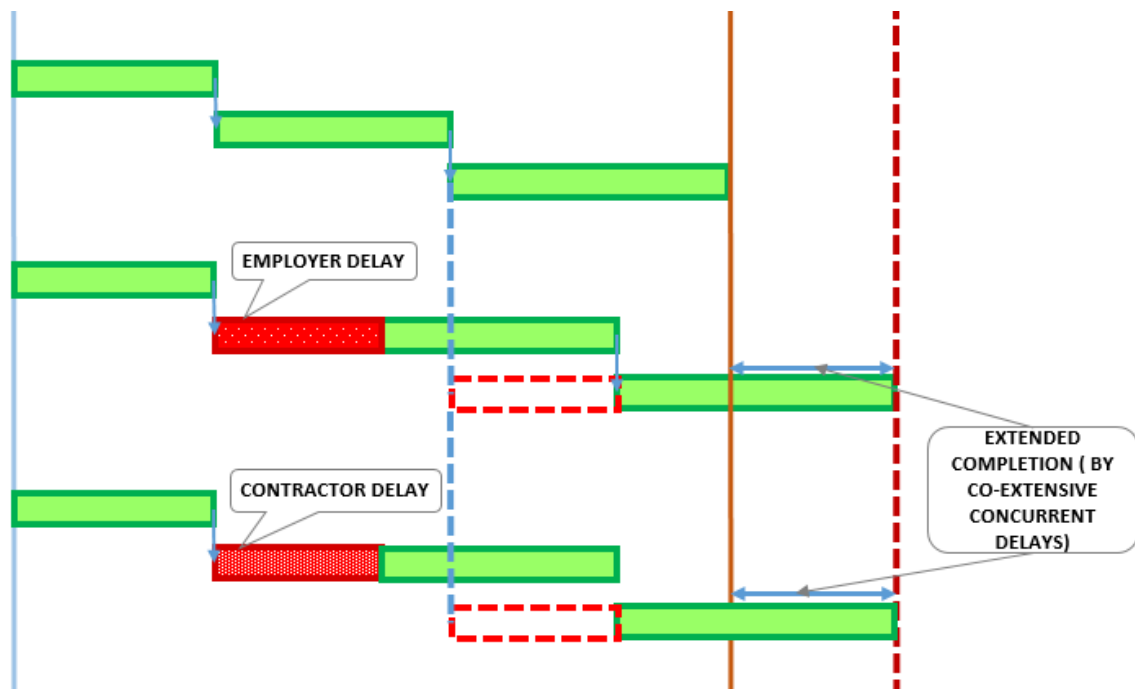


Figure 01 – ‘Co-extensive’ or ‘Literal’ Concurrency

⁷ “AACEI International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)” (Section 4.2D1, p104)

b. CONCURRENT IN EFFECT (FUNCTIONAL CONCURRENCY)

In “Concurrent-In-Effect” or “Functional Concurrency” the concurrent events need not be co-existing but have to be in the same period of analysis and should produce same critical effect to the project completion (Refer Figure-02). SCL protocol paragraph 1.4.6 identifies this as “Concurrent Effect of Sequential Delay Event”.⁸

“The term ‘concurrent delay’ is often used to describe the situation where two or more delay events arise at different times, but the effects of them are felt (in whole or in part) at the same time. To avoid confusion, this is more correctly termed the ‘concurrent effect’ of sequential delay events”.

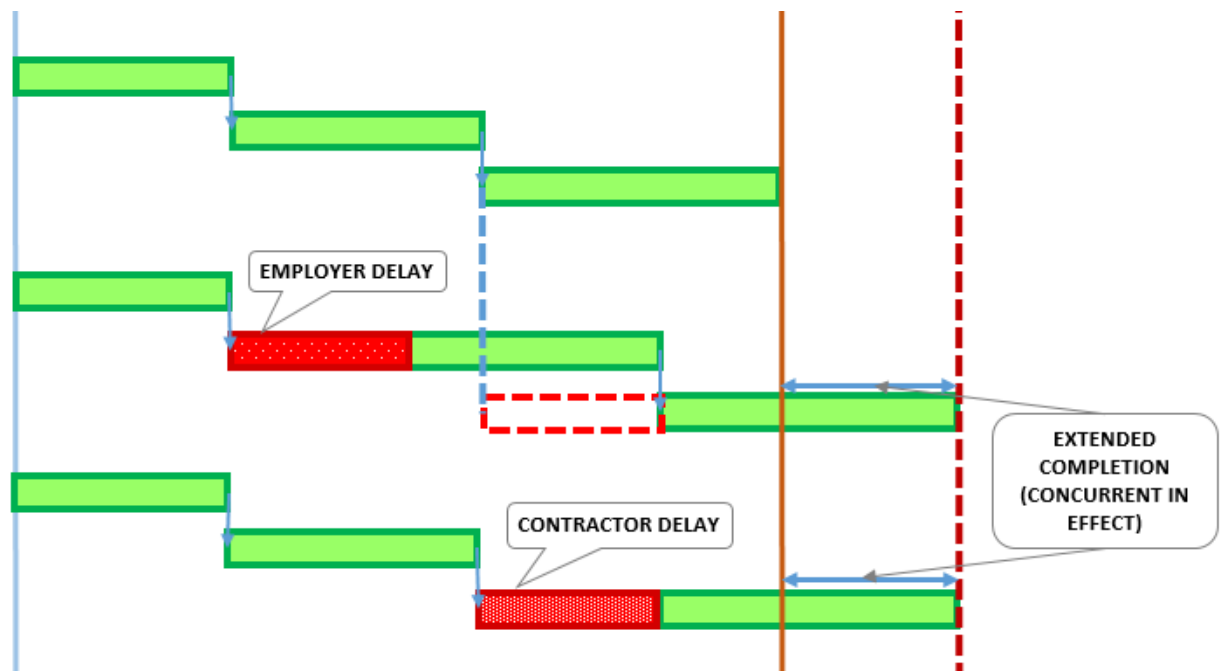


Figure 02 – ‘Concurrent in Effect’ or ‘Functional’ Concurrency

⁸ “Society of Construction Law (SCL), Delay and Disruption Protocol October 2002” (Section 1.4.6, p16)

c. DIFFERENT CONCURRENCY INSTANCES

There can be different instances of concurrency based on the types of delays occurring simultaneously. It is important to note that only the overlapping duration of two concurrent delay events are considered as concurrent and has to be analyzed according to the concurrent delays criteria. The non-overlapping portions of each delay are to be treated as individual delay and analyzed accordingly. In order to simplify, three main concurrency situation are given below.

1. “Excusable and Non-Compensable” delay event and “Non-Excusable” event. For example a Neutral event occurring with Contractor delay event.

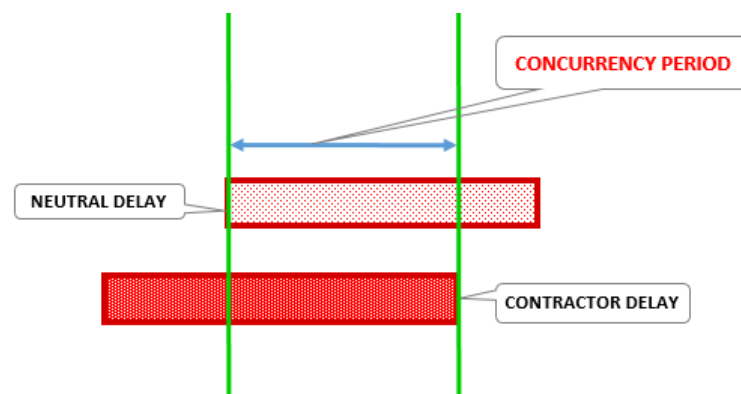


Figure 03 – Contractor delay occurring concurrently with Neutral delay

2. “Excusable and Non-Compensable” delay event and an “Excusable and Compensable” delay event. For example a Neutral event occurring concurrently with Employer delay event.

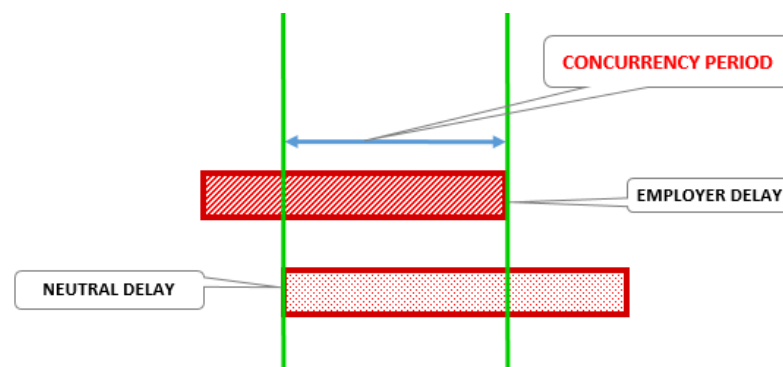


Figure 04 – Employer delay occurring concurrently with Contractor delay

3. “Excusable and Compensable” delay concurrently with “Non Excusable” delay event. For example an Employer delay occurring concurrently with Contractor delay.

