THE FEASIBLE USE OF THE UK DELAY AND DISRUPTION PROTOCOL IN MALAYSIAN CONSTRUCTION INDUSTRY

By

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Dedicated To my beloved Family and friends

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LIST OF ABBREVIATIONS

CA	Contract Administrator
CIDB	Construction Industry Development Board
EOT	Extension of Time
ICE	Institution of Civil Engineers
IEM	Institution of Engineers Malaysia
JCT	Joints Contract Tribunal
PAM	Pertubuhan Arkitek Malaysia
PWD	Public Works Department
UK	United Kingdom

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Delay and Disruption Protocol was published in October 2002 by the Society of Construction Law, United Kingdom. The purpose of the protocol is to provide a means by which the parties can resolve these matters and avoid unnecessary disputes. It also provides the useful guidance on common issues that arise in relation to construction contracts. The guidance intends to be generally applicable to any contract that provide for the management of delay and disruption.

Knowles (2002) stated that the protocol to able to answer some of the common issues that arise on construction contracts which one party wishes to recover from the other an extension of time and or compensation for additional time spent and resources used to complete the project. The intention is to provide a material to be referred in avoiding unnecessary disputes.

Based on the comment of Robinson (2004), the protocol has been designed as a code of good practice to be used before a contract is entered into and during the administration of the contract, including for assessing claims and resolving disputes. The scheme provided by the protocol for dealing with delay and disruption issues is intended to be balanced and viable. He further

highlighted that the protocol recommends the parties to consider and agree on various procedures and entitlements while drafting a contract to remove uncertainty and potential for a dispute at a later stage. During the construction period, the protocol provides guidance on how to deal with claims for delay and disruption this being one of the most common areas of claim and dispute in construction contracts (Rochester and Robertson, 2003). However, Brown (2005) stated that the protocol was originally intended to provide guidance only on delay and disruption claims and was not to be adopted as a contractual document nor treated as a statement of the current law. This argument needs to be investigated and resolved through the views and acceptance of the protocol from the local construction industry.

1.2 Problem Statement

Delay in construction is a global phenomenon (Murali and Yau, 2006). For example, in Saudi Arabia, Assaf and Al-Hejji (2006) found that only 30% of construction projects were completed within the scheduled completion dates and that the average time overrun was between 10% and 30 %. Furthermore, Fugar and Agyakwah (2010) stated that construction delay is a major problem facing the Ghanaian construction industry. Aibinu and Jagboro (2002) also mentioned that the construction delay has become endemic in Nigerian. It is imperative to create awareness to extent in which delays can adversely affect project delivery.

However, the construction sector in Malaysia, as a fast developing country in South-East Asia has not escaped from the delay problems. About 17.3% out of 417 government contract projects in Malaysia were considered sick, which the sick was defined as more than 3 month of delay or abandoned. (Murali and Yau, 2006).The construction sector is one of the important sectors that contribute to Malaysia's economic growth, such as the GDP contribution of 1.1%, 4.5% and 7.9% in the first quarter, second quarter and third quarter in 2009 (Ng, 2010).

Under the standard form of contract used in Malaysian construction industry, none of them provides the details guidance for the delay issues. For example, under the Clause 23.0 in Pertubuhan Arkitek Malaysia (PAM) Contract 2006, Clause 24.0 in Construction Industry Development Board (CIDB), Clause 43.0 Public Works Department (PWD) 203A form (Rev.2007), Clause 43 and 44 in Institution of Engineers, Malaysia Form of Contract for Civil Engineering Works (IEM.CE) 2011, they only stated the general procedures and entitlement for EOT but never provide the details guidance on the assessment of EOT. These may cause the parties certain contractual disagreements, when they are handling the problem of delay. The use of express extension of time clause are basically for the advantage of the employer rather than the contractor, as such clauses preserve the employer's right to impose liquidated and ascertained damages under the contract (Harbins Singh, 2007). Thus, it is necessary for a construction industry have a proper guidance for the delay issues to both parties.

Delays adversely impact on project stakeholders including owners, design professionals, construction professionals, users and others (Faridi and El-sayegh, 2006). They also mentioned that delays result in extension of project time, which leads to extra overheads that increase the cost. Delay problems not only cause significant financial losses to contractors but they also expose employers to serious financial and economic risks such as high interest rates and loss of market opportunities. For these reasons, proper assignment of the risks involved and quantifying project delays are critical to the resolution of claims and disputes over extensions of time and time related cost (Nuhu and Issaka, 2008). Murali and Yau (2006) identified six main effects of delay in Malaysia construction project, such as: time overrun, cost overrun, disputes, arbitration, litigation, and total abandonment.

As a result, project delay is a serious problem that may cause negative effect but why Malaysia does not have the delay protocol to provide the guidance to our local construction industry and minimize the problem of delay since the existing contract provisions are too generic in nature to solve the disruption problems? This research then is to find out the feasible use of UK Protocol delay and disruption in Malaysia construction industry.

1.3 Research Aim

This research aims to investigate the feasible use of UK delay and disruption Protocol in Malaysian construction industry.

1.4 Research Objectives

The objectives of this research are:

1. To critically review the similarities and differences of the UK delay and disruption Protocol through the existing references in contract forms detailed literature study that available in Malaysia.
2. To examine the feasibility of the UK delay and disruption Protocol to be used in Malaysia construction industry.

1.5 Research Scope

This research focuses on the commonly used standard forms of contract in Malaysia namely the PWD 203A (Rev. 2007), CIDB 2000 form, PAM 2006, and the IEM.CE 2011 form of contract. The area of research was conducted within Klang Valley due to its strategic location in Malaysia.

1.6 Significance of Study

The significant of this study is to determine the similarities and differences of the Delay and Disruption Protocol in UK with Malaysian construction contract. It would provide a better understanding and concept for further research and development, for example the gaps that would be exist and rooms for improvement in local scenario. Subsequently, we also can determine the feasibility to use the UK Protocol delay and disruption to our local construction industry.

Basically the standard contract form is the only method to refer and solve the problem of delay in Malaysian construction industry. However, the guidance and recommendation of the Delay and Disruption Protocol UK is a very useful for a construction industry. Therefore, this significance of research is to incorporate certain principle of the protocol into Malaysian construction contracts for prevention or to overcome delay issues or conflicts in the construction industry.

1.7 Research Methodology

The primary data source of this research was collected through interviews and questionnaire survey. The interviews were undertaken by one-to-one basis to validate the contents and structure of the questionnaire before sending it out to respondents. The personnel involved in contract

administration were selected from three industry stakeholders, such as developer, contractor and consultant.

The secondary data sources consisted of the forms of articles, journals, magazines, books and sources from the internet. The information can be obtained from Universiti Tunku Abdul Rahman (UTAR) Library, National Library and etc.

Figure 1.1 illustrates the overall research flow that was carried out in this research.

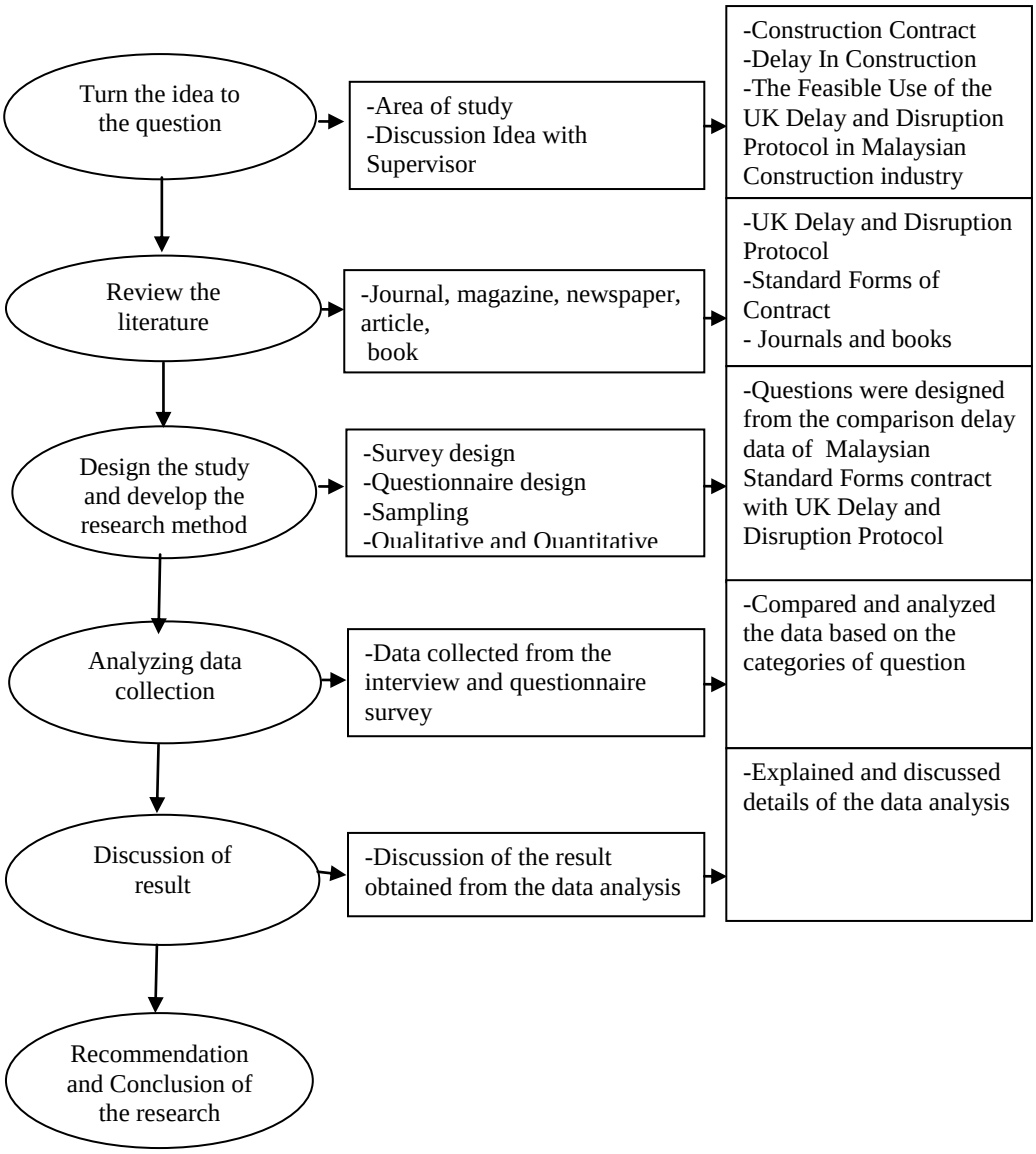

Figure 1.1: Research flow chart

1.8 Research Structure

This research consists of 5 chapters, which are:

1.8.1 Chapter 1: Introduction

This chapter is a brief introduction about the research topic consisting of background of study, problem statement, aim, research objectives, research scope, significant of study, brief research methodology and research structure.

1.8.2 Chapter 2: Literature Review

(i) Critical Review of UK Delay and Disruption Protocol

This chapter discusses on the UK delay and disruption Protocol which included the Extension of time, concurrent delay and other relevant details. The related data and information were gathered from UK delay and disruption Protocol, journals, articles, books, magazines, and some reliable internet sources.

(ii) Critically Review of Malaysian construction Delay and Disruption

This subsequent section discusses the Malaysian construction delay and disruption which included the Extension of time, concurrent delay and other relevant details.

(iii) Comparison of Malaysian Construction Delay and Disruption and UK Delay and Disruption Protocol.

The comparison method has been applied to find out the similarity and differences of the Malaysian and UK delay and disruption, it then summarises and presents in a table.

1.8.3 Chapter 3: Research Methodology

This chapter discusses the research approaches adopted in this research. It consists of data collection, research design, questionnaire design and analysis methods.

1.8.4 Chapter 4: Result and Analysis

This chapter discusses about the results and findings from the survey conducted. Statically analysis methods have been used to analyze the data collected.

1.8.5 Chapter 5: Conclusion and Recommendation

This chapter discusses the conclusion and recommendation of the research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter would discuss the delay and disruption issue from the UK delay protocol and Malaysian standard forms of contract. Subsequently the comparison method has been applied to find out the similarity and differences of the Malaysian and UK delay and disruption.

2.2 Critical Review of UK Delay and Disruption Protocol

This chapter explains the Protocol's on core principles relating to delay and disruption. The following restates the core statement of principle from the Protocol and then explain or expand on them.

2.2.1 Extension of Time

The main benefit of EOT for the contractor is to relieve the liability for damages for delay of the Contractor, for example, liquidated damages. Further, it also establishes a new contractual date of completion and prevents time for completion 'at large'. Nabarro and Jonathan (2009) stated that the key purpose of an EOT mechanism is twofold, namely: (i) to confront the prevention principle head-on by providing a basis for extending time in the event that a

delay occurs which is the responsibility of the employer and in doing so protects the employer's right to liquidated damages; and (ii) to reallocate risks to the employer which would otherwise be the responsibility of the contractor.

However, it is wrongly said that an entitlement to an EOT automatically carries with entitlement to compensation for prolongation costs.

The granting of an Extension of Time does not automatically lead to entitlement to compensation. Once it has been established that compensation for a prolongation is due, the evaluation of the amount compensable is made by reference to the period when the effect of the Crown-caused delay occurred.

2.2.2 Entitlement of Extension of Time

Application for EOT should be made as soon as possible to the delay events that give rise to the application. If the Employer has assumed risk and responsibility for the related events or causes of delay, then the Contractor will potentially be entitled to an EOT. The involve parties should attempt so far as possible to deal with the impact of Employer Risk Events as the work proceeds for EOT and compensation. Further, after the delay event occurs and in any event not later than one month and the application has been received by the Contract Administrator, the EOT application should be assessed as soon as possible.

If there is remaining float in the programme at the time of an Employer Risk Event, an EOT should only be granted to the Employer Delay is predicted to reduce to below zero the total float on the activity paths affected by the Employer Delay.

2.2.3 Application for EOT should be made and dealt with as close in time as possible to the delay event that gives rise to the application.

In some standard forms, Contractor should give notice to the Contract Administrator as soon as an Employer Risk Event occurs and these notices are expressed to be conditions precedent to entitlement. Then, the Contract Administrator should also notify the Contractor as early as possible of any Employer Delays of which it is aware.

Each EOT application should be assessed as soon as possible after the event occurs and not later than one month after the Contract Administrator received the application. Then, the Contract Administrator should bear in mind that it is permissible to deal with EOT incrementally.

Furthermore, a competently drafted construction contract should allow the Contract Administrator to determine an EOT even the Contractor has not applied or has applied with insufficient information. A properly drafted EOT clause should contain the EOT to be granted in respect of acts of prevention or breach of contract by employer. However, the process of granted EOT due to Employer Risk Event requires consideration of the available float.

