Effective Risk Management – Achieving A Win-Win

This paper seeks to set out the need for developing and establishing a proper logical process of construction contracting and managing so that a construction project can be successfully carried out with as minimal impact on planned time and budgeted cost. Likewise, it seeks to highlight that this can only be achieved by ensuring that there is a win-win situation for all involved such as the contractor and that this must entail setting up effective standards from the start.

Whilst many believe that the ambition of completing on time and within cost is not merely ambitious but downright wishful thinking, this paper seeks to provide methods that may bring you closer to achieving that goal. It must however be remembered that to achieve this, you will need the full assistance of a willing and able contractor. That is why a win-win risk management has to be the standard.

Risk Identification and Allocation – A Necessary Step

Construction, A Risky Business!

1. The archives are filled with the history of problems faced in construction projects worldwide whether it is a mega multi-international project, complex type of project or even small local projects. In fact, our own experience will show that even for small renovation works, there can be comparatively big problems. The industry is notorious for problems and claims.

2. Variations, delays and disruptions with its ensuing claims or cost impacts are the common features of every type of construction project. The escalation of construction cost either suffered by the owner or the contractor and the

inevitable delays along with the opportunity loss and the increased financing cost have been the hallmark of the construction industry.

3. It seems that these standard problems worldwide have been on-going for centuries without any sight of control. We only have to look at Malaysia to see the number of reported problems with construction projects and to realize that the control mechanisms are not in place. The Matrade building[1], the Kuching Prison and now the latest episode of the highway in Johor to the new customs, immigration and quarantine complex which was budgeted at RM250million but now reported as having ballooned to RM470 million, are some of the more published examples simply because they are public sector projects involving tax-payer's monies. However, Malaysia is rife with even private sector projects that have been abandoned, scaled-down and delayed.

4. We Malaysians are not alone. This is a global problem. In the UK, surveys show that there are a large number of delayed and cost-overrun projects[2]. Even the UK has its list of infamous construction projects such as the Scottish Parliament building known as Holyrood[3].

5. Dr. Julian Crtichlow in his introduction to the series of papers termed as "The Great Delay Analysis Debate" quotes:-

"It has been said that the only major construction project to finish on time and to budget was a church where, presumably, divine intervention played a role"

6. It has to be understood that this is not a peculiar problem to any particular type of project but it in fact is a problem that infects all sorts of projects, at all types

[1] Original cost of RM167million had experienced a cost overrun of RM119.5million with extensive delays

[2] 1999 survey in the Construction News (18.4.1999) shows that 58% of private projects are delayed and 32% suffer cost-overruns. It also shows that 66% of the UK Government projects suffer delays of more than 2/3 of the original period prescribed. In 2002 these figures remained the same.

[3] A delay of 3 years and GBP150million cost-overrun. The Holyrood enquiry report in 2004 by The Rt. Hon. Lord Fraiser of Carmyllie QC laid the blame squarely on design delays, over-optimistic programming and uncertain authority.

of locations, within all types of legal systems, cultures, languages and protocols or practices. Delay, variations and disruptions are universal to all construction and civil engineering projects and it seems that it cannot be avoided.

7. Construction is a risky business but one must be aware that it can be tamed and controlled. One must be aware of the type of risks as far as possible and the techniques to manage or control the risk. To quote Sir Michael Latham[4]:-

"no construction project is free of risk. Risk can be managed, minimized, shared, transferred or accepted. It cannot be ignored."

8. Once the risks are understood and identified, there must be an exercise in allocation. Who is to bear the risks and how is it to be clearly stated in the contract? Can and ought this risk be shared? Can this risk be passed on to others like the insurance company? Can this risk be managed effectively so that it is avoided or mitigated when it does take place? These are some of the general issues that ought to be considered at the allocation stage.

9. Normally one would think that after the risks have been allocated and the contracts are executed, the concerns of the parties then switch to the job but whilst progressing in the job, the other essential general questions that prevent the managing and the completing of a successful project for both the developer/owner and the contractor starts show its ugly head, namely:-

- If a risk event arises, do the contract conditions and terms clearly set out who is responsible?;

[4] In the Final Report on the Government/Industry Review of Procurement and Contractual Arrangements in the Construction Industry prepared by Sir Michael Latham.

- For the benefit of the project, are there any methods by which either the owner/developer or contractor can mitigate the effects of the risk event?;

- Can the effects of the risk event be conclusively proven or disproved?;

- Is there an effective forum where any disputes on the risk allocation and the effects of the risk event can be resolved?

10. However, all the above concerns are clearly matters that ought to be addressed prior to any execution of any contracts. If one is to ensure that solutions to the above questions are to be effective, they must be thought out at the allocation of risk stage and drafted into the contract or specifications or negotiated with the contractor.

11. Today in the construction industry, there are effective processes available for a contractor and even a developer/owner to utilize and to help them focus their mind on the kind of risks that may exist within a particular project and the risks that obviously arise based on their own abilities or lack of abilities and potentially the abilities of others within the project.

12. These tools then allow a party to determine and establish the following:-

- the chances of any particular risk occurring;

- who should be allocated the determined risk;

- ensuring that the allocation is effective;

- managing the particular risks in any event so that the effects are mitigated;

- ensuring that the appropriate standard of cause to effect is required thereby minimizing exposure to excessive claims;

- ensuring that there are clear and precise but also achievable standards of cause to effect which would ensure that proper claims would be compensated.

13. With an effective implementation of the above considerations, it provides parties with some degree of control, management and ability to mitigate risk effects, when the risk events inevitably occur. Further, when the risk effects end up causing a financial loss, it provides a clear understanding of who is to be responsible and to what extent, thereby encouraging settlement of claims or expedient determination of disputes with some degree of certainty.

14. The starting point is to consider the process for determining the risks and its allocations, which in turn will focus the parties carrying out the exercise to determining the standards required to resolve the other management of project questions.

The Risk Allocation Techniques

Identifying the Risk

15. There are international contract drafting experts who have tried to create spreadsheets setting out the variety of risks for a variety of projects as a technique in advising their clients on the choice of standard forms as the conditions of contract and its possible amendments. These spreadsheets run into 100s of risks.

16. Essentially developers/owners tend to have 3 broad concerns namely cost, time and quality. Contractors on the hand have 4 broad concerns namely being paid the value of works and on time, recovery of cost for variations, delays and disruptions, interference by 3rd parties and unforeseen contingencies in respect of the method of construction and temporary works. Further depending on who has the responsibility for the design, the broad concerns related to the design

would be as to the sufficiency of the design for its purpose, sufficiency of design information for construction and the requirements of the regulatory authorities.

17. All the potential risks should and ought to be captured within these broad spectrums of concerns. Any other risks outside the spectrum ought to be risks that are essentially shared or passed on.

18. Academics have tried to categories the various risks applicable into neat compartments that focus the mind to the allocation of risk exercise. Once identified, all the risks within a particular category are then either placed on the developer/owner or contractor or shared. The type of categories that come to mind are legal disputes, design, buildability, biddability, construction, financial, political and insured risk.

