

**PLANNING & SCHEDULING BY USING MICROSOFT PROJECT: A CASE
STUDY OF "SUGGESTION FOR CONSTRUCTION AND COMPLETION
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ABSTRACT

The construction industry is significant in the development of the Malaysian economy towards its realization of achieving vision 2020 to attain the status of a fully developed nation. To implement construction project, a proper planning and scheduling is of vital important in order for the project to be executed and run smoothly. The best schedule is not the schedule showing the project completed in the shortest time period, it is the schedule that meets the primary objectives of the total project. Those primary objectives are to create a quality project, completed on time, within budget, and in a safe work environment. Therefore, the focus of this research is to conduct and exploratory study on developing planning and scheduling in construction project. To achieve the aim of the study, the following objectives has been identified such as to study the concept of planning and scheduling in construction project, to study the construction sequence of work for multi storey building and to produce S-Curve by application of Microsoft Project software. Two multi storey building project was selected and structured interview was conducted to experience personal who really involved in the construction project such as Project Manager, Planner Engineer and Project Engineer. The study has been carried out using case study method in which two samples of construction schedule has been evaluated and analyze in term on how to develop the scheduling. From the study, it was found on how the project was planned, the sequence of work and linking relationships between activities for the whole project. By choosing the best schedule of the project, then new schedule has been developed by using Microsoft Project 2003 until produce the S-Curve. In conclusion, no doubt that information from the research can benefit both the practiced and the education of project management.

ABSTRAK

Industri pembinaan amat penting dalam pembangunan ekonomi Malaysia bagi merealisasikan wawasan 2020 sebagai status negara maju. Untuk menjalankan projek pembinaan, perancangan dan penjadualan yang teliti amatlah dititikberatkan untuk memastikan projek yang dilaksanakan berjalan lancar. Penjadualan yang terbaik bukanlah jadual yang menunjukkan projek itu dapat disiapkan dalam masa yang singkat, tetapi adalah jadual yang dapat memenuhi matlamat utama projek tersebut seperti dapat menghasilkan projek yang berkualiti, siap tepat pada masanya, dalam kosnya dan dalam persekitaran kerja yang selamat. Oleh itu, fokus kajian ini adalah untuk mengendalikan dan menghuraikan mengenai penghasilan penjadualan dan perancangan dalam projek pembinaan. Untuk mencapai matlamat utama kajian ini, berikutan adalah objektif yang telah dikenalpasti seperti untuk mengkaji konsep penjadualan dan perancangan dalam projek pembinaan, untuk mengkaji urutan kerja pembinaan bagi bangunan yang bertingkat dan untuk menghasilkan lengkungan "S" dengan menggunakan perisian Microsoft Projek. Dua projek bangunan bertingkat telah dipilih dan temubual berstruktur telah dilaksanakan bagi individu yang begitu terlibat dalam projek pembinaan seperti Pengurus Projek, Jurutera Perancangan dan Jurutera Projek. Kajian ini telah dijalankan dengan menggunakan kaedah kajian kes yang mana dua contoh jadual pembinaan yang akan dinilai dan dianalisis dalam aspek bagaimana menghasilkan penjadualan. Daripada kajian ini, telah dikenalpasti cara projek itu dirancang, urutan kerja pembinaan dan hubungan antara aktiviti untuk keseluruhan projek. Dengan memilih penjadualan projek yang terbaik kemudian jadual baru akan dihasilkan dengan menggunakan perisian Microsoft Projek 2003 sehingga mengeluarkan lengkungan "S". Kesimpulannya, tanpa diragui lagi, maklumat daripada kajian ini dapat memberi kebaikan bagi kedua-dua pihak industri dan pendidikan pengurusan projek.

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Planning can be thought of as determining “what” is going to be done, “how”, “when” by “whom”, and “when.” In construction projects the “plans” (blueprints) and specifications for the project generally define both the end product and, often, the general time frame in which to complete the project. However, they normally do not specifically identify the individual steps, their order, and the timing followed to achieve the end product. Thus, when we discuss planning in the construction process, we must address the “how” and, therefore, the “what,” “when,” “where,” and “who.”

When we discuss scheduling, we are usually interested in some aspect of the time element of the plan. In essence, a schedule is a timetable of activities, such as of “what” will be done or “who” will be working. Such a timetable can be looked at in two ways: the first is focusing on an activity, such as determining “when” a certain task will be performed relative to other activities. The second is concentrating on a specified time frame and then ascertaining “who” will be working (or needed) or “what” should be occurring at a particular time. All of us are involved in planning and scheduling on an ongoing basis. The degree to which we carry it out and the techniques we use vary depending upon the complexity of our situations and our needs and objectives.

