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Full Length Research Paper

Legal advances on evaluation of contractors' right to extension of time

***Najib E. Sali, Mahathir V. Anwar and Razif Idlan**

School of Law, Faculty of Management and Law, University of Malaya, Kuala Lumpur, Malaysia.

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Delay is acknowledged as the most common, costly, complex and risky problem encountered in construction projects. Different project scheduling and planning techniques would have different approaches of assessment of extension of time (EOT). Hence, this research aims to (a) review the legal positions in Malaysia with regards to EOT assessment and (b) evaluate the contractors 'entitlement to EOT from case studies in Malaysia. Literature study was carried out for the first objective whereas two real-case studies on different delay analysis methods were investigated later. Subsequently, three legal experts of construction claims were interviewed. The literature showed that the courts and arbitration tribunals have not generally gone into great depths for EOT assessment and delay analysis. The experts, considering the second objective, delivered a unanimous opinion that both cases were weak in terms of the entitlement for EOT due to the issue of concurrency of the delaying events and the lack of accuracy of the work programme.

Key words: Project management, legal perspective, delay, extension of time (EOT), construction.

INTRODUCTION

The risk on cost and time overrun is very high in construction project (Zavadskas et al., 2010). Delays and their resulting costs could be the most complicated contractual disputes proliferate under a building or construction contract (Goldfayl, 2004). Timely completion is crucial in evaluation of project performance (Egemen and Mohamed, 2005). Many measures have been initiated and researched to prevent or mitigate the problems. However, delays are still very common in construction projects around the world (Hegazy and Menesi, 2008).

Numerous studies have been conducted on the topic of delays and extension of time (EOT). Most of the previous studies have focused on identifying the sources, causes, or effects of delay, whereas others discuss delay-analysis methods or the delay claims, as shown in Table 1. Project delays can be produced by various causes based on the different types of projects and their origins, such as high-rise projects in Thailand (Ogunlana and Promkuntong, 1996), public projects (Al-Momani, 2000) and residential projects (Sweis et al., 2008) in Jordan, infrastructure projects in Ghana (Frimpong et al., 2003), residential projects in Kuwait (Koushki et al., 2005) large construction projects in Saudi Arabia (Assaf and Al-Hejji, 2006) and general building projects in Egypt (El-Razek et al., 2008). Usually, the findings are very significant particularly for individual projects and their countries.

Besides, previous studies have also successfully addressed many issues regarding limitations and improvements of the delay analysis methodologies. In addition, delay-analysis methods have been developed over the years; yet, no single methodology is universally acceptable for any given claim situations (Braimah and Ndekugri, 2009). Moreover, there is a lack of real case studies on the issue of assessment of delay claims. Therefore, this research utilized two case studies involving the assessment of EOT. Legal views are sought to achieve the research objectives, which is a different

*Corresponding author. E-mail: najib222@yahoo.co.uk

Table 1. Previous studies on delays – sorted according to years.

Research	Areas	Scope of study
Ogunlana and Promkuntong (1996)	Causes of delay	High-rise building projects, Thailand
Kartam (1999)	Delay claims	Generic methodology on delay claims
Al-Momani (2000)	Causes of delay	Public projects, Jordan
Frimpong et al. (2003)	Causes of delay	Groundwater construction projects, Ghana
Kumaraswamy and Yogeswaran (2001)	Delay claims	Substantiation and assessment of delay claims, Hong Kong
Aibinu and Jagboro (2002)	Effects of delay	Building projects, Nigeria
Hegab and Nassar (2005)	Delay claims	Decision tree for delay claims
Kim et al. (2005)	Delay analysis method	DAMUDS method
Koushki et al. (2005)	Causes of delay and cost overrun	Private residential projects, Kuwait
Arditi and Pattanakitchamroon (2006)	Delay analysis methods	As-planned vs. as-built, impact as-planned, collapsed as-built, and time impact analysis methods
Assaf and Al-Hejji (2006)	Causes of delay	Large construction projects, Saudi Arabia
Faridi and El-Sayegh (2006)	Causes of delay	UAE contractors and consultants
Farrow (2007)	Delay analysis methods	Empirical study on delay analysis methodology
Sambasivan and Soon (2007)	Causes and effects of delay	Malaysian clients, consultants and contractors
Braimah and Ndekugri (2008)	Delay analysis method	Selection factors of delay analysis methodologies
El-Razek et al. (2008)	Causes of delay	Building projects, Egypt
Hegazy and Menesi (2008)	Delay analysis method	Improved version on Window analysis method
Iyer et al. (2008)	Delay Claims	Expert system on time delay and extension, India
Sweis et al. (2008)	Causes of delay	Residential projects, Jordan
Kaliba et al. (2009)	Causes and effects of delay and cost escalation	Road construction projects, Zambia
Kao and Yang (2009)	Delay analysis methods	Windows-based delay analysis methods
Braimah and Ndekugri (2009)	Delay analysis methods	Consultants' perceptions, UK

perspective to the previous studies. Ultimately, the research outcomes would render a practical sense of reference for the entitlement of EOT.