19. Whatever categorization is used, it is essential that one can still identify what type of risk falls within the categories and then make a decision as to who is to bear the risk. This is commonly known as risk allocation.

20. As a developer/owner, there is also a need to identify where the risks can be controlled and minimized because merely allocating the risk to one party does not resolve the essential problem which is that the construction project itself ultimately would suffers the risk which indirectly affects the developer/owner.

21. There must also be an appreciation that mere allocation of risk does not mean that the risk at all times will be maintained with the party so allocated. It must be recognized that conduct during the progress of a project may cause the risks allocated to switch. Therefore if possible, even these areas must be identified and considered.

22. Generally speaking, the first step is to define and know your own objectives and to identify the potential courses of action to attain these objectives. Then you need to identify the factors that present a risk or an opportunity, in so far

as it either hinders or promotes the attainment of the objectives. Thereupon, the course of action that presents the maximum ratio of opportunity to risk co-related to the objectives, ought to be the course of action adopted.

23. On of the items that presents an issue of risks and affects the objectives, is the site itself. At the feasibility stage, many questions must be asked of the project site so that the likely impacts and therefore the likely risks will be identified. A checklist of the questions to be asked is attached at Addendum 1A.

24. The process of determining and allocating risk is fundamentally linked to the drafting of the conditions of contract, which is effectively the choice of standard form conditions of contract and any amendments thereto. It may also involve the drafting of terms in the specifications especially as to items of works within the preliminaries.

25. The risk allocation process should generally be:-

- the identifying of the general objectives or some of the main criteria for the Project. The design and supervision responsibility and the importance of a fast completion will dictate the choice of the contractual relationship and the price mechanism;

- once these general objectives are determined along with the procurement or contractual relationship and the price mechanism, identify and make a conscious decision on the allocation of various risks arising therefrom, namely whether to retain the risk, transfer the risk, share the risk and even insure the risk if possible. This would then determine the conditions that ought to be in place to meet the objectives. It must however be understood that it would be natural to fail to have foresight of all risks which human and nature can create, as they are truly infinite;

- allocate the risk through the conditions of contract or even the specifications or drawings but ensure that it is clear, unambiguous, consistent and complete. This process cannot be stressed enough. Almost all disputes arise to some extent due to lack of clarity or ambiguity with the Contract Documents and the allocation of risks. Good draftsmanship (if there is such a thing) is the essence of minimizing disputes. The more complex a provision or a condition especially those with extensive sub-provisions and cross-references, the more likely interpretation ambiguities will arise. The need for clarity is even more important in the international market where parties have differing legal traditions and therefore differing expectations and understandings as to the effect of certain provisions. Alas it would be delusional to believe that the perfect draft of all contractual allocations can be achieved because language is after all an imperfect tool.

Principles on Risk Allocation

26. If risks are not allocated, then the law tends to take the position that any matter directly within the control of the developer/owner or his agents will be the developer's/owner's risks and all others including neutral events not caused or within the control of either party, will be the contractor's risk. The contractor's risk would even include the soil conditions as that is seen as a buildability risk[5].

27. The allocation of risk has a correlative effect on planning, time, cost and the bid. On the developer's/owner's part, the more risks that are placed on a contractor, the more likely the cost of construction will escalate. On the contractor's part, the higher the bid the more unlikely the award.

[5] Bottoms v Mayor of York [1892] Hudson's Building Contracts 4th edition, volume 11, page 208

28. There should also be a recognition by the parties that placing excessive risks on the other may jeopardize the other's solvency and in the end, that cannot be in their own best interest.

29. Therefore an essential element in allocating risk is the practice of certain general ethos or baseline principles that ought to prevent the costs from escalating or will allow a strong bid and reduce the likelihood of disputes:-

- an identification of one's own weaknesses and strengths related to the various likely risks;

- where the strengths surmount the weaknesses in any particular risk, one should assume the risk and not factor the same into the rates;

- where one is more capable of controlling and shouldering the risk arising from one's familiarity, experience and ability in controlling the risk, then one should assume the risk and not factor the same into the rates;

- where one is more able to influence the magnitude of the risk and to therefore minimize the risk, then one should assume the risk and not factor the same into the rates and use the opportunity to treat the risks so allocated as motivational towards minimizing and controlling it (this is sometimes known as the "least-cost risk bearer");

- where the risk can be transferred to 3rd parties through insurance for example, this should be encouraged. For a contractor, some risks can be transferred to and borne by its sub-contractors, especially where a right to claim and recover is then limited to a like right and amount of recovery by the contractor from the owner/developer;

- where a risk is wholly outside each parties' control, then risk sharing is also encouraged. This is applicable to force majeure and inclemental

weather (mere bad weather risk is usually borne by the contractor and inclemental weather risk is usually borne by developer/owner);

- certain risks are placed based on overall objectives of the project depending on whether time, quality or cost is the driving factor;

- and finally some parties chose to use the foreseeability model with distinctions applied to risk that are "known", "known-unknown" and "unknown-unknown". Known risks to a contractor are transferred to the contractor, known-unknown is divided to 2 categories, one being reasonably foreseeable and the other being remotely foreseeable where the former is transferred onto the contractor and the latter is kept by the developer/owner and the unknown-unknown is shared, transferred to insurers or borne by the developer/owner.

30. There are various views on the baseline principles to be adopted but they are generally the same[6]. In fact some professional bodies have set up models to be used but their models are based on specific emphasis to elements such as cost.

31. Whichever risk analysis models are used, they will all be based on a set of assumptions but these assumptions, depending on how much effort on research is made, can be fairly constructive and informed, making the results more likely to be accurate.

32. There is a need to develop a systematic and objective management of risk into a project planning and execution programme, for both developers/owners and contractors. There is a need for all relevant organizations to establish philosophies, attitudes and procedures designed to reduce uncertainties,

[6] Abrahamson Max W, "Risk Management" [1984] ICLR 241
The Australian Joint Working Party , "No Disputes: Strategies for Improvement in the Building and Construction Industry (the No Dispute Report) [1990]
Construction Industry Institute of the USA, "Allocation of Insurance Related Risk and Costs in Construction Projects [1993]

claims, to stimulate informed bidding, to increase awareness amongst all parties and key staff involved, to reduce unenforceable contract language and to allow easy and efficient contracting practices which are more cost effective.

33. The organizations can do so by[7]:-

- Forming a task-force or committee of project knowledgeable stakeholders. These should include consultants or experts, previous experienced personnel of the organization, the project team with their knowledge of the site (this is an important aspect as the proposed team will understand and better implement the views gained in the risk allocation and management process);

- Setting up a workshop to identify and then predict the frequency and severity of risks and prioritize those risks warranting further attention. A comparative study can be made through research of the projects in the near vicinity, previous projects involving the parties and any previous similar projects carried out by the organization and the proposed team;

- Draft working papers should be circulated to the various experienced personnel in the organization with the possibility of further comments or thoughts;

- Setting up a separate workshop to develop a specific risk management implementation plan based on severity or frequency of the risk taken up by the party;

- Contract administration training and contract familiarization.

