



UNIVERSITI
TEKNOLOGI
MARA

F|S|P|U
FACULTY OF ARCHITECTURE,
PLANNING AND SURVEYING

FULL PAPER
PROCEEDING



3RD UNDERGRADUATE
S E M I N A R
BUILT ENVIRONMENT & TECHNOLOGY

SEPTEMBER
2018

ISBN 978-967-5741-67-8

FACULTY OF ARCHITECTURE, PLANNING & SURVEYING
UNIVERSITI TEKNOLOGI MARA PERAK BRANCH
SERI ISKANDAR CAMPUS

UiTM PERAK @ *Seri Iskandar*

CONSTRUCTION PLANNING FOR THE SUCCESS OF PROJECTS : A CASE STUDY

Nor Sharena Bt Mohd Amin Lou and Hafizah Mohd Latif

^{1,2} Department of Building, Faculty of Architecture Planning and Surveying,
Universiti Teknologi MARA, (Perak) Kampus Seri Iskandar 32610 Bandar Baru Seri Iskandar, Perak
Email: hafiz017@perak.uitm.edu.my

Abstract:

In the construction of road, highways, airports or any other structures, the planning and scheduling of a project is an important part for every process of construction work proceeds smoothly. The aim of this research is to identify the process of project planning in road construction of Federal Road 12 (FR12) from Gambang, Pahang to Segamat, Johor-Phase 1 to complete the project in time and within the budget. The methods of this research were through the observation under a systematic and valuable construction schedule from Critical Path Method was carried out. The objectives of this research are determining the schedule of work through critical path method (CPM) and to investigate on tracking and updating of the schedule work. The Critical Path Method was developed through a software, Microsoft Project to build schedule contain document project tasks, duration, budget, date start and finish, percent complete, track progress until the project complete. The Gantt charts will automatically appear to show the illustrations of the project schedule and the dependency relationships between activities in the programming, planning and control of construction projects once the scheduling complete. There is no easy process to update the plan to get plan commitment. The research reveals that the construction schedule effects the whole construction from the start. The well-organized planning system can reduce the construction time, cost, labor and provided a more continuous work flow to increasing productivity of work.

Keywords: Critical path method (CPM); Microsoft project; Gantt chart; Schedule; Planning

1.0 INTRODUCTION

Construction project planning is a fundamental and challenging activity in the management and execution of construction projects. It was one of the most important parts of construction management. It involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks, and the identification of any interactions among the different work tasks. Project planning is an important part of the deciding aspect of the project team's job to think about the project's future in relationship to its present in such a way that organizational resources can be allotted in a manner which best suites the project's purposes. A good construction project plan is the basis for developing the budget and the schedule for work. Developing the construction site plan is a critical task in the management of construction, even if the plan is not written or otherwise formally recorded. In addition, he added to the technical aspects of construction site planning, it may also be necessary to make organizational decisions about the relationships between project participants and even which organizations to include in a project. Broadly speaking, construction planners are given a result and need to do what is necessary to make the result come to life. Synthesizing the steps necessary to complete a construction project is a challenging task.

The steps include choosing among technology and methods, defining work tasks and relationships, and estimating activity durations and resource requirements. In doing so, a planner must take many variables into account. They may include labor efficiency, crew type, crew size, material type, and weather. Besides these factors, there are also random factors that affect the duration of activities such as the skillset of the engineer, or how effectively the assigned superintendent will tackle the project. Once the planner has a reasonable grasp on the duration of a task, usually, the next step is to estimate what resources the task will require. Examples of resources include available space, tools, and equipment.

Identifying resource availability helps with contingency planning to avoid potential problems. When examining construction planning, it is important to understand that decisions on how to organize the project are either budget or schedule oriented. There are 2 approaches to preparing such a list. One is to have a project team “brainstorm” the list of activities. This approach is suitable for small projects, however, for larger and more complex projects, it is difficult to develop a comprehensive list of activities without forgetting some items, for such projects, creating a work breakdown structures (WBS) is a better approach. (Gido and Clements, 2003)

Project activity planning and scheduling requires the planner to establish and estimate an amount of working time required for accomplishing each identified activity. This is about setting up durations for project activities and tasks. Durations will depend on the amount of work effort and available of activity resources. Review the resource decomposition and project activities templates to estimate the number of work periods required for completing the identified activities and producing the deliverables. The output of this process is activity estimates that are linked to resource calendars. This information will be used later in developing the implementation schedule. Besides, obtaining possible dates for each activity and the critical path was important for the schedule. Setting the construction methods and procedures to be followed (McConnell, 2011).

