ABSTRACT

The application of the scheduling software has been quite popular in Malaysia recently. Planning software like Microsoft Project and Primavera had been used to develop the schedule for construction project for the purpose or project monitoring and control. Many clients organization have made the task to submit computer generated schedule as mandatory. However in real practice the schedule submitted has not been very useful for the client. In some instances the schedule has been ignored once submitted to the client. There are many problems associated to this situation. Among them is due to the absent of the standard guideline that can be used to manage the schedule itself. The contractor. Contractor has been prepared the schedule based on their own assumption and without much consideration for actual application for the project later. Therefore this short term research has been conducted with the main aim to develop such guideline. The methodology adopted for the study includes the interviews with panel of professional in construction and questionnaire survey. The development of the guideline is based on the feedback by the respondents of the questionnaires survey conducted. Prior to that, the research has also investigated the current state of arts of the scheduling practice in Malaysia and its limitation. The major finding of the research is the development of the guideline for managing the scheduling process. This guideline can be used by the major client to regulate the process of preparing, submission and updating the project progress. It is expected that this schedule can be improve further by improving its level of comprehensiveness.

ABSTRAK

Sejak kebelakangan ini penggunaan perisian penjadualan projek menjadi begitu popular dalam industri pembinaan di Malaysia. Perisian seperti Microsoft project dan Primavera telah digunakan untuk menyediakan penjadualan projek pembinaan bagi tujuan pengawalan dan pemantauan projek. Malahan semakin banyak pihak klien telah menjadikan penyediaan dan penyerahan penjadualan dengan menggunakan perisian komputer sebagai satu syarat utama. Namun pada hakikatnya sebenarnya penjadualan yang sediakan oleh pihak kontraktor seringkali tidak dapat memberi manafat yang diharapkan oleh klien. Malahan kadang kala ia telah diabaikan setelah dihantar kepada klien. Terdapat banyak masaalah yang berkaitan dengan situasi ini. Diantara masaalah yang paling utama adalah kerana tidak ujud satu garispanduan yang dapat diguna pakai sebagai rujukan untuk mengurus proses penjadualan projek itu sendiri. Ia telah disediakan mengikut andaian pihak yang menyediakannya sahaja tanpa mengambil kira keperluan aplikasinya yang sebenar untuk projek. Oleh itu penyelidikan ini dijalankan bertjuan untuk menyediakan garispanduan tersebut supaya ia dapat digunakan secara praktikal secara bersama antara klien dan kontraktor. Metodologi yang digunakan untuk melaksanakan kajian ini termasuklah temubual dengan panel professional dalam industri pembinaan dan juga dengan kaedah borang soal selidik. Garis panduan yang dihasilkan adalah bnerdasarkan kepada maklumbalas yang telah dianalisa melalui borang soal selidik. Sebelum garis panduan ini dibuat kajian juga dibuat untuk mengetahui keadaan sebenar amalan penyediaan dan penggunaan penjadualan projek di Malaysia masa ini serta masalah yang dihadapi. Hasil utama kajian yang dijalankan ini adalah penyediaan satu garis panduan untuk menguruskan proses penjadualan projek. Garis panduan ini boleh dugunakan oleh pihak klien untuk menguruskan proses penyediaan, pemeprosesan dan penerimaan dan mengawal dan memantau kemajuan projek. Adalah diharapkan panduan yang disediakan hasil dari kajian ini dapat dimantapkan lagi dengan penyelidikan dimasa hadapan dengan menambah baik tahap perincian maklumat yang terkandung.

INTRODUCTION

1.1 Introduction

Construction Industry in Malaysia like in any other country is an important sector in the economic growth of the country. Construction project on the other hand involved a complex process. Many different parties involved in construction. These parties are the client, consultants, contractors, sub-contractors, project manager, transporters, machine operators, vendors, local authorities, government agencies and many more. The scope of work in construction business is very wide and hundreds of various kinds of professionals, sub-professionals and workers required in the implementation. Construction industry is the backbone that supports the growth of other industry like transportation, tourism, and manufacturing. Therefore it is critical for the construction to deliver the project on time and within the expected quality to ensure the constructed facilities will not impede the other industry's business process.

In this regards, failure to complete and implement construction projects on time will create havoc and chaos to the public and community indirectly. In order to properly implement of a project, proper management and planning is required. One of the important tools in planning is project schedule. Scheduling is the process of breaking down the project into smaller manageable package of work, assigning the logical relationship between the project tasks to facilitate the process of monitoring, control, costing and reporting for the project. It is not an easy task and requires a lot of consideration before it can be practically implement at site.

Project planning suppose to be an effort to support collaborative teamwork effort. A project schedule is not meant to be used by one party only either contractor

or client but rather a to be used to coordinate the project task across the functional boundary of the project participants. Therefore it is critical to have a standard format, coding system and typical activities break down as a reference that will support the planning works and making parties involved in construction have the same objectives and same basis for reference. Therefore it is very critical to have a standard guideline to be used by parties that involved in developing project schedule. Currently no such guideline ever exists in Malaysia.

1.2 Aim and Objectives

The main aim of this research is toward developing a standard guideline for managing the construction schedule for construction.
To achieve this aim several objectives have been developed for the research as follows:

1. To determine the basic underlying principles of using project schedule in project monitoring

2. To evaluate the principles needed to regulate the related team members in preparing the project schedule.

3. To proposed the basic principles of regulating the submission and evaluation process of project schedule

1.3 Research Scope and Limitation

The main scope of the research covers the aspects of developing the guideline to regulate the process of preparing the project schedule by the contractors in Malaysia for the submission for the client to review. Once the schedule is accepted

the guideline should also guide the client and the contractor in the process of using the schedule to update and monitor the of work progress. The developments of the guidelines in this research are based on the industry wide opinion and agreement based on the respondents experience and need. The data for the study collected within Malaysia. Due to cost constraint the data collected mainly from the Johor Bahru and Klang valley area. The guideline will cover the as aspect mentioned in the objective only: the process of preparing the schedule, submission and acceptance procedure and schedule updating process. It is also emphasis during the construction phase of the project life cycle where the schedule will be prepared by the client.

1.4 Brief Research Methodology

Due the cost constraint the methodology of the study has to be limited. The initial request for fund for the project was RM28,000. However only RM11,500 were allocated. This little amount really put a lot of constraint for the study. Therefore decision has to be made to suit methodology used with the budget allocated.

Considering the above mentioned factor the following methodology has been adopted for the research:

1. Literature review was done to collect information related to the project planning and scheduling
2. Face to face interviews was conducted with the industry professionals to validate the idea of the limitation of the current state of art of the practice in project schedule preparation, submission and application. The interview also has established from the viewpoint of the experts for the need to regulate the scheduling process.
3. Conducting industry wide questionnaire survey in Klang valley and Johor Bahru area for the development of the guideline for the project schedule preparation and application.