[7] Paper delivered by Smith Robert J at the 2nd Civil Engineering Conference in the Asian Region at Tokyo 2001

34. It has been recognised that misallocations of risk is the leading cause of construction disputes[8]. Further, an enhanced and a broadened cognisance of the wide range of risks that could materialise will result in better informed and more prudent designs, improved specifications, better informed bids, improved project communications and it ought to enhance the contract administration practices.

35. A general list of risks is attached as Addendum 1B and it is in no way to be construed as an exhaustive list. The list has also been divided to the various suggested allocations[9].

36. The checklist or qualitative analysis employed can be varied to reflect how much thought has gone into the allocation process. It is felt that the checklist should at all times identify not merely the risk and the party so allocated but should contain the specific causes or weaknesses within the risk categories that give rise to concerns had by the party preparing the checklist and the likely effects of the risk.

37. Only then can the persons involved in the risk allocation process also put their minds to the other very important matter that should be covered in the checklist namely, what are the preventive measures (not the contract clauses) that can be employed to avoid, abate and reduce the chances of the risk occurring. As previously stated, the developer/owner should consider this fact even if the risk is intended for the contractor, simply because it still remains a risk of the project.

38. The checklist should also include a corrective consideration as to the intended steps for mitigating the risk or limiting the consequences of the risk, reducing

[8] In the USA, Center for Public Resources Inc [1991]
[9] Smith, Robert J, "Allocation of Risk – The Case for Manageability"

the uncertainty of the outcome of the risk event, passing the consequences to 3rd parties and handling the same once the risk event has occurred with some risk mitigation processes. To this analysis, should be added any further consideration of any causative and legal liability risk handling possibilities that ensure the party exposed is only exposed to a fair and reasonable financial outcome of the risk event.

39. A contractor is also encouraged to deal with the risks allocation and handling analysis in its planning and scheduling processes, as well as to carry out such an analysis for the risks arising from its sub-contractors and suppliers.

40. An example of the risks qualitative analysis checklist as suggested by us is attached as Addendum 2.

The Allocation of the Design And Supervision Risk – The First Factor in the Process

The Contractual Structure

41. Part of the process of identifying the risk commences with the choice of procurement of the project or the choice of the contracting relationship. This particular choice in itself requires an exercise of assessing to what degree the developer/owner can manage its own risk. This would then determine the procurement approach and will clearly dictate the cost budget for the project.

42. In deciding on the choice of procurement or contracting relationship, a developer/owner must consider 2 main issues namely the design function and the supervision and co-ordination of the construction works function. The determination of where the risks related to both these items ought to be placed, will then dictate the contractual relationship chosen.

43. A design risk placed on a contractor may not result in an increased cost simply because the contractor has an opportunity to design a structure which can be built more cheaply and quickly.

44. There are also other considerations such as funding or financing or a need for a fast completion (military project) that may require a completely different structure to the contractual relationship with its dictated ensuing risk allocations.

45. Local conditions such as the experience and technological ability of the contractors or sub-contractors will also be a factor for consideration.

46. Therefore the developer/owner will have to consider the following options:

Traditional Structure

45.1 most commonly known as the pure construct or build contracts, where the developer/owner appoints its own designer who, based on the conceptual requirements, produces a set of design drawings that ought to be sufficient for construction;

45.2 within this structure, there can be instances where these designs are not sufficiently advanced (fast track projects) and the contractor is asked to take responsibility over some aspects of the detailed design;

45.3 there are also instances where there is an options for alternative or altered designs suggested by the contractor and accepted, renders these aspects of the design as wholly within the contractor's responsibility;

45.4 however, the essence of these traditional structures is that normally the developer/owner is responsible for the design vide his agent, the designer, and is also responsible for the supervision and co-ordination of the project. Generally the designer or the group of consultants would

carry out the project supervision, guiding and controlling the contractor during the progress of works and most importantly supervising the interface between the design and the construction;

45.5 there are some distinct factors that generally have to be considered in deciding whether to adopt this structure namely:-

(i) is it a specialized project with a specialized concept that requires the input of professional and independent designers;

(ii) further, is it a project where a contractor's technical capacities may not correspond with the type, complexity and standards required;

(iii) is the developer/owner uncertain of what concept is required and seeks to settle this issue first before deciding to construct;

(iv) is the design concept settled but time is not of the essence;

(v) is the design concept settled but time is of the essence. If this is the case, then having a distinct design phase from the construction phase, and requiring a contractor to familiarize itself with the design and technological requirements may prolong the entire process;

45.6 if such a structure is to be implemented in a project, it is wise to consider carefully the effective role of the designer and the duties and obligations of such persons in co-relation to the contractor. This is because there are various separate and distinct risks that arise from the traditional structure due to the involvement and interaction between the contractor and the consultants;

Single v Multiple Contractors

45.7 upon deciding to use the traditional structure, the developer/owner must consider whether it is preferable for him to split the clearly distinct items of work and award the same to multiple contractors;

45.8 the tendency is for the developer/owner to utilize specialist sub-contractors for specialist areas of the works using the nominated structure and to use different contractors for the sub-structure and super-structure works, where applicable. However, the extent of the distinct items of work that can be divided up is dependent on the type of project and the complexity of the interface between the distinct items of work in terms of the design, the temporary works and time;

45.9 there are some distinct factors that generally have to be considered in deciding, whether to adopt this structure namely:-

(i) the cost benefit by contracting directly with the specialist and various trade contractors. If the design is not complex in certain areas and the supervision and management teams are considerably experienced, then the cheaper utilization of domestic or local contractors may be possible;

(ii) the direct control over the actual contractors who are involved at site (rather than the control exercised by the main contractor over the various sub-contractors). This in turn will result in direct control of the quality of materials, the interface between the design and the construction process and the problems faced at the site vis-à-vis the actual contractors at the site;

(iii) the onerous responsibility of identifying the distinct packages and contractual needs;

(iv) the onerous responsibility to co-ordinate the various contractors and packages including their schedules, and temporary works;

(v) the onerous responsibility to interface the design of the differing items of works especially if there has been any defects or variations and any clashes discovered;

(vi) therefore the need to appoint an extremely experienced and pro-active management and supervision team, normally from the consultants/designers to carry out (iii), (iv) and (v) above, with its ensuing reduction in the cost benefit gained. There can also be appointment of engineering procurement and construction management (EPCM) to carry out these services;

(vii) the major risks of increased and varied claims from the various contractors;

Management Contracting

45.10 there is one other general variance to adopting the multiple contractors structure namely, management contracting. This is by way of appointing one lead contractor with the largest portion of the works who is then placed with the obligation to administrate and ensure the co-ordination between the various contractor schedules and to interface between their respective temporary works. This effectively means that a lead contractor will be required to coordinate and manage the project;