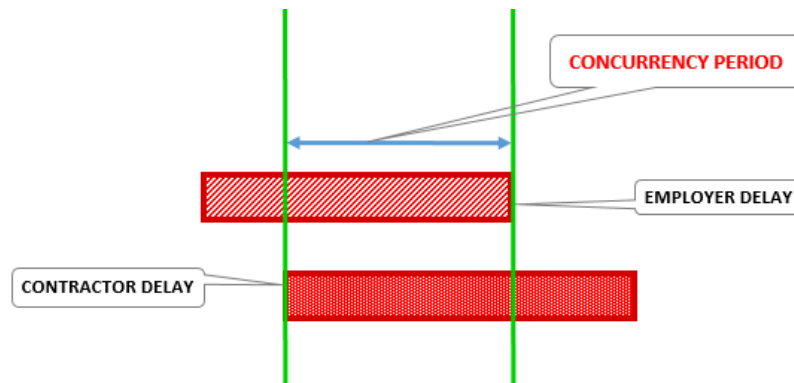


Figure 05 – Employer delay occurring concurrently with Contractor delay

There can be other instances where an Employer Delay, Contractor Delay and Neutral Delay occur concurrently or even delays such as subcontractor delays, authority delays or variation delays occurring concurrently. However, any of these instances can be categorized under the above mentioned three instances.

II.B LITERATURE REVIEW ON LEGAL ANALYSIS CONCURRENT DELAYS

In construction contracts analysis of concurrent delays is one of the most difficult issues when it relates to assessment of EOT and prolongation costs. Parties try to allege concurrency in order to excuse themselves from their liability to compensate the other party⁹. For contract administrator's assessment of entitlement of parties in concurrent delays is often challenging. Apart from review of cause, effect and responsible party of the delays the contract administrator has to identify the amount of concurrency and possible apportionment of entitlement.

“Not only does a contract administrator have to identify the causative events, and their effect, but he will have to grapple with the thorny matter of identifying and apportioning liability and attempting to isolate the costs that were experienced as a direct result of the contribution of one party, or the other, to the overall delay.”¹⁰

1. CONTRACTUAL PROVISIONS ON CONCURRENCY

a. EOT PROVISIONS IN CONTRACTS

Construction contracts generally provides separate claim procedures for EOT and cost to deal with occurrence of a delay event. The event may be an ‘Employer Risk Event’ or a ‘Contractor Risk Event’ or a ‘Force Majeure/ Neutral Event’. For example the claim procedure for extension of time and costs under FIDIC Red Book of 1987 is provided in clause 44 and clause 53 respectively and under FIDIC Red Book of 1999 the procedures of claims is provided in sub-clause 20.1. Various contractor risks, employer risks and

⁹ “AACEI International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)” (Section 4.2A, p101)

¹⁰Keane P J, Caletka AF, “Delay Analysis in Construction Contracts” (Blackwell Publishing, Oxford, 2008)

neutral risks are usually identified and methods to address such risks are provided in the contracts. If the delay is caused by a single party then the award of relief is normally straightforward as given in the Table-01 below.

Sl. No.	Delays Caused By	Relief		
		Extension of Time (EOT)	Prolongation Cost	Liquidated Damages
1	Contractor Risk Event	✗	✗	✓
2	Employer Risk Event	✓	✓	✗
3	Neutral Event	✓	✗	✗

Table-01 - Entitlement for delays are caused without concurrency

b. CONCURRENCY IN CONTRACTS

When the delay is caused by two parties simultaneously the matter becomes difficult because contracts generally do not provide to deal with concurrency situation and are silent on the subject¹¹. This is because of differing legal principles on concurrency and various other factors that need to be taken into consideration in assessment of entitlement under concurrency.

FIDIC Red Book of 1987 sub-clause 20.3 related to loss/damage due to ‘Employer Risk Event’ states that in the event of combination of risks, the determination for loss or damage should take into account the proportional liabilities of the parties causing the risk events.¹² However, generally contracts in UAE which are based on FIDIC do not provide mechanism to deal with concurrency because of the complexity of the issue. The

¹¹ “AACEI International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)” (Section 4.2A, p101)

¹² FIDIC, Red book of 1987, Sub-Clause 20.4 states that “...In the case of a combination of risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.”

unfamiliarity of the project managers and engineers about laws and practices related to concurrency may result in unfair interpretations if concurrency related clauses are added to the contract.

Technical factors such as integrity of the project programme, criticality of the activities, available float for the activities and pacing delays has to be considered to decide on concurrency. The dominant cause of the delay and time of occurrence of the event also affects the determination of entitlement. Defining concurrency and liabilities under concurrency in the contracts sometimes leads to unfair contract conditions. It requires detailed review of risk allocation in contracts for concurrency and the transfer of risks will affect the tender price.

Accordingly each concurrency case has to be assessed based on the merits of the individual case. This is done by referring to available case laws and legal principles developed over time related to concurrency.

c. PREVENTION PRINCIPLE

If a contract does not provide for EOT clause and if an Employer Risk Event occurs by which he prevents the contractor from completing his works under the contract then the contractor is not bound to complete the works within the 'Time for Completion' of the project and the time becomes 'at large'. In this case, the contractor is supposed to complete the works in a reasonable period of time and liquidated damages does not apply. This is because, according to the 'Prevention Principle' a party may not apply contractual condition on the other party if the party has prevented the other party from contractual obligation.

Similarly, if EOT clause is not there and a concurrent delay occurs then to apply the prevention principle it is contractor's responsibility to prove that the project would be delayed anyway due to an 'act of prevention' by the employer.

2. SCL PROTOCOL ON CONCURRENCY

The below section reviews the source and validation of the concurrency principle as established in the “Society of Construction Law (SCL) Delay and Disruption Protocol” (Hereinafter referred as SCL Protocol). The SCL have developed guidelines to deal with concurrency situations in the protocol and this section analyses SCL’s stand on concurrency.

a. CONCURRECNY AND EXTENSION OF TIME (EOT)

SCL protocol position with regards to EOT under concurrent delays is that the Contractor delays should not reduce its entitlement of EOT if a concurrent Employer delay extends the ‘Time for Completion’ of the project. According to SCL protocol paragraph 1.4.1¹³,

“Where Contractor Delay to Completion occurs concurrently with Employer Delay to Completion, the Contractor’s concurrent delay should not reduce any EOT due.”

b. CONCURRENCY AND COMPENSATION

SCL protocol position for compensation under concurrent delays is that the contractor may not recover costs incurred during the period of concurrency unless it can separate the additional cost caused by the employer and the contractor. According to SCL protocol paragraph 1.10.4¹⁴,

¹³ “Society of Construction Law (SCL), Delay and Disruption Protocol October 2002” (Section 1.4.1, p15)

¹⁴ “Society of Construction Law (SCL), Delay and Disruption Protocol October 2002” (Section 1.10.4, p23)

“Where an Employer Risk Event and a Contractor Risk Event have concurrent effect, the Contractor may not recover compensation in respect of the Employer Risk Event unless it can separate the loss and/or expense that flows from the Employer Risk Event from that which flows from the Contractor Risk Event. If it would have incurred the additional costs in any event as a result of Contractor Delays, the Contractor will not be entitled to recover those additional costs. In most cases this will mean that the Contractor will be entitled to compensation only for any period by which the Employer Delay exceeds the duration of the Contractor Delay.” [emphasis added]

The last line of the paragraph 1.10.4 of SCL protocol explains what it means by separation of cost. By separation of cost the SCL protocol means the compensation for the period of the concurrent events which exceeds the concurrency period.

The below figures explain the entitlement and liability scenario when ‘Employer Risk Event’ exceeds the ‘Contractor Risk Event’ Figure-06 and when ‘Contractor Risk Event’ exceeds the ‘Employer Risk Event’ Figure-07.