This brief methodology of the study is graphically displayed in Figure 1.1

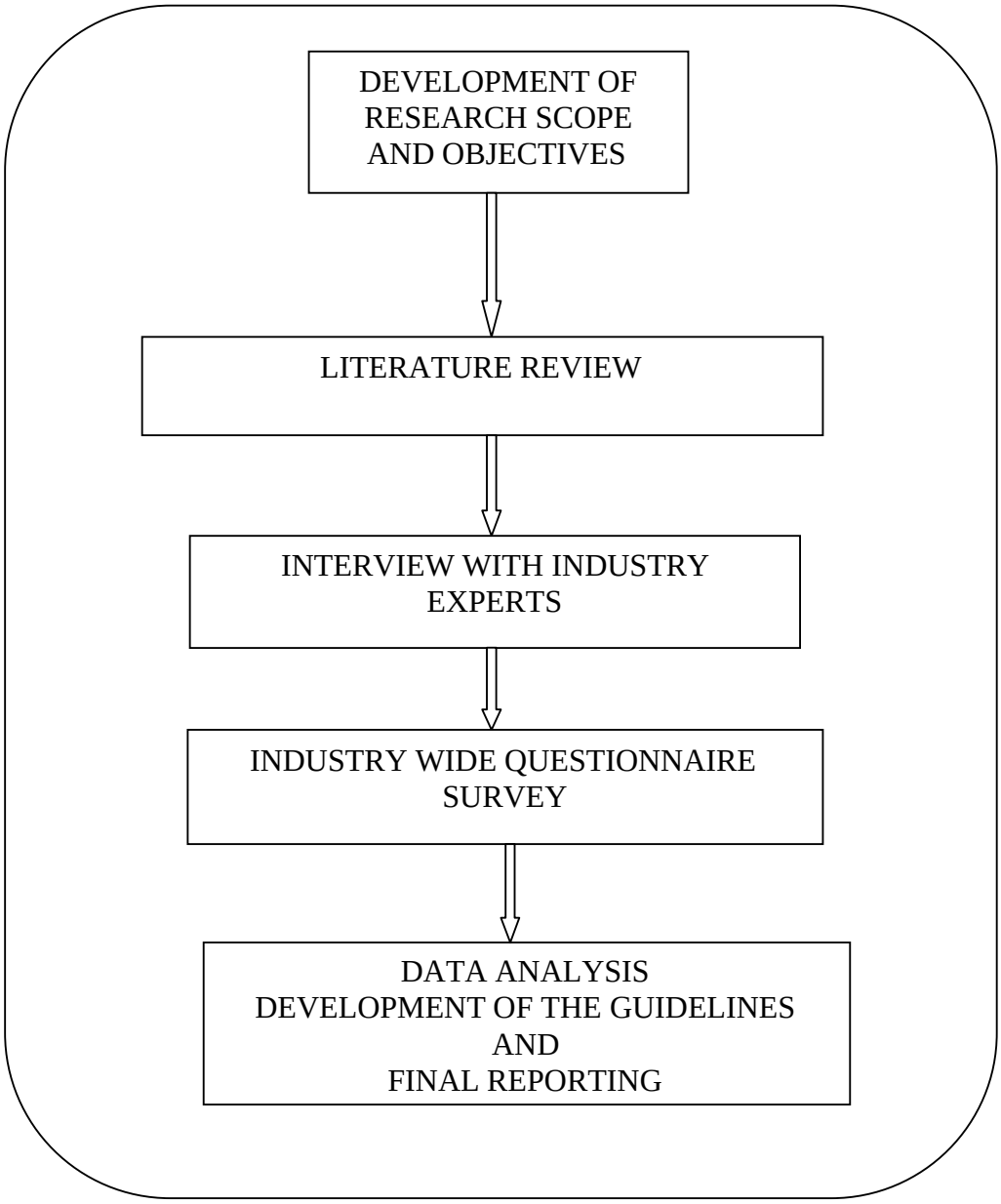

Figure 1.1 Brief methodology of the research

PROJECT SCHEDULING AND CONTROL PROCESS

2.1 Introduction

The successful or failure of the construction project often associated with its management creditability. Management can be defines as the process undertaken by one or more individuals to coordinate the activities of other to achieve results not achievable by one individual acting alone (Donelly *et al.* 1992). Indeed there are many other definition of management and their focus keep transforming from "*an art of getting work done through others*" as describe by Mary Parker Folliet to a more contemporary one which emphasis on teamwork. However the basic process of management as define by Henry Fayol has not change where fundamentally it is consist of four basic function: planning, organizing, controlling, and leading.

Project Planning is one of the critical components of the project management processes. Project management processes can be organized into five groups of one or more processes each (PMI, 2000):

(i) Initiating Process – authorizing the project or phase.

(ii) Planning processes – defining and refining objectives and selecting the best of the alternative courses of action to attain the objectives that the project was undertaken to address.

(iii) Executing processes – coordinating people and other resources to carry out the plan

(iv) Controlling processes – ensuring project objectives are met by monitoring and measuring progress regularly to identify variances from plan so that corrective action can be taken when necessary.

(v) Closing processes – formalizing acceptance of the project or phase and bringing it to an orderly end.

2.2 The Importance of Planning in Construction

Construction projects are normally complex. The project process consists of the following stages as shown in figure 2.1 (Kwakye 1997).

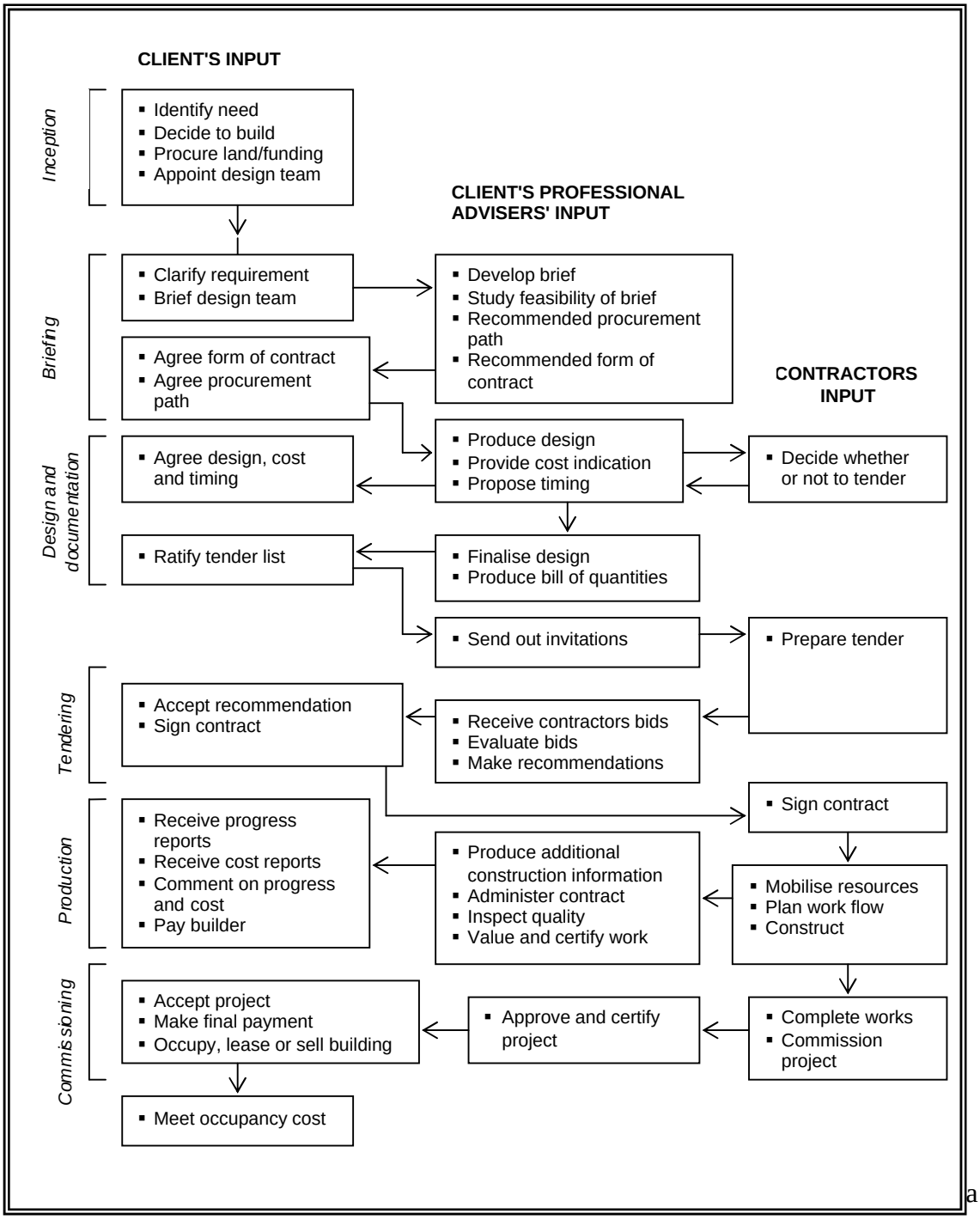

Figure 2.1 common task of delivery a construction project.