Project teams develop a strong sense of identity which in turn creates a high level of commitment from team members. Due to their involvement in projects of a similar nature organizations can develop and maintain a long-term body of experience and skills in specific areas. Project organization structure can gather everyone together quickly to resolve problems related to the project. The teams can have a strong sense of identity. It is the easiest structure within which to create a strong team culture. In addition, the whole team is focused on the team’s goals, so conflict of loyalty exists with the day job for the people working on the project. Their day job is the project. All the resources are dedicated to the project, so it was much easier to schedule work also planner can know when the team members are available. Besides, projects run in this structure are great environments for improving the project management skills. (Kloosterman, 2013).

Critical Path Method schedule was include all work specified in the Contract Documents, including all expected activities of subcontractors, vendors, suppliers and all other parties associated with construction of the project. Besides, CPM allows management to prioritize their activities more accurately. When many activities need the same equipment or resources, it can be determined which activity gets the resources first based on the amount of the activities. The CPM schedule can also help accurately determine when the materials for activities need to be delivered. A CPM generates a graphical view of the project and is used to calculate how much time and resources are required to complete an activity. The best of CPM is how it gives them a vision of the whole project. As the logic diagram is developed, it forces the management team to think at a much higher level for each activity and relationships that exist among all activities. It also determines critical activities requiring attention so the project can be completed on time. (Rodriguez, 2017)

According Gido and Clements (2003), they said that a detailed activity necessary to accomplish the overall projects can be generated through team brainstorming, especially for a small projects. However, for projects in which a work Breakdown structures is used, individual activities can be defined by the person or the responsible team for each activity. Project activities planning and scheduling requires the planner to define what amount of actions and tasks are necessary for producing project deliverables in a timely manner. The input for this process will be the project deliverables statement or Bill of Quantities (BQ). The planner can use this document to define high-level activities that will be used later in creating the project implementation plan.

The one of the oldest but still one of the most useful methods of presenting project schedule information is the Gantt chart, developed around 1917 by Henry L. Gantt, a pioneer in the field of scientific management. The Gantt chart shows planned and actual progress for a number of tasks displayed as bars against a horizontal time scale. It is a particularly effective and easy to read method of indicating the actual current status for each of a set of tasks compared to the planned progress for each item of the set. As a result, the Gantt chart can be helpful in expediting, sequencing and reallocating

resources among tasks, as well as in the valuable but mundane job of keeping track of how things are going on. A Gantt chart is a tool used for project management. It is used to represent the timing of various tasks that are required to complete a project. The Gantt chart provides a powerful graphical representation of the project (Meridith & Mandel, 2012)

2.0 LITERATURE REVIEW

2.1 Definition of planning

Planning engineers determine and develop the most suitable and economically viable construction and engineering methods for projects. They are involved throughout the development stages, and are present on site during the build to oversee procedures. It is the responsibility of the planning engineer to estimate a timescale for a project and to ensure that the outlined deadlines are met. They work closely with site managers and other engineers to ensure a project runs on schedule and that material supplies are sufficient. The most important responsibilities of an engineer planner was a planning, integrating, and executing plans. Almost all projects, because of their relatively short duration and often prioritized control of resources, require formal, detailed planning. The integration of the planning activities is necessary because each functional unit may develop its own planning documentation with little regard for other functional units. Planning is the function of selecting enterprise objectives and establishing the policies, procedures and programs necessary. Planning in a project environment may be described as establishing a predetermined course of action within a forecasted environment. Planning engineer was the key to successful project planning. It is desirable that the project manager be involved from project conception through execution. In addition, project planning must be systematic, flexible enough to handle unique activities, disciplines through reviews and controls and capable to of accepting multi-functional inputs (Kerzner H. , 2009).

2.2 Integrity in planning project

As a planner, the behavior such as integrity need to be indoctrinated in them for identifying risks of delaying, conducting assessment of the progress, taking preventive actions and implementing mitigate measures such as monitoring or inspection. Planners needs always be aware that the smoothness of a project depends on integrity of planner and accountability as a planner.