Additionally, if the Contractor is entitled to an EOT, the Contract Administrator should not wait and see if the Contractor actually needs the EOT, in order Contractor not to be liable for liquidated damages.

2.2.4 Float

Float is the amount of time for activities may be shifted in time without causing delay to a contract completion date. Float also can describe as time available for an activity in addition to its planned duration. Generally there have two types of float, there are free float and total float. Free float is the amount of time that an activity can be delayed beyond its early start/early finishes dates without delaying the early start or early finish of any immediately following activity. Total float is the amount of time that an activity may be delayed beyond its early start/early finishes dates without delaying the contract completion date.

Larkin (2007) mentioned that float is the time available for an activity or path in addition to its duration. The critical path is the series of activities with least float. There are several types of float. There is an activity float, often called free float, which is the time available to an individual activity without it affecting its succeeding activity. Another is project float, which is the time available to the critical path where it ends before the contractual date for completion.

2.2.5 Ownership of Float

Ownership of float often causes the arguments in dispute over entitlement to EOT. A Contractor may argue that he owns the float because in planning how to carry out the works and he has allowed additional or float time to prevent if it is not able to carry out the works as planning.

On the other hand, employer also may say that the Contractor has no contractual remedy for being prevented from completing the works at any time prior to the contract completion date and therefore the Contractor is not entitled to an EOT unless the delay to progress will result in a contract completion date being missed. So the Employer may say the project owns the float.

Larkin (2007) also provided three different views as to who is entitled to use the float. Contractors argue that only they are entitled to use the float as it is their programme and they are entitled to plan and carry out the works as they think fit. Employers claim that since they are paying the contractor the price of carrying out the works to the contractor's preference then only the employer should be entitled to use the float. The third view is that neither party exclusively owns the float and that it is available to whoever uses it first.

Peters (2003) mentioned that the float ownership concept is fundamental to the analysis of project delay and the allocation of responsibility when there is concurrent delay. Both Owner and Contractor

want access to the float in the schedule because it affords them more flexibility in their decision making and use of resources. However, many contracts do not address this important topic. As a result, neither the Owner nor Contractor has a contractual right to use the float.

If the contract is silent regarding float ownership, the Contractor will likely attempt to maximize the delay calculation by quantifying project delay using the early start and finish dates. The Owner, on the other hand, will likely attempt to minimize the delay calculation by claiming the float and quantifying project delay using the late start and finish dates. To avoid this controversy, many Owners have recognized the importance of clarifying the ownership of float in their contracts.

2.2.6 Concurrency as it relates to extension of time

Concurrency is a contentious issue for both because there are different views on the correct approach to concurrency when analyzing for entitlement to EOT.

Concurrent delays occur when the delaying effects of two or more independent events impact upon progress and would, each delaying effect without the other, have caused delay to completion. For delays to be called concurrent, the effects of the events must impact upon progress in similar time periods although, not necessarily, in exactly the same time period; i.e. a delay from days 8 to 15 on one programmed string of activities could be said to be

concurrent with a delay from days 12 to 19 on another programmed string of activities because the effects would, one without the other, have caused similar delays to completion (Brian, 2003).

Doyle (2005) stated that an attempt to address the issue of concurrent delays has been made in some standard form contracts in Australia. Clause 35.5 of the AS2124-1992 is an example of the an attempt o deal with the issue of concurrent delays, which provides:

‘‘Where more than one event causes concurrent delays and the cause of at least one of those events, but not all of them, is not a cause referred to in the preceeding paragraph, then to the extent that the delays are concurrent, the Contractor shall not be entitled to an extension of time for practical Completion’’

In effect this clause operates to wholly deprive the contractor of an entitlement to extension of time during a period where a delay for which the contractor is not contractually entitled to an extension of time (and which may but not necessarily be caused by the contractor) occurs concurrently with any other delay for which the contract might be contractually entitled to an extension of time.

In *Henry Boot v Malamaison Hotel Ltd (2000) BLR 509*, CA, where the parties had already agreed that if there were two concurrent causes of delay, one of which was a non-culpable event and the other was a culpable event, then the Contractor was entitled to an EOT for the period of delay

caused by the nonculpable event, notwithstanding the concurrent effect of the culpable event (Master builders 3rd quarter, 2006).

Generally, Contractor has duty to mitigate the effect on its works of Employer Risk Events. However, the duty to mitigate does not requiring the Contractor to add extra resources or to work outside its planned working hours.

The requirement in the UK joints Contract Tribunal (JCT) contracts for the Contractor to use 'best endeavours' to prevent delay in the progress of the works and prevent completion of the works being delayed beyond the completion date may place a higher burden on the Contractor than the normal duty to mitigate. However, in the event of Employer delay, the Employer should agree to pay the Contractor for additional mitigation measures.

Atkinson (2003) mentioned that the most onerous obligation is that the contractor must use his best endeavours to reduce the delay. It is suggested that the obligation does not require the contractor to expend substantial sums to reduce the delay. In *Midland Land Reclamation Ltd -v- Warren Energy Ltd (1997)* it was held that the best endeavours obligation was not the next best thing to an absolute obligation or guarantee. In *Terrell -v- Mabie Todd and Co (1952) it* was held that a best endeavours obligation only required a party to do what was commercially practicable and what it could reasonably do in the circumstances.

In *Motherwell Bridge Construction Limited v Micafil Vakuumtecchnik (2002) TCC 81 CONLR44* the claim for acceleration costs of site works failed. There was a term of the contract that if unexpected delays and difficulties occurred, Motherwell was required to provide additional personnel at no extra cost at the request of Micafil in order to meet the required completion date.

2.2.7 Financial consequences of delay

Delay will result in additional cost. It is often contentious about who should bear the cost of delay. The Protocol is not primarily concerned about the question of valuation of the direct cost of change or variation of the works such as, labour, plant and materials. It is mainly concerned with the Contractor's cost of prolongation and disruption.

2.2.8 Valuation of variations

The effect of variations should be pre-agreed between the Employer/CA and the Contractor. A fixed price of a variation is not only including the direct costs but also the time related costs, an agreed extension of time and the necessary revisions to the programme.

Atkinson (2001) mentioned that variations under the contract can be valued by a number of methods. The price can be agreed by the Employer and Contractor directly, more usually by means of a quotation mechanism subject to analysis by the A/E. The contract may contain a Schedule of Rates to be used to value variations or standard published rates may be used as Day works.

He also mentioned that if the Contract contains a Bill of Quantities then the rates in the Bill of Quantities may be used as the basis of valuation. Most standard forms of contract (including ICE and JCT Standard Forms in the U.K.) which adopt Bills of Quantities have a four tiered approach to the valuation of variations. These are:

(1) Valuation using bill of quantity rates or schedule rates

(2) Valuation on the basis of rates analogous to 1 above

(3) Valuation on the basis of fair valuation or fair rates or reasonable prices

(4) Valuation on the basis of day works

In the case of *Henry Boot Construction Limited -v- Alstom (2000) Combined Cycles.*

The issue on appeal was how the valuation rules contained in the ICE 6th Edition Conditions of Contract should be operated. The ICE 6th contains in summary the following rules for the valuation of variations:

1. Work of a similar character and executed under similar conditions to work priced in the Bill of Quantities is to be valued at the applicable rates and prices;
2. Work not of a similar character or not executed under similar conditions is to be valued using the rates and prices in the Bill of Quantities as the basis for valuation so far as may be reasonable;
3. Otherwise, a fair valuation shall be made.

Boot tendered a lump sum price for a tender addendum to increase the depth of excavation to two areas of the works. The price included the shoring that was necessary because of the increased depth. Although the price was calculated using the quantities for two areas of the works, it was expressed to be for only one of these areas. Alstom was no doubt unhappy at having to pay extra for the additional excavation to the second area of the works, but of even more concern was that substantial further similar work was instructed as a variation. Boot contended that the variation should be valued by applying a rate derived by dividing the lump sum by the quantity for the one area of the site to which the lump sum was expressed to apply. Thus, Boot would be paid at a rate substantially higher than perhaps even they had contemplated at the time of tender.

The issue for the Court of Appeal to consider was, “when should bill rates be applied to a variation”? This hinged upon the correct interpretation of the words "so far as may be reasonable".

The Court of Appeal held that "it is the reasonableness of using the rates and prices, and not the reasonableness of the prices or rates, which has to be considered". So the reasonableness of a rate should be gauged strictly by comparing the work covered by the variation order against the work priced in the bill of quantities. It is inappropriate to take into account extraneous consideration such as how a rate or price was arrived at and whether it was too high or too low.

2.2.9 Compensation for prolongation

Delay will cause prolongation and increased cost. The recoverability of the compensation depends on the terms of the contract and the cause of the prolongation. Where the prolongation costs is resulting by Contractor Risk Event then the Contractor must bear the cost himself. Compensation for prolongation by Employer Risk Event will primarily comprise exclusively additional time related resources, notably its site overheads. However, it is not possible to say that compensation for prolongation comprises exclusively additional time-related resources because other types of recoverable loss may result from Employer Risk Events.

Unless expressly in the contract, compensation for prolongation should not be paid for anything other than work actually done, time actually taken up or loss and/or expense actually suffered. In other words, the compensation for prolongation caused other than by variations is based on the actual additional cost incurred by the Contractor.

2.2.10 Relevance of tender allowances for prolongation and disruption Compensation

The tender allowances have limited relevance to the evaluation of the cost of prolongation and disruption caused by breach of contract or any other cause that requires the evaluation of additional costs. The tender allowances

may be relevant as a base line for the evaluation of prolongation and disruption caused by variations.

2.2.11 Concurrency as it relates to compensation for prolongations

If the Contractor incurs additional costs that are caused by Employer Delay and Contractor Delay, then the Contractor should only recover compensation if it is able to separate the additional costs from both delays.

2.2.12 Time for assessment of prolongation costs

Liability for compensation must first be established by showing that the prolongation has been caused by an Employer Risk Event. Once it is established that compensation for prolongation is due, the evaluation of the sum due is made by reference to the period when the effect of the Employer Risk Event was felt, not by reference to the extended period at the end of the contract.

2.2.13 Float as it relates to compensation

If the Employer Delay, the Contractor is prevented from completing the works by the Contractor's planned completion date, for example, being a date earlier than the contract completion date, then the Contractor should entitled to be paid the costs directly caused by the Employer delay, notwithstanding that there is no delay to the contract completion date,

provided also that at the time they enter into the contract, the Employer is aware of the Contractor's intention to complete the work prior to the contract completion date, and that intention is realistic and achievable.

2.2.14 Mitigation of loss

The Contractor should do reasonably to avoid the financial consequences of Employer Delay.

There are two aspects to mitigate its loss: firstly, the Contractor must take reasonable steps to minimise its loss and secondly, the Contractor must not take unreasonable steps that increase its loss. Most construction contract requires the Contractor to do all it can to avoid or reduce delay.

However, the Contractor does not have a duty to carry out any change in scope any more efficiently than the original scope. If the Employer wishes the Contractor to take measures to mitigate the Employer Delay, the Employer should agree to pay the Contractor for the costs of those mitigation efforts.

2.2.15 Global Claims

A global claim can describe as the Contractor seeks compensation for a group of Employer Risk Event but it does not or cannot demonstrate the direct link between the loss and individual Employer risk events.

The global claims without substantiating cause and effect are discouraged by the Protocol and rarely accepted by the courts.

2.2.16 Claims for payment of interest

Some standard forms of contract listed out the interest, as a component of compensation and is payable. If it can be shown that the loss was actually suffered as a result of breach of contract and the loss was in the contemplation of the parties at the time of contracting, then the interest may also be a component of compensation. There are also statutory rights to interest.

2.2.17 Profit

Profit was prevented from earning because of an Employer Risk Event. It is generally not recoverable under the contract. However, if the contract allow for recovery of profit, an appropriate rate may be arrived from the Contractor's audited accounts for three previous financial years closest to the Employer Risk Events for which audited accounts have been published.

2.2.18 Acceleration

Some contract forms provide for acceleration by instruction or by collateral agreement. Acceleration may be instructed by reference to hours of working and sequence. Unless the contract allows, the Contractor cannot be instructed to accelerate to reduce Employer Delay.

2.2.19 Disruption

Disruption can describe as disturbance, hindrance or interruption to a Contractor's normal working methods, resulting in lower efficiency. If disruption is caused by the Employer, it may give rise to a right to compensation either under the contract or as breach of contract.

2.2.20 Claim preparation cost: are they recoverable?

Most of the construction contracts allow Contractor to recover the cost/or expenses it has actually incurred and prove by evidence. However, Contractor should not be entitled to claim additional cost for the preparation of that information unless it can show the additional cost as a result of the unreasonable action or inaction of the CA in dealing with the Contractor‘s claim. Similarly, unreasonable action by the Contractor in prosecuting its claim should entitle the Employer to recover its costs.

2.3 Guidelines on preparing and maintaining programmes and records

EOT dispute would be avoided if properly monitored and recorded progress of work during construction. Good record keeping and good use of a programme can remove some uncertainty issues when dispute about late completion. Record kept in suitable format should reduce the cost of analyzing delay.

2.3.1 Guidelines on preparing and maintaining programmes and records

The Contractor should submit the programme as early as possible and the CA should accept a programme showing the manner and sequence of the Contractor plans to carry out the works. The procedure should not be different for the size of the project. The Protocol recommends that the parties should reach a clear agreement on the programmes. The agreement should cover:

(i) The form the programme should take.

It should be prepared as a critical path network using commercially available critical path method project planning software. For the programme to be suitably used for the analysis and management of change, it must be properly prepared, so it can accurately predict the effects when a change occurs. The Contractor should identify on the programme where the critical path lie. The programme should clearly identify all relevant activities, such as

design manufacturing, procurement and on site construction. It also should record the information from the Contractor reasonably requires from the Employer or CA. The programme should record when information is required from the Employer or CA, by logically linking the information to the activities of the Contractor that are dependent on the information.

(ii) Interaction with method statement

The programme should be read in conjunction with a method statement describing in detail how the Contractor intends to construct the works and the resources intended to be used. The Protocol strongly recommends the contract should require the Contractor to provide method statement with fully cross-referenced and the programme.

(iii) The time within which the Contractor should submit a draft programme for acceptance.

After the commencement of contract, the contractor should plan the works properly within the reasonable time. The draft programme should be submitted and accepted before starts the work. The draft programme should not attempt to encompass any changes or delays that have occurred since the contract commencement date. Any changes or delays in post commencement should be dealt with in accordance with the EOT procedures after the programme has been accepted.