These complicated stages require careful planning for its implementation to avoid any possible conflicts between the responsible parties to carry out the different task at site. The project planning provides a clear roadmap for all team members about the path they should follow. The main constraints of construction are time, cost and quality. Meeting these three constraints at every stage of the project process would result in a smooth uninterrupted work progress at site. Otherwise should there be any interruption to the project plan would seriously wound the original plan of completion time. Work may be temporarily stop at site for corrective measure, reorganizing the schedule, resolving the conflict and many other undesirable consequences that eventually may lead to project delay and even claim and litigation.

Therefore the need for proper project planning is upmost important to ensure all the task required for the accomplishment of the project will have adequate resources, logically oraginised in relation with their predecessors task, and adequate time allocated for their completion. Scheduling is one the most important tool to support the planning process. In the past most of the scheduling task is manually done without the aid of computer software. Some project do not have a proper written schedule and very much rely on the experience of the constructors and project manager. Due to the lack of computational facilities most of the schedule developed in the past is quite simple based on Gantt Chart technique and the process of tracking and monitoring is quite difficult. Often the process of forecasting of the project achievement very much depends on the one's experience and wisdom. Most of the time there is lack of warning for the potential of project delay. The following section describes the common scheduling technique used in construction to schedule and control the project.

2.3 Progress Monitoring Process

One of the major purposes of having project progress is to update and monitor project progress. The typical project schedule is complex and comprise with many activities in it. The major project may have up to tens of thousands of activities and

smaller one with few hundred activities. Therefore the practical way of updating the schedule must be done using computer. Manual updating should be a matter of past as the computer facilities is easily available today.

In general principles tool like progress curves, also called S-Curves is very popular method of displaying project progress. S-Curve is graphically plot some measure of cumulative progress on the vertical axis against time on the horizontal axis. Progress can be measured in terms of money expended, quantity surveys of work in place, man-hours expended, or any other measure which makes sense. Any of these can be expressed either in terms of actual units (dollars, cubic meters, etc.) or as a percentage of the estimated total quantity to be measured. The shape of a typical S-Curve results from integrating progress per unit of time (day, week, month, etc.) in order to obtain cumulative progress. On most projects, expenditures of resources per unit time tend to start slowly, build up to a peak, and then taper off near the end. This causes the slope of the cumulative curve to start low, increase during the middle, and then flatten near the top.

Planning and reporting progress like Bar Charts, progress curves can express some aspects of project plans. Once the project is underway, actual progress can be plotted and compared with that which was planned. It is then possible to make projections based on the slope of the actual progress curve. Such projections, however, should neither be made nor interpreted without a good understanding of the reasons for deviations, if any, from planned progress, and of the current and future plans of project management. An example of SCurve application is shown in figure 2.2.

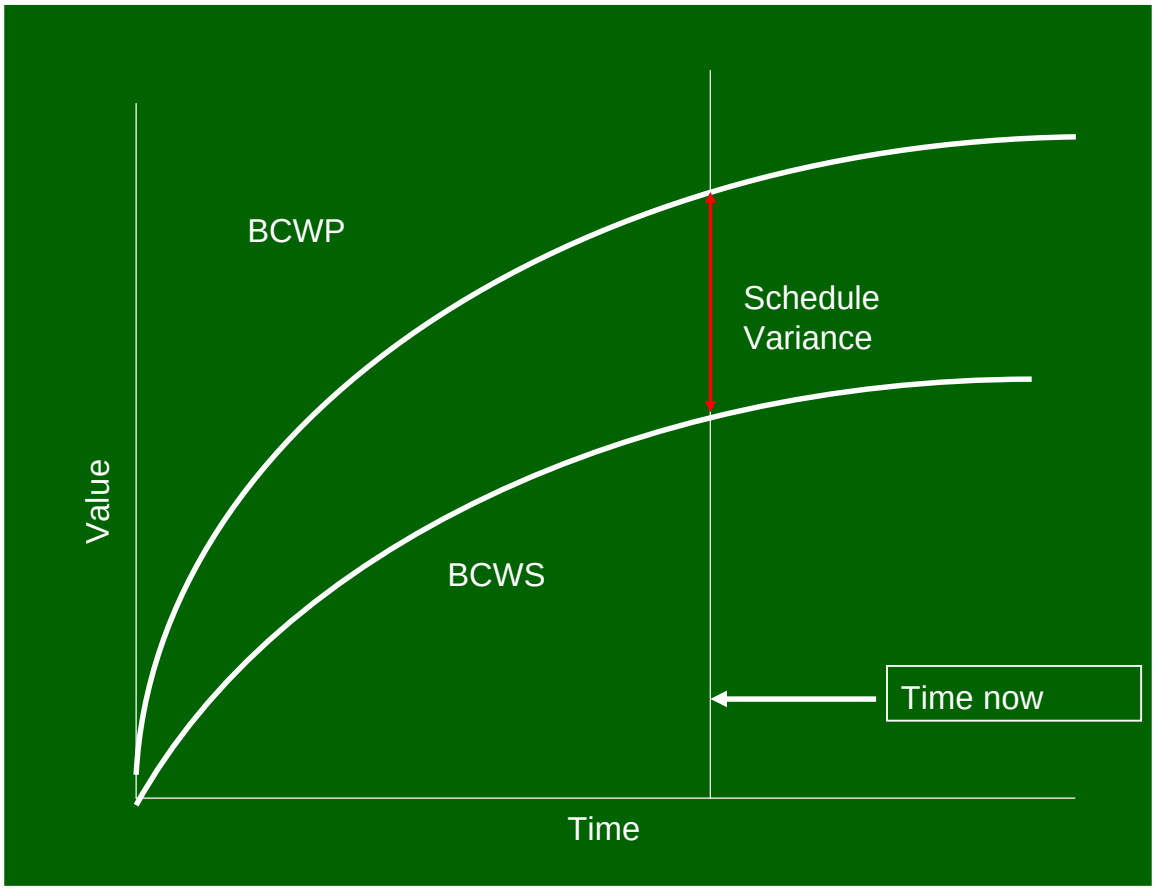

Figure 2.2 Typical S-Curve and Earn Value concept

2.4 The Importance of Using Planning Software

With the advancement of the computer technology the process project planning has become much more easier compared to the past. Various type of project planning software are available in the market such as Primavera Project Planner, Microsoft Project, Sure track, and Artemis to name a few are available in the market. Some are quite cheap to acquire like Microsoft Project but some are quite expensive and suitable for major construction project with big budget.

Scheduling of the construction project with the aid of the software has many advantages to it. Some of these advantages are:

a. The tedious calculation process can be simplified
b. The network diagram is automatically drawn
c. The process of updating the schedule can be done without worrying the effect of changes as it is will be automatically calculated
d. The schedule can be loaded with the required resources for each task and this will be take into consideration in schedule calculation
e. The critical path for the schedule can be automatically traced
f. The schedule can be track against the baselines.
g. Changes can be made on the schedule without any difficulties

2.5 Scheduling Using Microsoft Project

"Microsoft Project is a scheduling and planning tool for project manager, providing easy-to-use tools for putting together a project schedule and assigning responsibilities and it also gives him powerful tools to carry him through to the end of the project (Pyron, 2000)". Microsoft Project software had developed more then a decade ago, but until now its application is quite limited to basic scheduling need of preparing the network diagram only. Recently it is being used for actual purposes such to generate project reports as a basic for the evaluating the claim. This is happen because the project managers have limited of knowledge of knowing Microsoft Project.

Actually Microsoft Project also can use to prepare professional and standard reports to explain the construction project to stakeholders such as clients, top management, engineer, supervisor, and sub-contractor. Integration between conventional progress report with Microsoft Project can greatly improve the poor communication within construction project parties. Whatever changes that had made in the planed schedule by the contractor, the client can understand the information easily and clearly only by viewing through all those simple reports summary that generate by Microsoft Project.