Delays and extension of time (EOT)

Assaf and Al-Hejji (2006) define construction delays as time overrun either beyond the completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project. It defines the criticality of the delay in the completion of the overall project and its impact thereafter.

From a legal viewpoint, delays have been discussed in different ways and perspectives. For instance, it was observed in the English case of Ascon Contracting Limited versus Alfred Mc Alpine Construction Isle of Man Limited (1999) that "delay" tends to bandied about as if it were a term of art with a precise technical meaning, but nothing demonstrates that this is the case. First, the word "delay" certainly can be used as a verb meaning to make something happen at a later time than planned or expected, such as "the delivery was delayed by a week", or to cause someone or something to be slow or late as in "the work will be delayed by the subcontractor" or it can be used to mean that there was a failure to act immediately, as in "if you delay now, the work will not be finished on time". Secondly, the word "delay" can be used as a noun, for example, "there will be a delay to the completion of the contract", or "there has been a delay in the roofing". It can also be used as an adjective, as in the "most delayed contracts are the result of the absence of competent management of change". It is understood from the passage that the word "delay" used in different context means different things.

Nevertheless, all delays can be categorized into three

categories, that is, those caused by the contractor, those caused by the employer or his representatives or those caused by events outside the control of both the contractor and the employer (Hackett et al., 2007). Delays could also be classified as “critical delays” and “non-critical delays”. In certain situations, the project might have a concurrent delay or ‘‘concurrent effect’’, where two or more delay events arising at different times, however, the effect of the events are felt at the same time as described in the SCL Delay and Disruption Protocol by Society of Construction Law (2002).

In summary, EOT is equally important for all the contracting parties. To contractors, a successful claim for EOT would absolve them from having to pay liquidated damages and to complete the project within the extended period. To the employer, it would prevent time from being rendered “at large”, that is, where the contractor needs only to complete the project within a reasonable time.

Legal position on the assessment of EOT

Contract provisions

Various standard forms of contract have elaborate provisions to deal with time, particularly on delay and EOT. However, most standard forms either fail to address the issue adequately or do not consider it at all. It is because EOT clauses in construction contracts are not prescriptive and are drafted in a general manner (Farrow, 2007). The provision on EOT is described as essential but insufficient for the contract to make a legal decision (Mitkus and Trinkūnienė, 2006).

Nevertheless, most standard forms of contract provide certain provisions for the assessment of delay based on a review of several local contract forms. The provisions are procedural-oriented for the contractor. Generally, it can be ascertained that the initiative for taking action under the relevant EOT clauses will begin from the contractor when he realizes that the progress of the works is delayed. The contractor is not required to give notice of delay that will be caused by some unexpected future event. He has only to give notice when it becomes apparent to him that the progress of the works is delayed.

On receipt of the contractor’s notice or more usually the application for EOT from the contractor, the contract administrator must decide whether the cause(s) of delay specified by the contractor falls within the stipulated and prescribed delay events. If the contract administrator is of the view that they do not so fall, no EOT will be granted. On the other hand, if the contract administrator concludes that the cause(s) of delay is within the scope and ambit stipulated and prescribed delay events, he/she must decide whether completion of the works is likely or has been delayed beyond the current completion date. When the contract administrator decides that the delaying cause(s) either has delayed completion or is expected to result in failure to complete the project on time, he/she must then put in writing a “fair and reasonable” EOT for completion of the works.

However, these standard forms contain no express provisions and contain no guidance at all about the basis on which the contract administrator should award the EOT, if he/she decides to award one. They all contain the similar provisions, stating that the “contractor shall be entitled to an extension of time if and to the extent that the completion date is or will be delayed…”, the contract administrator has to determine a “fair and reasonable” EOT. The use of such vague expression gives rise to potential disputes.

