PLANNING AND SCHEDULING TECHNIQUE IN PROJECT MANAGEMENT: A STUDY ON CRITICAL PATH METHOD (CPM) TO IMPROVE PROJECT COMPLETION TIME

BY
Celia Lim Han Jia

This report is submitted as a partial requirement for the degree of Bachelor of Science (Hons) in Quantity Surveying Faculty of Science, Technology, Engineering and Mathematics INTI INTERNATIONAL UNIVERSITY (April, 2014)
DECLARATION BY THE CANDIDATE

I, Celia Lim Han Jia, 18006337 confirm that the work in this report is my own work and the appropriate credit has been given where references have been made to the work of other researchers.

(Handwritten signature)

Student Name: Celia Lim Han Jia
Student ID: 18006337
Date: 28th April 2014
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ABSTRACT

Project delay is the worldwide common phenomena in construction industry. Therefore, it is particularly important that project planning and scheduling need to be implemented carefully and satisfactory with the purpose of completing the project successfully within the required timeframe. CPM has been proven to be the most useful technique for planning and scheduling the construction project. There are basically 3 studies have been carried to indicate the usage of CPM by Engineering News Record’s (ENR) Top 400 Contractor. Based on the latest studies by Kelleher in 2004, the percentages of ENR Top 400 Contractor using CPM has grown up to 98% compared to the survey took place in 1990 and 1974, which is at 93% and 90% respectively. (Kelleher, 2004) Based on the research, the percentage of CPM usage has been increasing in the past few years. The ascending percentage does not occur without reason. The ordinary usage for CPM is for scheduling purpose, however, the areas of CPM application has been expanding over the years. This study show particular concern to determine the effectiveness of Critical Path Method (CPM) in scheduling a construction project. The study is focuses on the contractor’s perception on CPM usage and to indicate the benefits of CPM applications that encountered by them. Based on the results, most of the respondents who implemented CPM agreed that this method beneficial their construction project. Although respondents did experience some problems during the application of CPM, it does not affect them from keep utilizing it.
# TABLE OF CONTENT

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>I</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>II</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>III</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td>IV</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>VII</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>VIII</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS</td>
<td>IX</td>
</tr>
</tbody>
</table>

## 1.0 INTRODUCTION

1.1 Background of study................................................. 1

1.2 Problem statement..................................................... 4

1.3 Objective of study.................................................... 6

1.4 Scope and Limitation............................................... 6

1.5 Methodology.......................................................... 7

1.6 Organization of Study.............................................. 9

## 2.0 LITERATURE REVIEW

2.1 Project Management Concept .................................... 10

2.2 Planning and Scheduling........................................... 11

2.3 The Planning and Scheduling Technique......................... 13

2.3.1 Bar/ Gantt chart................................................... 13

2.3.2 Line of Balance (LOB)............................................ 14

2.3.3 Network Analysis.................................................. 14
4.2.2 Organization involved.......................................................... 13
4.2.3 Year of experience.............................................................. 44
4.3 Respondents feeling towards Planning and Scheduling process ...... 45
4.3.1 Importance of Planning and Scheduling Performance in overall Project ........ 45
4.3.2 Involvement of Planning and Scheduling in project..................... 47
4.4 Usage of CPM .................................................................. 48
4.4.1 Scheduling Technique Used............................................... 48
4.4.2 Frequency of CPM use....................................................... 49
4.4.3 Application of CPM........................................................... 51
4.4.4 Project Duration Determination......................................... 53
4.4.5 Degree of success in achieving advantages of CPM .................. 54
4.4.6 Type of CPM used............................................................. 55
4.4.7 Software packages used.................................................... 56
4.4.8 Disadvantages of CPM...................................................... 57
4.5 Advantages of CPM............................................................... 59
4.6 Summary........................................................................... 61
5.0 CONCLUSION AND RECOMMENDATION.......................... 64
5.1 Introduction.......................................................................... 64
5.2 Summary of Research Finding............................................. 65
5.3 Recommendation for Further Studies.................................... 67
REFERENCES........................................................................... 68
APPENDIX................................................................................. 72
LIST OF TABLES