DATA COLLECTION AND ANALYSIS

3.1 Introduction

The methodology for this study was divided into three stages. First stage involved literature review to develop understanding on the aspect related to scheduling practices and limitation of its application. Second stage involved interviews with the selected industry experts to validate the validated the findings from literature about state of arts of current scheduling practices in Malaysia. Face to face interviews were conducted with personnel from both the construction industry. 'Qualitative content analysis' method (Fellows and Liu 1997) was used to analyse the responses from these interviews.

The last stage involves industry wide questionnaire survey. In this survey the investigation on the issue related on the current practice of project scheduling for construction project has been further investigated and important elements for the development of the guidelines for the preparation, submission and updating of the schedule has been determined. The final stage involved preparation of this report and submission. The following sections describe the results of data collection, their analysis and the inferences that can be made from them.

3.2 Analysis of the face to face Interviews with Industry Experts

There were five separate face to face interviews with personnel within construction industry conducted in the research. All of the interviewees were experienced practitioners in construction industry. One of them were senior project manager, two owners of construction companies, who are also play important roles in managing their own construction work, one consultants and a director of major construction organization in Malaysia. The interviews used a semi-structured approach. All the

interviews were carried out at different times and places. The set of questions to be asked were prepared as a guideline prior to the interview session which normally lasted around one hour. However during the actual session, a different sequence of presenting the questions was used to allow more flexibility in the discussion. In general the questions presented in the interviews fell into these common themes:

- Their experience related to managing project scheduling
- Problems and the need for regulating the scheduling process
- Basic concept of the guideline

Table 3.1 shows the content analysis of the interview with the expert panels.
The discussions of the
Each of the above issue is briefly discussed here to describe their importance and relationship to the research focus.

3.2.1 Panelist Experience related to Managing Project Scheduling

In general all panelists have experience in some form of scheduling techniques used in the project associated to them. They have indicated the used of CPM technique and Gantt Chart which is actually two common technique used throughout the construction project in Malaysia.

With regard to the preparation of the schedule it is found that 60% of the interviewees claimed prepared by the contractor but the rest prepared by the consultant. This is quite confusing as the schedule must be prepared by the contractor as the contractor is responsible to carry out the construction task. However they may refer to the different arrangement of project delivery systems for example in the Design and Build whereby the consultant team up with the contractor. On the other hand the consulting taking the role roles of project manager representing the client may developed the general work schedule for the client to monitor the project progress.

With regard to the preparation of the schedule it was found that there is still lacking in term of the application of the planning software. Despite using computer but not all schedule developed using planning software. Computer generated schedule using planning software such as MS Project and Primavera Project Planner have able to generate the scheduling information automatically which include analysis and reporting functions. The interviews indicate that the use of planning software is quite common as it should be. The software is easily available and the price for some of them is quite reasonable.

The interviewees were also being asked about the implication of the scheduling toward promoting information sharing in the project. Almost all responses indicated that it does not promote information sharing or collaborative working environment. This finding is further reinforced with the respond for the question related to the

updating of the schedule. Most of the interviewees indicated that contractors take the initiatives to maintain and update the schedule and does not signify the role of the client in this process. This is a common scenario in our construction industry whereby the client and contractor maintain a different set of schedule for their own purpose of application. They do not share or use the same schedule collaboratively. One of the interviewees even indicated that the client have different type of schedule compared to the one maintain by the contractor.

In correspond to a more general question on their feeling on the current process in project scheduling most of the interviewees consensually indicated that there is a need for improvement and need to be regulated in a systematic way. Other issue raised by them includes the need for standardization, lack of training and the need for industry to be more serious in addressing the issue related to the project scheduling.

3.2.3 Problems and the need for Regulating the Scheduling Process

The second main issue raised in the interviews was about the need for regulating the scheduling process. All interviewees agreed to such need but one of them raised the concern about fairness. It is a reasonable to raise such concern as the justification for the development of such guideline must take into account that the basic fundamental purpose of scheduling is to support collaborative working environment of the project.

When asked about the responsibility to develop the guideline the study observed mixed answer. Majority feel that the client should take the initiative to develop the guideline. One opinion said the CIDB and another suggested Professional body. Probably the ‘client’ that respondent refer to is the major client such as organization like JKR, Petronas and others. However if we need to have a common standard guideline it would be better for professional body or CIDB to take such task. Individual client organization can use such guideline with some modification to suit their need.

3.3 Analysis of the Questionnaire Survey

This section reports the analysis of the data gathered from the industry wide postal questionnaire survey. The questionnaire was designed to evaluate further the current practice of project scheduling and justification of the elements that important toward developing the guideline. This questionnaire consists of three major parts:

Part A : Background of the respondent

Part B: Investigation of the state of Art of the Project Schedule Application

Part C: The basic necessary elements in the development of the guidelines

The questionnaire was analysed using simple frequency analysis statistic. Question are given in two mode. First mode requires the respondent to 'tick' the given choice of answer for them to respond. The calculation is made by counting the number of 'tick' for each question. The percentage is calculated based over 52 respondents.

The second type of question (used for Part B and C) require the respondents to state their level of agreement for a given statement. The level of agreement is given on five ordinals Likert Scale from 1 to 5. The description of each level of agreement is as follows:

1 – Most Disagree

2 – Disagree

3- Neutral

4- Agree

5 – Most Agreed

The respond for this section is also calculated using frequency analysis as well. The total frequency of the respond is divided into two group. The first group is the 'Disagree' group where summation is made for the frequency of the respond for 1

and 2. On the other hand the summation of the frequency of the respond for 4 and 5 are calculated together as the 'Agreed' group. The respond for '3' is not counted as they represent the 'neutral' or undecided respond. As for the guideline development Agreed Group percentage (over 52 respondents) are compared against the Disagreed Group for evaluation and acceptance or rejection of the idea.

The findings from each section are being discussed in the following sections.

3.4 Background of the respondent

A total of 100 set of questionnaires were distributed for this research using postal services. About 30% of the questionnaires are being distributed by hand. In general the respondents were randomly selected from personal or organization within Malaysian construction industry. They consist of consultant, contractors and project manager that are directly involved in this industry. Only 58 sets of questionnaires were returned and 52 fully answered all questioned and considered in the analysis. This represent 52% rate of return which not too bad for this kind of research.

The distribution of the respondents in accordance to their organisation in this industry as shown in the Table 3.2

Table 3.2 The distribution of the respondents group.

Respondent Group	**Number**	**Percentage**
Government Agency	10	19.2%
Contractors	22	42.3%
Consultants	16	30.8%
Project Manager	4	7.7%
Total	52	100%

On the other hand the number of years of their experience in this industry is tabulated in the following Table 3.3:

Table 3.3 Years of Experience in Construction industry

Years of Experience in Construction industry	**Number**	**Percentage**
Less than 5 years	12	23%
Between 5-10 years	16	30.8%
More than 10 years	24	46.2%
Total	52	100%

The above table indicates that more than 75% of the respondent are indeed well experience in this industry.

Majority of the respondents also involved in medium to large scale of project as shown in Table 3.3

Table 3.3 Value of project involved by respondents

Value of project	**Number**	**Percentage**
Less than RM500,000	12	23.1%
RM500,000 - RM5mil	16	30.8%
RM5mil – RM20mil	18	34.6%
More than 20mil	6	11.5%
Total	52	100%

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Based on the above background it can be assume that the respondent has adequate background and experience as this study intended to have.