(iv) A mechanism for obtaining the acceptance of the CA of the draft programme.

The Contractor may construct the works in the manner he thinks appropriate. The contract provision for accepting the draft programme should reflect that fact. It might also contain wording to the effect that if the CA does not respond to the Contractor regarding the programme within a specified time, it should be deemed accepted. Once it is accepted, the draft programme becomes the Accepted Programme. Acceptance does not turn the Contractor's programme into a contract document, however, if the programme is made a contract document, the Contractor may become entitled to a variation whenever it proves impossible to construct the works in accordance with the programme.

The Protocol recommends that a sum be allowed by the Employer in the contract price payable on the provision by the Contractor of a proper programme and further payments for properly updating the programme. Correspondingly, a contract term might allow for withholding of part of payment or liquidated damages due to the Contractor's failure to provide and update the programme.

(v) Requirement for updating and saving of the Accepted Programme

The contract should require that the Accepted Programme be updated with actual progress using the agreed project planning software and saved electronically at intervals of no longer than one month. The Contractor should enter the actual progress on the Accepted Programme as it proceeds with the works to create the Updated Programme. Actual progress should recorded the actual start date and finish date for activities, together with percentage

completion of currently incomplete activities and/or the extent of remaining activity durations. The monthly updates should be archived as separate electronic files and saved monthly versions of the Updated Programme should be copied electronically to the CA together with a report describing all modifications made to activity durations or logic of the programme. The purpose of saving monthly version of the programme is to provide good contemporaneous evidence in the case of dispute.

The Accepted Programme should be actual against planned progress that is monitored and can be used as a tool for determining EOT. The CA should notify the Contractor if disagree with the amount of progress achieved by Contractor and the CA and Contractor should attempt to reach agreement.. If they still not agree, the CA's view should prevail unless and until overturned under the contract dispute resolution procedures and the CA's view on progress should be reflected in the Updated programme.

The Contractor may develop the Accepted or updated programme. When granting or refusing an EOT, the CA should provide sufficient information to allow the Contractor understand the reason of the decision. If the Contractor does not agree the CA's decision, it should inform the CA immediately. If no agreement can be reached quickly, either party should take steps to have the dispute or difference resolve accordance with the dispute resolution procedure applicable in the contract.

The Protocol recognizes that contractors sometimes delay due to their own responsibility, so it is realistic to expect that the programme in these circumstances can show the completion being predicted to occur later than the contract completion dates. The contract should contain provisions allowing the CA to require the Contractor to produce revised programme which plan and reflect in the programme steps it intends to take to reduce its delay. Acceptance by the CA of the revised programme does not constitute acceptance of the Contactor Delay, it merely acknowledges that the programme reasonably reflects the current situation.

It is important to compliance with the requirement of the contract in respect of the programme. The CA may consider invoking the contract provision for dealing with general defaults by the Contractor if the Contractor fails to compliance the requirement. In this situation, the CA should maintain and update the programme based on its own knowledge.

2.3.2 Software

The parties should agree the software use to produce the programme. If the parties have not agreed the type of software to produce programme, it will increase the difficulties in dealing with EOT issues both during the design and construction and final account stages of a project.

2.3.3 Records

The Protocol recommends that the parties should reach a clear agreement on the record keeping. It is important for delay analysis starting point to understand what and when the work was carried out.

2.4 Guidelines dealing with Extensions of time during the course of the Project

In order to deal efficiency and accurately with extension of time applications, the Protocol set out a recommended procedure. It requires the parties to follow the recommended good practice on programme and records discussed previously.

2.4.1 Extension of time procedure

It is important to follow strictly all the requirement of the condition contract for application and granting of extensions of time.

The Contractor should submit the sub-network to be inserted into the updated programme as soon as possible and showing the affected of the Employer Risk Event and linkage into the updated programme. Additionally, the Contractor also should submit such document and records as necessary to demonstrate the entitlement in principle to an EOT. It is not a proper demonstration of entitlement if the Contractor simply stating the Employer Risk Event occurred and claiming delay of that event.

The Contractor will only entitle to EOT if those events or causes of delay are listed in the contract of that project. The CA should provide sufficient information to allow the Contractor understand the reason for granting or refusing an EOT.

The Contractor should inform the CA immediately if the Contractor does not agree the CA's decision. Disagreement of EOT issue should not left until end of the project, the either party should take action to resolve the issue accordance with the dispute resolution procedures applicable to the contract.

The CA should make its own determination of EOT if the Contractor absence submission of the information required. It is reasonably to be expected that the CA will only award minimum EOT if the CA has not been presented with the necessary information.

The Protocol recommends the CA should use Updated Programme as a primary tool to determining the amount of the EOT. The purpose of granted EOT is to extent the Employer Risk Event is predicted to prevent the work completed by then prevailing contract completion date.

2.5 Guidelines on dealing with disputed extension of time issue after completion of the project- retrospective delay analysis

If the project followed the recommendations in the Protocol and guidance during the course of work, but the delay issues was not carried out contemporaneously, the analysis of the impacts of delay issue can be carried out retrospectively.

However, if the guidance and recommendation of Protocol have not been followed during the course of works, after a project completed it will largely be dictated by: (i) the relevant condition of contract, (ii) the nature of the causative events, (iii) the value of the dispute, (iv) the time available, (v) the records available, (vi) the programme information available, (vii) the programmer's skill level and familiarity of the project.

2.5.1 The Terms of the Contract

Some contract forms provided by the Contractor are entitled for relief from LD's for Employer Risk Events that actually cause delay to completion. Collapse as-built, as-planed v as-built and time impact analysis are suitable for those forms. However, other contract forms provided by the Contractor is entitled relief the LD's for the likely effect of an Employer Risk Event. These forms are suitable for impacted as-planned and time impact analysis.

2.5.2 The nature of proof required

As-planned v as-built analysis can identify the delay progress; however, it is restricted by its inability to identify concurrency, re-sequencing, mitigation or acceleration. This analysis method is useful in starting point. Impacted as-planned is based on the effect of the Employer Risk Events on the planned programme of work. This delay analysis is using the CPM technique due of the involves least amount of variable. The usefulness of this technique is restricted by the theoretical nature of the projected delays that are determined using this technique and uncertainty as to the feasibility of the Contractor's planned programme.

Collapsed as-built is based on the effect of the Employer Risk Events on the programme of work actually built. Similar to the as-planned v as-built, it is restricted by its inability to identify concurrency, re-sequencing, mitigation or acceleration. Where acceleration, redistribution of resources has taken place during the course of the works to overcome the effects of events, this form of analysis may cause unreliable results.

Time impact analysis based on the effect of the Employer Risk Events on the Contractor intention for the future conduct of the work progress actually achieved at the time of delay events. It also can be used to resolve the complex delay issues, such as concurrent delays, acceleration and disruption. This technique is suitable to resolve complex disputes related to delay and compensation of delay issues.

2.5.3 The factual material available

If the project is lack of planned network programme and nor as-built records then CPM analysis, if possible it can only be based on the ex post facto creation of the planned programme from the tender documentation and an impacted as-planned analysis

Impacted as-planned analysis is appropriate for the situation to have a good as-planned network programme but has not been updated with progress and no as-built records.

Collapsed as-built programme is appropriate for the situation to have good as-built records but the as planned programme was not produced in adequate detail or not produced at all.

As-planned v as-built analysis is appropriate for the situation where an as-planned programme and an as-built programme exist or as-planned programme was regularly updated but only little information is available for the network logic followed.

Table 2.1 summarises the type of the analysis that can be conducted on the types of factual material available. The ‘X’ below represents the factual material that is required for a particular analysis, but some cases are alternative.

Table 2.1 Type of facture material available

Type of analysis	As-planned programme without network	Networked as-planned prgramme	Updated as-planned networked programme	As-built records
As-planned v-as built	X	Or X	And X	Or X
Impacted as-planned		X		
Collapsed as-built				X
Time impact analysis		X	Or X	And X

The cheapest and simplest analysis methods generally are As-planned v as-built and impacted as-planned analysis. Collapsed as-built also is a simple analysis method although it needs more laborious and subjective due to the inherent difficulties of establishing accurate as-built logic from the records. Although time impact analysis is the most consuming time and expensive method, but it is the most thorough method of analysis.

It is recommended the interested parties try to agree method of analysis before they start to retrospective (after delay) delay analysis. In the case where litigation or arbitration has been commenced but absence of the agreement, the parties should carefully consider to obtain the decision of the judge or arbitrator as to the method of proposal before they start to proceed with the delay analysis. The Protocol considers the issue of the failure to consult the parties on delay analysis methodology or identify the resolved differences in

methodology might take in to account by the judge or arbitrator in awarding and allocating recoverable costs of the dispute.

It is recommend that the parties should follow: (i) agree and set out in writing the method of determining the delay to completion for their particular dispute. (ii) agree who is to carry out the analysis, for example, consultant.

The Protocol recommends the adjudicator, judge or arbitrator when deciding the entitlement of EOT, they should practicable put him/herself in the position of the CA at the time Employer Risk Event occurred. The Protocol also recommends them to use the Updated Programme to establish the status of the works and determine what EOT entitlement could or should recognize by the CA at the time. It is not a good practice for CAs to 'wait and see' the effect of an Employer Delay and justify not granting an EOT if the Contractor making effort beyond that which are required under the contract and overcome the Employer Delay. EOT is a matter of entitlement but not need.

2.6 Summary of Principles UK delay and disruption Protocol

Table 2.2 shows the important issue and guidance of UK delay and disruption Protocol.

Table 2.2: Summary of UK Delay and Disruption Protocol Principles and guidance

Item	Principle	Guidance
1	Extension of Time	Incorrectly said that an entitlement to an EOT automatically carries with an entitlement to compensation for prolongation costs during the period of the EOT.
		Contractor should give notice to the Contract Administrator of any Employer's Risk Events as soon as possible
		Good practice to keeping of records and preparation, acceptance and updating of programmes is followed, then the disagreement about a claimed entitlement to an EOT will be reduced.
		A competently drafted construction contract should contain provision entitling the Contract Administrator on its own initiate to determine an EOT, even if the Contractor has not applied for one or has applied with insufficient information.
2	Float as it relates to extension of time	Parties should ensure the float issue is addressed in their contracts
		Accurate identification of float is only possible with the benefit of a proper programme that has properly updated.

Item	Principle	Guidance
3	Concurrency as it relates to extension of time	Where true concurrent delay occurs, the Contractor should nevertheless be entitled to an EOT for the Employer Delay to Completion. Separate analysis should be carried out for the concurrent delay events. Analyses should be carried out for each event separately and strictly in the sequence in which they arose. The Employer Risk Event should be analysed first.
		Accurate identification of concurrency is only possible with the benefit of a proper programme. The Protocol's has set out the recommendations for preparation of programme in Guidance Section 2.
		The simple approach to concurrency adopted by the Protocol aims to provide contracting parties with clarity and certainty about entitlement to EOT at the time delay events occur, rather than waiting for their full effect to be felt and then analysed afterwards.
4	Financial consequences of delay Issue	Entitlement to an EOT does not automatically result in entitlement to compensation for the same period.

Item	Principle	Guidance
5	Valuation of variations	The Protocol discourages leave the compensated separately at the end of the contract the prolongation and disruption element of a number different variations and/or changes. Protocol supports the parties to agree in advance of the execution of the variation.
		Where it is not practicable to agree in advance the amount, the Protocol recommended that the parties to the contract should do their best to agree the total amount payable as the consequence of the variations and/or changes separately as soon as possible after the variations are completed. Variation clause provides that where the varied work is similar character and conditions to the original work, then the tendered contract rates should be used. Where the work is not similar character or condition with the original work, then the contract rate can be used but with adjusted of the difference circumstances. If the work is quite dissimilar then the reasonable or fair rate are to be determined.
		The Protocol also encourages the standard forms of contract have a provision that where a variation work affects unvaried work, the affected unvaried work may be treated as varied work.
6	Compensation for prolongation	Protocol recommends the contract contained an agreed amount per day that can be applied to each day of prolongation.
7	Concurrency as it relates to compensation for prolongations.	The Contractor should only recover compensation if it is able to separate the additional costs caused by the Employer Delay from those caused by the Contractor Delay.
8	Float as it relates to compensation	If as a result of an Employer Delay, the Contractor is prevented from completing the works by the Contractor's planned completion date the Contractor should in principle be entitled to be paid the costs directly caused by the Employer delay, notwithstanding that there is no delay to the contract completion date

Item	Principle	Guidance
9	Mitigation of loss	The Contractor must take reasonable steps to minimise its loss and must not take unreasonable steps that increase its loss.
10	Mitigation of delay	The Contractor has a general duty to mitigate the effect on its works of Employer Risk Events.
		The duty to mitigate does not extend to requiring the Contractor to add extra resources or to work outside its planned working hours.
11	Claims for payment of interest	(a) Interest pursuant to contract, the rate of interest can be agree in the contract and the circumstances in which it will be payable.
		(b) Interest as damages/finance charges, it is the position in most area of the business that interest payable on bank borrowing or the lost opportunity to earn interest on bank deposits, the quantifiable as damages where the claimant can show: (i) that such loss has actually suffered and (ii) the loss was within the reasonable contemplation of the parties at the time of contracting.
12	Disruption	Protocol recommends when establishing the compensation for disruption it is necessary to isolate issues that can affect productivity but are unrelated to the Employer's liability. For example, weather, plant breakdown
		Contractor should maintain and make available to the CA good site records in order that the CA may carry out proper assessments of disruption.

Item	Principle	Guidance
13	Time for assessment of prolongation costs	Liability for compensation must first be established by showing that the prolongation has been caused by an Employer Risk Event.
		The period to be evaluated is that in which the effect of the Employer Risk Event was felt but not to the extended period at the end of the contract.
14	Acceleration	Unless both party agreed in the contract, compensation is not allowed if the Contractor acceleration for his own record.
15	Preparation of programme	Protocol recommends the parties should reach a clear agreement on the programme. The agreement should cover (i) the form the programme should take, it should be prepared as a critical path network. (ii) Interaction with method statement, it should describe how construct the works and the resources to be use. (iii) the time within which the Contractor should submit a draft programme for acceptance, should be a reasonable time for Contractor to plan the contract works properly. (iv) A mechanics for obtaining the acceptance of the CA of the draft programme. (v) Requirement for updating and saving of the Accepted programme. Additionally, Protocol has provided the guidelines on preparing and maintaining programmes and records, such as initial programme and accepted programme.
16	Delay analysis	To use the work programme as a basic of the reference to grant the EOT.
17	Method of delay analysis	As-planned v as-built , Impacted as-planned, Collapsed as-built, Time impact analysis

2.7 Critically Review of Malaysian Construction Delay and Disruption

2.7.1 Introduction

There are four institutions and organizations in Malaysia that produce standard forms of construction contracts. These are:

(a) The Institution of Engineers, Malaysia ("IEM").