45.11 in fact within the management contracting structure there are a number of possible further variances. This includes placing all the other sub-contractors under nominated packages and making the management lead contractor responsible for the time, cost and quality control of these other contractors. It is unlikely however that in this situation the lead management contractor would be considered responsible for the workmanship or any design input from the other contractors unlike in the turnkey structure;

45.12 the role of the lead management contractor can vary as can its mandates or rights;

45.13 a further variance to this structure is to involve the lead management contractor in the tendering process for the other contractors and thus arguably making him responsible for the other contractors' workmanship or design input;

45.14 there are some factors that generally have to be considered in deciding on whether to adopt this structure namely:-

(i) to ensure that the management contractor's fee is normally based on target pricing which is pegged to the decrease in the price or cost to the employer. It is therefore an incentive for him to control price by running an efficient and tight site;

(ii) alternatively, the appointment of the management contractor only to co-ordinate between all contractors;

(iii) there is also the risk that the lead contractor may not be able to effectively co-ordinate especially if the other contractors are also competitors and the risk of the lead contractor being partisan to only its needs;

Design and Build or Turnkey

45.15 this form of contracting places the duty to design and construct solely on the contractor and generally the traditional turnkey contracting structure is mainly based on an entire design and entire construct concept;

45.16 there can also be what is termed as partial turnkeys, where various contractors are actually appointed on separate design and build

requirements. This is however not advisable as the interface problems do not only relate to that between the works and the designs, but also the design to design which may result in a technical nightmare;

45.17 the other hybrid is the part turnkey, part traditional structure. This is especially where in a particular project there may be a requirement for a complex equipment system or complex civil requirement within the entire design concept. If the project is only limited to 2 sets of contractors, and if the works are actually distinct in time or space, the interface problems may be reduced and therefore this hybrid system may be workable;

45.18 in the traditional turnkey type of contracting structure, the consultants are merely involved in the tender and possibly the supervision of the work (or through project management company) and this may include providing them with some control over the designing and construction process depending on the developer/owner's requirements;

45.19 this contractual structure is normally tendered out on a lump sum firm price basis;

45.20 there are some factors that generally have to be considered in deciding on whether to adopt this structure namely :-

(i) the entire responsibility and risk is with the contractor, other than those caused by the actions of the employer which ought to be minimal;

(ii) the general contracting dangers to the developer/owner in respect of hidden allocation of risks are normally avoided;

(iii) the design will correspond with the contractor's technical capacities;

(iv) the efficiency created out of a fast track project may potentially reduce the price of the project;

(v) the danger that the design is sacrificed at the expense of the cost of construction (under-design);

(vi) the developer/owner's control of the project is minimal;

(vii) the developer/owner or his consultants must be clear and precise as to their design concept and requirements at the tender stage as otherwise, there will be extensive variation issues and obviously the ensuing delay issues. There have been instances where the design has been advanced by the developer/owner and his consultants before placing it on a turnkey structure in order to ensure there is no under-designing (joint design turnkey);

BOT (Build, Operate and Transfer)

45.21 this structure normally applies to public sector projects or concessions;

45.22 the contractor is required to source its own project financing and recover the same as well as profit from operating the project for an agreed period;

45.23 it is one of total responsibility and total risk, where the contractor effectively designs, constructs, finances and has to ensure that the project is completed on or before time and is free of defects so that the contractor may be able to operate it immediately;

45.24 thereafter, the contractor has the added risk of the profitability of the operation and has to maintain the facility over the number of years agreed;

45.25 for the purposes of the construction, the BOT contract structure is usually based on the turnkey form of contract as the differences between both structures of contracting do not relate to the actual construction and responsibilities but are different in terms of the financing, the operation upon completion and the maintenance;

45.26 the transferee will have the opportunity to verify the quality and the output capacity of the project whilst it is being operated by the contractor;

45.27 the incentive to the operator must be maintained especially as the operation period draws to an end as otherwise the maintenance of the project may be jeopardized. Some conditions of contracts require a limited period for defects and maintainence liability even after the transfer has occurred;

45.28 the BOT structure can become very complex due to the parties involved and the financing aspects. There may be various parties in a consortium obtaining the concession who in turn may contract with another set of parties for the design and construction whereby these said parties may also separately finance the design and construction. The concessionaire may then appoint a separate party to operate and maintain the facility and the margins are then split between the concessionaire, the contractors and the operators. When financiers get directly involved in the contracts, the structure very often takes a different shape and becomes highly complex and demanding as they will seek to demand an implementation of a contractual scheme that protects their investment and risk; and

45.29 this structure becomes highly attractive when public funding is inadequate or when private management is seen as far more efficient and therefore beneficial.

The Price Structure

47. There should also be a decision on the price structure intended, as part of the process of determining who and how far a party is to be responsible for the design uncertainties or certainties.

48. There are generally 3 possibilities but variances within each structure are quite common:-

Lump-Sum

47.1 this structure fixes the price regardless of the contractor's as-built cost and therefore places substantial risk on the contractor build-ability and assessment of the works involved from the specifications and drawings. The tendering cost for the contractor is normally higher due to the extensive assessments that have to be made;

47.2 this structure normally translates to a higher tender price unless, the contractor is claims-orientated and the contract conditions, specifications and drawings are weak in their drafting or preparation;

47.3 there are circumstances where the price may change but generally the risk of the quantities involved and the works that are indispensably necessary to complete and build lies squarely with the contractor;

47.4 it is common to require a breakdown of the lump sum prices along with a schedule of rates for the variation works;

47.5 payments are usually in the form of stage payments or milestone payments;

47.6 the developer/owner would however have to compile and transfer sufficient information on the design and any other factors that may

affect the contractor's buildability so that a realistic lump sum price may be formulated;

47.7 despite providing some of this information affecting the buildability, normally as a measure of protecting the developer/owner, the more crucial elements of the information presented may carry provisos requiring further investigation by the contractor or be deemed to have been further investigated by contractor and the accuracy or veracity of the information is normally expressly excluded so as to avoid liability arising therefrom;

Cost reimbursable

47.8 in this structure, the contractor is paid for the cost incurred plus a pre-determined margin of profit, which can be fixed or fluctuating;

47.9 if the fluctuating fee is dependant upon the cost of the project, then in order to provide an incentive to cost efficiency, the developr/owner may introduce a target cost which if exceeded may incur a decrease in the profit or fee earned. The fee disincentive may likewise be pegged to the completion date;

47.10 this pricing structure is normally used where it is impossible for parties to fully assess the construction cost because there are numerous uncertainties, such as in tunneling projects;

47.11 it should also be used in fast-track projects where the design is being developed as the construction work is proceeding as it allows the overlapping of design and construction processes;

47.12 it should also be used where there are non-financial objectives, ie. early completion is the imperative objective;

47.13 another method that may limit the eventual cost of such a form of pricing is to apply a “reasonably expended” standard;

Unit Price or Priced Bill or Re-measured

47.14 this price structure establishes prices fixed by the contractor for various units or items of work involved and described in the bill of quantities and such prices are usually deemed to include the cost of materials and labour;

47.15 the risk as to the quantities and the take-offs from the drawings are placed with the developer/owner but normally the risk of a change in the cost elements related to any given unit of work priced vis-à-vis the rate in the bill of quantity is with the contractor although some structures allow a formulative increase for a percentage increase in quantities (where the quantities increase or decrease by a +/- %). These are commonly referred to as rates with escalations;

47.16 this method is extensively used as it is one of the most commercially viable form of contracting for the contractor especially with the open-ended valuation provision applicable in most standard forms where in certain circumstances, even the risk of the increased cost comparative to the rate can be dislodged;

47.17 the advantage of using this pricing structure is that the contractor will more likely than not keep to the specifications, as there is no interest in cutting cost.