Table 2.1 List of activities ........................................ 24
Table 3.1 The classification of the rating scales of the Questionnaire (Abdul Majid and McCaffer, 1997) .... 40
Table 4.1 Overall Response Rate for Survey Questionnaire ...................................................... 41
Table 4.2 Respondent’s Position in Organization ........................................................................ 42
Table 4.3 Type of Organization .................................................................................................. 43
Table 4.4 Year of experience ...................................................................................................... 44
Table 4.5 Level of agreement on the importance of good planning and scheduling performance in overall Project Life-Cycle and in Project Completion Time ................................................................................. 45
Table 4.6 Level of involvement of planning and scheduling in project ........................................ 47
Table 4.7 Scheduling Techniques used ........................................................................................ 48
Table 4.8 Frequency of CPM use .............................................................................................. 49
Table 4.9 Area of CPM application ........................................................................................... 51
Table 4.10 Purpose of CPM usage ............................................................................................. 52
Table 4.11 Project Duration Determination ................................................................................ 53
Table 4.12 Degree of Success ..................................................................................................... 54
Table 4.13 Type of CPM used ..................................................................................................... 55
Table 4.14 Software Packages used .......................................................................................... 56
Table 4.15 Disadvantages of CPM in controlling schedule ......................................................... 57
Table 4.16 Advantages of CPM application ................................................................................ 59
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1</td>
<td>Terminologies for AOA ('i-j') CPM Activities</td>
<td>18</td>
</tr>
<tr>
<td>Figure 2.2</td>
<td>Typical relationships for AOA diagrams (Don, Raymond and Sion, 1997)</td>
<td>19</td>
</tr>
<tr>
<td>Figure 2.3</td>
<td>Terminologies for Precedence Diagram (AON) Activities</td>
<td>20</td>
</tr>
<tr>
<td>Figure 2.4</td>
<td>Overlap among activities</td>
<td>22</td>
</tr>
<tr>
<td>Figure 2.5</td>
<td>Forward and backward pass calculations and the critical path of the network</td>
<td>24</td>
</tr>
<tr>
<td>Figure 4.1</td>
<td>Respondent's Position in Organization</td>
<td>42</td>
</tr>
<tr>
<td>Figure 4.2</td>
<td>Type of Organization</td>
<td>43</td>
</tr>
<tr>
<td>Figure 4.3</td>
<td>Year of experience</td>
<td>44</td>
</tr>
<tr>
<td>Figure 4.4</td>
<td>Level of agreement on the importance of good planning and Scheduling Performance in overall Project Life-Cycle and in Project Completion Time</td>
<td>45</td>
</tr>
<tr>
<td>Figure 4.5</td>
<td>Level of involvement of planning and scheduling used in project.</td>
<td>47</td>
</tr>
<tr>
<td>Figure 4.6</td>
<td>Frequency of CPM use</td>
<td>49</td>
</tr>
<tr>
<td>Figure 4.7</td>
<td>Purpose of CPM usages</td>
<td>52</td>
</tr>
<tr>
<td>Figure 4.8</td>
<td>Project Duration Determinations</td>
<td>53</td>
</tr>
<tr>
<td>Figure 4.9</td>
<td>Degree of Success</td>
<td>54</td>
</tr>
<tr>
<td>Figure 4.10</td>
<td>Type of CPM used</td>
<td>55</td>
</tr>
<tr>
<td>Figure 4.11</td>
<td>Software Package used</td>
<td>56</td>
</tr>
<tr>
<td>Figure 4.12</td>
<td>Disadvantages of CPM in controlling schedule</td>
<td>57</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------</td>
<td></td>
</tr>
<tr>
<td>CP</td>
<td>Critical Path</td>
<td></td>
</tr>
<tr>
<td>CPM</td>
<td>Critical Path Method</td>
<td></td>
</tr>
<tr>
<td>EOT</td>
<td>Extension of Time</td>
<td></td>
</tr>
<tr>
<td>LOB</td>
<td>Line of Balance</td>
<td></td>
</tr>
<tr>
<td>ADM</td>
<td>Arrow Diagramming Method</td>
<td></td>
</tr>
<tr>
<td>AOA</td>
<td>Activity on arrow</td>
<td></td>
</tr>
<tr>
<td>PDM</td>
<td>Precedence Diagramming Method</td>
<td></td>
</tr>
<tr>
<td>PERT</td>
<td>Program Evaluation and Review Technique</td>
<td></td>
</tr>
<tr>
<td>ES</td>
<td>Early Start</td>
<td></td>
</tr>
<tr>
<td>EF</td>
<td>Early Finish</td>
<td></td>
</tr>
<tr>
<td>LS</td>
<td>Late Start</td>
<td></td>
</tr>
<tr>
<td>LF</td>
<td>Late Finish</td>
<td></td>
</tr>
<tr>
<td>PMI</td>
<td>Project Management Institute</td>
<td></td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

1.1 Background of study

According to the Master Builders, the reason why we need to emphasize the process
of planning and scheduling in a construction project is because construction in general
is an engineering process of buildings and infrastructure, it is usually a one-off
fabrication on the project site, unlike in manufacturing or factory setting where there
is trial and prototyping prior to actual production process. (2002, p69) As a result, any
errors that happen in construction can cause disruptions and delays to the schedule of
work, or in worst case, failure in execution and completion of the construction
project. (2002, p69) Belassi and Tukel indicate that it has been recognised over the
last 50 years the project management work has placed a great attention on problems in
project planning and scheduling, this is because a predominant management is
resulting from the development of an effective scheduling technique. (2006, p141)