(b) Pertubuhan Arkitek Malaysia ("PAM").

(c) Construction Industry Development Board ("CIDB").

(d) Jabatan Kerja Raya ("JKR").

However, standard forms of contracts which are applicable for construction depending on the categories of works and types of clients. For example, PAM form 2006 normally uses in Private Project and P.W.D form compulsory for government works (JKR).

2.7.2 PAM form 2006

The PAM 2006 Forms are stated to be a redraft of its 1998 predecessor. However, a closer scrutiny of the two Forms shows only superficial resemblance. The various provisions in the new Forms have been reworded, reshuffled, and amalgamated. The risk allocation for time, money matters, quality issues and dispute resolution between the contractor, employer and consultant team has been shifted significantly. Although the

PAM 2006 Forms contain some contemporary provisions, they are also more procedural requiring the contractor, employer and consultants to strictly

adhere to time provisions with the attendant loss of rights or incurring of liabilities (Harbans Singh, 2009).

2.7.2.1 Extension of time

If the Contractor is opinion the works are or will be delayed by any relevant events stated in Clause 23.8, he may apply the EOT with comply with the Clause 23.1 (a) and (b). Under the Clause 23.1 (a) PAM form 2006, if the Contractor intents to apply for an EOT, he may give written notice to the Architect within twenty eight (28) days from the date of A.I, CAI or the commencement of the Relevant Event, whichever earlier. Under the Clause 23.1 (b) PAM form 2006, within twenty eight (28) Days of the end of the cause of delay, the Contractor should send to the Architect his final claim for EOT duly supported with all particulars to enable the Architect to assess any EOT to be granted.

2.7.2.2 Contractor to prevent delay

Under the Clause 23.6, the Contractor have the duty to use his best endeavour to prevent or reduce delay in the or progress of works and do reasonably to satisfaction of the Architect to prevent and reduce delay or further delay in the completion works.

2.7.2.3 Relevant Events

The following are the Relevant Events:

23.8 (a) Force majeure

23.8 (b) Exceptionally inclement weather

23.8 (c) Loss, damage injury occasioned by one or more of the contingencies

23.8 (d) Civil commotion, strikes, lockouts, etc

23.8 (e) Contractor not receive in due time the necessary AI for which he had applied in writing to the Architect (late drawing or details)

23.8 (f) Delay in giving possession of site

23.8 (g) Compliance with the Architect's instruction

23.8 (h) Delay on part of Nominated Sub-contractors

23.8 (i) Re-nomination of Nominated Sub-Contractors

23.8 (j) Delay by artists, tradesmen or others employed by the Employer

23.8 (k) Delay or failure supply of goods and materials by the Employer

23.8 (l) Testing and inspection of any materials, good or executed work

23.8 (m) Any acts of prevention or breach of contract by the Employer

23.8 (n) War damage

23.8 (o) Compliance with AI issued in connection with the discovery antiquities

23.8 (p) Compliance with statutory requirements ((law, regulation)

23.8 (q) Delay or failure caused by Appropriate Authority or Services Providers in carrying out their work

23.8 (r) Appointment of a replacement person (Architect/Engineer/QS/Specialist Consultant)

23.8 (s) Dispute with neighbouring owners

23.8 (t) Delay on the execution of work for provisional Quantity which Architect is not a reasonably accurate forecast of the quantity of work required

23.8 (u) Failure of the Employer to give access to site in time or any passage to the site which is in possession or control of the Employer

23.8 (v) Suspension of works by the Contract due to late payment and the withdrawal of the Architect and/or Consultant

23.8 (w) Suspension of works by the Authority but not due to the Contractor's/Nominated Sub-Contractor's negligence, omission, default and/or breach of contract

23.8 (x) Any other ground for EOT expressed in the Contract

2.7.2.4 Loss and/or expense caused by matters affecting the regular progress works.

Under the Clause 24.1, if the progress of work is materially affected by any matter expressly stated in Clause 24.3(a)-(n), the Contractor may make a claim for loss and/or expense.

2.7.2.5 Valuation rules

Under Clause 11.6(a), if the variation work are similar and executed under similar condition and does not significantly change the quantity of work as set out in contract, then the rates and prices in contract documents shall determine the valuation. However, under Clause 11.6(b), if similar work but is not executed under similar conditions or is executed under similar conditions but is a significant change in the quantity of work, then the rates and prices in the contract shall be the basis to determine the valuation which fair adjustment in the rates. Additionally, in the Clause 11.6(c) stated if the work is not similar set out in contract, the valuation shall be the fair market rates and prices and which is determine by Quantity Surveyor. If the work cannot be measured and valued under Clause 11.6(a),(b),(c), the Contractor is allowed value by daywork rates stated in the contract or the actual cost plus fifteen (15) per cent. Additionally, under Clause 11.7, if the Contractor incurred additional expenses which would not be paid under Clause 11.6, the Contractor may make a claim for such additional expenses.

2.7.2.6 Additional expense caused by Variation

Under the Clause 11.7, if the variation is caused the Contractor incur additional expenses, the Contractor may claim for additional expenses.

2.7.2.7 Access to Contractor's books and documents

Under Clause 11.8, Contractor should keep contemporaneous records to substantiate all his claims for additional expenses under Clause 11.7 and under Clause 24.2 to claims for loss and/or expense. All documents shall remain available until all claims have been resolved. The Contractor shall use his best endeavour to ensure all documents available.

2.7.2.8 Interest

Under Clause 30.17, if the Employer fails to pay the Contractor after the Period of Honouring Certificates or the Contractor owes a debt or fails to pay any sum owing the Employer, a simple interest based on the Maybank Base lending Rate plus one (1) per cent shall be payable until the payment is made.

2.7.2.9 Work Programme

Under clause 3.5, within 21 days from receipt the Letter of Award, the Contractor should provide to the Architects 6 copies of Work Programme showing the order in which he proposes to carry out the work. The work programme should comply with any requirements specified in the Contracts Documents.

2.7.2.10 Architect's acceptance of programme

Under clause 3.7, the work programme may be used by the Architect to monitor progress and the Architect is entitled to rely on the work programme as a basis for the assessment of extension of time and the effect of the delay and/or disturbances to the progress of the work.

2.7.3 CIDB Form 2000

Construction Industry Development Board (CIDB) is an important organization which develops the Malaysian construction industry. The objective of CIDB is to develop the capacity and capability of the construction industry through the enhancement of quality and productivity by placing great emphasis on professionalism, innovation and knowledge in the endeavour to improve the quality of life.

2.7.3.1 Extension of Time

Under the clause 24.1, the Contractor should carried out the works with due diligence and has taken reasonable steps to prevent or reduce such delay, the time for Completion of the Works may be extended by the Superintending officer which has been caused by any or more of the following events:

24.1 (a) Force majeure

24.1 (b) Exceptionally inclement weather

24.1 (c) Industrial action by workmen, strikes, lock-outs or embargoes affecting any of the trades employed upon the Works or in the preparation, manufacture or transportation of any Equipment, materials or goods for the Works and provided that the same are not due to any unreasonable act or default of the Contractor or of any sub-contractor or supplier. Provided that this event shall only

apply if the industrial action by workmen, strike, lock-out or embargo causing delay is in Malaysia

24.1 (d) One or more of the Excepted Risks

24.1 (e) The Contractor not having received from the Superintending Officer within a reasonable time necessary Drawings, instructions or other information in regard to the Works for which notice has been given by the Contractor in accordance with Clause 4.6 or the supplementary or revised drawing, specifications, or instruction as required by Clause 4.7

24.1 (f) An instruction from the Superintending Officer to resolve a Discrepancy in or between any of the Contract Documents pursuant to Clause 7.4;

24.1 (g) Compliance with Statutory Requirements for which the Employer is responsible under Clause 10.1 or which results in a Variation pursuant to Clause 10.2

24.1 (h) Ordering of test by the Superintending Officer which is not intended by or provided for in the Contract pursuant to Clause 15.4 and the uncovering or making openings for inspection of any work which is not intended by or provided for in the Contract pursuant to Clause15.6, unless the test or inspection showed that the work, the Equipment, materials, goods or workmanship were not in accordance with the provisions of the Contract

24. (i) Failure of the Employer to give possession of the Site or any part of the Site to the Contractor as required by Clause 17.2;

24. (j) Acts or omissions of other persons or contractors employed by the Employer in executing work not forming part of the Contract

24. (k) Subject to sub-clause 19.1(b) an instruction by the Superintending Officer to suspend any work;

24. (l) A Variation;

24. (m) Damage, loss or injury to the Works or part of the Works caused by any one or more of the risks covered by the insurance policies referred to in Clause 38A, 38B or 38C, whichever is applicable;

24. (n) The issue of an instruction by the Superintending Officer in respect of antiquities and fossils under Clause 39;

24. (o) The issue of an instruction by the Superintending Officer in relation to a Prime Cost or P.C or Provisional Sum item which gives rise to a Variation of the work described under the Prime Cost or P.C. or Provisional Sum item in the Contract Documents;

24. (p) If Option Module C applies, delays on the part of Nominated Sub-Contractors or Nominated Suppliers for the same reasons as set out in sub-clauses 24.1(a) to 24.1(o), provided that the same are not due to any act, negligence, default or breach of contract by the Nominated Sub-Contractors or Nominated Suppliers or any of their respective servants or agents;

24. (q) Any other grounds for extension of time expressly mentioned in the Contract but not mentioned in this Clause 24.1.

However, it is provided that the Contractor shall not be entitled to any extension of time where the instructions or acts of the Employer or the Superintending Officer are necessitated by or intended to cure any default of or breach of contract by the Contractor.

2.7.3.2 Notice of Delay

Under the Clause 24.2 (a), if the Contractor is of the opinion that the progress or completion of the Works or any section of the Works is or will be or has been delayed by any event including but not limited to the events stated in Clause 24.1, he shall forthwith notify the Superintending Officer of such event within 30 Days of the occurrence of such event. Within the said 30 Day period the Contractor shall also provide:

(i) the appropriate Contract references (if applicable) to such event of delay;

(ii) the estimated length of the delay and of the extension of time required;

(ii) details of the effect of the event of delay on the works programme accepted under Clause 5.

Additionally, under the clause 24.2 (b), if the Superintending Officer is of the opinion that the notice and particulars provided by the Contractor under sub-clause 24.2(a) are insufficient to enable him to decide on the Contractor's application, the Superintending Officer may require the Contractor to provide within 14 Days or such other period as may be specified by the Superintending Officer such further information which the Superintending Officer may

reasonably require including particulars concerning any event and the circumstances of the delay and the measures planned and/or taken to avoid or reduce delay.

2.7.3.3 Superintending Officer's Decision

Under the Clause 24.3 (a), subject to compliance with sub-clauses 24.2(a) and (b), the Superintending Officer shall notify the Contractor in writing within a reasonable time but in any case not exceeding 30 Days of the receipt of the notice or further information, as the case
may be, whether in his opinion the event of delay is one which in principle entitles the Contractor to an extension of time.

Clause 24.3 (b) stated that within a further 30 Days after the decision in sub-clause 24.3(a) but in any event prior to the expiry of the Time for Completion, the Superintending Officer shall grant such extension of time, if any, of the whole or any section of the Works (as the case may be) as may in his opinion be fair, reasonable and necessary for the completion of the Works or any section of the Works.

However, under the Clause 24.3 (c) if the Superintending Officer considers that he does not have sufficient information to enable him to decide on the Contractor's application in accordance with sub-clause 24.3(b), the Superintending Officer may nevertheless grant such extension of time as may

in his opinion appear to be fair, reasonable and necessary on the information available, taking into account all the matters set out in sub-clause 24.3(d).

Under the Clause 24.3(d), the Superintending Officer when deciding on any extension of time under this Clause 24.3, shall take into account the followings:

(i) Extension of time previously granted, if any;

(ii) The effect or extent of any work omitted or (where Option Module A is applicable) decrease in the quantity of any work as a result of the remeasurement of provisional quantities stated in the Bill of Quantities under the Contract;

(iii) Any delays which may operate concurrently with the delay due to the event or events in question including those which are due to acts or defaults of the Contractor.

2.7.3.4 Interim Decision of Extension of Time

Under the Clause 24.4(a), notwithstanding Clause 24.2, when a delaying event has a continuing effect such that it is not practicable for the Contractor to submit all the particulars and further information in accordance with Clause 24.2, the Contractor shall nevertheless be entitled to an extension of time provided that he has submitted to the Superintending Officer interim particulars at intervals of not more than 30 Days and final particulars within 30 Days of the event causing the delay ceasing to operate.

Subsequently, the Clause 24.4(b) stated that, on receipt of such interim particulars, the Superintending Officer shall make an interim decision on extension of time and within 30 Days of the receipt of the final particulars, the Superintending Officer shall, subject to Clause 24.7 review all the circumstances and shall decide an overall extension of time in regard to the event.

2.7.3.5 Superintending Officer's Discretion

Notwithstanding the other provisions of this Clause 24, the Superintending Officer may, in his absolute discretion (but is not obliged to)to grant a fair, reasonable and necessary extension of time notwithstanding that the Contractor has failed to comply with the
provisions of this Clause 24.

2.7.3.6 Certificate of Extension of Time

Under the Clause 24.6, any decision of Superintending Officer in granting extension of time under Clause 24 shall be notified by the Superintending Officer to the Contractor in a certificate, a copy of which shall also be extended to Employer and Nominated Sub-contractor or Nominated Supplier (if involve).

2.7.3.7 Review of Superintending Officer's Decision

Under the Clause 24.7, at any time prior to the issuance of the Final Certificate under Clause 42.8 the Superintending Officer may review any previous extension of time granted and either fix a Time for Completion later than that previously granted if in his opinion the granting of such longer Time for Completion is fair and reasonable or confirm to the Contractor the Time for Completion previously fixed.

2.7.3.8 Certificate of Non-Completion

Under the Clause 26.1(a) if the Works have not been completed within the Time for Completion or any extended time granted pursuant to Clause 24 and the Superintending Officer is of the opinion the same ought reasonably so to have been completed, the Superintending Officer shall issue a certificate to that effect. Such certificate shall be referred to as the "Certificate of Non-Completion". The Certificate of Non-Completion shall be issued to the Contractor with a copy to Employer and Nominated Sub-contractor or Nominated Supplier (if involve).