The Owner’s Objectives

48 A simple table has been set up to show how the general effect of cost, time and quality risk co-relates to a developer/owner or to a contractor based on the

procurement and price mechanism structure as discussed above. This is seen attached as Addendum 3.

49 A proper risk assessment therefore becomes the first step in the determination of the duration of the project.

50 The developer/owner would generally have to bear in mind the following objectives and project parameters in determining the contractual and price structure[10]:-

- Is cost control a major consideration;
- Does the owner wish to control the contingencies;
- Is a bid competition required;
- Is there to be maximum owner involvement;
- Is there to be minimal owner involvement;
- Does the owner have oversight capabilities;
- Is there to be a single source responsibility;
- Does the owner require the contractor to provide project funding;
- Are the project design, scope and specifications clearly defined;
- Are the complexities in the design and the details clearly defined;
- Are the quantities certain;
- Is there minimal scope changes expected;
- Is there a potential for large scale variations;

[10] Paper delivered by Golloway, P and Nielsen K, at the 2nd Civil Engineering Conference in the Asian Region at Tokyo 2001

- Is the schedule tight;
- Is the project environment volatile or stable;
- Is it a large, complex project;
- Does the project involve primarily new technology.

51 Developers/owners must be willing to review and revise their actions in order to not only reduce their own risk but to also obtain the best price and at the same time avoid placing the project at risk by placing the contractor at too much risk. The steps to be taken ought to include:-

- Reviewing the contract documentation before giving out to tender and testing them against the checklist of the risk allocations;
- Making more information, even for soil conditions, known to the contractor. This is despite there being exclusions of liability. Alternatively, ensure that the serious tenderers do carry out soil investigations or obtain further information before commencement;
- Carrying out construct-ability reviews to ensure design is cost efficient;
- Utilizing real time dispute resolution procedures (temporary finality – adjudication, references to experts or the dispute review boards);
- Establishing realistic contract performance period;
- Budgeting and having the funds for contingencies;
- Planning for communications or aspects of partnering;
- Pre-planning for permits and authority approvals;
- Accepting that soil and site conditions are risks best undertaken by the owner otherwise cost of the bid would escalate or risk of non-

performing contractor becomes real. Empirical research has shown that generally there is no increased cost due to claims by allowing a provision for reasonably unforeseen soil conditions claim[11];

- Delegating decision making authority to owner's representative;
- Allowing for pre-defined formulae-based adjustments of value for variations;
- Pre-defined procedures for claims and substantiation;
- Realization that consultants and determiner SO can waive strict procedural requirements and can assume liability through conduct and to provide protection for the same (unauthorized acts);
- Considering or seeking advice on new risk sharing practices or clauses.

52 It is to be noted that a completely over-optimistic duration will either lead to fewer tenderers of a doubtful nature, higher cost or a delayed project with its ensuing financial repercussions, which the owner/developer would have to endure before seeing any possible recovery from a contractor. As such, there is now suggestion that developer/owners should also utilize tools that have traditionally been used by contractors in pre-planning and scheduling their works when considering the overall duration of the project.

New Concepts Of Risk Handling

[11] DW Halligan, WT Hester & H R Thomes, "Managing Unforeseen Site Conditions", Journal of Construction Engineering and Management, American Society of Civil Engineers [1987]

Partnering

53 One of the traditional criticisms and the cause of a lack of interest in public sector projects used to be the fact that the Government and its consultants refused to assume any risks. In 1990, the Risk Allocation Subcommittee of a Joint Working Party of the Australian National Public Works Conference and the National Building and Construction Council noted in their analysis paper :-

"the private sector should expect to assume a higher level of risk than a normal construction bid but the public sector cannot assume a zero risk posture as this will not allow a properly priced financial proposal and will discourage participation and subsequent privatization opportunities."

54 The new millennium has seen the U.S., U.K., Australia and even Hong Kong implement the new concept "partnering" relationship for public sector projects so as to manage cost and time overruns. This concept is also a positive step towards the elimination of a claims culture, where productivity is tied in with rewards with time spent moving forward in a project and not postulating or looking for loopholes and bickering at the site in order to enhance a claim.

55 What is partnering? In essence it is:-

- A maturity of realising that value is in the long term relationship obtained by trust and openness where the long term goal is for profitability of all involved;
- All parties are encouraged to openly address problems because each party realizes that no one benefits when there is exploitation;
- Innovation is encouraged;

- Each party is aware of the others' needs and weaknesses and serves to work together to achieve a win-win;

- The project benefits, the overall performance is improved, the reputations are enhanced and the profitability of the project is increased thus allowing a sharing of this benefit;

- It is not however an excuse to compromise the quality or to introduce variations without cost;

- There is no guarantee that disputes will not arise or that the budget will not be exceeded.

56 Partnering makes use of a collaborative approach between contracting parties where 2 or more organisations work together to improve performance through agreeing mutual objectives, devising a way for resolving any disputes ("nipping problems in the bud") and committing themselves to continuous improvement, measuring progress and sharing the gains[12].

57 Teamwork and good faith underscore the relationship between parties where timely completion and cost reduction becomes the all-pervading mutual contractual objective. However, there must be a partnering culture within the management of the parties involved.

58 A successful partnering solution can only occur if there are commitments on 2 levels :-

[12] Definition extracted from Sir John Egan's report "Rethinking Construction"

(a) the senior management, where the tri-partite commitment arrived at during "brainstorming sessions" is often embodied in a written document termed as a "Partnering Charter". It is to be noted that at this stage there is no dispute or any view that one party is the enemy and as such, the commitment to solving problems rather than disputing them is usually forthcoming; and

(b) the staff level where the commitment begins with teambuilding workshops in which goals, open communication, trouble shooting and internal dispute resolution processes are agreed upon. The workshops continue throughout the project.

59. The Partnering Charter is then defined as a Contract Document as therefore the agreed processes must be implemented in the spirit of the Partnering Charter. The success of partnering also depends on many of the same personnel staying on throughout the process from the non-aggressive conditions of the pre-contract stage till the project is completed. A copy of a sample of the partnering charter is in Addendum 4A.