The significance of this requirement, however, is that if the delay events do not fall within the clause but are caused by prevention or default on the part of the employer, then the time for completion will be set at large and the contractor would then only be obliged to complete within a reasonable time as decided in the case of Thamesa Designs Sdn Bhd versus Kuching Hotels Sdn. Bhd. (1993). The practical difference with this mode of EOT is that if time is found at large, the employer loses his/her rights to liquidated damages but can still recover general damages for delay, as proved.

However, it must always be borne in mind that the contractor’s entitlement to a fair and reasonable EOT is subject to the dual proviso that the contractor must have constantly used his best endeavours to prevent delay and to do all that may reasonably be required to the satisfaction of the contract administrator to proceed with the Works.

Current legal position

It is apparent that the assessment of a fair and reasonable EOT is not a simple exercise. The entitlement to EOT or a reasonable period of time to complete the affected works is a mixed issue of fact and law. In the assessment of a fair and reasonable EOT, it has been held in the English case of John Barker Construction Limited versus London Portman Hotel Limited (1996) in England, it has been held that it has to be a logical analysis in a methodical manner of the impact that the relevant matters have or are likely to have on the contractor’s planned programme. The court further stipulated that:

a) The assessment must be based on whether the delaying events are on the critical path;
b) Whether they have affected the critical activities scheduled to be performed in the contract; and
c) Calculate rather than make an impressionistic assessment of the time taken up by the delaying events.

In other words, the “extension” is flawed if the contract administrator makes an impressionistic rather than a

calculated assessment bearing no logical or reasonable relation to the delay caused.

The effect of the cause of delay on completion is to be assessed at the time when the works have actually been carried out and not when the works were programmed to be carried out. The English Court of Appeal case of Walter Lawrence and Son Limited versus Commercial Union Properties (UK) Limited (1986) was held to be so even though the contractor was in culpable delay, that is, the contractor was already behind the programme through his own fault when exceptionally weather caused further delay.

In Balfour Beatty Buildings Limited versus Chestermount Properties (1993), it was held that where a contractor is in culpable delay because the completion date has lapsed but practical completion had not been achieved, the architect must still grant EOT if a relevant event occurs in the period of culpable delay and if there is not a difficulty that would prevent an EOT producing a new completion date, which considering the existing delays, was a date prior to the occurrence of the relevant event. In other words, the architect is simply required to add on the extra time caused by this relevant event to the completion date or extended date previously granted.

The subject of concurrent delay is an issue that poses major problems to contract administrators. The legal position is accurately and succinctly summarised in the case of Henry Boot Construction (UK) Limited versus Malmaison Hotel (Manchester) Limited (1999). The case addresses the issue of the concurrent effect contributed by two equally competing causes, such as for example, where the Developer/Owner has delayed the work in relation to the delayed essential construction information, facilities, material and equipment such as temporary prop details, marine equipment, tower crane, man hoist, etc and at the same time it is also possible that the contractor is in culpable delay that is, the contractor's inability to hire and maintain competent staff and workers. An approach to dealing with this conundrum was addressed by Dyson J wherein His Lordship observed as follows:

"Secondly, it is agreed 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 a site for a week not only because of exceptionally inclement weather (a relevant event) but also because the contractor has a shortage labour (not a relevant event), and if the failure to work during that week is likely to delay the works beyond 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" Malmaison was considered and further supported by His Honour Judge Seymour Q.C (in a judgement later referred to by the English Court of Appeal as exemplary) in the case of Royal Brompton Hospital NHS Trust versus Hammond (2001) wherein it was observed that:

"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 light of the authorities to which I have referred, it would be entitled to extensions of time by reason of the occurrence of the Relevant Events notwithstanding its own defaults."

Furthermore, in the event that it is impossible to separate the delays caused by the developer/owner from those due to the contractor's own fault, then the position in law is that the contractor must be given the benefit of the doubt with reference to EOT (Peak Construction (Liverpool) Limited versus Mc Kinney Foundations Limited, 1970; Rapid Building Group Limited versus Ealing Family Housing Association Limited, 1984).

Clearly, the claimant under the aforesaid standard forms of contract is under the legal and evidential burden of proving the nexus between the alleged delaying event or the cause, and the delay to completion, or the effect.