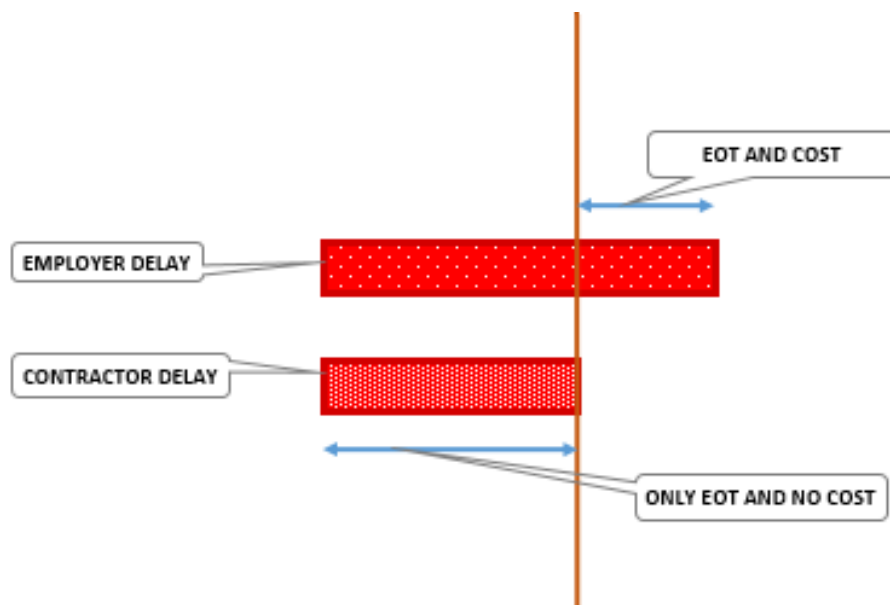


Figure 06 – Employer Delays exceeds Contractor Delays

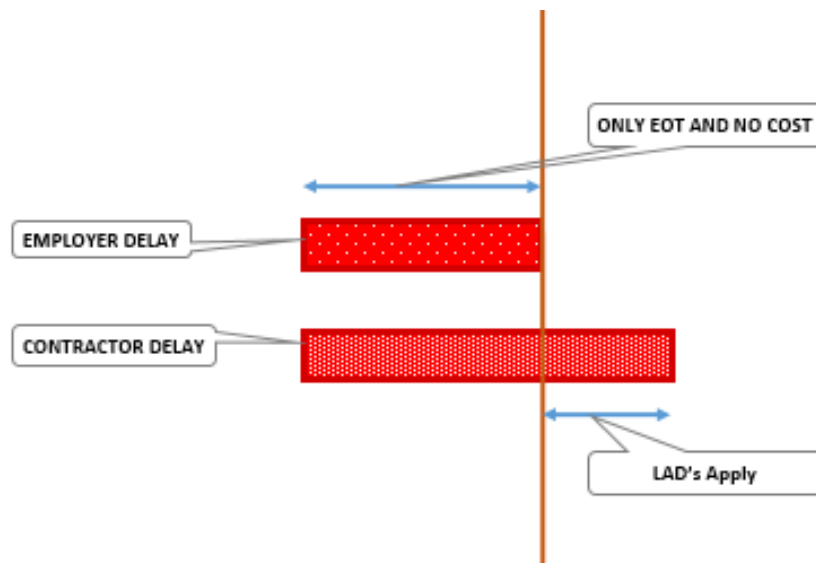


Figure 07 - Contractor Delays exceeds Employer Delays

This also means that this principle can be applied when the concurrent delays are 'concurrent in effect' as explained in Section-IIA 3b of this document. This is because in a 'concurrent in effect' scenario (Figure-02) it is possible to separate the period of delays and the additional cost.

3. AACEI RECOMMENDED PRACTICE ON CONCURRENCY

The below section reviews the source and validation of the concurrency principle as recommended by “Association for the Advancement of Cost Engineering International (AACEI) in its recommended practice No. 29R-03 Forensic Schedule Analysis” (Hereinafter referred as AACEI recommended practices). In its recommended practice AACEI have deeply investigated various concurrency scenarios and developed guidelines for delay analysis.

a. EXTENSION OF TIME (EOT)

About EOT under concurrency AACEI is consistent with the principles of SCL protocol i.e. EOT without cost unless otherwise stated in the contract. According to AACEI recommended Practice,

“...the contractor is barred from recovering delay damages to the extent that concurrent contractor-caused delays offset owner-caused delays, and the owner is barred from recovery liquidated/stipulated or actual delay damages to the extent that concurrent owner-caused delays offset contractor-caused delays.”¹⁵

b. COMPENSATION FOR PROLONGATION/ LIQUIDATED DAMAGES

Similarly for prolongation cost also the AACEI recommended practice is in line with the principles of SCL protocol. According to AACEI recommended practice,

¹⁵ “AACEI International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)” (Section 4.1B, p99)

“...entitlement to compensability, whether it applies to the contractor or the owner, requires that the party seeking compensation shows a lack of concurrency if concurrency is alleged by the other party. But for entitlement to excusability without compensation, whether it applies to the contractor or the owner, it only requires that the party seeking excusability show that a delay by the other party impacted the critical path.”¹⁶

Thus, the relief as stipulated in SCL protocol and AACEI recommended practice can be summarized as follows (Refer Table-02).

Sl. No.	Concurrent Delays Caused By	Relief			Remarks
		Extension of Time (EOT)	Prolongation Cost	Liquidated Damages	
1	Contractor Risk Event / Neutral Event	✓	✗ (see remarks)	✗ (see remarks)	Excusable Delay, Cost only if it can be apportioned
2	Employer Risk Event / Neutral Event	✓	✗ (see remarks)	✗ (see remarks)	Excusable Delay, Cost only if it can be apportioned
3	Employer Risk Event / Contractor Risk Event	✓	✗ (see remarks)	✗ (see remarks)	Excusable Delay, Cost only if it can be apportioned

Table-02 - Entitlement under different concurrency situations as per SCL and AACEI (Generally, when additional cost cannot be separated)

¹⁶ “AACEI International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)” (Section 4.1C, p100)

4. LEGAL PRICIPLES ON CONCURRENCY BASED ON CASE LAWS

In order to quantify the entitlement and liabilities under concurrency different principles have evolved over time based on different case laws. This section is a brief review of the literature available on these principles.

a. FIRST IN LINE APPROACH

As indicated by Keane and Caletka (2008)¹⁷ the “First in Line Approach” is based on the logic that the event occurring first of the two concurrent events is considered as the critical delay. However, the drawback of this approach is that it does not consider the impact of any other concurrent event unless the other events continues to impact the project completion after the impact of the first event is ceased. The culpability of the delay goes to party who caused the delay first.

b. CAUSATION BASED APPROACH – DOMINANT CAUSE

As explained by Williamson (2005)¹⁹ based on ‘Keating on Building Contracts’ there are possibly three “cause based” approach in case of concurrency situation as explained below.

THE DEVLIN APROACH

This approach is based on the decision by Justice Devlin in “Heskell v Continental Express Limited”¹⁸. Accordingly, if two causes of delay occur concurrently and one is due to breach of contract, then the liability of the delay lies with the party who is under

¹⁷ Keane P J and Calekta A F, “Delay analysis in Construction Contracts” (1st edition, Blackwell Publishing Ltd, Oxford 2008) 205

¹⁸ “Heskell v Continental Express Limited” (1950) 1 All England 1033

the breach. Williamson (2005)¹⁹ explains that this principle is unworkable in construction contracts as it has to be applied to the claim of the contractor and counterclaim of the employer. In this instance it may lead to an absurd position where the contractor will be successful for his claim for loss and the employer for his claim for liquidated damages.

BURDEN OF PROOF

According to this approach if part of the damage is caused by the claimant, then it is his responsibility to demonstrate the amount of loss caused otherwise than his own breach. Pickavance (2005)²⁰ refers to Keating and considers this method to be difficult to apply in a concurrency situation in which both the contractor will claim for his loss and the employer will claim the LAD's and both will fail.

DOMINANT CAUSE

This approach has the advantage that there can be only one dominant claim and can be applied to both, claim and the counter claim. The claimant has to just establish the dominant cause to be successful in the case. According to this principle:

*“If there are two causes, one the contractual responsibility of the Defendants and the other the contractual responsibility of the Claimant, the Claimant succeeds if he establishes that the cause for which the Defendant is responsible is the effective, dominant cause...”*²¹

¹⁹ Williamson A QC “Concurrency In Construction Delays”(2005)

²⁰ Pickavance K, “Delay and disruption in construction contracts” (2nd edition, LLP, London 2000) 499

²¹ Williamson Keating “Concurrency in Construction Delays”

c. ‘DOT-ON’ OR ‘NET-EFFECT’ PRINCIPLE

This principle is related to ‘relevant’ concurrent event occurring after the project completion date when the contractor is already in delay. In *McAlpine Humberoak*²² one of the most fiercely contested disputes on concurrency the Court of Appeal upheld Lord Justice Lloyd's decision that:

“If a contractor is already a year late through his culpable fault, it would be absurd that the employer should lose his claim for unliquidated damages just because, at the last moment, he orders an extra coat of paint.”

In *Chestermount Properties*²³ a similar type of concurrent delay situation was brought to the courts attention where Justice Coleman stated:

“...where a relevant event occurred during a period of culpable delay, the revised completion date should be calculated on a ‘net basis’, that is by taking the date currently fixed and adding to it the number of days...regarded as fair and reasonable in respect of the consequences of the relevant event...”

The court held that the contractor is entitled to an EOT for the concurrent employer delay occurred during the contractor delay period but only in respect of the additional delay caused by the ‘Employer Risk Event’ calculated from the original or extended completion date. This is commonly known as the ‘dot-on’ principle or ‘net-effect’.