60. Amongst other projects[13], the Andrews Oilfield project involving BP has been referred to as a successful partnering process where there were brainstorming processes for one year between BP and contractor and both sides came to a viable plan within BP's original budget of GBP 370 million (which was initially found not economically viable as the cost was estimated to be GBP 450 million) and the timescale. They executed an additional alliancing agreement. The project was completed under budget at GBP 280 million and early and both parties shared the success. All the additional costs which arise

[13] Also the House of Commons Project in 1999, the Thames Water supply project, the 3Com office and research facility project, the Bleak Hill School for St. Helens MBC , 2 R&D centers for Nortel Networks, the Roko Leisure Health and Fitness Club in Portsmouth, Monmouth Sports Hall in Monmouthshire, the Brownfield regenration scheme for Ealing Family Health Authority, UK, all referred to by Sir Michael Latham in a conference in Kuala Lumpur on 26.2.2002.

from distrust procedures normally implemented in a project ie. duplication of inspectors, certifications checking processes, were cut out.

61. The end result was that the contractor gained more through a profit sharing scheme where it received a bonus of GBP45 million, over and above its cost plus payments.

62. Partnering suits projects that are of high value and high risk where the pricing structure tends to be a cost reimbursable type contract or a guaranteed maximum price type contract ("GMP"). The partnering charter's or agreement's philosophy must be reflected in the construction contract as well.

63. The interesting legal elements normally adopted in a partnering process can include the involvement of the contractor in the design process, the adoption of good faith requirements with the uncertainty of how the courts would interpret the same, the construction cost treated as a prime cost with an undertaking to have an open book basis for the cost incurred and the GMP is the benchmark, a lessening of the severity of the LAD by attaching milestones with grace periods for catch up or setting of LAD against costs savings and bonuses, a reconsideration of the need for retention sums or defects liability periods and a much more amicable dispute resolution process being made compulsory.

64. In England, despite the partnering charter not being incorporated into the Contract Documents, judges were willing to consider the intention of the parties derived from the charter as a basis to construe rigidly or flexibly a particular ambiguous clause in the conditions of contract[14].

[14] as per Judge Humphrey Lloyd QC, Birse Construction Limited v St. David Ltd [1999] BLR 194

65. In Malaysia, it is likely that a well-drafted partnering contract will be construed as effectively a project partnership defined by the contract where concepts of fiduciary duties and a duty to use best endeavours to ensure the success of the venture will encapsulate good faith principles[15]. However, there must be clear drafting to limit any excessive construction of the fiduciary principles within partnership, which may not be suited even for a partnering concept.

66. So why partnering:-

- Reduces real cost[16];
- Improves predictability;
- Meets the end users' needs (especially public projects);
- Improves on quality and safety;
- Avoids hostilities and the possibility of one party (which could be any party) being left with a loss[17];
- There should be projects where reputations are made whilst no one loses;
- Avoids the time wasted on claims and avalanche of accusations and correspondence without solutions;
- Time for the industry to change and companies to become successful in construction technology and experience rather than a few rich men!

[15] as per Gopal Sri Ram JCA, Hartela Contractors Ltd v Hartecon JV Sdn Bhd & Anor [1999] 2 CLJ 788
[16] According to Sir Michael Latham's project examples it would seem that partnering averages a 10% to 15% cost savings. In the USA it is reported to save up to 5% of the cost, per Heale Andrew J, "Construction Partnering : Good Faith in Theory and Practice", Const Law Journal 1999
[17] Sir Michael Latham describes this proposition as "why change, didn't we do okay?" resistance to change and the short answer is, "no we didn't do okay, or if we did, someone got kicked and sometimes it was us"

- Margins may not be as great as the “good” jobs but you have a chance at avoiding the “bad” ones;

- The negatives tend to be the trust factor amongst people at management (at site it sometimes is seen) and the bad guys won’t let it happen. Shouldn’t this change?

67. The current available standard forms for partnering are the PPC 2000 and the NEC Partnering Option 2001.

Statistical Sampling Technology

68. In Malaysia there is seemingly a lack of emphasis placed on techniques of risk analysis for the purposes of planning, fixing durations and scheduling.

69. Time is a matter of concern for both the developer/owner and the contractor and the feasibility of the time or duration fixed by the developer/owner or accepted by the contractor requires a constructive analysis of likely impacts, likely effects and this may then dictate the likely allocation, control, management and mitigation methods employed for time related risks.

70. Early risk analysis can provide early foreseeability of the potential risk events and likely impacts thereby determining the considered approach for the contractual structure, price structure and contract conditions.

71. The techniques are all models using statistical sampling of variable events and likely impacts. Risk analysis using technological statistical sampling has become the most considered method of recognizing likely effects by likely causes, the chances of those causes and effects occurring and the extent to which they can be considered acceptable or they can be mitigated. This is not

just a part of successful decision making on risks but it is a part of successful and efficient project management, especially for large and complex projects.

72. Today due to the existence of useable, functional, convenient and speedy risk analysis software, the techniques are available to many. Most of the software in the market can be used as a stand-alone application or can work as an add-on to the commonly used Microsoft Excel and Microsoft Project. Some examples of these risk analysis software which are available in the market are Primavera Monte Carlo, Pertmaster Project Risk, Intaver Risky Project, Palisade @RISK for Project, Crystall Ball, Projistic etc.

73. All risk analysis are essentially probabilistic models developed to translate project characteristics into risk boundaries mainly related to time. There needs to be firstly the duration for activities within the schedule or a planned duration, which is considered reasonable. There should also be a construction logic in place which effectively translates into a CPM.

74. Most of the software adopt the Monte Carlo Simulation, the Latin Hypercube Sampling, the Petri Net Simulation or the what-if simulation, and perform reiterations to generate outcomes by using various types of probabilistic distributions such as Triangular, Normal, Uniform, BetaPert, LogNormal and so forth to simulate the performance of a project. Essentially, the power of these simulations and reiterations lies in the picture of possible outcomes it creates. Simply by inputting the uncertainties, choosing the best suited distribution and running a simulation, these advanced risk analysis tools take the project model from representing just one possible outcome to representing thousands.

75. The variable or risk events must be identified from literature, domain experts or experience. The effects of these risk events are also then to be gathered

from the same source. Then a probability is derived for each simulated risk events to effects and finally the model is verified or validated. There are numerous literature to gather risk events and likely outcomes. Some of them are referred to in the attachment at Addendum 4B.

76. The use of these type of software is exceptionally useful for contractors to work out their planning, their schedules, their effective CPMs and their floats. It also allows simulations of mitigation plans or corrective plans in order to recover likely effects and the contractor can prepare and employ a particular mitigation plan that show the best recovery based on the probabilities of effects.

77. Using such techniques becomes an effective employment of a good risk management system during the planning and scheduling stage and also during construction stage which ultimately enables the project team to confidently manage the project by allowing introduction of corrective measures, monetary contingency and scheduled float in order to minimize losses to the project and maximize the likelihood of the project finishing on time and within budget.