In other words, the contractor is required to prove the cause and effect. In delay analysis, the problem of causation is related to identifying the occurrence that caused the delay to progress that caused the delay to one or more completion dates (Pickavance, 2005). Strict proof of causation is required in relation to entitlement to an extension of time as provided for in the case of Kinetic Builders Inc, ASBCA Nos 51012 and 51611 (1999) in which the Board of Contract Appeals said:

"In the initial decision, we denied the portion of the appeal [an extension of time and prolongation costs] on the basis that 'there is not a preponderance of evidence that the time taken by the developer (D) to resolve the defective bathroom layout caused an increase in the time required for completion of the contract'. The contractor (C) contends that this finding is erroneous. The contention is without merit. The same is based on data from C's contract progress schedule and its weekly contract progress reports showing that from 15 August 1995 to 20 November 1995, progress in the completion of the entire contract has slipped from 4.2% ahead of schedule to 5.8% behind schedule. From that data alone, C concludes that its progress had been negatively affected by the defective design'. That conclusion requires a causal connection between the design defect and the slowing of the progress rate. None has been shown.

C contends, alternatively, that it 'is at least entitled to a time extension to restart and complete the dry wall work which was delayed' while waiting for a modification to correct the design defect. C, however, has not shown that the design defect delayed or prevented any dry wall work.

Table 2. Background of experts.

Expert	Descriptions
Expert A (45 years of working experience)	Expert A had appeared in several major cases in the Court of Appeal and the Privy Council. He is a Fellow of the Chartered Institute of Arbitrators, United Kingdom, as well as Malaysian Institute of Arbitrators. Expert A's fields of practice include: the legal drafting and advice for oil and gas industry, construction law, commercial litigation, arbitration and the like
Expert B (32 years of working experience)	Expert B started his career as an Engineer in the power industry for about 10 years before he retrained in law and started his legal career. He had appeared as counsel in the Court of Appeal and the Federal Court. He also sits as arbitrator in international and domestic arbitrations. He had provided comments on draft standard conditions of contracts for construction works and consultancy agreements of construction projects
Expert C (29 years of working experience)	Expert C has 29 years of professional experience with emphasis in the contractual and commercial aspects of building and civil engineering projects. Besides, he actively involves in pre and post contract administration, commercial and contractual management, risk analysis of contract, final accounts, contractual claims and disputes management

Indeed, the record shows that there was dry wall installation and other work elsewhere in the building that could have been, but was not accomplished by C while a solution to the design defect was awaited."

In conclusion, the Courts in the UK have adopted the view that for it to be a desired method of approach, in Balfour Beatty versus Lambeth LBC (2002) the court observed that "the foundation must be the original programme (if capable of justification) and substantiation to show its validity and reliability as a contractual starting point) 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."

However, it must be borne in mind that the courts have not generally gone to any great depths to determine which method of proof is acceptable under particular circumstances or, when a method of analysis has not been accepted, the reasons for its rejection. There is still no definitive judicial ruling concerning the method with which to assess delay and there is a general lack of certainty in this aspect.

METHODOLOGY

Literature review was carried out regarding assessment of delay and EOT. Subsequently, primary data were collected involving two case studies using different delay-analysis methods, that is, as-planned versus as-built; and time-impact analysis after obtaining the permission from the relevant parties, the data collected were solely for academic purposes and treated in full confidentiality. The documents for the EOT application were reviewed. Then, the data were recorded and gathered using document analysis method (from texts) (Fellows and Liu, 2003) and observation with note-taking and sketches (Tan, 2008).

Next, three (3) well-known experts were appointed for this research based on their qualifications and experience and expertise in the construction industry. Table 2 shows the background of the experts. The contractors' EOT applications were explained and handed over to the experts. They were asked to assess and comment on the case studies. Four main areas were asked during the semi-structured interview, that is, appropriateness of delay analysis method, commentary on the delay analysis method, discussion on delaying events and overall remarks. Consequently, the data collected from the interview were analysed and summarized using content analysis. Finally, discussion and conclusions were drawn.

RESULTS AND ANALYSIS

Project A

Project A is a civil engineering work. It is to extend an existing plant for the storage of granular area. The owner planned to increase their bulk storage capacity. The original contract duration stipulated in the Letter of Award was 12 months.

However, during the execution of the Works, disputes arose and several principal delay events were encountered by the contractor for which it claimed it was not responsible. The disputes primarily stem from the substantial quantity of rock discovered and a series of slopes failures which had resulted in considerable delay and disruption to the contractor. The contractor claimed that he needed about a year of EOT to complete the project.