Planning and scheduling are basic to most things we, as humans, do. Planning is the way organizes and sequence the tasks needed to accomplish a goal. There are plans for meeting common goals, such as getting to work on time, and more formal plans, such as those used by companies (such as a strategic plan, business plan, financial plan, and ,marketing plan). The planning required to construct an office building requires the identification of the tasks needed to complete the building and then the sequencing of those tasks in their logical order. Scheduling is one component of the plan and aids in visualizing the plan.

The scheduling part of the construction plan requires that the *tasks* or *activities* are assigned a duration corresponding to the anticipated productivity of the *crews* doing the work. When tasks have durations and are put in their proper order by identifying the *relationships* they have with one another, a construction schedule is created. Scheduling is just one part of construction planning, which may also include plans for safety, community relations, material storage and handling, and environmental protection along with the schedule to create the overall *construction plan*.

The construction schedule has many uses, beginning with its representation of the initial construction plan. To be effective, plans must be monitored for progress. A comparison of the progressed, or *update*, schedule with the project *baseline*, or original, plan enables the manager to identify problems early. Adjustments can be made when needed, and the effect of proposed changes can be *simulated* in the schedule, so that the result can be assessed.

In 1917 Henry Gantt developed a method of relating a list of activities to a time scale in a very effective manner, by drawing a bar (or Gantt). Henry Gantt (1861- 1919) was a pioneer of management science who is almost as well known in management sciences circles for his views on productivity and employee compensation as for the bar chart. He developed a means of depicting industrial tasks in a way that easily communicated the tasks, their durations, and their timing to each project participant.

Two companies, DuPont and Remington Rand, collaboratively developed the *Critical path method (CPM)* in the 1950s for the renovation, construction, and maintenance of chemical plants. “DuPont’s goal was to optimize and balance the lost opportunity costs of a refinery’s downtime with the increased costs of accelerating the renovation.”

This critical path method evolved into what is known as the arrow diagramming method (ADM) or activity on arrow (AOA) method. The ADM removed the statistical component from the PERT critical path method and replaced it with a deterministic method for assigning activity durations. Later, the *precedence diagramming method (PDM)* evolved replacing the single *finish start-to-start relationship* found in the ADM with multiple types of relationships. Each advance has given the planner and scheduler better tools for modeling reality.

John Fondahl, emeritus faculty at Stanford University and winner of the American of Civil Engineer’s (ASCE) Peurifoy Construction Research Award in 1990, has been noted as the originator of the modern, deterministic CPM scheduling method. His work has helped constructors effectively model their projects in more flexible and less cumbersome ways than were previously available.

A manager schedules to achieve control of not only time, but also cost, quality, and safety. The schedule helps managers plan methods and procedures that will ensure that the project objectives are met. The management team schedules in order to accomplish activities in the most productive manner possible so that time is not wasted on the project. Then, the schedule becomes the primary tool to communicate that thinking and planning by the management team to all the shareholders in the project. In specifically, according to (J.S Newit, 2005) these are benefits of scheduling:

- i. Reduce total construction time
- ii. Reduce the costs of labor, overhead, interest on loans, and capital
- iii. Provide a more continuous work flow

- iv. Increase productivity
- v. Give employees and subcontractors a goal to work toward
- vi. Improve your company image – (professionalism)
- vii. Meet owner's requirements
- viii. Force detailed thinking and planning
- ix. Improve communication with everyone involved in the project.

Although, every planning and scheduling has been carried out perfectly and closely, this will not guarantee that the project will be completed successfully. A project will not be successful if monitoring and controlling process is not being executed according in the implementation of the project. Nowadays, the construction industry in Malaysia is facing critical problem especially delays in the completion of project. And even though the project has already been completed, there still exist the problem of safety, quality and esthetic values.

For instances, the case of the MRR2 whereby it has to shut down from public use, simply because cracking was found on it's piers. Another example would be the cracking and settlements of various newly constructed school and computer laboratory which was a big national issue last year. According to "*Bulletin Engineer*" December 2005, stated that one of the main reasons for this problem is the failure in monitoring and controlling process. The project manager (JKR) not supervises closely (monitor) how the contractor construct the work and failure in control the quality of work, cost, time schedule according to the contract requirement. This scenario, gives us the impression that the process monitoring and controlling is an integral part of construction in order to balance the quality, cost and time.