78. With these software, uncertainties or risks in time, resources and costs can be conveniently input and modeled for a project using various types of distribution probabilities and perform simulation to produce a more realistic project by evaluating and calculating the chances that the project will be completed on time and within budget, and present results in straightforward answers and easy-to-understand formats.

79. With this wealth of extra information, the following questions can now be confidently answered with ease based on the statistical probability of events rather than just having to rely on one’s experience and his gut feeling; What is the probability of finishing the project on time and within budget? What are

the chances of finishing the project by this day? Which tasks have the most amount of risk and are most likely to cause project delay and need to be mitigated first? How much is the project most likely to cost after incorporating the risk mitigation measures?

80. In addition, the risk analysis application is able to monitor the progress of construction by assessing the need to refine the initial strategy or to change courses when a new risk is discovered or as resource availability changes during the construction phases. This effectively helps to reduce the chances of being late and over budget as the project is progressing mid-way. Basically by making any what-if changes to an on-going project, an immediate result on how the change impacts the project can be observed within seconds and subsequently decision making can then take place without much further delay and with confidence.

81. One does not need to be a statistical expert or have any prior knowledge of risk analysis theories to be able to perform a thorough risk analysis for a project by using the software available. They are used by project team members of all levels, from young engineers just entering the project risk management arena to the world's leading construction risk experts.

82. With such technology in risk management, one can conveniently peruse other parties' work programmes produced from project management software, such as Primavera Project Planner, SureTrak, FastTrack Schedule and Microsoft Project, to perform your own risk analysis for a similar project. This can simply be done by importing the work programme electronically into the risk analysis application, identify and allocate the uncertainties or risks for each task, proceed with the step-by-step instructions, and in no time, a risk analysis for the project would have been performed. This risk management procedure is

very useful for owners and consultants to manage the contractors effectively so as to avoid unnecessary work disruption and claims.

83. Besides, technology allows project team members to contribute to the risk database with their own uncertainties or risks they foresee in the project, identify the severity of the risks, analyze the impacts, and discuss ways to mitigate the risks in a more effective and cooperative fashion as a team. Over time, risk management allows the project team to build a more comprehensive risk database based upon their experiences and lessons learned, which will be useful for better management of future projects.

84. Results generated from risk analysis are clearly presented in preformatted professional and easy-to-interpret templates (table, schedule, summary etc.) and charts (Gantt Chart, S-curve graph, histogram, etc) bundled in these software. Therefore, reporting is made easy to pinpoint and convey the risk impacts and mitigation recommendations to the management effectively. Some examples of the charts are attached as Addendum 5.

85. The tool is also considered useful for developer/owners in assisting them to assess likely risk impacts and likely success of mitigation or recovery plans for the contractors. It also serves as a management tool for likely impacts caused by developer/owner responsibilities such as design information delays or interruptions in a fast track project at parameters of the low and high levels, thus understanding the exposure, and the situations where the developer/owner must insist that no delays are forthcoming from the consultants.

86. Obviously, the tool requires development from the contractor’s angle as well as the developer/owner’s angle. There are situations where in addition to the work programme and the critical path network, the contractor may be asked to produce these statistical sampling tools as a gauge for the management of the

contractor's biggest fears therefore alerting the developer/owner as to the areas where the contractor feels will be his Achilles heel and the developer/owner can take steps to ensure that this does not occur or is mitigated if it is within the developer/owner's control or managed if it is within the contractor's control.

87. The mentioned technological tools are also being used by contractors to determine likely risk events that may cause an overrun of their budgeted cost as well as the likely risk events that could bring on LADs thereby further impacting the project cashflow. All of these types of analysis will therefore show the likely risk events that will affect the profit margin hoped for. So risk on cost can likewise be simulated. It is unlikely however that this analysis will be shared with the developer/owner pre-contract.

Computerised Work Programmes

88. Today, technology has drastically changed the face of time management. Therefore knowing the existence of these technological tools allows the developer/owner to better decide the allocation of risks on time issues.

89. Network programmes are the common tool used in today's project because it identifies in detail not only the activities and the durations planned by the contractor but also their interdependence on each other. The network programmes represents the time characteristics of the project and not just each individual activity. The additional project dimensions mean that it is necessary to consider the introduction of additional activities which do not represent tasks, but contingencies in time for risk events or "time risk allowances".

90. The most commonly used network programme is the critical path programme which models the construction logic links between each activity in detail. The construction logic is then represented in the defined construction sequence of the project and it sets out explicit details of minor and major activities relating to the method of work, the sequence within each method of work, the construction constraints which include dates when areas of work must be made available or dates when information should be already with the contractor and it further provides the resource restraint which shows the availability of plant, equipment, labour and the need for materials modeled within the sequential linking of activities using the same resource.

91. There are two types of critical path programmes, one being the Activity-on-Arrow programmes and the other being the Activity-on-Node programmes.

92. The importance of having such a detailed work programme with this type of critical path network is that it will indicate the logic used by the contractor, the floats that exist within non-critical activities and eventually become the tool to analyse whether a delay to an activity has truly impacted the contractor's ability to complete the entire works within the completion period.

93. Furthermore, linking the detail programme to resource allocation and usage allows an assessment of whether there has been a reasonable assessment of resources required by the contractor for particular activities therefore avoiding allegations of disruptions and lost of productivity or delay simply because the contractor did not allocate sufficient resources in the 1st place to the particular activity.

94. The link to resources also provides a tool for effective resource leveling and resource reallocation along with re-scheduling the works when delay event occur so as to mitigate the time and cost impact.

95. The logic links ought to show a finish-to-start link, a finish-to-finish link, a start-to-start link and in some instances although rarely a start-to-finish link. It is in recognizing that no activity is truly indivisible and complex works usually consist of a considerable number of separate task and activities all of which normally do have some form of interrelationship and interdependence, that the need for this particular type of work programme will be clearly required.

96. All these information cannot be satisfactorily produced manually. However, in today's technology there are softwares that provide a contractor the ability to reflect his planned works in such detail with his resource planning as well. All this information can only benefit the developer/owner as it allows the developer/owner to equally manage the time and resource of the contractor and to be aware of developer/owner's activities that interact with the contractor's activities.

97. It also becomes a tool that ensures the truth is revealed and allows decisions to be made on liability for time and cost without having to resort to legal dispute resolution processes.

98. Having such a requirement within the contract structure may require an element of pricing within the preliminaries in the contract and there will be a cost impact on both parties relating to maintaining the appropriate personnel who understand and are able to manage such programmes. However, the benefit from having this programmes can be considerable as seem later in the discussions on the topic of handling time and cost risk.

99. One of the leading work programmes that offers both time and resource linking is the Primavera Project Planner (P3). The P3 programme provides managers and schedulers total control over the time and resource based

performance within the contract. It is effectively a management tool for both developers/owners and contractor and its designed to handle high intensity, short duration, time critical, large scale, intricate and multifaceted projects. It can handle thousands of activities within one project.