However, the Clause 26.1 (b) stated that, if under sub-clause 24.7(a), the Superintending Officer fixes a later Time for Completion then any Certificate of Non-Completion previously issued shall cease to be of effect and the Superintending Officer shall issue such further Certificate of Non-Completion as may be necessary. The Employer shall then pay or repay to the

Contractor any amounts recovered or allowed or paid under Clause 26.2 for the period up to such later Time for Completion.

2.7.3.9 Damages for Non-Completion

Under the Clause 26.2(a), upon the receipt of a Certificate of Non-Completion the Employer shall be entitled to recover from the Contractor Liquidated Damages calculated at the rate stated in the Appendix for the period from the Time for Completion or any extended Time for Completion where applicable to the Date of Practical Completion, and may deduct such Liquidated Damages, whether in whole or in part, from any payment due or to become due to the Contractor under the Contract.

However, the Clause 26.2 (b) stated that the payment or deduction of such Liquidated Damages shall not relieve the Contractor from his obligation to complete the Works or from any other of his obligations and liabilities under the Contract.

2.7.3.10 Employer's Rights for Damages at Law

Under the Clause 26.3, in the event that the Employer for whatever reason shall not be entitled at law to recover Liquidated Damages, the Employer shall remain entitled to recover such loss, expense, costs or damages as he would have been entitled at law.

2.7.3.11 Extension of Time During Delay Period

Under the Clause 26.4(a), after the issue of the Certificate of Non-Completion, if the execution of the Works is subsequently delayed by any of the events set out in sub-clauses 24.1 (e) to (q) inclusive, the Employer's right to Liquidated Damages shall not be affected by such delaying events but subject to compliance by the Contractor to Clause 24.2, the Superintending Officer shall grant an extension of time as is fair, reasonable and necessary pursuant to Clause 24. Such extension of time shall be added to the Time for Completion for the Works or any section of the Works. The Employer shall then pay or repay the Contractor any amounts of Liquidated Damages recovered, allowed or paid under Clause 26.2 for the said extension of time.

2.7.3.12 Delay in Certification

Under the Clause 42.12, the Employer shall be liable to pay to the Contractor damages, whether by way of interest or otherwise if in the event of any failure or delay by the Superintending Officer in certifying any payment due or payable to the Contractor pursuant to the provisions of Clause 42.

2.7.3.13 Notice of Claims

Under Clause 32.1, the Contractor shall give notice in writing within 30 days after the event if he intends to claim loss and expense. Contractor shall notify the Superintending officer within 30 days of the occurrence of such event. The notice shall specify: (i) the event and its consequences, (ii) the contract references, (iii) an estimate value of loss and expense.

2.7.3.14 Loss and Expense Claim

Under Clause 31.1, the Contractor shall be entitled to recover loss and expense incurred by him and for which he would not be reimbursed by any other provision of contract. Howsoever arising as a result of regular work having been disrupted, prolonged or otherwise materially affected by the event stated in 31.1(a)-(j).

2.7.3.15 Valuation of Variation

After received the valuation of variation from Contractor, the Superintending Officer within 30 days shall make valuation accordance with Clause 29.1 and shall notify the Contractor value of valuation in writing. If the Contractor disagrees with the value of Variation, he shall give notice to Superintending Officer within 30 days of receipt of the notice. Then, the Superintending Officer shall within 30 days notify the Contractor of his decision.

2.7.3.16 Mitigate of delay

Under Clause 24.1, the Contractor has carried out the work diligence and has taken all reasonable steps to avoid or reduce delay.

2.7.3.17 Interest

Under the Clause 42.9(b), if the Employer fails to make payment within the Period of Honouring Certificate, the Employer shall pay the Contractor addition amount certified, simple interest at the rate stated in the Appendix shall be used until the payment of such sum.

2.7.3.18 Maintain Proper Daily Records

Under clause 29.1(d), the Contractor should maintain proper daily records specifying the time spent for workman of the relevant work, plants, equipment, materials or good used to execution the varied work.

2.7.3.19 Work Programme

Under Clause 5.1 (a) Contractor should submit work programme which related to time for completion identifying the sequence, logic and critical path for he proposes to carry out the work, (b) Method statement which describing the arrangement, sequence and method of construction the work.

2.7.4 P.W.D. Form 203A (JKR)

PWD Forms is compulsory for government works. There are two common types of the PWD Forms, PWD Form 203A (Rev. 10/83) (Standard Form of Contract to be used where Bills of Quantities form part of the Contract) and PWD 203 (Rev. 10/83) (Standard Form of Contract to be used based on Drawings and Specifications without Bills of Quantities). In fact, PWD form 203A (Rev. 10/83) is used more often than PWD 203 (Rev. 10/83) form because Bills of Quantities are very often used in Malaysia. Therefore, PWD 203A (Rev. 10/83) is taken as the representative standard form of contract in Malaysia. The PWD forms are applied for all projects funded by the Malaysian public sector. Besides, there are also contract forms for subcontractor, supplier and design and built/turnkey contract basis, that is PWD 203N, PWD 203P and PWD 203DB/T.

2.7.4.1 Delay and Extension of Time

Under the Clause 43, if the progress of the works is delayed, the Contractor shall give written notice of the causes of delay to the Superintending Officer (S.O.) and if the S.O. opinion that the completion of the works is likely to be delayed beyond the date for Completion stated in the Appendix or beyond the any extended Date for Completion previously fixed under this condition:

(a) By force majeure

(b) By reasons of any exceptionally inclement weather

(c) By reasons of directions given by the S.O., consequential upon disputes with neighbouring owners provided the same is not due to any act, negligence or default of the Contractor or any sub-contractor, nominated or otherwise

(d) By reason of loss or damage occasioned by any one or more of the contingencies referred to in Clause 36 hereof (provided and to the extent that the same is not due to any act, negligence, default or breach of contract by the Contractor or any sub-contractor, nominated or otherwise, whether in failing to take reasonable steps to protect the works or otherwise)

(e) By reason of S.O.'s instructions issued under the Clause 5 hereof, provided that such instructions are not issued due to any default or breach of contract by the Contractor or any sub-contractor nominated or otherwise

(f) By reason of the Contractor not having received in due time necessary instruction, drawings, levels or instruction in regard to the nomination of sub-contractors and/or suppliers provided in this contract, from the S.O. due to any negligence or default of the S.O. and for which he shall have specifically applied in writing on a date which having regard to the Date for Completion stated in the Appendix to these Conditions or to any extension of time then fixed under this Conditions, was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same

(g) By reason of delay in giving possession of the Site as provided under Clause 38 (d) hereof

(h) By reason of any action due to local combination of workmen, strike, or lockout affecting any of the trades employed upon the Works, provided the same are not due to any unreasonable act, neglect or default of the Contractor or of any sub-contractor, nominated or otherwise

(i) By delay on the part of artists, tradesmen or others engaged by the Government in executing work not forming part of this Contract

(j) By the Contractor's inability for reason beyond his control and which he could not reasonably have foreseen at the date of closing of tender of this Contract to secure such goods and/or materials as are essential to the proper carrying out the Works

(k) By delay on the part of Nominated Sub-contractors and/or Nominated Suppliers of their works, and such delay shall be caused by the same reasons affecting their work as stated above in sub-clauses (a) to (j) inclusive (provided that the same are not due to any act, negligence, default or breach of contract by the Nominated Sub-contractor and/or Nominated Supplier and/or Contractor, or any of the servants or agents of such Nominated Sub-contractor or Nominated Supplier or the Contractor)

Then, the S.O. shall estimate the length of the delay beyond the date or time aforesaid make in writing a fair reasonable extension of time for completion the works. However, the Contractor shall use constantly his best

endeavours to prevent delay. The certificate issued by the S.O. under this Conditions shall be referred to as the ‘‘Certificated of Delay and Extension of Time’’.

2.7.4.2 Loss and Expense Caused by Delays

Under the Clause 44, if the progress of works has been affected by reason stated under Clause 43 (c), (f) or (i) hereof, and the Contractor has incurred direct loss and/or expense for which he would not be reimbursed by a payment made under any other provision in this contract, then the Contractor shall within one (1) month of the event give written notice to the S.O. of his intention to claim for such direct loss or expense together with the estimate amount of such loss and/or expense, subject always to Clause 48 thereof.

2.7.4.3 Valuation of Variation

Under Clause 25.1, all variations shall be measured and valued by the S.O. Unless previously agreed, otherwise variation shall be made accordance: (a) the rate in the Bill of Quantities if the work is similar character and executed under same conditions. (b) if the work is not similar character or executed under same conditions, the basis of rates shall be used, reasonable and fair valuation shall be made by the S.O. (c) the rates in the Bill of Quantities shall determine the valuation for omitted and if the omission is difference condition under any work carried out, the rates shall be value under

(b). However, if the work cannot valued properly, daywork price shall be used which stated in appendix.

2.7.4.4 Mitigate of expenses

Under the Clause 50.2(b), if the Contractor fails to take necessary action to mitigate the expenses incurred while the officer instructed to suspend the work, the Contractor shall not be entitled to payment for the loss and expense.

2.7.4.5 Mitigate of delay

Under Clause 43.1, the Contractor shall take all reasonable steps to avoid or reduce delay to proceed with the work.

2.7.4.6 Work Programme

Under Clause 12.1, within 14 days after receipt the Letter of Award, the Contractor should provide Work Programme to the S.O. for his approval a programme of work for the execution of the works in such forms and details as the S.O. shall reasonably determine.

Under Clause 12.2, if the actual progress work does not conform to the fixed or approval programme of work, the contractor should produce a revised programme showing the necessary modification to the approved programme to

ensure completion of work within the time for completion as defined in Clause 39 hereof or any extended time granted pursuant to Clause 43.

2.7.5 IEM form

To date, IEM has produced three standard forms of construction contracts, there are:

(i) IEM Conditions of Contract for Works Mainly of Civil Engineering Construction

(ii) IEM Standard Conditions of Sub-Contract for use in Conjunction with the IEM Conditions of Contracts for Civil Engineering Works

(iii) IEM Conditions of Contract for Mechanical and Electrical Works.

IEM standard forms essentially are hybrid forms except for the IEM Conditions of Contract for Mechanical and Electrical Works which essentially follows the corresponding FIDIC standard form. The various forms published by IEM, it needs to be appreciated, are the only ones currently for use in private sector civil engineering works and mechanical and electrical works in Malaysia (Onn, 2002).

2.7.5.1 Additional Costs Incurred

Under the Clause 4.3(1), if the Contractor incurs additional Costs in complying with the instruction issued by the Engineer under the Clause 4.2(2) and as a direct consequence there is delay to the compensation of the Works,

(a) These Costs may then be recovered by the Contractor under Clause 53 and

(b) The Engineer must take the delay into consideration in exercising his authority with respect to Clause 44 of these Conditions.

2.7.5.2 Delay in Issuing Further Drawings

Under the Clause 5.4 (1), if the Engineer fails or is unable to issue the required drawings within the time reasonable in all circumstances and the Contractor suffer delay to the completion of the Works and incurs Costs, then :

(a) Such delay must be taken into consideration by the Engineer in determining any new date for Completion to which the Contractor may be entitled to under Clause 44 and

(b) The Costs may be recovered by the Contractor under Clause 53.

2.7.5.3 Delay in Approving Design

Under the Clause 6.4 (1) if the Engineer has delayed the approval of the design submitted by the Contractor under Clause 6.1 and 6.3 and the Contractor incurs delay in meeting the Date of Completion and additional Costs as a direct consequences:

(a) The Engineer must take the delay into consideration in determining any extended Date for Completion to which the Contractor may be entitled under Clause 44.

(b) The Engineer must certify the additional Costs in accordance with the provisions of Clause 53.

2.7.5.4 Adverse Physical Conditions

Under the Clause 12.2 (1) if the Contractor encounters any conditions about the Site (other than climatic conditions) which have directly or indirectly caused the delay of the works beyond the Date of Completion and the Contractor has incurred Costs as a consequence.

(a) The Engineer must take the delay into consideration in determining any extended Date for completion to which the Contractor may be entitled under Clause 44

(b) The Engineer must certify the additional Costs in accordance with the provisions of Clause 53.

2.7.5.5 Accurate Setting Out

Under the Clause 17.1 (5) if the Engineer delays in providing the information required for the Contractor to begin the setting out of the Works and such delay has contributed to the delay of the Contractor to complete the Works before the Date for Completion and the Contractor incurs Costs as a consequence, then,

(a) The Engineer must take the delay into consideration in determining any extended Date for Completion to which the Contractor may be entitled under Clause 44;

(b) The Engineer must certify the additional Costs in accordance with the provisions of the Clause 53.

2.7.5.6 Errors in Setting Out

Under the Clause 17.2(1), the Contractor must make good any errors in the positions, levels, dimensions or alignment of the Works irrespective of the cause of such error. However, under the Clause 17.2(2), if the cause of such error is a direct consequence of wrong data or information provided by the Engineer in writing or in the drawings, and such errors cause the delay of the Works beyond the Date for Completion and the Contractor incur Costs, then,

(a) The Engineer must take the delay into consideration in determining any extended Date for Completion to which the Contractor may be entitled under Clause 44;

(b) The Engineer must certify the additional Costs in accordance with the provisions of the Clause 53.

2.7.5.7 Damage or Loss Due to Employer's Risks

Under the Clause 20.3(2), if damage or loss to the Works and their making good has caused delay to the Works beyond the Date for Completion of the Works, the Engineer must take such delay into consideration In determining any extended Date for Completion which the Contractor may be entitled under the Clause 44 and certify Costs incurred which the Contractor may be entitled under the Clause 53.

2.7.5.8 Failure to Give Site Possession

Under the Clause 41.2 (1), if the Contractor suffers delay from the failure on the part of the Employer to give possession of Site or where applicable access in accordance with the provision of this Clause, and such delay has directly or indirectly caused the delay of the works beyond the Date for completion and the Contractor has incurred Costs as a consequence,

(a) The Engineer must take the delay into consideration in determining any extended Date for Completion to which the Contractor may be entitled under Clause 44; and

(b) The Engineer must certify the additional Costs in accordance with the provisions of Clause 53.

2.7.5.9 Consequence of Suspension

Under the Clause 42.2(1), if the suspension of the Works or part of the Works has caused the delay of the Works beyond the Date for completion and the Contractor incurs Costs, then

(a) The Engineer must take the delay into consideration in determining any extended Date for completion to which the Contractor may be entitled under Clause 44.

(b) The Engineer must certify the additional Costs in accordance with the provision of Clause 53.

2.7.5.10 Extended Date for Completion

Under the Clause 44.1 (1), the Engineer may certify extension to Date for completion of the Works by fixing an extended Date for completion if there is delay to the completion of the Works which has been caused by any of the following events or a combination of them:

(a) Any variation instructed under Clause 51.