Project planning and scheduling play an increasing important role in determining the
project success or failure in relation of time. (Charoenngam, 1996, Pinto and Slevin,
1989; Frederick, 2012, p155) Most of the design engineers claim that they cannot
efficiently produce their work due to the interruptions and delays. The reason are
mainly from the insufficient of planning, and in some instance no planning at all.
(Oberlender, 2000, p140)
Pilcher’s (1992) defined planning as ‘...the deliberate consideration of all circumstances concerned with a project in order to evolve the best method of achieving a stated objective’. In context of construction, it simply mean that the it is a process of forming a set of direction with the sufficient detail, informing the team on what must be done, when it should it complete and the resources to be used in order to produce the deliverable of the project successfully (Meredith and Mantel, 2006; Macro, 2011; Maserang, 2002) whereas the meaning of project scheduling is known as the procedure of identifying the sequential order of planned activity, assigning appropriate activities duration and identifying the start and completion dates for each activity supported by all the relevant preferred tools and technique. (Charoenngam, 1996; Oberlender, 2000, p139)

Since effective project management involves adequate and proper project planning and project scheduling, the use of suitable scheduling technique is equally important. The most common and widely used techniques available for planning and scheduling are bar chart; network analysis, either activity on nodes or on the arrow; and line of balance, which used for repetitive construction work. (Frank and Ronald, 2001, Pg 43)

The application of scheduling can be supported by various software packages that readily available in the market, for example Microsoft Project, Asta Power Project, Primavera and so on, providing a structured systematic and logical presentation for effective communication and management of the construction project. (Master Builder Journal, 2012, p71) These computerized system help to determine the technique such as bar chat and CPM and also it effectively manage the project by
graphically puts together a schedule that can be utilized by project personnel and easily collaborated with.

In project management context, a Critical Path (CP) is a sequence of project activities network with longest overall duration, indicating the shortest time required for the completion of project. (WordHistory, 2004; Bakouros and Kelessidis, 2000) Critical Path Method (CPM), a network-based provide an essential schedule that accurately reflects the details of actual project, ensuring the works proceeds as planned and that no one particular event interrupt the flow of project. (Frederick, 2012, p162) It has been proven over the past 20 years, a well-developed, updated and consistently used of CPM schedule during a project can increase the probability of a project completing on time. (Patricia, 2005) In the case of extension of time (EOT), the UK industry, the Society of Law has introduces its Protocol document in its attempts to impose on the construction industry a scientific method to determine EOT entitlement and compensation for delay and disruption using critical path analysis. (Master Builder Journal, 2012, p73) Today, most of the project manager depends on scheduling tools based on the Critical Path Method (CPM) to identify the overall project duration and the activities’ float times, (Menesi, 2010) From this method, important information about the degree of flexibility with respect to the project schedule as well as the critical and noncritical activities can be provided which probably leads to greater efficiency in planning and controlling. (Menesi, 2010; Wrisley, 2002)
1.2 Problem statement

In today construction industry, it is a common issue that a construction project suffering from delay problem. A shortfall of planning and scheduling technique often cause delay in construction project. (Assaf et al, 1995; Macro, 2011) The execution of construction activity is not follow according to the planning and scheduling that has been fixed earlier. It can even cause project failure as well, for instance, abandoned of project. Inadequate planning has been identified as one of the major causes of project abandonment. (Ayodeleand and Alabi, 2011) Activities deal in major construction industry focuses on planning, executing, coordinating, and controlling project. (Bylth et al., 2004) Due to poor quality of management practice, there are many construction projects fail to achieve their goal and objective. (Brown et al, 2001; World Bank, 1996)

Project manager faced problems in monitoring and controlling the project due to the increasing complexity and size of the construction industry. Therefore, it is particularly important that project planning and scheduling need to be implemented carefully and satisfactory with the purpose of completing the project successfully within the required timeframe. As the project increase in size, the construction’s activities become more and more complicated. As the consequences of this situation, conflict between sequences of activities can be found due to the inadequate planning and scheduling. The efficiency of planning and scheduling is greatly depends on the methodology adopted.
Most of the planning and scheduling techniques are aim to control the time scale and cost, therefore, one best way to overcome delay is to adapt an appropriate planning and scheduling technique into the management of construction project. (Richard and David, 1989, p22) Project management is a challenging task with many complicated responsibilities. Fortunately, there are numbers of technique that available to assist with accomplishing the complex task and executing the liability. (Maslen, 2002)

In today construction industry, project planning and scheduling has evolved into a useful and complex management technique. (Hildreth, Munoz and Tech, 2005) The level of professional schedulers has increase considerably; however, the proper use of planning and scheduling language and an appreciation of the importance and complexity of the processes have decayed. This result from the level of understanding of managers and executives who supervise them has lagged. (Hildreth, Munoz and Tech, 2005)

Indeed, many texts and manager regards CPM as the most usable and practical network scheduling system that can be used in the engineering and construction industry since its introduction in the late 1950s. (Oberlender, 2000, p115) By using CPM, the minimum completion time for a project along with the possible start and finish times for project activities can be calculated. (Macro, 2011) However, despite the benefit and expanding use of CPM, the literature indicates that CPM has a number of drawbacks that raise concerns about its use in the construction industry (Galloway 2006). Regardless the ‘uses’ and ‘misuse’ of CPM, it could not deny that the