100. The other very important benefit of such a programme is that it allows both parties to analyse unlimited "what-if" alternatives and target plans. It allows the addition of variation task, evaluates floats, and provides visual appreciation of impact and on-going activities in an organised and colour coded presentation.

101. It also provides resource scheduling with advance resource leveling options.

102. Most importantly it is a live programme which can be imputed on a daily basis thereby allowing an appreciation of the evolvement of the progress of the project and the progress of each individual activity with impacts on float and float tracking appreciations on an immediate basis. It allows also appreciation of precedence relationships and cascading effects of project bottlenecks.

103. Further by using fragnets it allows particular groups of task and resource allocations to be extracted individually so that a programme within a programme can be created to analyse events in more detail.

104. In analyzing delay impacts the software work programme allows the ability to crunch information and rebuild an as-built live programme retrospectively or if the analysis is being carried out immediately after the delay event it allows resource rescheduling and activity rescheduling with leveling options so that a party can analyse various different alternatives to mitigating a delay event and its impact so that time and cost overall is reduced.

105. Without this tool time and cost management for delay events can never effectively take place through the developer/owner and the developer/owner is at all time as the mercy of a willing or reluctant contractor. A sample of some of the charts and presentations of Primavera is in Addendum 6.

106. It is noted that the JKR standard forms of Conditions of Contract makes no mention of a work programme let alone a computerized work programme as mentioned above.

107. It is possible that the intention was for the standard to be stipulated in the specification but the danger with the work programme being referred to in the specification is as to whether it truly becomes a document (hard or soft copy) within the Contract and hence binding on the parties and whether it becomes an effective tool applicable and binding in determining issues such as EOT, mitigation and loss and expense claims.

108. We note that the EOT provisions in the JKR standard forms does not relate the analysis done by the SO or any other person named to the utilization of the work programme as the strict determining tool for entitlements.

109. This issue of whether a work programme should become the definitive tool to assess time and cost impact have previously been an issue of serious concerns by many developer/owner simply because they believe the work programme is a contractor's tool and it can be manipulated by the contractor to serve his own interest without the owner being able to assess matters appropriately.

110. As such, developer/owners preferred to leave the option open as to how and what tool is to be used to determine EOT.

111. In fact, the lack of any defined tool left the developer/owner more vulnerable by virtue of the fact that it is the contractor who has all the information as to his works and his planned progress and the contractor could develop evidence supporting his case without any real opportunity for the developer/owner to counter such as an assertion of delay and its impact.

112. It seems that it would be foolish for a developer/owner not to require all information in detail on contractor's plans to be provided at an early stage of the project when it is likely to be reflective of the true intentions of the contractor so that it may be utilized against the contractor at the later stage.

113. Furthermore, if a developer/owner takes the effort to ensure that he equally has the right personnel to analyse such a detail work programme at an early stage of the project and to input the programme based on actual events to ensure that the programme is a live programme, the developer/owner will clearly be aware of whether the contractor has produced a work programme that carries logic and therefore realistic and likewise whether claimed events and impacts are accurate.

114. As such, it will be required that a detailed contract clause is introduced to require a contractor to produce such a work programme at the early stage of the project for the developer/owner or its consultants verification and approval (checking the logic and whether there are artificial restraints) before such a programme is deemed accepted and hence applicable within the contract.

115. A contractor on the other hand should not be concerned about this requirement especially for projects of a high value (ie. anything around RM50 million) because it also allows the contractor to manage his cost and time effectively and allows the contractor to prove his entitlements to claims conclusively

thereby avoiding the need to be concerned about failing to recover compensation for what the contractor rightfully is entitled to.

116. A clause that can be used is as follows:-

"Programme of Works

(a) Within twenty-eight (28) days of the date of the Letter of Award, the Contractor shall submit in a form acceptable to the S.O. the following documents:

(i) a programme for the manufacture, delivery, supply, construction, installation, testing and completion of the Works, prepared using recognized computer-aided techniques and showing at least the following information:

(aa) periods for construction of each section or part of the Works;
(bb) durations of each activity in each section or part;
(cc) critical activities and critical path;
(dd) float times for each activity and total float time
(ee) latest dates for receipt of information, instructions, approvals and the like from the S.O.

(ii) ***a method statement for execution of the Works.***

No work is to commence on Site until these requirements have been filled.

(b) The Contractor shall submit to the S.O. in the form and within the periods specified by the S.O. such documents as to the planning,

programming, method of execution of the Works, cashflow and labour and materials forecasts and other documents and information of a similar nature as may be specified in the Contract.

(c) The programme shall be regularly monitored by the Contractor and shall be revised and updated to take into account any extension of time for completion, in accordance with the provisions of Clause 44. Also, if required by the S.O. the Contractor shall revise the programme to include any acceleration measures necessary under Clause 43 or instructed b the S.O. pursuant to sub-clause 44(f)"

117. The appropriate software programme as a contracted tool in project management for both the contractor and the developer/owner would allow great advantages for both parties. It becomes the effective tool for planning relevant to both parties (ie. contractor planned sequence and commencement of various elements of work, floats and the use of floats, delay mitigation by re-sequencing, resources allocation and verification, resource leveling and re-allocation, proper assessments of EOT and productivity effects, dispute resolution tool).

118. The weakness in the JKR form of contract is that it does not address the provision and quality of the work programme and its resource allocations and hence does not make it a tool for time management and EOT. In such situations, the benefit can only be seen in the contractor's favour.

119. We attach a checklist relating to the provision of a work programme in Addendum 7.

120. We also enclose checklist for various other matters in Addendum 8 such as:-

(i) Primary purposes of Contract Administration;

(ii) Principal duties of Contract Administrator;

(iii) Principal types of information to be provided to the contractor by the contract administrator;

(iv) The likely timing of the issue of required information to the contractor;

(v) Matters requiring legal knowledge during contract administration;

(vi) The purposes of contract administrator in Site Progress Meeting;

(vii) Principal purposes of the Extension of Time Clauses;

(viii) Grounds for Extension of Time – Basic Rule;

(ix) Extension of Time: 'Relevant Event' under JKR 203 and 203A Forms (Rev 10/83) Clause 43;

(x) Acts of Prevention: Principal Forms;

(xi) Acts of Prevention: Typical Examples;

(xii) 'Neutral Events': Typical Examples;

(xiii) Post Application Procedures of EOT: Typical Preliminary Checks by the contract administrator;

(xiv) Imposition of Liquidated Damages: Typical pre-conditions;

(xv) Deduction of Liquidated Damages: Common conditions precedents used;

(xvi) Liquidated Damages: Typical grounds for challenge/defence by contractor;

(xvii) Checklist submittals – Checklist for contract administrator;

(xviii) Checklist for the preparation, submission and issue of the certificate of non-completion;

(xix) Checklist on decision to impose liquidated damages on the contractor;

(xx) Sample checklist for tenderers (TGC).