An EOT application was submitted by the contractor to the owner wherein the various principal delaying events and its impacts to the claimant's work programme

was presented. The delaying events outlined by the contractor were as follows:

a) Late instruction to commence rock excavation – The instruction to commence rock excavation was only issued by the owner one month after discovery of rock. The agreed works programme envisaged earthworks in rock-free environment. The eventual quantity of rock which the contractor encountered was 40% of the total volume of excavation quantity for hill cutting and trimming.

b) Occurrence of landslide No. 1 – The landslide occurred at the 1st platform of hill slope. The contractor claimed that the landslide had prevented him from cutting the hill to form the slope. The situation was worsened with the further caused by the owner's late issuance of the requisite instruction to carry out the landslide remedial works.

c) Rock excavation for the foundation works of rooms A and B. The delay was attributed to the slow processes of excavation and trimming of rock strata to the specified formation level.

d) Rock excavation for the foundation works of the extended building - The contractor alleged that he could not proceed with any works at the location where the existing Room C was situated because the demolition of the same to facilitate the construction of the foundation and execution of ensuing works was delayed.

e) Late commissioning of rooms A and B and delayed instruction to demolish existing room C - It was alleged that the contractor's progress of works was affected as the owner had delayed the necessary piping, tie-in and commissioning works.

f) Occurrence of landslide No. 2 and 3 - In the course of the project, two other landslides had occurred. It was only nearly 2 months after the contractor's notification, and subsequently, the owner instructed the contractor to remove the failed material to facilitate the construction. It was alleged that the owner failed to issue any instructions relating to permanent slope stabilisation measures to be undertaken on the failed slopes.

g) Delay caused by the nominated sub-contractor's roofing and cladding works – It was alleged that the nominated sub-contractor failed to commence and complete the roofing and cladding works over duration of 2 months. One of the workers employed by the sub-contractor had a fatal accident while installing the roof covering and a stop work order was issued.

The contractor's EOT application was explained to and discussed with the experts. The following is the summary of the content analysis from the corresponding interviews.

Appropriateness of delay analysis method

The contractor had adopted the as planned versus as-built method in this case study. All the experts opined that the method was the best approach in support of the EOT claim since the work programmes were poorly updated and tracked.

Commentary on the delay analysis method

However, when asked as to the adequacy of this method as proof of entitlement, the experts pointed out that there are a number of conditions that have to be satisfied before this claim can reasonably be considered to be an adequate proof of entitlement. Without further analysis or rationalization the method of proof is satisfactory only if either:

a) 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 clearly identified; or

b) There are no such contingencies in the planned programme and the only contingency in the built programme is the discrete event, the effect of which is to be identified.

Discussion on delaying events

Because of the inherent limitations as highlighted, the experts commented that this method is rarely used as a method of deductive proof in complex construction claims. To prove their point, the experts had highlighted the following:

a) The additional works caused by the rock excavation for rooms A and B would undoubtedly cause further delay and disruption to the contractor's works. However, the delay caused by this event was operating concurrently with the delay caused by rock excavation in both hillside cutting and trimming and foundation excavation works have rendered the assessment of this event of delay unnecessary as far as EOT is concerned due to its concurrent nature. As such the delay and disruption caused by this delay event was not accounted for in the computation of EOT.

b) The concurrent issue also holds for the owner's late commissioning of rooms A and B and the delayed instruction to demolish the then-existing room C. The delay events were operating concurrently with the delay caused by the rock-breaking process during (1) hillside cutting and trimming and (2) rock excavation for the foundation works of the extended building. Hence, the delay and disruption caused by this delay event was not accounted for in the computation of EOT.

c) Similarity, the delay caused by Landslide No. 2 and 3 was operating concurrently with other delay events. So, it was not accounted for in the computation of EOT.

In addition, the experts also commented that this delay analysis method applies the critical path analysis method

and able to compute the effects of some concurrent delays that are all on the critical path, however, it cannot ascertain the precise calculation of each delay's contribution to the extension of the project duration.

Overall remarks on Project A

In summary, the experts concluded that the additional one year as EOT claimed by the contractor is not sustainable because the concurrency of the delaying events was not taken into account.