2.3 Accountability of a planner

Accountability of a planner is critical to every projects success. The project planner may empower the entire teams to uphold the project's accountability. Planner always needs to address to project manager about kickoff meeting and lay out what goals are to be accomplished. In the kickoff meeting, the interconnectedness of tasks was highlighted by planner to make all the team understands what their own accountability is. In addition, planner always had to publicly follow up on team progress for making the entire team be able to rely on the successful fulfillment of the project. The performance issues need to be escalate when necessary once in time for handling poor performance of some team member.

3.0 METHODOLOGY

3.1 Observation

Firstly, is by observation of the schedule of planning site work from Microsoft project. The observation for this schedule was being done by daily because it was occurred with the daily works of site construction. The activity task that have been observed was the percentage complete and the duration taken for preliminaries, design and build, demolition and removal, traffic management and control, environmental protection works, occupational safety and health, widening works, routine maintenance works and provisional sum. This schedule need to follow up daily because it needed to update the percentage of work done to make sure the physical s-curve and Gantt chart does not drop and maintain the time until the construction work finish.

3.2 Interviews

To understand more about the process and the procedure of the following method was by asking people who involve with it. Of course for the information that needed to find out and the scope of work, It is required to ask the people surrounded with it. It was a hard challenge to find out the function and how to control the Microsoft Program so it will be organized. The question such as “how to develop the CPM schedule”, “How many tasks have been inserted in the schedule”, “Why must have been used the Microsoft Project as the software but not another software”. This interview has been carry out during updating the weekly progress of work at KLSB office. This is the unstructured interview. The interview also continues to the construction site where the site engineer and labor gave their cooperation about the work progress that they need to follow up for every week. All the information has been write down in a small note book.

3.3 Document Review

There is a lot of documents that can reviewed and a lot of hard and soft copy that have been given by the engineer planner. Based on the monthly progress report on September, all the percentage complete of the actual activity and the Gantt chart was gain from the report. In addition, the key plan and location plan of the road construction also gain from the company document, the schedule of the construction work also be the review for this report. All the pictures of the construction site have been taken from the monthly progress report and other document file such as Traffic Management Plan.

4.0 ANALYSIS AND FINDINGS

From the observation of the project of upgrading and widening works of the road construction at Federal Road12 from Gambang to Segamat. This project was still on the phase 1 where is the whole ongoing project is still at Pahang. The purpose of this project was because of the original path of the road was too narrow for the vehicles from both sides to pass it. In addition, there is too many accident have occur and had increased day by day, also the accident mostly had involved death This project was handover to another contractor because the previous contractor cannot afford to continue the whole project until complete because of delayed 10 months. So when another contractor officially accept the project, the planner immediately identify where is the problem of the project and the reason of the project was delayed about 10 months. The planner immediately found out that the project planning and management of the previous contractor were improper. The main activities that should have been taken out were not emphasized, thus it has dragged the whole schedule. The previous contractor did not given a serious account on any minor delays from the beginning and this has cumulated into 10 months. The delays caused by work flow on site, which had not followed the project planning.

Then, this will also effect when they were fail to adjust course when too many things goes wrong and mix up. That is why the progress of daily, weekly, monthly progress work needed to be produced when the kickoff meeting or any meeting be held to always be aware the whole team with the project goals. Beside of that, the previous contractor also make mistake by not prioritizing the necessary task at first, planner always need to be aware which task was going first before another task can start by breaking down the projects into smaller pieces such as Work Breakdown Structures (WBS). All of this step actually require planner regularly communicating with the whole team members for keep updating and tracking the progress. Planner also needs to have integrity and accountability in themselves to produce commitment in their own work.

4.1 New project planning

The current planner tried to reduce the overall cost of the project. For this, she has produced a more realistic project planning. The planner focused on shorting the durations of some of the works to be carried out. She also rearranges the activities needed to be carried out. The first and foremost step to

planning a project refers to defining the actual problem that solved upon completion of the project. The process of defining also requires making a detailed description of the problem. Planner announced a mission of the project that meets the client needs and project goals. Make a project strategy development that follows the mission and outlines the high-level actions for implementing the project objectives. Besides, she also needs to strategize the project work and make a detailed implementation plan for the team. The strategy showed how the project will work, what the team will do, and in what way the project goals be satisfied. She referred back to bill of quantities (BQ) which is a document prepared by the cost consultant that provides project specific measured quantities of the items of work that identified by the drawings and specifications in the tender documentation.