3.5 Common Type of Project Schedule Used

The purpose of this inquiry is to be make observation on the common type of project schedule used in our construction industry. The respondent were asked to tick the common scheduling technique that they experienced (used) with for the last three projects that they involved. Each respondent may have involved in more than one type of schedule. The tabulation of the result for this question is as shown in the following table:

Table 3.4 Type of Common Scheduling Technique Used

	Type of Schedule	**No of Respondents**
1.	Bar Chart / Gantt Chart	48
2.	CPM (Networking Technique)	22
3.	Line of Balance	0
4.	Others	2

The result shows that most popular scheduling technique used is the Gantt Chart followed by the Networking technique. However it should be noted here that most of the computer generated schedule used lime MS Project and Primavera has the capability of displaying both CPM and Gantt Chart view. Indeed most of the time the users are more comfortable to display their schedule in this Gantt Chart view and this may give the wrong impression those who are not familiar or quite with the network approach to consider this schedule as CPM. According to this result CPM are the second most common technique used.

Line of Balance despite being a fairly good scheduling technique especially for construction work that has many repetitive activities has not record any usage in the survey. This probably the technique is hardly known and no computer software has been found in our local market that can support its application. With regard to ‘others’ the respondent did not really indicate what are the other technique.

3.6 Common Type of Software Used to Develop the Schedule

The questionnaires also investigate the common type of project schedule used to develop the schedule. The same rule applies as to the previous section whereby the respondent can select more than one answer as the question are referring to the three last projects they involved. The result of the responses is shown the following table.

Table 3.5 Type of software used in the project

	Type of Software	**No of Respondents**
1.	MS Project	31
2.	Primavera Project Planner	11
3.	Artemis	0
4.	Sure Track	2
5.	Microsoft Excel	24
6.	Others	3

As expected MS Project represent the most common type scheduling (planning) software used with 31 respond. It is also expected that there will be a significant respond for Microsoft Excel it is not dedicated scheduling software. The reason it is being included in this questionnaire is just to see if it can attract any responds. However this objective might not be true if the respondents genuinely tick the MS Excel as despite the software can be used to develop the Gantt Chart manually and has powerful spreadsheet capability to perform basic computation required for a schedule.

Primavera despite being powerful software has not been that popular as MS Project probably because it more complicated to use and cost a lot more. Sure track is MS Project version of Primavera has two responds. Like Primavera, Artermis is a powerful scheduling software but do not record any used. This is probably the software is not common in this country and quite costly to acquire.

3.7 Malaysian Experience in Scheduling Process

This part of the questionnaire aim to investigate the state of art of scheduling practices in based on the experience and feedback of the respondents. Eighteen (18) questions has been presented in this part of questionnaires. Important issues raised include:

- Application of the scheduling software
- Problems in software application
- Limitation of network technique

Each of the above themes is discussed the following sections:

3.7.1 Application of the scheduling software

The analysis of the questionnaire related to this aspect is tabulated in the following table 3.6. The aim is to review current practice and purposes of scheduling for construction project.

Table 3.6 State of arts of scheduling process

	Disagreed 1+2	Agreed 4+5
At the end of the project the schedule always being disregard	2%	88%
The initial schedule is rarely being update	10%	81%
Usage limited to monitoring of cash flow and progress	13%	77%
The information of project schedule must be transparent	10%	60%
Mostly using Bar Chart/Gantt Chart	48%	52%
The schedule should be used as a tool to support collaborative working	33%	48%
Project schedule based on CPM is more effective than Bar Chart	52%	42%
The client and contractor normally has different set of schedule to suit their own need	15%	35%
Client only interested in major milestone of the project completion not day today activity completion	15%	35%
Most schedule is not that practical compared to experience as far as work process concern	58%	27%

Based on the analysis it can be seen that highest level of agreement is recorded for the item related to schedule application after the project being completed. It is expected that the schedule will be disregard as it may assumed that it does not serve any purpose. Unfortunately this is not true as the schedule represents the roadmap and the logical sequences how the project activities being constructed or done. There it is important to keep the schedule for future references. Further any claim for variation order and compensation or damages claimed must use the schedule as a critical source of reference. However if the schedule is not being occasionally updated and record of ‘as constructed’ schedule is not being finalized then it is obvious the schedule will not have any significance value for future references. Furthermore if it is just a simple bar chart schedule that unable to show the logical relationship between the activities then probably nobody has any interest for it anymore. The rational why this factor has received significant agreement by the respondent is being supported by factors that indicated that the schedule being rarely updated and (81% agreement) and limitation of its usage.

Other factors being investigated are the type of the schedules used and the purpose of scheduling. About 52% agreed that bar Chart is commonly used. This moderate level of agreement indicate wide acceptance of other technique particularly CPM. The moderate agreement on effectiveness of CPM (42%) shows lack of understanding toward CPM benefits. This is also indicate the level of application and acceptance of CPM is still quite moderate in Malaysia.

With respect to the purpose of the schedule the respondent agreed that mainly is use to update progress and cashflow. Other than that the respondent does not quite believe that schedule can help to promote collaborative working (48%). So they did not quite agree that the information on the project schedule must be transparent (60%). This contrary to the true spirit of purpose of scheduling. This reflect the moderate level of knowledge and awareness about scheduling in our construction industry.

3.7.2 Problems and limitation in scheduling

In this study eight (8) typical problem and limitation have been posted in the questionnaire survey. These problems are shown in table 3.7

Table 3.7 Problems and limitation in scheduling

	Disagreed 1+2	Agreed 4+5
Level of knowledge of project team members is not at par with each other about schedule	4%	96%
CPM (network diagram) is difficult to understand	4%	87%
The process of updating the schedule is difficult	4%	85%
It is rarely prepared by qualified person	15%	69%
Does not serve much purpose as intended	17%	69%
It expensive to have CPM schedule	8%	88%
Only in medium to large scale project only	29%	65%
The effectiveness of the project schedule prepared today is hampered by lack of proper guideline	25%	63%

All problems posted have received a high level of agreement more than 60%. One of the major problems with regard to the application of the project process is the significant different level of knowledge between the project members on it. This is not surprising as it is our practice to assignment the task of scheduling to specific project personnel only. Furthermore CPM schedule is considered as quite difficult to understand (87% agreement) and the process of updating is also considered complicated. Therefore in respond to this there is a serious need for our Malaysian construction industry to provide more training effort to all parties in this industry. Without appropriate skill in scheduling process it is very difficult to support the objective to use the schedule as a tool to promote collaborative working environment.

Other associated problems as agreed by the respondent are the high price to have the CPM (network) schedule for the project. It is quite difficult to justify this issue because the basic price of some of the software is quite reasonable. Probably the users failed to quantify the potential benefit of the schedule to the project compared to the additional cost of the schedule. Other reason is the user might not able to full reap the benefit of networking schedule particularly using software due to their lack of experience or knowledge in its application. However it is interesting to note that the level of agreement toward the fact that the schedule is suitable for medium to large project is only 63%. It can deduce that the respondent did consider the importance of scheduling to small project as well.

One major issue that being raised in this part of the questionnaire is related to the guideline. Surprisingly only 63% of the respondent agreed that the effectiveness of the project schedule prepared today is hampered by lack of proper guideline. This probably the respondent might not be familiar with the guideline as it has never existed yet. The disagreement level of 25% indicates a low level of disagreement as well where 12% of the respondent chooses to be neutral.

3.8 Important Elements in Development of Guideline

This part of the questionnaire aim to evaluate the level of agreement of respondents toward important factors (elements) that to be considered in the development of the guideline in this research. The proposed guideline in this research is divided into several major sections as follows:

1. Preparation the project schedule.
2. Submission
3. Evaluation process of project progress

In the evaluation process the research has adopted an approach whereby any factor that received less that 50% agreement will not be included or being consider for inclusion with modification to suit the opposite respondent view of the respondents. Other suitable clauses which are seem to be consistent with the opinion of the respondent but not directly included in the questionnaires will be considered as well. A set of guidelines is presented in the following chapter.

3.8.1 Preparation the project schedule.

This is a very important stage whereby the guideline must give a very good insight to the contractor about the basic feature of the schedule that they have to prepare and submitted to the client for approval. The issue raised in the questionnaire for this aspect shown in the following table 3.8 below.