(b) Any circumstances or occurrence entitling the Contractor to an extended Date for Completion by reason for an express provision of the Contract.

(c) The occurrence of an Employer's Risk or a combination of these risk.

(d) The relocation of any buried services or mains which are not shown on the drawings.

(e) Any act of prevention or breach of Contract by the Employer.

2.7.5.11 Contractor's Notice

Under the Clause 44.2(1), if the Contractor considers that there will be or has been delay to the completion of the Works beyond the Date for Completion which are caused by the events listed in Clause 44.1(1), he must then serve a notice to the Employer. Furthermore, under the Clause 44.2(2), the notice must include the : (a) appropriate provision in Clause 44.1(1) which is applicable including the express provision of the Contract in the case of Clause 44.1(1)(b) or the details of the act of prevention in the Clause

44.1(1)(e); and (b) the estimated extended Date for Completion which he considers that he is properly entitled to or which he requires to complete the Works. Under the Clause 44.2(3), the Contractor must act with reasonable dispatch in serving the notice required in Clause 44.2(1). Additionally, under the Clause 44.2(4), if the delaying event is still operating when the Contractor serves the notice referred to in Clause 44.2(1), the Contractor must nevertheless within 28 days of the event stops being operative, and update or revise the details which he has submitted earlier.

2.7.5.12 Engineer's Certification

Under the Clause 44.3(1), the Engineer may request the Contractor to submit the information and details to enable him to proper consider and certify an extension of the Date of Completion. The Engineer must notify Contractor within 14 days of receipt of the Contractor notice under Clause 44.2(1) and further information and details under Clause 44.3(1), whether the Contractor is entitled to any extension to the Date for Completion. Under the Clause 44.4(3), the Engineer must within 30days issue the Certificate of Extended Date for Completion if the Contractor is entitled extension of time and he has also notified the Contractor under Clause 44.3(2). Furthermore, if the delaying event on which the Engineer has certified the extended Date for Completion is continuing, the Engineer may nevertheless issue an interim Certificate of Extended Date for Completion.

However, under the Clause 44.3(5), the Engineer must take the following factors into consideration before certifies the extended Date for Completion: (a) the extension to the Date for Completion previously certified if any; (b) the effect of any works omitted from the contract by the provision of Clause 51; and (c) the effect of any substantial decrease in the quantity for any item of Remeasured Works which has a critical impact on the Date for Completion.

2.7.5.13 Certification after Date for Completion

Under the Clause 44.4(1), before the Engineer issues the Final payment Certificate under the Clause 59.2, and irrespective if any notice has been served by the Contractor under the Clause 44.2(1), he may consider and review all events which are among those listed in Clause 44.1 and which have caused delay to the completion of the Works before the Date for Completion. Under the Clause 44.4(2), if the Engineer considers the Contractor is entitled to an extension of the Date for Completion, he must accordingly issue a Certificate of Extended Date for Completion similar to Clause 44.1(2). Furthermore, Clause 44.4(3) stated that the Engineer must not certify any extended Date for Completion earlier than that has already notified to the Contractor in this consideration and review.

2.7.5.14 Defaults of Nominated Sub-Contractor

Under the Clause 57.4(8), upon any termination of the Nominated Sub-Contractor, the Engineer must take the delay into consideration in determining any extended Date for Completion under Clause 44 and the Engineer must certify the additional cost under the Clause 53.

2.7.5.15 Suspension of Works if no payment

Under the Clause 58.4(2), if the Employer continuously fails to make payment after having being served with the notice under Clause 58.4(1), the Contractor may choose either to suspend the works or reduce the rate of works. Additionally, under the Clause 58.4(5), if the Contractor reduce the rate of works, the Engineer must take the delay into consideration in determining any extended Date for Completion under Clause 44 and the Engineer must certify the additional cost under the Clause 53.

2.7.5.16 Notice of Claim

Under Clause 53.1 (1), if the Contractor intends to claim for costs, he must give notice to Engineer. However, under Clause 53.1 (2) the notice must be served not later than 28 days after the commencement of the event giving rise to the claim

2.7.5.17 Valuation of Variations

Under Clause 52, if the variation work are similar and executed under similar condition, then the schedule of rates in contract must be used to value the work. However, if it is not applicable, then reasonable rates in the Bills of Quantities are to be used as a basis or guide to value the work. If Engineer considers both of the rules are not applicable, he must fix rates which are appropriate, fair and reasonable. The Contractor may give notice to Engineer to request fair and reasonable rate under Valuation rule in Clause 52.1(c) if the rate for that item is rendered unreasonable or inapplicable. Furthermore, under Clause 52.5(1), the Engineer may include his instruction for the Variation must be valued on a daywork basis.

2.7.5.18 Records Keeping

Under Clause 53.2 (1), the Engineer may instruct the Contractor to maintain any records that are not mentioned by the Contractor in the notice claim.

2.7.5.19 Contractor’s Responsibility to Make Good Damage or Loss

Under Clause 20.2, Contractor is responsibility to make good damage or loss during the period from the Date for Commencement to the date of issuance of the Certificate of Completion. However, if the damage or loss work is caused by risks that are among the Employer's Risks, under Clause

20.3(2), the Engineer must take consideration to determine any extended date of completion under Clause 44 and certify Costs incurred under Clause 53.

2.7.5.20 Interest

Under Clause 58.3(4), if the Employer fails to pay the Contractor according to Clause 58.3(1), he must pay the additional amount which is calculated in the form of simple interest and is based on the rate stated in the Appendix.

2.7.5.21 Documents to be submitted

Under Clause 14.1, Contractor should submit (a) master programme showing the construction and completion of the work, (b) general method statement,(c) organisation chart, (d) 'S' curves showing the planned financial and physical progress of work, (e) plant utilisation programme, (f) forecast of the labour requirements. However, this clause also listed out the item or requirement need for the above mentioned matter.

2.8 Comparison of UK Delay and Disruption Protocol with Malaysian Standard Contract forms

Table 2.3 shows the result of comparison principles of UK Delay and Disruption Protocol with Malaysian Standard Contract forms. ‘Y’ represents similar principles and ‘x’ represents different principles

Table 2.3: Comparison of UK Delay and Disruption Protocol with Malaysian Standard Contract forms

Item	Principle	Guidance	Similar (Y) or Difference (N)			
			CIDB	IEM	PAM	PWD
1	Extension of Time	Incorrectly said that an entitlement to an EOT automatically carries with an entitlement to compensation for prolongation costs during the period of the EOT.	Y	Y	Y	Y
		Contractor should give notice to the Contract Administrator of any Employer's Risk Events as soon as possible	Y	Y	Y	Y
		Good practice to keeping of records and preparation, acceptance and updating of programmes is followed, then the disagreement about a claimed entitlement to an EOT will be reduced.	Y	Y	Y	Y
		A competently drafted construction contract should contain provision entitling the Contract Administrator on its own initiate to determine an EOT, even if the Contractor has not applied for one or has applied with insufficient information.	N	N	N	N
2	Float as it relates to extension of time	Parties should ensure the float issue is addressed in their contracts	N	N	N	N
		Accurate identification of float is only possible with the benefit of a proper programme that has properly updated.	N	N	N	N

			Similar (Y) or Difference (N)			
Item	Principle	Guidance	CIDB	IEM	PAM	PWD
3	Concurrency as it relates to extension of time	Where true concurrent delay occurs, the Contractor should nevertheless be entitled to an EOT for the Employer Delay to Completion. Separate analysis should be carried out for the concurrent delay events. Analyses should be carried out for each event separately and strictly in the sequence in which they arose. The Employer Risk Event should be analysed first.	N	N	N	N
		Accurate identification of concurrency is only possible with the benefit of a proper programme. The Protocol's has set out the recommendations for preparation of programme in Guidance Section 2.	N	N	N	N
		The simple approach to concurrency adopted by the Protocol aims to provide contracting parties with clarity and certainty about entitlement to EOT at the time delay events occur, rather than waiting for their full effect to be felt and then analysed afterwards.	N	N	N	N
4	Financial consequences of delay Issue	Entitlement to an EOT does not automatically result in entitlement to compensation for the same period.	Y	Y	Y	Y

Item	Principle	Guidance	Similar (Y) or Difference (N)			
			CIDB	IEM	PAM	PWD
5	Valuation of variations	The Protocol is discouraged leave the compensated separately at the end of the contract the prolongation and disruption element of a number different variations and/or changes. Protocol supports the parties to agree in advance of the execution of the variation.	N	N	N	N
		Where it is not practicable to agree in advance the amount, the Protocol recommended that the parties to the contract should do their best to agree the total amount payable as the consequence of the variations and/or changes separately as soon as possible after the variations are completed. Variation clause provides that where the varied work is similar character and conditions to the original work, then the tendered contract rates should be used. Where the work is not similar character or condition with the original work, then the contract rate can be used but with adjusted of the difference circumstances. If the work is quite dissimilar then the reasonable or fair rate are to be determined.	Y	Y	Y	Y
		The Protocol also encourages the standard forms of contract have a provision that where a variation work affects unvaried work, the affected unvaried work may be treated as varied work.	N	N	N	N
6	Compensation for prolongation	The Protocol recommends the contract contained an agreed amount per day that can be applied to each day of prolongation.	N	N	N	N

			Similar (Y) or Difference (N)			
Item	Principle	Guidance	CIDB	IEM	PAM	PWD
7	Concurrency as it relates to compensation for prolongations.	The Contractor should only recover compensation if it is able to separate the additional costs caused by the Employer Delay from those caused by the Contractor Delay.	N	N	N	N
8	Float as it relates to compensation	If as a result of an Employer Delay, the Contractor is prevented from completing the works by the Contractor's planned completion date the Contractor should in principle be entitled to be paid the costs directly caused by the Employer delay, notwithstanding that there is no delay to the contract completion date	N	N	N	N
9	Mitigation of loss	The Contractor must take reasonable steps to minimise its loss and must not take unreasonable steps that increase its loss.	Y	Y	Y	Y
10	Mitigation of delay	The Contractor has a general duty to mitigate the effect on its works of Employer Risk Events.	Y	Y	Y	Y
		The duty to mitigate does not extend to requiring the Contractor to add extra resources or to work outside its planned working hours.	Y	Y	Y	Y

Item	Principle	Guidance	Similar (Y) or Difference (N)			
			CIDB	IEM	PAM	PWD
11	Claims for payment of interest	(a) Interest pursuant to contract, the rate of interest can be agree in the contract and the circumstances in which it will be payable.	Y	Y	Y	N
		(b) Interest as damages/finance charges, it is the position in most area of the business that interest payable on bank borrowing or the lost opportunity to earn interest on bank deposits, the quantifiable as damages where the claimant can show: (i) that such loss has actually suffered and (ii) the loss was within the reasonable contemplation of the parties at the time of contracting.	Y	Y	Y	N
12	Disruption	Protocol recommends when establishing the compensation for disruption it is necessary to isolate issues that can affect productivity but are unrelated to the Employer's liability. For example, weather, plant breakdown	Y	Y	Y	Y
		Contractor should maintain and make available to the CA good site records in order that the CA may carry out proper assessments of disruption.	Y	Y	Y	Y
13	Time for assessment of prolongation costs	Liability for compensation must first be established by showing that the prolongation has been caused by an Employer Risk Event.	Y	Y	Y	Y
		The period to be evaluated is that in which the effect of the Employer Risk Event was felt but not to the extended period at the end of the contract.	Y	Y	Y	Y
14	Acceleration	Unless both party agreed in the contract , compensation is not allowed if the Contractor acceleration for his own record.	N	N	N	N

Item	Principle	Guidance	Similar (Y) or Difference (N)			
			CIDB	IEM	PAM	PWD
15	Preparation of programme	Protocol recommends the parties should reach a clear agreement on the programme. The agreement should cover (i) the form the programme should take, it should be prepared as a critical path network. (ii) Interaction with method statement, it should describe how construct the works and the resources to be use. (iii) the time within which the Contractor should submit a draft programme for acceptance, should be a reasonable time for Contractor to plan the contract works properly. (iv) A mechanics for obtaining the acceptance of the CA of the draft programme. (v) Requirement for updating and saving of the Accepted programme. Additionally, Protocol has provided the guidelines on preparing and maintaining programmes and records, such as initial programme and accepted programme.	N	N	N	N
16	Delay analysis	To use the work programme as a basic of the reference to grant the EOT.	Y	Y	Y	Y
17	Method of delay analysis	As-planned v as-built , Impacted as-planned, Collapsed as-built, Time impact analysis	N	N	N	N

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research refers to a search for knowledge. The purpose of research is to discover answers to questions through the application of scientific procedures. It is to find out the truth which is hidden and which has not been discovered yet (Kothari, 1990).Thus, it is important to decide the method to use of the research.

Research tools are administered on the sample subjects for collecting evidences or data. The tools provide useful data for interpretation of results achieved in the study (Yogesh, 2006). There are several data collection methods, for example, direct observation, participant observation, document analysis, questionnaire and interviews. However, Blessing and Charkrabati (2009) mentioned that data collection should focus on data that can be used and data that can be collected within the constraints of the research project.

This chapter outlines the methodologies used to guide the research. They were explained in systematic and sequence order with regards to the achievement of the objectives. The data analysis also elaborated in this chapter.

3.2 Literature review: comparative approach

The secondary data sources mainly consist of the protocol and the standard forms of contract, for example, PAM 2006 form, PWD 203A form, CIDB 2000 form and IEM.CE 2011 form. Other sources were also collected and referred to journal articles, books, newspapers and internet sources.

Subsequently, comparative study was carried out to compare the existing literature with the protocol. The existing references for delay issues are mainly from standard form of contracts. The different features or principles were used and set as questions in the questionnaire. The purpose of this comparative study is to highlight the new principles from the protocol, which are not practiced or known to the local practitioners. Then, questionnaire survey was conducted to examine the acceptance level of the features of the protocol.

3.3 Semi-Structured Interview

After preparing the questions, it is important to seek local experts' validation and views on the questions. Therefore, semi-structured interview was carried out with two experts before distributing the questionnaire. The semi-structured interview was chosen as its flexibility and semi-rigid form to collect data from the interview (Moore, 2000). The feedback from the experts could enhance and confirm the quality of contents in the questionnaire.

3.4 Questionnaire Survey

Primary data was collected through questionnaire survey in this research. A questionnaire is a form, which is prepared and distributed for the purpose of securing responses. Generally these questions are factual and designed for securing information about certain conditions or practices, of which recipient is presumed to have knowledge. According to the research done from Institute for Work & Health (2008), an advantage of using primary data is that researchers are collecting information for the specific purposes of their study.