²² “*McAlpine Humberoak Ltd v McDermott International Inc.*” (1992)

²³ “*Balfour Beatty Ltd v Chestermount Properties*” (1993) 32 Con LR 139

d. MALMAISON APPROACH

One of the most famous and important case in the English courts which provides recommendations on dealing with concurrent delay is the Malmaison case²⁴ where Justice Dyson stated that:

“...if there are two concurrent causes of delay, one of which is a relevant event and the other is not, then the contractor is entitled to an extension of time for the period of delay caused by the relevant event, notwithstanding the concurrent effect of the other event. Thus to take a simple example, if no work is possible on site for a week, not only because of exceptionally inclement weather (a relevant event), but also because the contractor has a shortage of labour (not a relevant event), and if the failure to work during that week is likely to delay the works beyond the completion date by one week, then if he considers it fair and reasonable to do so, the architect is required to grant an extension of time of one week. He cannot refuse to do so on the grounds that the delay would have occurred in any event by reason of the shortage of labour.”
[emphasis added]

Where there are concurrent events, one of which is ‘Contractor Risk Event’ and the other ‘Employer Risk Event’ both of which are independent and would individually cause a delay to the project completion, then the contractors culpable delays shall not reduce his entitlement for EOT. The Malmaison approach was supported by the famous case of Royal Brompton²⁵ in which Justice Seymour provided a similar judgement:

“However, if Taylor Woodrow was delayed in completing the works both by matters for which it bore the contractual risk and by relevant events, within the meaning of that term in the Standard Form, in the light of the authorities to which I have referred,

²⁴ “Henry Boot Construction (UK) Ltd v Malmaison Hotel (Manchester) Ltd” (1999) 70 Con LR 32

²⁵ “Royal Brompton Hospital NHS Trust v Hammond & Others” (2001) 76 Con LR 148

it would be entitled to extension of time by reason of the occurrence of the relevant events notwithstanding its own defaults”

This approach is in consistence with the guidelines provided by SCL protocol and AACEI recommended practices in assessment of EOT under concurrency as discussed in Section II B 2&3 of this document.

e. APPORTIONMENT PRINCIPLE

According to the apportionment principle if two delay events are concurrent and the loss/expense of the parties in concurrency period can be separated, then the parties should be allowed to recover their loss/expense appropriately. Justice Drummond Young in the recent case of “City Inn v. Shepherd Construction”²⁶ case concluded that,

“Apportionment enables the architect to reach a fair assessment of the extent to which completion has been delayed by Relevant Events whilst at the same time taking into account the effect of other events which involve contractor default”

Justice Drummond Young decided that it is appropriate to apportion responsibility for concurrent delay on a 'fair and reasonable basis' as none of the causes of delay were considered dominant events. However the Contractor in this instance did not have a baseline programme to rely upon and this approach is highly subjective. It may be inferred that if the dominant cause or relevant critical event causing the delay can be proved using appropriate project programme, the ‘dominant cause’ principle should apply.

In a different case Laing Management v John Doyle²⁷ Justice Drummond Young delivered his opinion to address the issue of apportionment in detail.

²⁶ “City Inn Limited v. Shepherd Construction Limited” (2006) CSOH 94

²⁷ “Laing Management (Scotland) Ltd v John Doyle Construction Ltd” (2004) SCLR 872 BLR 295

“...if it cannot be said that events for which the Employer is responsible are the dominant cause of the loss, it may be possible to apportion the loss between the causes for which the Employer is responsible and other causes...in an appropriate case...”

Justice Drummond Young suggested a three tier solution to address concurrency:

1. To check if the separation of concurrency period is possible
2. If separation not possible check for dominant cause
3. If dominant cause test fails then the apportionment principle should be applied.

The dominant cause principle is based on ‘All or Nothing’ or ‘Winner takes it all’ approach. The easy rule to deal with concurrent events in a construction project is to award an extension of time without cost as addressed in Malmaison approach. However, if True Concurrency is established without any dominant cause, the fair rule is to apportion the cost as supported by recent construction cases.

The US courts are more experienced in complex concurrent delay cases than English courts who have adopted apportionment principle as one of main approach under concurrency.²⁸ Contractors and Employers appear to be confused by the concept of concurrent delay due to the decision in Malmaison and try to list all compensable delay events as 'concurrent delay' in an attempt to minimize their own culpable delays in the hope of relief from potential damage claims. Applying apportionment principle with the three tier check avoids such wrong practices.

Therefore, based on the research done on case laws and relevant literatures, it can be concluded that the evaluation of entitlement under concurrency has to be carried out as follows:

1. Establish that there is True Concurrency by separating the delay events for actual concurrency period.

²⁸ Cocklin M, “International Approaches to the Legal Analysis of Concurrent Delay: Is there a solution for English law?” (SCL Paper number 182, April 2013) (p9)

2. Check for the dominant cause whether one event is dominant over other the other. If dominant cause is established the responsible party of the dominant cause is liable to compensate the other party.
3. If True Concurrency is established, and it is not possible to decide on the dominant cause then the apportionment principle should apply.

Even though apportionment principle provides fair judgement, it is not commonly used due to difficulties in separating the delay events and identifying true concurrency. The Chapter 04 provides a case study which simplifies this issue and the liabilities of the parties can be identified without much effort using the recommended methodology.

II.C LITERATURE REVIEW ON EVALUATION CONCURRENT DELAYS

There are lot of articles and books available related to delay analysis methods and evaluation of concurrent delays. The methodologies mentioned in these literature are mainly based on the guidelines and recommended practice as provided by the institutions SCL and AACEI. SCL in their ‘Delay and disruption protocol’ and AACEI in their ‘Forensic Schedule Analysis’ provides various mechanisms to evaluate delays and concurrency. This section reviews the main methodologies which are in practice in construction industry and attempts to establish the best methodology that can be used to evaluate concurrency.

1. DELAY ANALYSIS METHODOLOGIES

All delay analysis methodologies aims at analyzing the delay events which causes critical delays to the project. However, based on the method of analysis used the accuracy of the time assessment varies and the calculation/apportionment of the cost depends on the results from time analysis.

The selection of delay analysis methodology is dependent upon various factors such as availability of baseline/as-built programmes, available time for analysis and funds for the claim preparation. The basic methods of delay analysis have been briefly reviewed in the following section.

a. IMPACTED AS-PLANNED

This method of analysis is the simplest and also referred as “What-If” method. The delay event fragnet is inserted into the baseline programme and the critical impact on the project completion is analyzed. As the name suggests it analyses the theoretical impact by considering what would the baseline programme look like with the impact of the event. It does not take into consideration the status of the project at the time of occurrence of the event and cannot be used to identify concurrency.

b. AS-PLANNED VS AS-BUILT

This is a retrospective method of analysis in which the as-planned programme is compared with the as-built programme. The programmes are reviewed in detail to identify the variances and to determine the as-built critical path. The method involves subjective determinations and is restricted due to its inability to identify resequencing, concurrency, acceleration or mitigation.

c. COLLAPSED AS-BUILT

Collapsed-as-built is a subtractive method where the delay events are removed from an as-built schedule and the resulting impact to project completion is assessed. This is also known as “But-for” method. This method is useful to analyze simple programmes, however, it cannot be used in programmes with complex logics.

d. TIME IMPACT ANALYSIS

In “Time Impact Analysis (TIA)” the delay event is impacted on the nearest available update of the programme which considers the status of the project at the time of occurrence of the event. This makes TIA to be the preferred methodology in the construction industry due to its ability to determine the culpability, concurrency and apportioning of liabilities and is the best technique for the assessment of EOT as mentioned in the SCL protocol²⁹.

e. WINDOW ANALYSIS

In windows approach the project period is divided into different ‘Window Periods’ or “Time Slices”. Shorter the window period, more accurate will be the result of analysis. The selection of the window period is generally based on the closing date of a schedule update. However, the period can be selected considering the milestone dates or start and

²⁹ “Society of Construction Law (SCL), Delay and Disruption Protocol October 2002” (Section 4.5 to 4.8, p47)

end dates of a delay event. The window analysis can be used in combination with any of the basic delay analysis methodologies appropriate to the specific case.

2. METHODS TO EVALUATE CONCURRENCY

The assessment of concurrent delays and evaluation of entitlements and liabilities is a complex task when it comes to complex construction projects. If the required evaluation is related to a single case of concurrency it is generally easy to establish the entitlements using various principles in practice. However, when it is required to analyze the concurrency issues in a whole project, it requires combinations of different methodologies discussed in the previous section.

As discussed under section on delay analysis techniques, the right approach in the analysis of delays is to consider the status of the project at the time of occurrence of the delay event. The method where the status of the project can be considered is “Time Impact Analysis” with additive modelling of delay events and “Collapsed As-built” with subtractive approach. The combination of these methods with window analysis helps to identify the entitlements, liabilities and concurrency issues in a whole project.

a. WINDOW ANALYSIS WITH COLLAPSED AS-BUILT

In the absence of contemporaneous programme updates, the methodology that can be used retrospectively to analyze concurrency is subtractive approach using ‘Collapsed As-built or ‘But-for’ technique. ‘But-For’ analyses are prepared by eliminating the dominant risk events that had occurred during a ‘Window Period’ in consideration that has an effect on project completion. Also, intermediate schedule updates can be developed by interpolating the dates and percentage progress based on the window period using the available as-built programmes.