We all agreed and it is save to assume that when it comes to big budget project, no known project were able to completed on time, budget and quality. In respons to this, it is vital for us to avoid or minimise the problem as much as we can. On the other hand, we need to make a good start by effectively and efficiently planning and schedulling in order to achieve our ultimate goal in the project life cycle. *“Failing to plan is planning to fail.”*

1.2 Problem statement

Nowadays, almost every construction industry in Malaysia is experiencing delay problem. The problem come from variety of reasons, the major sources is caused by construction activity which has been execute not according to planning and scheduling efficiently that has been fixed. Eventually, contractor will need time extension to accomplish the project. The EOT will be given which the delay problem not caused by lack of proper care(incautious, unaware) and mistake by the contractor, but it's normally caused by force major such as defection in supplying construction materials, variation order (VO) by client and the nature disaster such as rainy season. Regarding to the extension of time in a project life, it will effect on cost increase to both parties, either the client or contractors.

The extension of time (EOT) given to the contractor is actually not caused incautious and mistake by the contractor, if the contractor facing that problem, therefore they should liable and bare the extra cost due the delay problem. As a consequence, the time will extent, cost will increase and for sure the quality of the project will be affected.

Furthermore, as the industry construction become more complex and increase in size, as a consequences it's is difficult to the project manager to monitor and control caused by ineffectively in scheduling and inadequacy of construction information. Accordingly planning and scheduling need to implement satisfactorily and carefully with the purpose of accomplish the project successfully within time, cost and quality required.

In addition, as the project increase in size, the construction's activities become more complex. As a sequence, the conflict in activities sequence occurred due to inefficient planning and scheduling. In order to excel, it is important to emphasis every aspect of construction activities before commencing its. The planning and scheduling efficiency depends on the methodology used. To conclude, the objective of a project will be meaningless if the method used is not appropriate.

Construction industry in Malaysia is considered far behind compared to the developed countries such as Europe, USA, Japan and Korea. We are not only behind in term of construction technology but also in term of construction management and implementation. As we know, the project scheduling is very important in project's life, unfortunately not many civil engineer experts in implementation and applications of Microsoft Project in construction project. Other than that, currently the contractors who used traditional method (Bar Chart) still lead the highest rank compared to the modern software. Although the modern and efficient software ease most of contractor burden in producing accurate and effective planning and scheduling, most small contractors still could not use it due to expensive and high price.

1.3 Objectives

Basically this thesis will conduct an exploratory study on implementation of Microsoft Project in every aspect of a project which comprise of Planning and Scheduling stage followed by the Monitoring and Controlling stage.

In this regards, in term of construction management, this dissertation is written for the objectives listed below:

1. To study the scheduling technique using network models (CPM)
2. To study the construction sequence of work for multi storey building (WBS)
3. Application of Microsoft Project software in planning & scheduling in order to produce S-Curve for physical percentage of the project.

1.4 Scope of study and limitation

In order to achieve the objectives for this study, the scope of the study will be focusing on:

1. The study only focusing on sequence of work for multi storey building construction project.
2. The study will carried based solely on one project scheduling software that is Microsoft Project
3. The area of study only covered the site construction in Pahang.
4. The budget cost for the project will be in between 30 to 100 million.

1.6 Research methodology

In completing this study, there are two methods will be used to obtain data namely:

Primary data: were collected through completed projects, personal interview especially Project Manager and Planner Engineer in order to understand the current practice on implementation Microsoft Project in term of Planning and Scheduling.

Secondary data: were obtained from external sources such as books, journals, internet and magazines.

The collection of literature review will be based on the current scenario on of the construction industry today. Having the data collection on hand, it will then be analyzed and results of the analysis will be based on the data collected through various channel. The final level will see the conclusions and recommendation by the author in enhancing the eligibility of the data collected. In Chapter 3, each stage of the methods of study will be further discussed.