It was designed based on the result of comparison the protocol with the Malaysian standard form of contacts. The questionnaire survey would distribute by via post, email, fax or by hand. The details of preparation of the questionnaire survey are discussed in the following section.

3.4.1 Questionnaire Survey Design

Questionnaires are often the best way of gathering the information and views. However, a badly designed questionnaire may get only unusable responses or none at all. Thus, a good design of questionnaire is very important to ensuring a successful result collected.

Questionnaire can be consisted of open-ended and close-ended question. Open-ended question allows the respondents to express their view

without restraint. Close-ended question was selected and used for this research due to this research focused on principles of protocol and Malaysian contract forms. Questions were set using the close-ended in simple with a logical sequence to help the discussion flow. The open-ended was not applied here because the questions were already validated and verified by the local experts and to avoid confusion in data analysis pertaining to the principles are new to the construction industry.

The questionnaire surveys were divided into two parts:

- First part- Background of the respondent
- Second part- Feasibility use of the UK Delay and Disruption Protocol in Malaysian Construction Industry

The first part focused on the background of the respondent, such as organization of employment, position, years of experience handing contract matters, education qualification. The purpose of this part was to clarify the respondent background in order the researcher can do a proper analysis based on the difference background of respondents.

On the other hand, the second part of the questionnaire focused on the questions regarding the feasible use of the protocol in Malaysian construction industry. Seventeen (17) questions were set in this part, where the questions were derived from the comparison between the protocol's principles with the local contract forms. Yet, the methods of delay analysis were not included as one of the questions because the methods were used based on case by case

basis. So, this principle was excluded from the questionnaire in order to avoid confusion. A five point Likert scale ranging from -2(Strongly disagree) to 2 (Strongly agree) was adopted to capture the suitability use of the UK Delay Protocol in Malaysia.

According to Chong and Rosli (2010), the result can be separate to three categories, where the result between -2.0 to -0.5 are under 'Disagree', result between -0.5 to 0.5 are under 'Undecided' and result between 0.5 to 2.0 are under 'Agree'.

3.4.2 Analysis Method

Data collected from the questionnaire survey were analyzed by using Statistical Packages for Social Sciences (SPSS) for Window version 16.0. It is a popular statistics program used in a variety of scientific disciplines which is composed of two facets, the statistical package and the SPSS language, a system of syntax used to execute commands and procedures. Based on the Jorgen et al. (2001) SPSS has three basic files, there are data, syntax, and output or viewer file. Data is the raw data, not to be changed unless you wish to change the data itself. Syntax is a set of written instructions for the programme. Output is produced by the programme, for example, table and graph.

SPSS was selected by the researcher due to its user friendliness and easily understandable data interpretation. The data collected from the

questionnaire would insert to the SPSS system for the analysis. Table 3.1 below illustrates the example of steps that has done by the researcher in order to achieve the goals for the analysis.

Table 3.1: Steps in working with SPSS

Step	Example
1. Define variables	Decide what the variables should be, for example, Variable: 'position'; Value labels: 0='Contract Manager', 1='Quantity Surveyor', 2='Contract Executive'.
2. Enter data	Type all the correct figures for each case and variable, for example, Contract manager=2
3. Choose procedure	Decide what kind of analysis to perform, and whether to produce a table or a graph, for example, Compare Means function.
4. Choose variables	Decide which variables wish to include in the analysis, distinguishing between dependent and independent variables where appropriate.
5. Study results	Examine the graph or table that appears in the output file and decide should do any changes to the analysis.

3.4.2.1 Cronbach's Alpha

Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when you have multiple Likert questions in a questionnaire survey that form a scale and you wish to determine if the scale is reliable. According to Morgan et al (2007), when the

value is larger than 0.70, it is integrated as a great support for the consistency of the results. This research used this test the reliability of the result collected.

3.4.2.2 Mean Analysis

Descriptive analysis was carried .Descriptive statistics were used throughout data analysis in a number of different ways. Descriptive analysis command can be used to determine measures of central tendency (mean), measures of dispersion (range, standard deviation, variance, minimum and maximum), and measures of kurtosis and skewness. From the result of mean analysis, the researcher can further discuss of the feasible use of the protocol into Malaysian construction industry.

3.4.2.3 Kruskal Wallis Test and Mann Whitney U Test

The Kruskal-Wallis Test is the nonparametric test equivalent to the one-way ANOVA and an extension of the Mann-Whitney U Test to allow the comparison of more than two independent groups. It is used when to compare three or more sets of scores that comes from different groups. This research used this test to find out the scores that come from three groups, such as contractors, developers and consultants. However, the results from this test were unable to tell which group would have the different view with another. Therefore, Mann-Whitney U Test was carried out subsequently to determine who would have the different view. It tested two independent groups when the dependent variable is either (a) ordinal or (b) interval but not normally

distributed, such as contractor versus consultant, contractor versus developer and developer versus consultant.

3.4.2.4 Ranking

Furthermore, this research also converted the mean to ranking of the principles. The purpose of ranking is to find out which principle is more feasible to be used in Malaysian construction industry.

3.5 Research Framework

The research methodology provides a guideline to solve the research problem by systematic way and studying how research is done scientifically in order to achieve the research goals and objectives. A research framework should consist of series of actions or steps necessary to effectively carry out the research and the desired sequencing of these steps in order to achieve the goals and objective of the research.

The flowchart diagram below (Figure 3.1) represents the steps, action planning and executed by the researcher. Step 1 was to review the literature review for the UK delay and disruption Protocol and Malaysian standard forms of contract. The comparison method used to investigate the similarity and differences of principles between protocol and Malaysian standard forms of contract. Step 2 was to design the study and develop the research method. Questionnaire has been designed from the result of comparison principles.

Then, the questions were reviewed and suggested to improve by two experts whose familiar in Malaysian standard forms of contract.

Step 3 was data collection through questionnaire survey. It was sent out by hand, postal, fax, email, etc. Step 4 was to analyses data collection, after collected the questionnaire survey, the data has been compare and analysis based on the category of question. The data was analyzed by SPSS, these included the reliability test, means, Kruska wallis test, and Mann-whiteney U-test.

Step 5 was discussion of result, the analyzed data would be further discussed and explained in details. Step 6 was about recommendation and conclusion of research, the research recommended for improvement, such as future study and limitation of research. The conclusion discussed whether the results have achieved the objectives of the research.

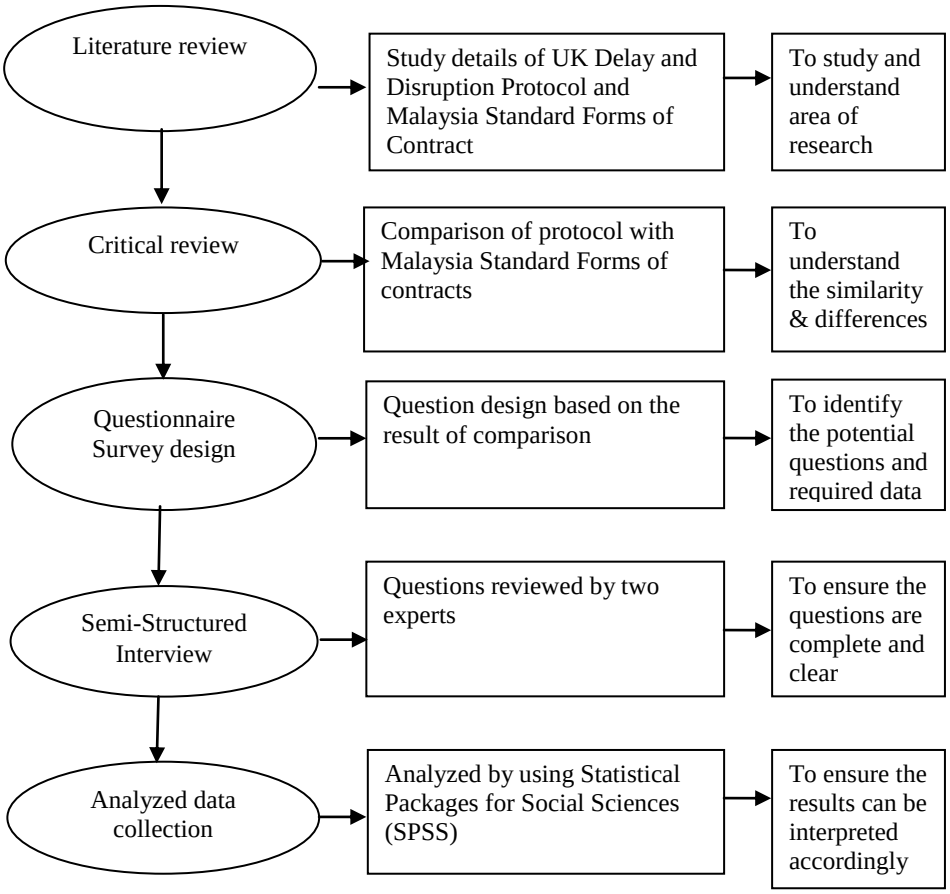

Figure 3.1: Research activities and processes

3.6 Conclusion

The research methodology chapter describes the method of data collected and analysis. The research methods are important and it would enable the researcher to achieve research aim and objectives. The details of the research method has describe clearly in this chapter, such as questionnaire survey, cronbach's alpha, mean analysis, kruskal wallis test and mann whitney U Test and ranking. The result of the data collection and analysis would be discussed in the following chapter.

CHAPTER 4

RESULT AND ANALYSIS

4.1 Introduction

This chapter discusses the results and findings from the survey conducted from October 2011 until March 2012. SPSS was adopted to analyse the data collected. The discussion includes semi-structured interview, questionnaire analysis, feedback of respondent, respondent background, result analysis, etc.

4.2 Semi-Structured Interview

Semi-structured interview was conducted in this research to verify the questionnaire. Two experts were interviewed in this research, namely Expert A and Expert B. Their names were not revealed as to confidentiality concerned. Expert A has more than 25 years working experience in construction industry. He was a contract manager in Gamuda Berhad, he is familiar with the Malaysia standard contract forms, currently he also is an arbitrator in Malaysian Institute of Arbitrators (MIArb). On the other hand, Expert B is a professional Engineer and also a practising lawyer, he has working experience in construction industry more than 20 years and he also expert in construction law. He is chief drafter for latest IEM CE 2011 form and chairperson for CIDB 2000 standard form of contract in Malaysia.

The questionnaire was designed based on the result of comparison of principle between UK delay protocol and Malaysia contract forms. Then, the questionnaire were reviewed by 2 experts have familiar with Malaysia standard form and ever studied about UK delay and disruption protocol. The purpose of questionnaire review by 2 experts is to ensure the questionnaires are able to capture the data needed in order the aim and objective can be achieve. There are total 17 questions has been set for questionnaire survey.

Minor changes were carried out only with regards to the language used and structure of the sentence. There was no addition or omission made to the 17 questions.

As a result, the interview with 2 experts achieved the followings:

1. The questions were set based on the research aim and objectives directly.
2. The questions were clear and easy to understand.
3. The grammar of questions was improved.

4.3 Feedback of Respondents

Total seven hundred and fifty (750) sets of questionnaire survey form were sent out to the Developer, Contractor and Consultant firm. Respondents are consisted from architect, engineer, contract manager, project manager, quantity surveyor or contract executive. All questionnaires were sent out by post or by hand. Table 4.1 shows the number of questionnaires sent out and

the percentage of respondent returned. However, there were only thirty sets of questionnaire survey from each group has used for analysis. The 30 sets are sufficient for analysis according to central limit theorem (Mann, (2005) which the sample size is considered sufficiently large to model the sample mean.

Table 4.1 Feedback of respondent rate

Area	Number of Questionnaires sent out (sets)	Number of respondent returned (sets)	Percentage of respondent returned
Developer	250	30	12%
Contractor	250	30	12%
Consultant	250	30	12%
Total	750	90	12%

4.4 Respondents Position

Table 4.2 shows the position of the respondents. Majority of the respondents were quantity surveyor or contract executive, which consisted of forty one respondents. The remaining were from sixteen architects, fourteen engineers, eleven project managers and eight contract managers.

Table 4.2 Respondents Position

Position	Number of questionnaire collected (sets)
Project Manager	11
Contract Manager	8
Architect	16
Quantity Surveyor/ Contract Executive	41
Engineer	14

4.5 Years of handling contract

Table 4.3 shows the years of handling contract from the respondents, there were twenty eight sets questionnaire survey collected from the respondents less than 5 years handling contract and 62 sets from the respondents more than 5 years handling contract.

Table 4.3 Years of handling contract

Years of handling contract	Number of questionnaire collected (sets)
Less than 5 years	28
More than 5 years	62

4.6 Respondents qualification

Table 4.4 shows the respondent qualification, there are 11 sets questionnaire survey collected from the respondents with Diploma holder, 63 sets from the respondents with Degree holder, 15 sets from the respondents with Master holder and 1 sets from the respondents with Phd holder.

Table 4.4 Respondents qualification

Qualification	Number of questionnaire collected (sets)
Diploma	11
Degree	63
Master	15
Phd	1

4.7 Result analysis

Table 4.5 shows the result analysis from SPSS. From the result collected, there were total 13 principles under agree category (0.5 until 2), 4 principles is under neutral category (-0.5 until 0.5) and none principle is under disagree category (less than -0.5).

Table 4.5 Summary of result analysis

Item	Description	Mean	Std. Deviation	P-Value
1	EOT application	0.4667	1.1238	0.033
2	Float address	0.8333	0.7533	0.316
3	Float identification	1.0667	0.667	0.914
4	Float Ownership	0.1222	0.922	0.501
5	Concurrency analysis	0.9444	0.8395	0.872
6	Concurrency identification	1.0778	0.7379	0.144
7	Valuation variation	0.9000	1.0605	0.35
8	Compensation prolongation	0.4667	1.0726	0.004
9	Concurrency prolongation	0.9111	0.8023	0.074
10	Claim interest	0.6111	0.8956	0.839
11	Acceleration payment	1.1667	0.6043	0.783
12	Acceleration compensation	0.3444	1.0511	0.095
13	Form Programme	1.0333	0.7103	0.019
14	Method statement	0.9889	0.8002	0.225
15	Draft programme	1.1889	0.6852	0.019
16	Acceptance programme	0.6556	0.8095	0.843
17	Update Programme	1.2556	0.6458	0.076

The agreed principles were:

1. Parties should ensure the float issue is addressed in their contracts,
2. Accurate identification of float is only possible with the benefit of a proper programme that has properly updated.
3. Separate analysis should be carried out for the concurrent delay events. Analyses should be carried out for each event separately and strictly in the sequence in which they arose but the Employer Risk Event should be analyzed first.