If contemporaneous as-built programmes are available, in order to accurately demonstrate the liabilities and entitlement of the parties under concurrency, the Time Impact Analysis (TIA) methodology with window analysis is considered to be the principal technique.

b. WINDOW ANALYSIS WITH ‘TIA’ TECHNIQUE

The liabilities under concurrency can be evaluated by using a modelled additive approach of delay events with TIA. However, TIA requires contemporaneous programme updates or as a minimum the programme update near to the event occurrence date. If the delay occurs concurrently with a Contractor delay it is advisable to use a standalone Time Impact analysis. If the analysis has to be done over a period of time it is recommended to use “TIA with Window analysis” methodology which separates the liabilities under different window period. If concurrent delays are found, the dominant delay has to be established and a professional assessment of the apportionment of delays has been carried out. Section-IV of this document provides a case study which details how the liabilities can be apportioned using TIA with window analysis.

3. FACTORS TO CONSIDER IN QUANTIFICATION OF CONCURRENT DELAYS

In order to resolve a concurrency situation it is important review in detail if the events are really concurrent. While determining concurrent events, emphasis should be on when the effects of the delays manifested or when it started impacting the critical path, rather than simply when they occurred. The factors to be considered in quantification of concurrency is listed below.

1. The criticality of the events. The importance of critical path and programme analysis in determination of EOT was stated in the case of Balfour Beatty³⁰ by Justice Lloyd.

³⁰ In “Balfour Beatty Construction Ltd v The Mayor and Burgesses of the London Borough of Lambeth” (2002) EWHC 597(TCC) Judge Lloyd stated that “By now one would have thought that it was well understood that, on a contract of this kind, in order to attack, on the facts..., the foundation must be the original programme and its success will similarly depend on the soundness of its revisions on the occurrence of every event, so as to be able to provide a satisfactory and convincing demonstration of cause and effect. A valid critical path (or paths) has to be established both initially and at every later material point since it (or they) will almost certainly change. Some means has also to be established for demonstrating the effect of concurrent or parallel delays or other matters for which the employer will not be responsible under the contract.” [emphasis added]

2. The delay events should be reviewed for pacing delays.
3. The concurrent events should be checked for literal or functional concurrency.
4. Concurrency has to be established in the delay period (cause) and not in the delay impact (effect).
5. The duration of window period determines the accuracy of analysis. The smaller the window period the better will be the accuracy of the results. But reducing the window period will increase the complexity of the analysis.
6. The chronological order of insertion of delay event is very important in window by window analysis.
7. The knowledge on the details of the delay event at the time of analysis also affects the quantification of entitlement (hindsight (retrospective) vs blindsight (knowledge at the time of event)).

Before assessment of compensation or damages or apportionment the following should be considered:

1. Determine the excusable period of delay, the non-excusable period of delay and the compensable period of delay should be established before evaluation of the compensation.
2. If concurrent delays by other agents such as subcontractors, architects, and suppliers, the entitlement of the primary parties should be evaluated first and then the allocation for the secondary agents should be calculated by a subsidiary analysis.

III. CHAPTER-03 RESEARCH METHODOLOGY

1. RESEARCH APPROACH

The aim of this Research Project is to analyze the application of legal principles on concurrency and evaluation techniques in practical scenario. The answers to the research objectives are expected from literature review and research on current practices. Even though there are many methodologies available to conduct research and ascertain practical implications of the subject matter, the methodology used in this Research Project is qualitative analysis. This is because of the distinct nature of the topic and a quantitative analysis may lead to misleading conclusions. According to Denzin and Lincoln (2011)³¹ qualitative research can be conducted through different empirical methods such as interviews, case study, observational, historical etc. This research project uses two of the qualitative approach, first a case study and then interviews with experts on the topic.

The case study in this project work uses a real-time project scenario of concurrency and evaluates the entitlements of each party and discusses the strengths and weaknesses of the analysis. The aim of using case study methodology is to demonstrate how the evaluation and apportionment of liabilities and entitlements under concurrency can be performed in real-time situation.

The objective of the interviews was to assess the opinions of practitioners on legal principles of concurrency and evaluation of entitlement and liabilities. The method adopted was direct interview with the experts on the subject. Five relevant questions related to the subject matter were prepared and discussed with four experts in the field. The discussions with the experts provided more clarity on the approach to be taken in dealing with concurrency situation.

³¹ According to Denzin and Lincoln (1994) “Qualitative research involves the studied use and collection of a variety of empirical materials - case study, personal experience, introspection, life story, interview, artifacts, and cultural texts and productions, along with observational, historical, interactional, and visual texts-...”

2. CASE STUDY METHODOLOGY - WINDOW ANALYSIS WITH TIA FOR APPORTIONMENT OF ENTITLEMENT

As mentioned in above section, the most accepted method of analysis is contemporaneous period analysis using ‘Time Impact Analysis (TIA)’ methodology as it takes into account the status of the project at the time of occurrence of the delay event. A case study on a real-time project which utilized the combination of window analysis with TIA was conducted. The analysis details were discussed with the delay analyst who prepared the analysis and with the delay expert witness. All the relevant information related to the project and the details of methodology used for the analysis have been analyzed in Chapter-04.

The analysis methodology used in the case study in order to evaluate and apportion the delay liabilities and entitlements is “window analysis with TIA”. The relevant ‘Employer Risk Events’ were listed out and the project period was divided into relevant window periods in order to analyze the delay impacts during the window period. The delays by the ‘Contractor Risk Events’ or ‘Mitigation’ by the contractor are assessed using the contemporaneous programme updates of the project. So, within each window period under review the analysis was carried out in two stages.

1. Impact the delay events within the respective window period by inserting the ‘delay fragnet’³² (Refer Figure-08).
2. Import the Contemporaneous programme updates to assess the mitigation of delays by the contractor (Refer Figure-08).

The process is repeated under each window period. If the delay events span over periods exceeding that of any window period the analysis will consider the effect of delay in the period under consideration only. In Figure-08 the ‘red bar’ shows the delay fragnet

³² A chronology of issues and developments related to the delay event during the delay period prepared in planning software like Primavera P6.

extending to subsequent window, the impact of which will be considered under the window period where it occurs.

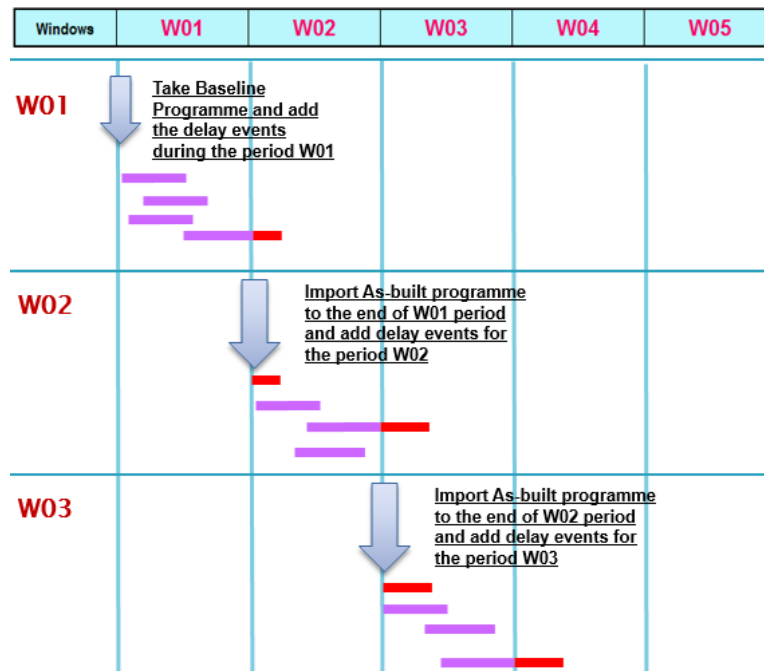


Figure 08 – The process of window analysis with TIA

This over a period of several windows will culminate in an overall delay impact. The results of liabilities and entitlements under each window is summarized in a table (Refer Table-07 and Table-08). The case study analysis has been carried out in Chapter-04.

3. THE INTERVIEW QUESTIONS TO EXPERTS

The second qualitative analysis approach used for validating and better understanding of the legal principles in concurrent delays and evaluation methodologies discussed in this document is by direct interviews with experts in this field. Five relevant questions were prepared and discussed with the experts. The method adopted was to assess the opinions of practitioners on evaluation and entitlement under concurrency by direct interview with the experts rather than general survey due to the distinct nature of the topic. The questions used for the interviews are as follows:

Question: 01

Do you agree with the principle of only EOT and no cost in concurrency situation generally? Specifically what is your view on the following three scenarios regarding prolongation cost?

Sl. No.	Concurrent Delays Caused By	Relief		
		Extension of Time (EOT)	Prolongation Cost	Liquidated Damages
1	Contractor Risk Event / Neutral Event	✓	?	✗
2	Employer Risk Event / Neutral Event	✓	?	✗
3	Employer Risk Event / Contractor Risk Event	✓	?	✗

Table 03 - Question on entitlement of prolongation cost under different concurrency situations

Question: 02

In concurrency situation, which principle do you support - dominant cause principle or apportionment principle or do you believe first dominant cause has to be tested if it fails apportionment principle should apply?