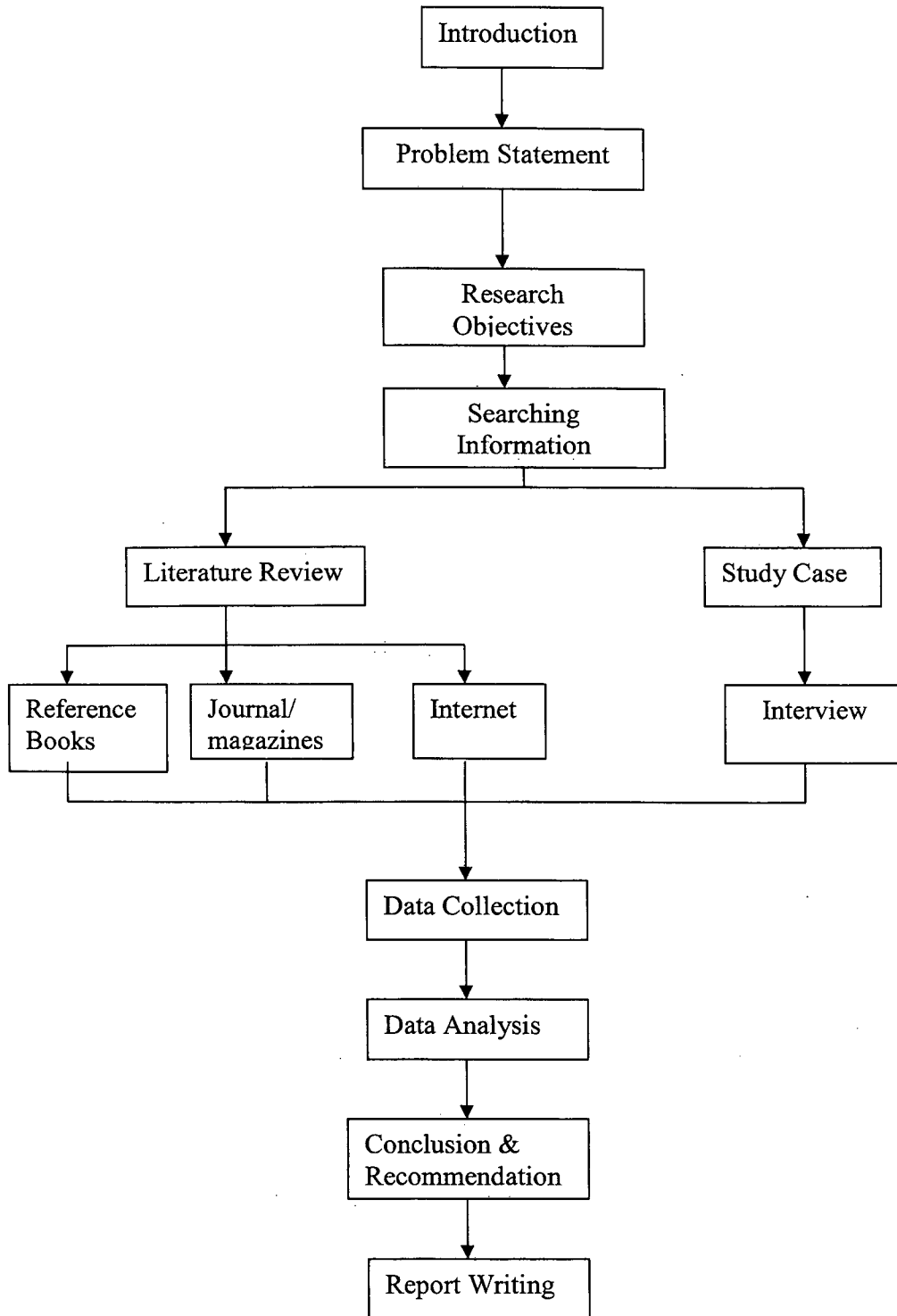


Figure 1.1 The flowchart framework study of this research.

CHAPTER 2

PLANNING AND SCHEDULING CONCEPT

2.1 Introduction:

Planning can be thought of as determining what needs to be done, by “whom”, “where”, “how” and “when”, in order to fulfill one’s assigned responsibility. In construction projects the “plans” (blueprints) and specifications for the project generally define both the end product and, often, the general time frame in which to complete the project. However, they normally do not specifically identify the individual steps, their order and the timing followed to achieve the end product.

How we are going to plan? When a task will be performing? Who will be working? When we discuss planning in the construction process, we need such a tools to guide step by step what should we are going to do, that is schedule. In essence, a schedule is a timetable of activities, such as determining “when” a certain task will be performed relative to other activities. The second is concentrating on a specified time frame and then ascertaining “who” will be working (or needed) or “what” should be occurring at a particular time. All of us are involved in planning and scheduling on an ongoing basis. The degree to which we carry it out and the techniques we are vary depending upon the complexity of our situation and our need and objectives.