Project B

Project B is an infrastructure work. The contractor had alleged that the occurrences of certain events during the course of carrying out the project had caused delay to the progress and completion of the said project and hence contended that he was entitled to a fair and reasonable EOT. The delaying events are:

a) Spalling of 2 segments of the bridge - It was alleged that due to the spalling of the segments and the ensuing remedial works had critically delayed the execution and completion of the works at the spans and subsequent works on the critical path. It caused delays in completion of the project.

b) Non-availability of segments for ramp bifurcation - The contractor had contended that the non-availability of segments for ramp bifurcation had critically delayed the completion of the project.

c) Construction of cantilever segments - The contractor had contended that due to wrong segment geometry, instruction by the contract administrator to cease work, additional survey and checking works coupled with additional corrective site measures had caused disturbance and consequent delay in progress of construction of the cantilever segments.

Appropriateness of delay analysis method

The experts commented that the time impact analysis adopted here has significant merit making it probably the most reliable technique. It is because the approach evaluates the effects of delay by chronologically starting with the first delay event and then incorporating each delay into an updated baseline schedule that represents the actual status of the delay in the project.

Commentary on the delay analysis method

Besides, the experts highlighted that doubts were cast as to the programme logical links and in the estimated duration of construction activities. This is important to determine the appropriateness of the original plan for later delay analysis. The original plan has to be realistic and reasonable for it to be appropriately used for delay analysis. The concern of the experts was that any intentional error can be inserted to obtain an advantage for potential delay.

Discussion on delaying events

The experts also observed that the contractor had not sanctioned Sunday as a non-working day in the work programme. However, based on the contractor's daily work progress report, it appears that, generally no work was carried out on Sunday. In this context, it appeared that the contractor's programme does not accurately reflect the actual work input in relation to the sanctioned works.

The experts also noted that the programme assumed limitless availability of resources and remarked that this assumption is not valid. This is especially so, when in every project, clearly there exist definite limits on the amount of resources available and these resources are shared by a number of activities or even projects.

They remarked that even noncritical activities, that is, activities that have positive float can still be "resource-critical" because the project duration will be delayed if resource-critical activities fail to release resources that are required by critical activities on time. The failure by the contractor to consider the resource capabilities and availability has caused an unrealistic portrayal of the actual situation on site.

Overall remarks on Project B

In conclusion, by the unanimous opinions, the experts opined that the contractor is not entitled to the EOT request because doubts were cast on the accuracy of the contractor's programme, which did not accurately reflect its actual work input in relation to the works, in addition to the unrealistic assumption of limitless resources implied in the schedule of works.

DISCUSSION

The research highlighted two different scenarios for the case studies. For instance, the experts gave a detailed explanation and their viewpoints regarding the delaying events in Project A; whereas, there are scanty inputs regarding the delaying events that happened in Project B. This is probably caused by the lack of familiarity and the technical knowledge needed regarding the background of the projects. Hence, these limitations need to be addressed. More case studies need to be explored and

selected appropriately, whereas, experts with different backgrounds may need to be involved when considering a more thorough investigation and comprehensive perspective on EOT assessment.

Nevertheless, important lessons were drawn from this research, and a generic guideline for EOT claim was proposed for contractors. In general, the contractors should be able to prove the following:

a) All the delays in progress are excusable delays;

b) The events producing the delay can be clearly identified;

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

d) There are no concurrent or parallel delays (if any, it should be well defined);

e) There is no acceleration, which is claimed for speeding up of progress;

f) The durations of the various activities and availability of the applicable resources have been accurately calculated; and

g) The completion of each activity is a prerequisite for the commencement of its successor.

Apart from these, construction contracts do not require the contactor to produce delay claims by any delay analysis method. In any event, the private nature of resolving construction disputes regarding delay claims do not encourage development of the techniques available. Therefore, it is recommended that the standard form of contracts should provide a more comprehensive contractual provision regarding the delay analysis and EOT claims. The rules and procedures would be abiding on the contracting parties. In the meantime, execution of proper or advanced scheduling methods is needed (Rogalska and Hejducki, 2007; Lucko, 2008; Abido and Elazouni, 2010) to liaise with the principles of the delay-analysis methods, thereby preventing or mitigating disputes.

Conclusions

The legal perspective on EOT assessment revealed that there is still no definitive judicial ruling regarding the method by which to assess delay. The contractors' entitlements to EOT were evaluated from the case studies. Both cases had weaknesses with regards to their EOT claims. It is not doubted that delay claims characterize as the most complex and litigious issues in construction projects, even though the practitioners aware of the various delay analysis methods and their methodologies. It is concluded that the entitlement to EOT is not simply a matter of preparing a list of the delaying events in a project; rather, the contractor must prove both how the listed events caused the so-called delay or impact and the corresponding duration of disruption of a valid critical path.

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