Question: 03

In my research project I am trying to establish that the evaluation of entitlement using apportionment principle is best possible using window analysis with TIA. Do you agree? If yes will this method be your final choice for the fair decision. Or will you suggest any other method for apportionment?

Question: 04

Should the contracts provide clauses to deal with concurrency situation and also specify the delay analysis methodology to be used for assessment of delays?

Question: 05

In your experience how much validity is there for the delay analysis methods used, when it comes to arbitration and especially in courts?

IV. CHAPTER-04 CASE STUDY AND DATA ANALYSIS OF INTERVIEWS

1. CASE STUDY ON CONCURRENT DELAY ANALYSIS

a. THE PROJECT DETAILS

The scope of works of the project involves construction of a Sea Outfall for a Sewerage Treatment Plant (STP) project. The project key dates and durations are given in Table-04.

Description	Date / Durations
Project Commencement Date	01 July 2013
Project Completion Date	14 May 2014
Actual Completion Date	09 March 2015
Original Duration	318 calendar days
Total Project Duration	617 calendar days
Total Delays	299 calendar days

Table-04 - Case Study, Project Dates/Durations

The delay analysis methodology used in this case study is ‘Window Analysis’ with ‘TIA’. The total project duration of 617 calendar days were broken down into 10 bi-monthly windows based on the data dates of available contemporaneous programme updates in Primavera P6 software. The 10 window periods are given in Table-05.

Windows	Window Period		Duration (Days)
	From	To	
W01	01-Jul-13	25-Aug-13	55
W02	25-Aug-13	25-Oct-13	61
W03	25-Oct-13	25-Dec-13	61
W04	25-Dec-13	25-Feb-14	62
W05	25-Feb-14	25-Apr-14	59
W06	25-Apr-14	25-Jun-14	61
W07	25-Jun-14	25-Aug-14	61
W08	25-Aug-14	25-Oct-14	61
W09	25-Oct-14	25-Dec-14	61
W10	25-Dec-14	09-Mar-15	74

Table-05 – Case Study, Window Periods

Table-06 provides the list of “Employer Risk Events” considered for analysis in this Case Study.

Event ID	Event Description
DE01	Suspension/Redesign of the Works
DE02	Delays in receiving invert levels from PM
DE03	Encounter corals in new alignment
DE04	Encounter Rocky/hard/dense soil on the new alignment

Table-06 – Case Study, List of Delay Events for Analysis

b. THE DELAY ANALYSIS

The window analysis with TIA essentially consisted of the following:

The baseline programme is copied and renamed as W01A for the analysis of window period W01. For each delay event under window W01, a summarized ‘delay fragnet’ is prepared and inserted into the W01A programme and linked to the subsequent relevant activities. If the delay events span over periods exceeding that of any window period the analysis will consider the effect of delay in the period under consideration only. The programme is then rescheduled and the resultant impacts to project completion due to the insertion of the ‘delay fragnet’ is noted under ‘Column B’ of Table-07.

In order to analyse the as-built impact of W01, the programme W01A is copied and renamed as W01B. The W01B programme is updated using the progress updates as of the end of window period W01. The programme W01B is rescheduled and the resultant impacts to the project completion is noted under ‘Column E’ of Table-07.

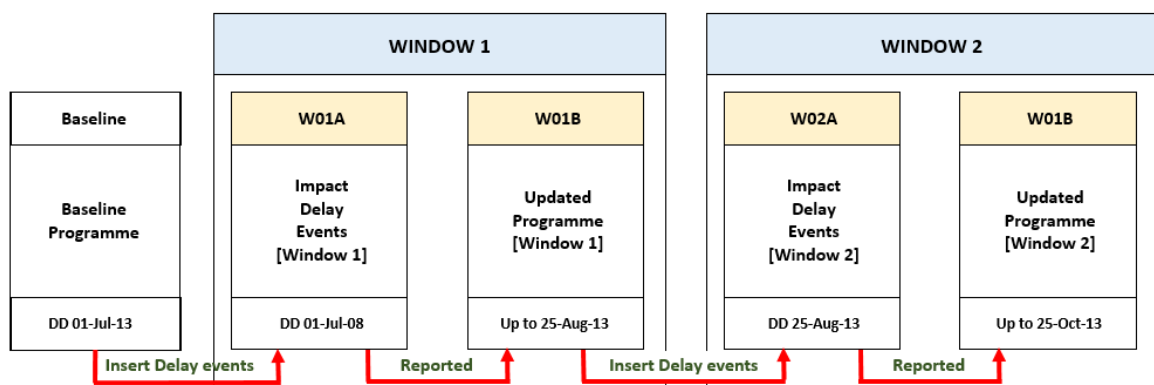


Figure 09– Diagram showing Delay Analysis Sequence

As shown in Figure-09 the procedure is repeated by impacting the windows and updating the progress for each of the windows from W01 to W10 for the project duration from 01 July 2013 to 09 March 2015. Table-07 provides summary of the results of ‘Window Analysis’ carried out from W01 to W10.

Window Nos.	Impacted Completion Date (W0XA) (A)	Periodic Impacted Delays (Calendar days) (B)	Cumulative Impacted Delays (Calendar days) (C)	As-Built Completion Date (W0XB) (D)	Periodic As-built delays (Calendar days) (E)	Cumulative As-built delays (Calendar days) (F)	Delays/ Mitigation by Contractor (Calendar days) (G)	Cumulative Delays/ Mitigation by Contractor (Calendar days) (H)
W01	01-Jul-14	-48	-48	01-Jul-14	-48	-48	0	0
W02	03-Jul-14	-2	-50	30-Jul-14	-29	-77	-27	-27
W03	02-Sep-14	-34	-84	08-Aug-14	-9	-86	25	-2
W04	08-Oct-14	-61	-145	08-Oct-14	-61	-147	0	-2
W05	06-Dec-14	-59	-204	03-Dec-14	-56	-203	3	1
W06	03-Jan-15	-31	-235	18-Jan-15	-46	-249	-15	-14
W07	17-Feb-15	-30	-265	02-Mar-15	-43	-292	-13	-27
W08	15-Mar-15	-13	-278	25-Feb-15	5	-287	18	-9
W09	25-Feb-15	0	-278	25-Feb-15	0	-287	0	-9
W10	25-Feb-15	0	-278	09-Mar-15	-12	-299	-12	-21

Table 07 – Case Study, Summary of Delay Analysis

c. RESULTS FROM ANALYSIS OF CASE STUDY

The Table-08 provides the details of the results from the analysis. Detailed interpretation of the results of analysis is given below.

Window Nos.	Delays/ Mitigation by Contractor (Calendar days) (G)	Cumulative Delays/ Mitigation by Contractor (Calendar days) (H)	Entitlement and Liability Details (Y)	Contractor Delay events and Employer Delay events details (Z)
W01	0	0	Excusable Compensable (Dominant cause found to be employer delay)	DE01
W02	-27	-27	Concurrent Contractor Delays (Alleged Pacing)	Contractor delays in Construction of Temporary Jetty, DE02
W03	25	-2	Excusable Compensable	DE02
W04	0	-2	Excusable Compensable (Dominant cause found to be employer delay)	DE02, DE03
W05	3	1	Excusable Compensable	DE03, DE04
W06	-15	-14	Concurrent Contractor Delays	Contractor delays in initial slow progress in trenching works, DE04
W07	-13	-27	Concurrent Contractor Delays	Contractor delays in Procurement of 3rd Pipe String, DE04
W08	18	-9	Excusable Compensable	DE04
W09	0	-9	Excusable Compensable (Dominant cause found to be employer delay)	No Delay Events
W10	-12	-21	Concurrent Contractor Delays	Contractor Delays in Testing and Commissioning, No Delay Events

Table 08 – Case Study, Summary of Entitlement/Liabilities

‘Column G’ provides the details of periodic delays and mitigation by the contractor. It is the difference between ‘Column E’ and ‘Column B’. The ‘negative values’ in ‘Column G’ shows that in the particular window the contractor was in critical delay. The ‘positive values’ in ‘Column G’ shows that the employer was in critical delay during the window period and the contractor has mitigated the delays. The ‘zero’ values shows that both contractor and the employer are in critical delay and dominant cause of the delay has to be analyzed.

In summary:

Total Actual Delays to the project = 299days (Sum of ‘Column E’)

Total Excusable delays = 278days (Sum of ‘Column B’)

Total Contractor delays = 21days (Sum of ‘Column G’)

Total Excusable and Compensable delays = 169days (Sum of Excusable and
Compensable delays from ‘Column Y’)

As it can be seen Pacing of Delays was alleged by the contractor under W02. However, it was found that the contractor was culpable during the window period W02.