Table 3.8 Item Related to the Preparation of Project Schedule

It is advisable for the contractor to adopt three level of WBS for the schedule	56%	21%
The schedule submitted must be included the assignment of resources for each production task	42%	31%
There should be at least one milestone in every two months of the project duration.	31%	46%
Client or their consultant is responsible to verified the schedule submitted by the contractor	19%	73%
Contractor must provide evidence that the schedule has been prepared by the qualified personnel who has already gone training for such obligation.	4%	85%

Based on the data analysed from the above table two factors received strong endorsement from the respondents with more than 70% agreement. They are the requirement for the qualified personnel to prepare the schedule and the client responsibility to verify the schedule submitted. However the other three factors related to Work Breakdown Structure, the inclusion for the resource constraint schedule and milestone for the schedule does not received strong agreement. This probably due to the need for simple approach in the initial stage of the guideline's introduction. The WBS and the milestone are quite subjective issue as well. They are quite flexible and can be tailored to suit the actual individual project requirement.

3.8.2 Submission and approval procedure of Project Schedule

The following issue that this research seeks the agreement from the respondent is related to submission and approval process of the project schedule. The result of the questionnaire survey analysis is shown in the following table.

Two interesting findings is the lack of agreement for two elements related to the date of submission and making the schedule as part of the agreement. These two items are considered important as we need to make the schedule submission as a serious obligation and thus must be bind to the project. However they do not received adequate agreement particularly the date of submission which only received 12%. Probably the two weeks period after receiving the Letter of Acceptance is too short

and contractor need longer time to prepare. With regard disagreement of the idea to 'make the schedule as a contractually bind and client to be the keeper of the schedule' is probably because nobody really want to be committed for something new like this. The effort to introduction of this guideline is still new and the industry is not familiar with the benefit, problem and risk associated to it. So rationally it is quite a fair evaluation by the respondents.

Table 3.9 Submission and approval process

Submission of the initial schedule by the contractor must be made two weeks after the official date of the Letter of Acceptance	67%	12%
Upon acceptance by the client the schedule shall be consider as part of the contract agreement and keep in the client position.	50%	21%
The software used by the contractor for the preparation of the project schedule must be approved by the client	27%	56%
Contractor is responsible to advise the client on any query raised from the first submission of the schedule and make any changes as advised by the client if agreeable to both the client and contractor. Otherwise further consultation is necessary between both parties until agreement is reached.	17%	63%
General work schedule using Gantt Chart should be prepared by the client for traditional contract	15%	63%
The used of CPM (Network Technique) must be mandatory for all projects worth more than RM1mil.	8%	81%
The used of Bar Chart should be limited to small project only	6%	83%
Contractor must be responsible for the preparation of project CPM schedule for construction phase	4%	83%
The schedule submitted by the contractor must be in the form of soft copy and hard copy format.	4%	85%
Consent for the acceptance of the schedule submitted by the contractor must be made by the client prior to the start date of the project.	6%	88%
The detail information displayed for each of the activities in the schedule should have the necessary information to facilitate the process of project monitoring and tracking.	4%	88%
The schedule submitted must have one critical path only.	0%	96%
The schedule duration must not exceed the total duration of the project in accordance to the contract agreement.	0%	100%

The other elements presented have received agreement from the respondents. Many of the important elements that are necessary for their inclusion in the guideline have been determined from the above table. Among them are:

- the suitable scheduling technique in relation to the project magnitude
- Reviewing process of the submitted schedule
- Responsibility to prepare the general wok schedule and detail work schedule
- Format of schedule submission by the contractor
- Client responsibility for approval of the schedule
- The detail information of the project's activities to facilitate the process of monitoring and tracking
- The limit of project duration
- The limit of critical path

3.8.3 Process of Updating and Evaluation Progress

The final part of the questionnaire related to the determining the guideline for the scheduling relates to the process of updating and evaluation progress. Table 3.10 shows the finding from the survey. All the related elements for the guideline development have received agreement with score between 50% - 69%. The lowest score (50%) is related to the agreement toward contractors responsibilities for each task duration. Since the contractor is the party which prepare the schedule so they are the one who should be responsible for the duration of each activities they assign. The client who approves the schedule based on contractors commitment. Other elements that are receiving low level of agreement (50%) are related to schedule baselines and biweekly meetings. Despite their low score these two elements are very critical for process of updating the schedule.

Table 3.10 Process of Updating and Evaluation Progress

Elements	**Disagreed**	**Agreed**
Contractor is fully responsible for the duration for each task in the schedule.	37%	50%
The client must organized a weekly face to face meeting or in virtual environment meeting to review and update the project progress where changes will be track using the approve schedule	27%	50%
The baseline can only be updated by the client.	33%	50%
Any application for the extension of time must be made with the justification using the project schedule.	42%	52%
There should not be any discrepancies between both schedules. Should there be any discrepancies the contractor is obliged to commit to the original project schedule.	27%	60%
Any extension of time granted must be represented by the adjustment of the schedule baseline.	12%	65%
Should there be any dispute between the client and contractor with regard to process of project progress tracking a qualified third party must be consulted to resolve the disagreement immediately.	25%	69%
Contractor can updated the schedule on daily basis but using a second copy of the original schedule where all the progress will be informed and updated to the client during the weekly meeting.	2%	77%
Once accepted by the client the date for the execution of all tasks in the schedule will be deemed considered as baseline of the schedule.	10%	79%
The schedule once accepted for the project cannot be adjusted by the contractor without the consent of the client to ensure its validity	2%	83%
Any changes or updating of the schedule can only be made in with the consent of client	13%	83%
The client and contractor must enter into prior agreement either to use the schedule milestone, progress on critical path for the purpose of the payment. If no prior agreement is made it is assume that the traditional method of disbursing the payment will be adopted. The schedule will be solely used for the purpose of tracking the project progress and claim evaluation.	0%	90%
The basis for the estimation of the percentage of the overall progress of the project must be agreed by the client and contractor.	0%	90%
The calendar used for the project as a basis for schedule including the holiday, must be mutually by the client and the contractor	0%	96%

The other elements that have received considerable agreement are related to:

- The use of project schedule for application of the extension time
- Duplication of project schedule client and contractor
- Consistency of the information in the project schedule
- Using schedule as a guide to make interim progress payment
- Procedure for estimating the project progress
- Process of estimating project progress
- Schedule project calendar

DEVELOPMENT OF GUIDELINE FOR PROJECT SCHEDULING

4.1 Introduction

The guidelines develop here is based on the findings from the data collected from the study. Initial data collected from the in the interviews with the professional involved in construction industry. Even though the aim of the interview is more of exploratory inquisitive nature but some findings from content analysis is important toward the development of the guidelines. The main source of data for guideline generated from the analysis made in the questionnaire survey. Based on the data collected the research has established list of elements that will be considered critical toward its development.

However the guide that is developed by this research is not written as ‘per se’ as the question presented in the questionnaire. The elements or factors established will be used but the clauses in guideline will be rewrite to suit the appropriate style to make sure that the guideline is more presentable for the users. Some additional clauses have been added even though they have not been directly asked in the questionnaire survey but they are considered relevant to the other factor that has been agreed. The following section represents the guideline as the result from this research.

GUIDELINES

FOR

MANAGING CONSTRUCTION

PROJECT SCHEDULE

SECTION I : General Application of this Guideline

1. This guideline is develop for the application for medium to large project
2. It is intended to be used for traditional design – bid-build contractor.
3. As for other type of contract some amendments must be made first to suit the nature of contractual arrangement.
4. It is an option for the client to adopt this guideline as part of the contract agreement or not.