Scope of Construction	
The scope of work for project upgrading Federal Road Persekutuan 12 (FR12) from Gambang, Pahang to Segamat, Johor – phase 1 as follows:	
A - Lump Sum Component	
BQ 1	- General Item and Design & Build Element
BQ 2	- Site Clearance and Demolition Works.
BQ 3	- Earthworks
BQ 6	- Drainage Works
BQ 5	- Pavement Works
BQ 6	- Road Furniture
BQ 7	- Geotechnical Works
BQ 8	- Structure Works
BQ 8.1	- Bridge Works - Bridge 1 (Sg. Belat)
BQ 8.2	- Bridge Works - Bridge 2 (Sg. Jenahang)
BQ 8.3	- Bridge Works - Bridge 3 (Sg. Rasau)
BQ 8.4	- Bridge Works - Bridge 4 (Bebo Arch - Sg. Temiang)
BQ 8.5	- Bridge Works - Bridge 5 (Sg. Pahang)
BQ 8.6	- Bridge Works - Steel Truss Bridge
BQ 9	- Traffic Management and Control (All Provisional)
BQ 10	- Environmental Protection Works
BQ 11	- Routine Maintenance Works
BQ 12	- Electrical Works
BQ 13	- Relocation Utilities
BQ 13.6	- Tenaga Nasional Berhad (All Provisional)
BQ 13.6	- Telekom Malaysia (All Provisional)
BQ 13.6	- Time (All Provisional)
BQ 13.6	- GAS Malaysia and PETRONAS Gas (All Provisional)
BQ 13.6	- Water Pipe (All Provisional)
BQ 14	- Occupational Safety and Health.
B - Provisional Sum Component	

Figure 1 : Scope of Construction in BQ.

She takes time to understand the scope of the project and determine the duration of the project. Then, she started to developing a Work Breakdown Structure (WBS) that identifies the low-level tasks and activities required for doing project work and producing the deliverables. . It is also used for setting up durations, task assignments, resource requirements, and cost estimates.

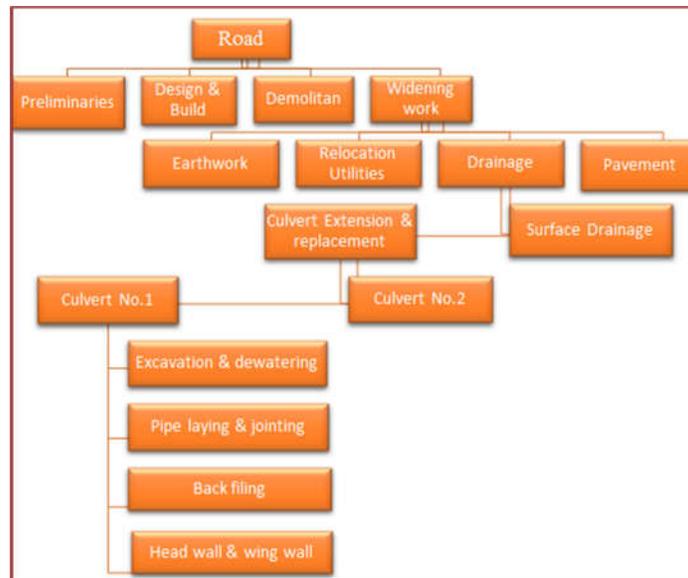


Figure 2 : Work Breakdown Structure (WBS)

After creating the work breakdown structures, she started use the planning software which is Microsoft Project (MP) to create the schedule of work through critical path method (CPM). In CPM schedule, the cost and duration for the project was very important for the planner for making sure the project can be completed within estimated budget and specified time. She also uses the predecessor and successor in logical order to define the activities in time scheduling. It was also use to summarizing all defined activities and showing interdependence between them.