2. DATA ANALYSIS OF RESULTS FROM INTERVIEWS

The method adopted to assess the opinions of practitioners on evaluation and entitlement under concurrency was direct interview. To keep it simple four interviews were conducted with experts in this field. Two of the interviewees were selected from legal background and two delay analysis experts. This document keeps the anonymity of the interviewees. The two legal experts are denoted as LEXP1 and LEXP2 and the delay experts are denoted as DEXP1 and DEXP2.

LEXP1 is a professor from Sri Lanka and a highly qualified chartered surveyor and engineer. He is Arbitrator/Mediator in London Court of International Arbitration and Dubai International Arbitration Centre.

LEXP2 is director of Claims and Disputes division of a multinational claims consultancy firm in UAE. He is from Jordan and works as arbitrator and mediator with a total of 11 years of experience in dispute resolution field.

DEXP1 is from UK and currently holding the position of director of Claims and Disputes Division of a major claims consulting company in UAE. He is having 26 years' experience in project planning and delay analysis and for around last 10 years he has worked as a delay expert.

DEXP2 is director of Planning and Forensic Analysis of another claims management company he is from Egypt and currently working in UAE with a total of 15 years' total experience and 3 years' experience as delay expert.

Q1 - PRINCIPLE OF EOT ONLY AND NO COST IN CONCURRENCY

The question was whether you agree with the principle of only EOT and no cost in concurrency situation generally? Specifically what is your view on the following three scenarios regarding prolongation cost? (Three scenarios summarized in Table-09)

The question was aimed at receiving the opinion of experts on the general principle of only EOT and no cost in concurrency situation. The general principle adopted by SCL Protocol and AACEI Recommended Practices for true concurrent delays is to approve EOT without cost unless the Contractor Delays can be separated from Employer Delays (highlighted in blue in the below Table-09). The views of the experts on the three scenarios have been summarized in Table-09. It is evident from the interview results that the experts do not agree with the general principle.

Sl. No.	Concurrent Delays Caused By	ALL		SCL	AACEI	LEXP1	LEXP2	DEXP1	DEXP2
		EOT	LD's	Prolongation Cost – (Generally, may vary based on specific cases)					
1	Contractor Risk Event / Neutral Event	✓	✗	✗	✗	✗	✓	✗	✗
2	Employer Risk Event / Neutral Event	✓	✗	✗	✗	✓	✓	✗	✓
3	Employer Risk Event / Contractor Risk Event	✓	✗	✗	✗	✓	✓	✗	✓

Table 09 – Summary of views of experts on prolongation cost entitlement under different concurrency situations

Even though LEXP1 was well aware of the general practice of not paying the contractor in case of concurrency he was totally against the practice when a Neutral Event occurs concurrently with the Employer Risk Event and even in the case of Employer Risk Event occurring concurrently with the Contractor Risk Event. According to him if the employer issues a variation during contractor delay or during a neutral event the employer is benefitting from the contractors misfortune which results in unjust enrichment by the employer. The employer's only rebuttal is anyway the contractor was delayed. This cannot be considered as a fair reason for not paying the contractor. He quoted the interpretation by John Marrin QC (2003)³³ of the Malmaison approach and explained that the concurrent event with the contractor delay in the Malmaison case was neutral event

³³ John Marrin QC 2003 in his paper on Concurrent Delay stated that “The approach there (Malmaison) identified involves a recognition that any one delay or period of delay may properly, as a matter of causation, be attributed to more than one delaying event. The suggestion is that it will be sufficient for the contractor to succeed on his monetary claim if one of the delaying events is such as to afford grounds for claiming financial recompense. Likewise, it will be sufficient to afford the architect a discretionary power to grant an extension of time if one of the delaying events affords grounds for extension of time.” [emphasis added]

which made the judge to award an EOT without cost. Similarly, if the concurrent event with the contractor delay is an Employer Risk Event then the contractor should be entitled for an EOT with cost.

LEXP2 agrees that the current practice in concurrency situation is EOT without cost. However, his personal opinion is that even if a contractor delay occurs in concurrency with a Neutral Event or with an Employer Risk Event the contractor should be paid the prolongation cost as the contractor has mobilized himself at the employers site for the employers work. It is not right approach to put contractor in loss for a Neutral Event. According to LEXP2 even in the case of a Neutral Event occurring without concurrency the contractor should be entitled for the EOT with cost. Another method he suggested was to assign the responsibility of risks under concurrency in the contract which will affect the contract price.

DEXP1 agreed completely with the general principle that in case of true concurrency the contractor is only entitled to EOT (no cost), unless the damage to each party can be ascertained and quantified and then a fair and reasonable set-off takes place for the apportionment. According to DEXP1 parties entering into a contract allocate the risk responsibility in the contract. Therefore in concurrency both parties are in default. In case of concurrency with a Neutral Event, employer should be liable for only time.

DEXP2 did not agree with the general principle, however, he agreed that it is widely used in practice as methods of apportionment is complex and requires extensive time and effort, therefore costly in application. His view matches the view of LEXP1. He considers that if Employer Risk Event is involved concurrently with other events the contractor should be paid to the extent that the Contractor can successfully prove loss/expense incurred only due to the Employer Risk Event.

Q2 - DOMINANT CAUSE OR APPORTIONMENT PRINCIPLE OR BOTH

The question was in concurrency situation, which principle do you support - dominant cause principle or apportionment principle or do you believe first dominant cause has to be tested if it fails apportionment principle should apply.

LEXP1 agrees with apportionment principle only in the situation where two delays occur at different time but the effect of the delays are felt concurrently (“Concurrent-in-Effect”). In this case the costs can be separated clearly. However, in case of true concurrency, he recommends that the contractor should be paid for his loss and expense caused due to the Employer Risk Event.

LEXP2 was of the opinion that first dominant cause has to be established and if it is not possible to work out which delay event is dominant then the relief shall be awarded based on apportionment principle.

DEXP1 considers that both dominant cause and apportionment of costs are sound principles. The principle to be applied depends on the merit of the situation, time and records available and other element of the case.

DEXP2 is inclined to the apportionment principle. However, he agrees applying a dominant cause test before apportionment.

Q3 - WINDOW ANALYSIS WITH TIA FOR APPORTIONMENT

LEXP1 agreed the TIA with window analysis is one of the best methods to evaluate concurrency, resequencing, mitigation and acceleration.

LEXP2 opined that window Analysis using TIA is a good method to analyze apportionment but he was concerned that generally monthly progress updates are not available in projects and even if available they are not done proper. He suggested that

even though difficult to analyze collapsed as-built methodology may be a good option in such situation.

In the view of DEXP1 there isn't one best method, we cannot say there is a method that fits all possible situations and scenarios. It has to be studied in a case by case basis. TIA and Collapsed As-built (both performed in Windows) are good approaches and can be used. However, according to him the best approach is Contemporaneous Period Analysis as advised by the Justice Akenhead in Walter Lilly³⁴ case.

DEXP2 agreed that window analysis with TIA is most likely the best method to adopt. He do not however agree that the foregoing can be established and applied generally, this decision ought to be taken on case-to-case basis.

Q4 - CONTRACT CLAUSE FOR CONCURRENCY AND DELAY ANALYSIS METHODOLOGY

If the entitlement under a concurrency situation has to be agreed in the contract, according to LEXP1, the tender price will go up as the contractor generally delays in the beginning of the project and later recovers the delays. The risk of concurrency should be borne by the employer as he benefits by low tender price.

LEXP2 suggested that concurrency should be clearly defined in the contract with the principle method of analysis to be used in case of occurrence of a delay or concurrency. But this does not mean that the employer should include unfair clauses on concurrency in the contract. He added that standard FIDIC contracts does not recognize concurrency but only recognize employer delays and contractor delays.

³⁴ In "Walter Lilly v Mackay Tee" (2012) point 392 Justice Akenhead stated that "As a tribunal, let alone a delay expert, one has to get a handle on what was delaying the project as it went along".

According to DEXP1, there can be fair clauses in contracts to deal with the concurrency situation. However, regarding the delay analysis methodology, it should be kept open or else it will become too restrictive. The contract may provide the main principles of the adopted method so that a fact based approach can be used on what principles should be satisfied by the adopted method.

DEXP2 considers it to be great to have Contracts with provisions covering concurrent delays. As such, it shall be well drafted, precise and clear. In his experience, he has seen various attempts to cover concurrent delays in the contract, which was rather adding more confusion and ambiguity to such controversial subject. He was not in favour of specifying a particular delay analysis methodology in the contract because he considers that the cons are more than pros if we try to include the delay analysis methodology in the contracts.

Q5 - VALIDITY OF DELAY ANALYSIS METHODS IN ARBITRATION AND ESPECIALLY IN COURTS

The question was on experience of the practitioners regarding the validity of various delay analysis methodology's used in construction industry when it comes to arbitration and especially in courts.

LEXP1 explained that the approach in arbitration and courts are completely different. In arbitration the expert witness appointed by the parties are independent and they agree on a method to be adopted for the analysis. Courts in UAE generally appoint experts who may not be an expert in delay analysis. However, courts in some common law countries recognize the importance of programmes and critical path methodology and there are supporting case laws.