Generally, 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.

Figure 2.1 and Figure 2.2 show the overlapping of process group in a phase and interaction between phases respectively. (Gilbreath, 1986) has described “Dust collectors” for unused plans and “Paper tigers” for unenforced plans which are among the failure factors in a project construction.

Planning is a valuable process in project management and one with which we are already familiar. After all, for example, how could we expect to take a holiday without some preparation – getting passports, foreign currency, air tickets and appropriate clothing? We will soon appreciate the risks we are expecting if we still proceed with the idea of taking a holiday without the preparation. Therefore, Planning has a purpose – to prepare for an enabling process that can lead to a desired result (Young, 1993).

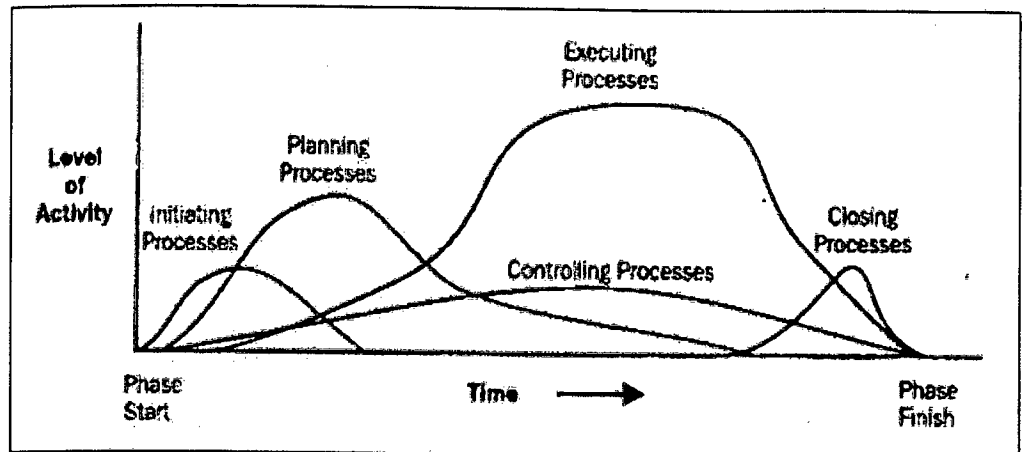


Figure 2.1 overlapped of process groups in a phase (PMI 2000)

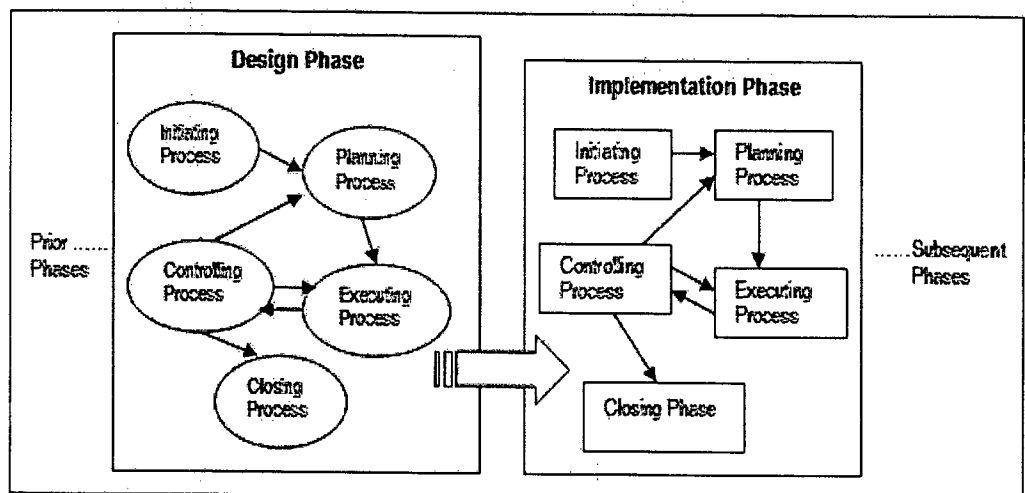


Figure 2.2: Interaction between phases (PMI 2000)

According to (Horald Kerzner,1995) planning is determining what needs to be done, by whom, and by when, in order to fulfill one's assigned responsibility. There are nine major components of the planning phase:

- i. Objective: a goal, target, or quota to be achieved by a certain time