SECTION II : Procedure of Preparation and Submission

1) The client is responsible to prepare the major work schedule and the contractor is responsible to prepare and submit the detail work schedule for construction phase
2) The duration of the schedule must be within the stipulated date of contract agreement.
3) The used of CPM (Network Technique) must be mandatory for all projects worth more than RM1mil.
4) The project schedule must be prepared by qualified personnel that have undergone training or courses provided by a recognized institutions
5) The contractor must get the consent of the client for the software to be used for the schedule.
6) The schedule submitted by the contractor must be in the form of soft copy and hard copy format.
7) The client is responsible to review the project schedule submitted by the contractor as soon as possible and give the feedback for improvement if necessary.
8) Contractor is responsible to advise the client on any query raised from the first submission of the schedule and make any changes as advised by the client if agreeable to both the client and contractor. Otherwise further consultation is necessary between both parties until agreement is reached.

9) Consent for the acceptance of the schedule submitted by the contractor must be made by the client prior to the start date of the project.

10) The schedule submitted must have one critical path only.

11) The detail information displayed for each of the activities in the schedule should have the necessary information to facilitate the process of project monitoring and tracking.

12) All cost of preparation should be included in the tender document and reviewed by the client.

SECTION III – PROCEDURE FOR UPDATING AND MONITORING THE SCHEDULE

1. Contractor is fully responsible for the duration for each task in the schedule unless change made upon the client request.
2. The calendar used by the contractor for developing the schedule must be approved by the client.
3. All the holiday other than standard public holiday such as during the Hari Raya and Chineese New Year that is common to this country must be established in the schedule calendar and endorsed by the client. However these holidays cannot be use as any basis for claim for any kind of compensation and must fit within contract standard project duration.
4. Once accepted by the client the date for the execution of all tasks in the schedule will be deemed considered as baseline of the schedule.
5. The schedule once accepted for the project cannot be adjusted by the contractor without the consent of the client to ensure its validity
6. Any changes or updating of the schedule can only be made in with the consent of client
7. The client and contractor must enter into prior agreement either to use the schedule milestone, progress on critical path for the purpose of the payment.

8. If no prior agreement is made it is assume that the traditional method of disbursing the payment will be adopted.
9. The schedule will be solely used for the purpose of tracking the project progress and claim evaluation.
10. The client must organized a weekly face to face meeting or in virtual environment meeting to review and update the project progress where changes will be track.
11. Contractor can maintain a copy of original schedule.
12. Contractor can update the schedule on daily basis but using a second copy of the original schedule where all the progress will be informed and updated to the client during the weekly meeting.
13. The baseline can only be updated by the client.
14. Any application for the extension of time must be made with the justification using the project schedule.

15. There should not be any discrepancies between both schedules. Should there be any discrepancies the contractor is obliged to commit to the original project schedule maintain by the client as a basic for any claim and payment.
16. Any extension of time granted must be represented by the adjustment of the schedule baseline.
17. Should there be any dispute between the client and contractor with regard to process of project progress tracking a qualified third party must be consulted to resolve the disagreement immediately.
18. The basis for the estimation of the percentage of the overall progress of the project must be agreed by the client and contractor.
19. The calendar used for the project as a basis for schedule including the holiday, must be mutually by the client and the contractor.

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CONTENT ANALYSIS OF STRUCTURED INTERVIEW WITH INDUSTRY EXPERTS

QUESTIONS	Interviewee #1	Interviewee #2	Interviewee #3	Interviewee #4	Interviewee #
What is the common scheduling technique used in the project that you involved recently?	Bar Chart	Network Technique (CPM)	Network Technique (CPM)	Network Technique (CPM)	Bar Chart
Who prepare the schedule?	Contractor	Contractor	Consultant	Contractor prepare and review by consultant	Prepared by the consultant for the client
Did the schedule used for the project developed using any specific planning software?	No. Just a computer printed bar Chart probably using Microsoft Excel	Computer generated schedule. Software is not MS Project	Developed using software probably Microsoft Project	Using Primavera	Computer printed using some common software
Did you satisfied with such schedule?	Ok acceptable to me as the project size is moderate	Acceptable	Not sure, it is maintain by contractor. Nobody really used it as the contractor was experience enough	Yes	Not so, quite confusing. I don't like it!! There must be a better way of doing it.
Did the software being updated during the course of project progress	Yes. They plot S-Curve on it.	Yes, done by the contractor.	No idea. But the client maintain a Gantt Chart to track the project progress	Yes, it is being updated by the contractor and printed out.	Yes, S-Curve being shown.
Did the client give any particular guideline for the contractor in preparing the schedule?	No	No	No	No	No
Do you think there is enough collaboration between client and contractor in sharing the information on of the schedule	No	No, most of the initiative done by the contractor. The schedule is for their own used. The client just interested in monthly work progress.	Not really	Not really, client were being brief during meeting . they don't really interested to analyse the schedule. Probably they don't really know how.	Yes, the client involved in approving the schedule and tracking the progress

QUESTIONS	Interviewee #1	Interviewee #2	Interviewee #3	Interviewee #4	Interviewee #5
Do you think we need to regulate the way the schedule is being prepared and used for the project?	Its good if we can but must be fair	yes	yes	Yes, we need to be more serious	yes
Who should produce the guideline?	CIDB	Client	Client	Professional body	Client
Do you agree that lack of guideline impede the effective application of the project schedule for the client and contractor?	Depend on the purpose of the schedule	Agreed there is a need for common understanding govern by the standard rule	Agreed, commitment sometime need to be force!!!	Agreed	Current scheduling main serve the contractor need and the client is not that serious so there is a need for regulation
How do you describe the current state of arts of project scheduling effort for construction project?	So much reliance on experience	Lack of standard procedure depend on individual capability	OK, the trend toward doing it professionally is growing	Lack of training hampered the common understanding. Normally dominate by one side only.	OK but still lot of room for improvement. Standard guideline maybe helpful but requires seriousness.
Who should promote the used of standard guideline if exist?	Client	CIDB	CIDB	Client	There is a need for enforcement by the government

INDUSTRY WIDE QUESTIONNAIRE SURVEY

ON

PROJECT SCHEDULING IN MALAYSIAN CONSTRUCTION INDUSTRY:

CURRENT STATE OF ARTS OF ITS APPLICATION

AND

THE DEVELOPMENT OF THE GUIDELINES

A STUDY CONDUCTED BY:

CONSTRUCTION TECHNOLOGY AND MANAGEMENT CENTRE
FACULTY OF CIVIL ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA
SKUDAI, JOHOR.
Mac 2006

INTRODUCTION

Planning and scheduling has been a very important part of a project management. A proper planning and a properly planned schedule could help in creating a good management of a project. Thus it is seen essential that the schedule be included in the contract document as a legal document.

The reason of inclusion is not only to facilitate the monitoring and management of the project, but to help in resolving dispute that occurs later in the project. In many cases, whereby dispute has to be taken into court, proper schedule has been the key evidence in solving the dispute.

Schedule which usually is used for monitoring of work only can also be used to monitor time, cost, resources and even quality. This shows the vast amount of usefulness of a schedule and thus the inclusion of it into the contract document is essential.

This questionnaire is part of the research initiatives done by Construction Technology and Management Centre as a fundamental research effort for the creation of a guideline for the inclusion of project schedule as a contract document for Malaysia's construction industry.

This questionnaire consists of three major part:
Part A : Background of the respondent
Part B: Investigation of the state of Art of the Project Schedule Application
Part C: The basic necessary element in the development of the guideline

Through this questionnaire, we are hoping to create a major guideline that can be use in the industry to properly include the project schedule as a part of a contract document. With this guideline, it is hope that the responsibilities of parties involved and usage of the project schedule can be established.

All the information provided by the respondent will treated with strictest confidentially and no name or any kind of information about the respondent identity will be published or provided to any other parties within or outside UTM. Should there be any question pertaining to this questionnaire do not hesitate to contact me at contact number given below. Your cooperation is highly appreciated.