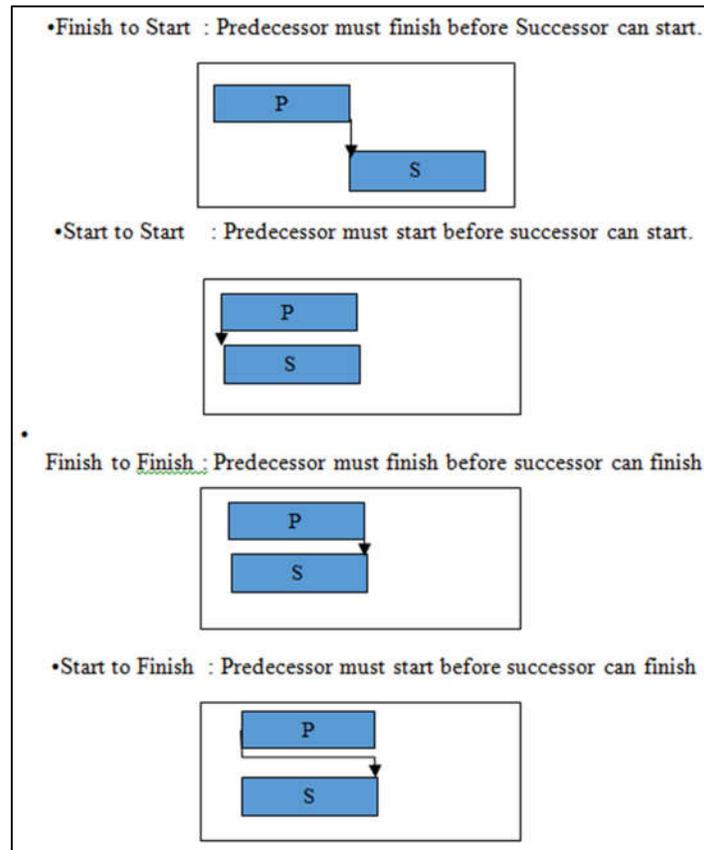


Figure 3: Predecessor and Successor

Beside of that, she also make sure that the number of worker for each work was sufficient enough and also keep updated the site progress with site engineers. The number of worker that divides into the zone was not same because it was depends on the activity task. She will contact with all the site engineers in every week to ask for the progress of work and makes the weekly progress report. She also making sure that the machineries and equipment that have been done using at zone 1 can be immediately moves to another zone to immediately starting the new progress at another zone for reduced the delayed work.

5.0 CONCLUSIONS

This report exhibits the ethics of planner in project planning. Planning is one of the most crucial aspects of construction management because it ensures that tasks are completed in the most efficient manner possible. The roles of a construction planner are essential to define each aspect of the project and simultaneously choose the best methods to complete them. Without the proper planning in construction project, the activity cannot be done and the whole construction cannot finish the construction within time and budget. Planning is one of the most crucial aspects of construction management because it ensures that tasks are completed in the most efficient manner possible. The roles of a construction planner are essential to define each aspect of the project and simultaneously choose the best methods to complete them. Without the proper planning CPM schedule in construction project, the activity cannot be done and the whole construction cannot finish the construction within time and budget.

As construction projects continue to increase in complexity, as planners should remember there is technology, such as Microsoft Project software, to help in mange the jobs with greater efficiency. Microsoft Office Project, also referred to as Microsoft Project (MP), is a suite of tools for more efficient project and portfolio management. MP is used in a variety of industries including construction, manufacturing, pharmaceuticals, government, retail, financial services and health care. The actual project

success is not dependent on well using of Microsoft Project but it is actually depend on how to manage and control the project. Simply entering the data into a project planning will never deliver a good plan without a good management.

REFERENCES

- Gido, J., & Clements, J. P. (2003). *Successful Project Management*. United States of America: Thomson South Western.
- Kerzner, H. (2009). *Project Management*. New Jersey: John Wiley & Sons
- Kloosterman, V. (2013, 5 3). How do Organizational Structures affect projects and project management. Retrieved from Continuing Professional Development: <http://continuingprofessionaldevelopment.org/how-do-organizational-structures-affect-projects/>
- McConnell, E. (2011, 3 17). Project Activities Planning and Scheduling. Retrieved from my management guide: <http://www.mymanagementguide.com/project-activities-planning-and-scheduling/>
- Rodriguez, J. (2017, 8 12). Learn About Critical Path Method Scheduling. Retrieved from the balance: <https://www.thebalance.com/critical-path-method-scheduling-844481>