According to LEXP2 delay analysis methodologies are well accepted in arbitration which based on the decision of the independent experts appointed by the parties or tribunal. However, there is generally no validity for the methods used in UAE courts.

DEXP1 clarified that in arbitration experts may not use any of the standard methods of analysis but he may use a combination of methods which suits the case. In common law legal system the judges will look for case laws and if there is no case laws he can interrogate the experts.

DEXP2 explained that in arbitration delay experts are heavily used where the parties usually appoint a tribunal having relevant background to the subject matter of their dispute, then the method of delay analysis often becomes an important and critical matter. In contrary; UAE courts typically appoint experts to provide opinion on the dispute, they are not experts in delay analysis, and even if they are, courts does not allow sufficient time to exercise detailed review and give an extensive opinion on this notion. The case could be better in some common law courts, and in particular, the judgements of the Technology and Construction courts in London which are better in quality than some arbitration Awards when it comes to Delay Analysis.

V. CHAPTER 05 –CONCLUSION

a. CONCLUSION

Detailed review of concurrent delays was carried out and it was established that “True Concurrency” occurs rarely and it is important to review the delays for the dominant cause before applying apportionment principle. Legal analysis of concurrent delays was carried out by review of famous case laws related to concurrency in comparison with the principles and guidelines provided by “Society of Construction Law (SCL)” and “Association for the Advancement of Cost Engineering International (AACEI)”³⁵. The rulings by judges in recent cases support apportionment principle in case of true concurrency situation.

Even though apportionment principle requires detailed analysis and is a time consuming process it provides fair decision. Detailed review of the delay events has to be carried out for the alleged concurrency. This has to be done by analyzing the cause and effect of the delay events and has to be carried out by investigating the delays for criticality and contractual entitlement. It has to be proved that the events are independent to each other and there are no pacing delays. Once it is established that the events are concurrent a three tier process as summarized from the legal review in this document has to be applied for apportionment of liabilities and entitlements.

1. Establish the actual period of concurrency by separating the delay events by identifying literal and functional concurrency³⁶.
2. Once the concurrency period is established check for dominant cause i.e. if cause of one event is dominant over the other. If dominant cause is established the responsible party of the dominant cause is liable to compensate the other party.

³⁵ Refer Section II B of this document

³⁶ Refer Section II A (3) of this document

3. If “True Concurrency” is established, and it is not possible to decide on the dominant cause then the entitlements and liabilities of the parties should be analyzed by apportionment.

From the opinion of the experts it can be concluded that true concurrency rarely occurs and most of the time it will be possible to identify a dominant cause.

A case study was done with window analysis in combination with TIA and it was established that for retrospective analysis of delays occurred in a project, especially when delays occurred in whole of the project has to be analyzed for concurrency and apportionment of cost “window analysis with TIA” is one of the best methods to identify concurrency and for apportionment of entitlements/liabilities of parties involved. The method takes into consideration the changes to critical path under each window period and the quantification of liabilities of all aspects of delays including concurrency can be achieved easily if contemporaneous programme records of the project are available. As discussed with the experts, even though window analysis with TIA is one of the best methods of delay analysis the selection of method depends on the merits of the case.

b. LIMITATIONS

The case study on the window analysis with TIA was carried out in a single project and the success of analysis results is limited to one case study. In order to confirm on success of the methodology the method need to be applied on a number of different cases and more real-time scenarios related to pacing delays and actual apportionment cases where dominant cause cannot be proved. The limitation of this methodology is that it can be adopted only if contemporaneous programme records are available.

In order to keep the research simple and to avoid complications interviews were carried out with four experts only and as discussed in this document it was observed that all the experts have different opinion related to apportionment principle and entitlement of the parties in a concurrent situation. Even though the opinions were obtained from highly

experienced legal and delay analysis experts it is important to get more opinions to understand international practices in dealing with concurrency.

c. RECOMMENDATIONS

The law is unclear on the issue of concurrency and each case of concurrency has to be evaluated based on its own merits. It is not advisable to include clauses on concurrency in contracts as it may lead to unfair clauses and wrong interpretations by the parties due to unfamiliarity of the subject. Similarly, it is not recommended to include delay analysis methods in contracts as most of the time it leads to more cons than pros. The subject need to be handled by experts in this field.

The results of interviews with experts prove that they differ in their opinion on apportionment and evaluation of concurrency. This is because one set of experts believe that the entitlement should be based on the risk responsibility agreed in the contract or strictly depending on the general practices and the other set believes that it should be based on a fair and reasonable approach. From the research it was identified that a strict definition to deal with concurrency is not possible based on current practices and case laws related to concurrency. A more detailed qualitative and quantitative research on international practices especially taking into consideration of the decisions by US courts who are more experienced in complex concurrent delays and where the apportionment is an accepted principle²⁸ is recommended on this subject.

BIBLIOGRAPHY

BOOKS

Keane P J and Calekta A F, Delay analysis in Construction Contracts (1st edition, Blackwell Publishing Ltd, Oxford 2008)

Pickavance K, Delay and disruption in construction contracts (2nd edition, LLP, London 2000)

Gibson R, Construction Delays - Extension of time and Prolongation Claims (Taylor & Francis, London 2008)

Furst S and Ramsey, Keating on Building Contracts (7th edition, Sweet & Maxwell, London 2001)

Chappel D, Cowlin M & Dunn M, Building Law Encyclopedia (1st edition, Wiley-Blackwell, Oxford 2009)

Murdoch J and Hughes W, Construction Contracts –Law and Management (4th Edition, Taylor & Francis, London & New York 2008)

Uff J, Construction Law (10th edition, Thomson Reuters (Legal) Limited, London 2009)

Denzin NK and Lincoln YS, The SAGE Handbook of Qualitative Research (4th edition, Sage Publications Inc., California 2011)

OFFICIAL PUBLICATIONS

Association for the Advancement of Cost Engineering International (AACEI)
Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, TCM
Framework: 6.4 – Forensic Performance Assessment (25 April 2011)

Society of Construction Law (SCL), Delay and Disruption Protocol October 2002 (Oxford, October 2004 reprint)

STANDARD CONTRACTS

FIDIC, Conditions of Contract for Works of Civil Engineering Construction (Fourth Edition, 1987)

FIDIC, Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer (First Edition, 1999)

ARTICLES & ELECTRONIC SOURCES

Cocklin M, 'International Approaches to the Legal Analysis of Concurrent Delay: Is there a solution for English law?' (Society of Construction Paper number 182, April 2013)

Bailey J, 'The Society of Construction Law Delay and Disruption Protocol: A Retrospective Analysis' (Society of Construction Paper number 189, November 2014)

Moran V QC, 'Causation in Construction Law: The demise of the 'dominant cause' test?' (Society of Construction Paper number 190, November 2014)

Marrin J QC, 'Concurrent Delay' (Society of Construction Paper number 100, February 2002)

Marrin J QC, 'Concurrent Delay Revisited' (Society of Construction Paper number 179, February 2013)

Lowe RH, Barba EM and Lare GB, 'A view from across the pond: an American perspective on the SCL Delay and Disruption Protocol' http://fidic.org/sites/default/files/6%20lowe07_view_from_across_the_pond.pdf accessed on 07 November 2015

Leary DO, 'Dealing with Concurrency in Construction Delay Claims' <http://www.tamimi.com/en/magazine/law-update/section-8/april-7/dealing-with-concurrency-in-construction-delay-claims.html> accessed on 01 September 2015

Williamson A QC, 'Concurrency In Construction Delays' http://www.keatingchambers.co.uk/resources/publications/2005/aw_concurrency_construction_delays.aspx accessed 12 November 2015

Burr A, 'The consideration of critical path analysis in English law' (Construction Law Journal 2005)

Long RJ, 'Analysis on Concurrent Delay on Construction Claims' http://www.long-intl.com/articles/Long_Intl_Analysis_of_Concurrent_Delay_on_Construction_Claims.pdf accessed on 02 October 2015

Rider RJ and Long RJ, 'Analysis on Concurrent/Pacing Delays' http://www.long-intl.com/articles/Long_Intl_Analysis_of_Concurrent_Pacing_Delays.pdf accessed on 02 October 2015

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- 2 “McAlpine Humberoak Ltd v McDermott International Inc.” (1992)
- 3 “Balfour Beatty Ltd v Chestermount Properties” (1993) 32 Con LR 139
- 4 “Henry Boot Construction (UK) Ltd v Malmaison Hotel (Manchester) Ltd” (1999) 70 Con LR 32
- 5 “Royal Brompton Hospital NHS Trust v Hammond & Others” (2001) 76 Con LR 148
- 6 “City Inn Limited v. Shepherd Construction Limited” (2006) CSOH 94
- 7 “Laing Management (Scotland) Ltd v John Doyle Construction Ltd” (2004) SCLR 872 BLR 295
- 8 “Balfour Beatty Construction Ltd v The Mayor and Burgesses of the London Borough of Lambeth” (2002) EWHC 597(TCC)
- 9 “Walter Lilly v Mackay Tee” (2012) point 392

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