Thank You

Dr MOHAMAD IBRAHIM MOHAMAD
Associate Professor / Manager
Construction Technology and Management Centre
Contact: (Off) 07-5531757 (Fax) 07-5555157 (Email) drm2i@yahoo.com

PART A : RESPONDENT BACKGROUND

Tick the appropriate box in corresponding to each question:

1. Type of Organisation that you represent

   Government Agency/ Client ☐ Consultant ☐

   Contractor ☐ Project Manager ☐

   Others (Please indicate) : ……

2. Years of involvement in construction industry

   Less than 5 years ☐ Between 5 to 10 years ☐ More than 10 years

3. Size of project that your organization involved

   Less than RM500,000 ☐ RM500,000 – RM5mil ☐ RM5mil – RM10mil ☐

   More than RM10mil ☐

PART B : PROJECT SCHEDULE APPLICATION

4. Indicate which type of scheduling techniques that being used in the last three projects that you involved? (you may tick more that one box if necessary)

   ☐ Bar Chart / Gantt Chart

   ☐ CPM (Network Technique

   ☐ Line of Balance (LOB)

   ☐ Others (Please specify) :……

5. What type of software used in the to develop the project schedule that you used in the above question (#4)?

   ☐ Microsoft Project

   ☐ Primavera Project Planner

   ☐ Artemis

   ☐ Sure Track

   ☐ Microsoft Excell

   ☐ Others please specified : ……

6. Which party prepared the project schedule in the above case?

   Contractor ☐ Client ☐ Consultant ☐ Project Management Consultant ☐

Please circle in the appropriate number indicating your level of agreement toward each of the following statement based on the following scale:

1. Strongly Disagreed 2. Disagreed 3 – Neutral
4. Agreed 5. Strongly Agree

7. The application of the scheduling process in Malaysian construction industry today is

(a)	Only in medium to large scale project only	1	2	3	4	5
(b)	Usage limited to monitoring of cash flow and progress	1	2	3	4	5
(c)	Mostly using Bar Chart/Gantt Chart	1	2	3	4	5
(d)	Level of knowledge of project team members is not at par with each other about schedule	1	2	3	4	5
(e)	It is rarely prepared by qualified person	1	2	3	4	5
(f)	Does not serve much purpose as intended	1	2	3	4	5

(g)	CPM (network diagram) is difficult to understand	1	2	3	4	5
(h)	The process of updating the schedule is difficult	1	2	3	4	5
(i)	Most schedule is not that practical compared to experience as far as work process concern	1	2	3	4	5
(j)	The client and contractor normally has different set of schedule to suit their own need	1	2	3	4	5
(k)	It expensive to have CPM schedule	1	2	3	4	5
(l)	The initial schedule is rarely being update	1	2	3	4	5
(m)	At the end of the project the schedule always being disregard	1	2	3	4	5
(n)	Client only interested in major milestone of the project completion not day today activity completion	1	2	3	4	5
(o)	The effectiveness of the project schedule prepared today is hampered by lack of proper guideline	1	2	3	4	5
(p)	The schedule should be used as a tool to support collaborative working	1	2	3	4	5
(q)	The information of project schedule must be transparent	1	2	3	4	5
(r)	Project schedule based on CPM is more effective than Bar Chart	1	2	3	4	5
The possible benefits that can be gain from the guideline						
(a)	A more reliable and consistence schedule for application	1	2	3	4	5
(b)	Possible source of information to solve dispute	1	2	3	4	5
(c)	More systematic evaluation of percentage of work done	1	2	3	4	5
(d)	Fair and justice prevailed in win-win situation for all parties involved	1	2	3	4	5
(e)	Having schedule as a legal document that can be used for litigation purposes	1	2	3	4	5
(f)	Proper guidance for contractor lessen their burden	1	2	3	4	5
(g)	Can improve the scheduling process in a long time	1	2	3	4	5

PART C – DETERMINING THE IMPORTANT ELEMENTS IN SCHEDULING GUIDELINE

This part aims to generate feedback and agreement related to the preparation, submission and the application of the schedule in monitoring and controlling of project progress.

Please circle in the appropriate number indicating your level of agreement toward each of the following statement based on the following scale:

2. Strongly Disagreed 2. Disagreed 3 – Neutral

4. Agreed 5. Strongly Agree

A. Preparation of the project schedule

1.	The used of Bar Chart should be limited to small project only	1	2	3	4	5
2.	The used of CPM (Network Technique) must be mandatory for all projects worth more than RM1mil.	1	2	3	4	5
3.	Contractor must be responsible for the preparation of project CPM schedule for construction phase	1	2	3	4	5
4.	Contractor must provide evidence that the schedule has been prepared by the qualified personnel who has already gone training for such obligation.	1	2	3	4	5
5.	General work schedule using Gantt Chart should be prepared by the client for traditional contract	1	2	3	4	5
6.	Client or their consultant is responsible to verified the schedule submitted by the contractor	1	2	3	4	5
7.	Consent for the acceptance of the schedule submitted by the contractor must be made by the client prior to the start date of the project.	1	2	3	4	5
8.	Contractor is responsible to advise the client on any query raised from the first submission of the schedule and make any changes as advised by the client if agreeable to both the client and contractor. Otherwise further consultation is necessary between both parties until agreement is reached.	1	2	3	4	5

9.	It is advisable for the contractor to adopt three level of WBS for the schedule	1	2	3	4	5
10.	Submission of the initial schedule by the contractor must be made two weeks after the official date of the Letter of Acceptance	1	2	3	4	5
11.	Upon acceptance by the client the schedule shall be consider as part of the contract agreement and keep in the client position.	1	2	3	4	5
12.	There should be at least one milestone in every two months of the project duration.	1	2	3	4	5
13.	The software used by the contractor for the preparation of the project schedule must be approved by the client	1	2	3	4	5
14.	The schedule submitted by the contractor must be in the form of soft copy and hard copy format.	1	2	3	4	5
15.	The detail information displayed for each of the activities in the Gantt Chart should have the necessary information to facilitate the process of project monitoring and tracking.	1	2	3	4	5
16.	The schedule submitted must be include the assignment of resources for each production task	1	2	3	4	5
17.	Contractor is fully responsible for the duration for each task in the schedule.	1	2	3	4	5
18.	The calendar used for the project as a basis for schedule including the holiday, must be mutually by the client and the contractor	1	2	3	4	5
19.	The schedule submitted must have one critical path only.	1	2	3	4	5
20.	The schedule duration must not exceed the total duration of the project in accordance to the contract agreement.	1	2	3	4	5

21.	Once accepted by the client the date for the execution of all tasks in the schedule will be deemed considered as baseline of the schedule.	1	2	3	4	5
B. Updating and Evaluation of project Progress						
1.	None of any particular of the schedule accepted for the project can be adjusted without the consent of the client	1	2	3	4	5
2.	Any changes or updating of the schedule can only be made in with the consent of S.O.	1	2	3	4	5
3.	The S.O. or his/her representative must organized a weekly face to face meeting or in virtual environment meeting to review and update the project progress where changes will be track using the approve schedule	1	2	3	4	5
4.	Contractor can updated the schedule on daily basis but using a second copy of the original schedule where all the progress will be informed and updated to the client during the weekly meeting.	1	2	3	4	5
5.	There should not be any discrepancies between both schedules. Should there be any discrepancies the contractor is obliged to commit to the original project schedule.	1	2	3	4	5
6.	The baseline can only be updated by the client.	1	2	3	4	5
7.	Any application for the extension of time must be made with the justification using the project schedule.	1	2	3	4	5
8.	Any extension of time granted must be represented by the adjustment of the schedule baseline.	1	2	3	4	5

9.	Should there be any dispute between the client and contractor with regard to process of project progress tracking a qualified third party must be consulted to resolve the disagreement immediately.	1	2	3	4	5
10.	The client and contractor must enter into prior agreement either to use the schedule milestone, progress on critical path for the purpose of the payment. If no prior agreement is made it is assume that the traditional method of disbursing the payment will be adopted. The schedule will be solely used for the purpose of tracking the project progress and claim evaluation.	1	2	3	4	5
12.	The basis for the estimation of the percentage of the overall progress of the project must be agreed by the client and contractor.	1	2	3	4	5

Thank you for your cooperation