4. Accurate identification of concurrency is only possible with the benefit of an updated programme.
5. The parties need to agree in advance for compensation on prolongation (cost) and disruption (time) before the execution of the variation.
6. The Contractor should only recover compensation if it is able to separate the additional costs caused by the Employer Delay from those caused by the Contractor Delay.
7. Interest pursuant to contract, the rate of interest can be agree in the contract and the circumstances in which it will be payable.
8. Payment for the acceleration should be based on the term of the contract. Otherwise, the basis of payment should be agreed before the acceleration is commenced.
9. The form the programme should take, it should be prepared as a critical path network.
10. Interaction with method statement, it should describe how to construct the works and the resources to be use.
11. The time within which the Contractor should submit a draft programme for acceptance, this should be a reasonable time for Contractor to plan the contract works properly.
12. A mechanism for obtaining the acceptance of the Contract Administrator of the draft programme, for example, providing the Contractor complies with the contract, he may construct the works in the manner it thinks appropriate.
13. Requirements for updating and saving of the Accepted programme, the Contractor should update the actual progress on the accepted

programme, for example, actual start and actual finish date for activities.

The neutral principles were:

1. Construction contract should contain provision entitling the Contract Administrator on its own initiate to determine an EOT, even if the Contractor has not applied for one or has applied with insufficient information.
2. Ownership of float should be used up based on first come first serve basis and nobody actually owns it.
3. The contract should contain an agreed amount per day that can be applied to each day of prolongation by the Contractor. This is the reverse of the normal Employer's liquidated damages provisions.
4. Where the acceleration is instructed and/or agreed, the Contractor is not entitled to claim compensation.

Based on the result above, it is clearly shows 13 principles were under agree category for feasible use in Malaysian construction industry. These probably the agree principles are fair to each organization and probably the principles will prevent or reduce the dispute in contract issue.

However, there are 4 principles were under neutral category. These probably the neutral principles are not fair and only advantage to certain organization. Thus, the neutral principles probably will confuse the involve parties and cause the dispute in contract.

Eventually, there is none for the disagreement on the principles. It shows that the principles are relevant but it is varied in terms of the acceptance level for its application into Malaysian construction industry.

4.8 Kruskal–Wallis test & Mann-Whiteney U-Test

Kruskal–Wallis test was adopted to analyse this research. It was used to compare the scores that come from 3 organizations. Kruskal–Wallis test indicated that 2 principles means of three groups are difference because the variables' P-value smaller than critical value of significance 0.05 (Morgan et al., 2007), it means there are different views from the three groups based on Table 4.6 below. The principles are (1) The form the programme should take, it should be prepared as a critical path network, (2) The time within which the Contractor should submit a draft programme for acceptance, this should be a reasonable time for Contractor to plan the contract works properly.

Further, there is a need to apply Mann-Whiteney U test to determine which group against another with regards to the two principles as mentioned earlier. Table 4.6 shows the result of the test. It reveals that consultant and developer have different view. It is probably able to explain some of the consultants or developers have their own format or system for work programme, or consultants are more concerned on paper work such as claim and variation order but the developers are more concerned on project status, therefore, they have differences view of these principles.

Table 4.6 Mann-Whiteney U-Test

Principles	P-value (Contractor & Consultant)	P-value (Developer & Contractor)	**P-value (Developer & Consultant)**
Form Programme	0.329	0.072	**0.006**
Draft Programme	0.223	0.110	**0.005**

4.9 Ranking of principles

The ranking of all principles is demonstrated as to understand the most favourable principles that applied in the construction industry. Table 4.7 shows the ranking of principles.

Table 4.7 Ranking of principles

Item	Description	Mean	Ranking
1	Update Programme	1.2556	1
2	Draft programme	1.1889	2
3	Acceleration payment	1.1667	3
4	Concurrency identification	1.0778	4
5	Float identification	1.0667	5
6	Form Programme	1.0333	6
7	Method statement	0.9889	7
8	Concurrency analysis	0.9444	8
9	Concurrency prolongation	0.9111	9
10	Valuation variation	0.9000	10
11	Float address	0.8333	11
12	Acceptance programme	0.6556	12
13	Claim interest	0.6111	13
14	EOT application	0.4667	14
15	Compensation prolongation	0.4667	14
16	Acceleration compensation	0.3444	16
17	Float Ownership	0.1222	17

Based on the result above, the ranking were: (1) Update Programme which was mean 1.2556 , (2) Draft Programme which was mean 1.1889 , (3) Acceleration Payment which was mean 1.1667, (4) Concurrency Identification which was mean 1.0778, (5) Float Identification which was mean 1.0667, (6) Form Programme which was mean 1.0333, (7) Method Statement which was mean 0.9889, (8) Concurrency Analysis which was mean 0.9444, (9) Concurrency Prolongation which was mean 0.9111, (10) Valuation Variation which was mean 0.9000, (11) Acceleration Payment which was mean 0.8333, (12) Acceptance Programme which was mean 0.6556,

(13) Claim Interest which was mean 0.6111, (14) Compensation Prolongation and EOT Application which was mean 0.4667, (16) Acceleration Compensation which was mean 0.3444, (17) Float Ownership which was mean 0.1222. From the analysis above, the ranking from 1st to 13th are under agree category and 14th to 17th are under neutral category based on the data collected.

Based on the analysis above, the top 3 rankings were: requirements for updating and saving of the accepted programme, the time within which the Contractor should submit a draft programme for acceptance, and Payment for the acceleration should be based on the term of the contract. These three principles are high ranking probably they can improve the contract issue and reduce the dispute issue in Malaysian construction industry, when there is a clear logical sequence and relationship for the tasks involved a project that illustrated in the work programme . Thus, it is agreed and accepted by most of the respondents.

Additionally, for the ranking 4^{th} to 13^{th} which were under agree category also represent the principles is accepted and agree by most of the respondents. These principles probably theoretical would improve the contract issue but there are less or never discuss in Malaysian standard contract forms. For example, float and concurrent delay issue.

However, for the ranking 14^{th} to 17^{th} which were under neutral category and low ranking. These principles are not accepted and rejected by

most of the respondents, probably these principles were risky and difficulty to apply in Malaysian construction industry. Further, some of these principles are less or never discussed in Malaysian standard contract forms. For example, float ownership, compensation prolongation and acceleration compensation. Thus, the result shows these principles under neutral category.

Table 4.8 Ranking of respondents less than 5 years and more than 5 years handling contract matter

Item	Description	Less than 5 years	Ranking	More than 5 years	Ranking
1	EOT application	0.6071	13	0.4032	15
2	Float address	0.8929	8	0.8065	10
3	Float identification	0.8571	10	1.1612	4
4	Float Ownership	0.1429	16	0.1129	17
5	Concurrency analysis	1.1071	2	0.8709	9
6	Concurrency identification	0.9285	6	1.1451	5
7	Valuation variation	1.1071	2	0.8065	10
8	Compensation prolongation	0.6071	13	0.4032	15
9	Concurrency prolongation	0.7500	11	0.9838	8
10	Claim interest	0.7500	11	0.5483	13
11	Acceleration payment	1.1071	2	1.1935	3
12	Acceleration compensation	0.1071	17	0.4516	14
13	Form Programme	0.9642	6	1.0645	6
14	Method statement	0.8929	8	1.0322	7
15	Draft programme	1.071	5	1.2419	2
16	Acceptance programme	0.6071	13	0.6774	12
17	Update Programme	1.2500	1	1.258	1

Table 4.8 shows the result of mean and ranking for the respondents which have less than 5 years and more than 5 years of handling contract matters. There are 28 respondents were less than 5 years of handling contract matters and 62 respondents are more than 5 years of handling contract. Based on the result collected for less than 5 years' experience of handling contract matters, there are total 15 principles are under agree category (0.5 until 2), 2 principles is under neutral category (-0.5 until 0.5) and none principle is under disagree category (less than -0.5). The results above are almost similar to the overall result of this research, although the overall result have 4 principles are under neutral category, the table above is clearly shows that 2 same principles is under neutral category and another 2 principles were low ranking and low points (0.6071) even though there are under agree category.

Based on the result collected for more than 5 years' experience of handling contract matters, there are total 13 principles are under agree category (0.5 until 2), 4 principles is under neutral category (-0.5 until 0.5) and none principle is under disagree category (less than -0.5).

The results above are similar to the overall result of this research, agree and neutral category principles is100% same as the overall result.

4.10 Discussion

The principles related to work programme received a very positive feedback from the construction industry. It serves as a useful tool to overcome the delay and disruption issues. Unfortunately, our local contract forms provide limited references or information on this area. A more comprehensive coverage of contract provision is necessary for regulating or using the work programme.

The research has answered some doubts over the feasible use of the Protocol in Malaysian construction industry. Most of the principles of the Protocol could be applied by referring to the local practitioners. No principles were rejected or disagreed by the respondents. It requires further investigation especially on those principles under neutral category. It could have other reasons or possible solutions for those principles.

Apart from that, the questions were designed in a generic manner in the questionnaire, which are the principles could be used in any delay and disruption issues of a construction project. Some of the specific principles are targeted for certain situations of the project, for instance, the delay analysis methods, that is, collapse as-built, as-planed v as-built and time impact analysis. However, the questionnaire approach was selected with regards to the research aim. This matter is not the scope of this research.

Overall, the agreed principles are extremely useful for future reference from either academic or practical perspectives because they can be applied as the contract provisions in local contract forms in the future. Nevertheless, the contract drafters should consider the generalisation of the agreed principles so that it will not target on case by case basis.

4.11 Conclusion

In conclusion, the analysis above is clearly stated most of the principles are under agreed category and only few principles are under neutral category. In other words, there are none of the principles are under disagree category. These principles of delay UK Protocol can improve Malaysian construction contract issue and bring advantages to the construction industry.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter discusses the conclusion, limitation and recommendation of the research. It also describes how the research objectives have been achieved based on the results analysis from the previous chapter.

The aim of study in this research is to investigate the feasible use of UK delay and disruption Protocol in Malaysian construction industry. This research consists of two objectives, which are (a) to critically review the similarities and differences of the UK delay and disruption Protocol through a detailed literature study that available in Malaysia and (b) to examine the feasibility of the principles UK delay and disruption Protocol to be used in Malaysia construction industry.

5.2 Similarities and differences of the UK delay and disruption Protocol through a detailed literature study that available in Malaysia

The similarity and differences of the principle of UK delay protocol and Malaysian standard contract forms were reviewed. This first objective was achieved through a detailed study of principles of the protocol and further used

a comparison method to find out the similarity and differences of the principles with the existing sources of reference.

Twenty three (23) principles were comparing, the result showed that 11 principles were difference and 12 principles were similar. The similarity principles included financial consequences of delay Issue, mitigation of loss, mitigation of delay, disruption issue, time for assessment of prolongation costs and delay analysis. On the other hand, the differences principles included EOT issue, float issue, concurrency issue, valuation of variation, compensation for prolongation, claims for payment of interest, acceleration issue, preparation of programme and method of delay analysis.

5.3 Feasibility of the principles UK delay and disruption Protocol to be used in Malaysia construction industry

The second objective is to find out the feasibility of the principle of UK delay and disruption Protocol to be used in Malaysia construction industry. The questionnaire survey was conducted in the construction industry and collected from the developers, Contractors and consultants. Based on the result analysis and discussion, the researcher found out thirteen (13) principles feasible use in Malaysia constriction industry. They are:

1. Parties should ensure the float issue is addressed in their contracts.
2. Accurate identification of float is only possible with the benefit of a proper programme that has properly updated.

3. Separate analysis should be carried out for the concurrent delay events. Analyses should be carried out for each event separately and strictly in the sequence in which they arose but the Employer Risk Event should be analyzed first.
4. Accurate identification of concurrency is only possible with the benefit of an updated programme.
5. The parties need to agree in advance for compensation on prolongation (cost) and disruption (time) before the execution of the variation.
6. The Contractor should only recover compensation if it is able to separate the additional costs caused by the Employer Delay from those caused by the Contractor Delay.
7. Interest pursuant to contract, the rate of interest can be agree in the contract and the circumstances in which it will be payable.
8. Payment for the acceleration should be based on the term of the contract. Otherwise, the basis of payment should be agreed before the acceleration is commenced.
9. The form the programme should take,it should be prepared as a critical path network.
10. Interaction with method statement, it should describe how to construct the works and the resources to be use.
11. The time within which the Contractor should submit a draft programme for acceptance, this should be a reasonable time for Contractor to plan the contract works properly.
12. A mechanism for obtaining the acceptance of the Contract Administrator of the draft programme, for example, providing the

Contractor complies with the contract, he may construct the works in the manner it thinks appropriate.

13. Requirements for updating and saving of the Accepted programme, the Contractor should update the actual progress on the accepted programme, for example, actual start and actual finish date for activities.

These principles were derived from the protocol and accepted by the professionals in terms of its feasibility use and application into Malaysian construction industry. Contract drafters should consider applying the principles in drafting the standard form of contract in the future.

5.4 Limitations

This research has some limitations in terms of its research approach. The limitations are as follow:

- This research only used questionnaire survey to collect result from developers, contractors and consultants.
- The respondents required to spend a lot of time to study and understand the questions.
- The respondent rate was relatively low, which 90 out of 750 sets were returned.
- Only 90 sets questionnaires were used in this research.
- This research only focused on PAM form, CIDB form, IEM form and PWD form.

5.5 Recommendations

The researcher recommends some areas of improvements for future research. They are:

- To compare international contract forms with the principles of the Protocol.
- To conduct case study of applying the agreed principles into contract forms.
- To examine the neutral principles in details.
- To draft the contract provisions of EOT and compensation for future contract forms by referring the Protocol.

5.6 Conclusion

In conclusion, standard form of contract is the common method to be referred in solving the problem of delay in Malaysian construction industry. However, the contract form has limited information and guide to the contracting parties. There is a need to learn from other practices to cope with the delay issue and problem, particularly on the UK Delay and Disruption Protocol. Therefore, the feasibility study was carried out. The research has demonstrated that most of the principles and guidelines of the protocol could be used in Malaysian construction industry. Thus, it renders an important insight for future contract drafting, which to incorporate agreed principles of the Protocol for the delay and disruption issues in construction projects.

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Appendix A

Publications

1. Tan CK, Chong HY and Omar M, *The Suitability of Applying Delay and Disruption Protocol in Malaysian Construction Industry*, 1st International Construction Business and Management Symposium (ICBMS 2011), UTM International Campus, Kuala Lumpur, Malaysia, 21-22 September 2011. (Published)

2. Application of core features of the Delay and Disruption Protocol: A quantitative approach. (In preparation)