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Planning & Scheduling of Eight Lane Expressway by using Microsoft Project

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ABSTRACT: Construction activities are to be achieved on a particular project within limited funds and time. Thus, the project management techniques are helpful in scheduling and planning the various construction project activities. Planning and scheduling are essential tasks in every construction project. So the project management for the construction project is the best practice that we can adopt. The main aim of any construction project is to execute or complete it, but the main objective of any project is that it should be that to complete it within the given time limit, with greater efficiency and economy, which is essential in the successful completion of the project. So, according to the study of various papers submitted by multiple authors, it has been studied that the traditional method of calculating the duration of the project is complex. There are many tools and techniques available to optimize the manufacturing process to avoid time and cost. This paper has studied how Microsoft Project software for managing construction projects helps in the construction project.

KEYWORDS: Microsoft Project, Project management, planning, scheduling.

I.INTRODUCTION

1.1 General

The highway construction industry is one of India's main sectors that provide an essential ingredient for developing an economy. And Infrastructure projects like Expressway construction are time-bound, and all project activities are directed towards achieving project objectives concerning scope, time, and quality. As it has known, the expressway construction projects are different from one another as there will be changes in place, situation, and weather conditions; by seeing all this, it is very tedious in planning and allocating resources as the resources are repetitively used in the execution of the project. In a complex project where many activities are performed at different places and different agencies and sub-organizations, with each having its scheduled targets, a slight delay in the critical action can affect many schedules. They include time and cost overruns due to inadequate project formulation, poor planning for implementation, lack of proper contract planning, and time management during execution. Delays can alter the planned level of resources and their mobilization. Time overrun increases overheads, reduce planned revenue from sales, and create fund inflow problems. Delays in contracted projects or construction projects can result in penalties and adversely affect the company's reputation.

Project management is the application for understanding knowledge, skills, and techniques of project activities to achieve project requirements. It is a plan for organizations to do something successfully, preparing them to supervise the project results for organizational goals and compete in their markets. It is defined as planning, organizing, motivating, controlling, purchasing, procedures, and the activity of protocols to achieve specific goals in scientific or daily problems. In project management, the project is designed to produce an exceptional product, service, or result with a defined start and end to a temporary purpose (Usually time-constrained and often constrained by funding or deliverables), undertaken to meet eccentric goals and objectives, typically to bring about beneficial change or added value. The temporary nature of projects is always (or operationally) instead of business as recurring, permanent, or semi-permanent functional activities to produce products or services. In an implementation, the management of these two systems is often quite different, and as such, deviations require the development of technical skills and management strategies. It has always been practiced casually but began to develop as a significant profession in the mid-20th century.

1.2 Project Management

Project management can play a significant role in the construction industry. Using these management tools will help to execute the project in a very economical manner and, at the same time, have to use optimum resources with limited duration. It also enables information to be stored and the project to be managed in a central location. Project management involves balancing the requirements that stakeholders may identify with or unknown expectations by giving the project quality, scope, and time.

Project management uses the information and transforms it for execution efficiently with lots of strategies to meet construction projects' requirements. The main goals to achieve every project are

- Project completion on time
- Optimal use of resources
- Within minimum investment

Project planning aims to create a work chart with activities that should be carried out after the appropriate date of commencement and completion. By scheduling, we can know the activities in a critical condition where they should be started and completed within the period not to affect the project's completion period. The allocation of resources required for project activities will reduce the wastage of materials that may affect the funds allocated for resources in a project.

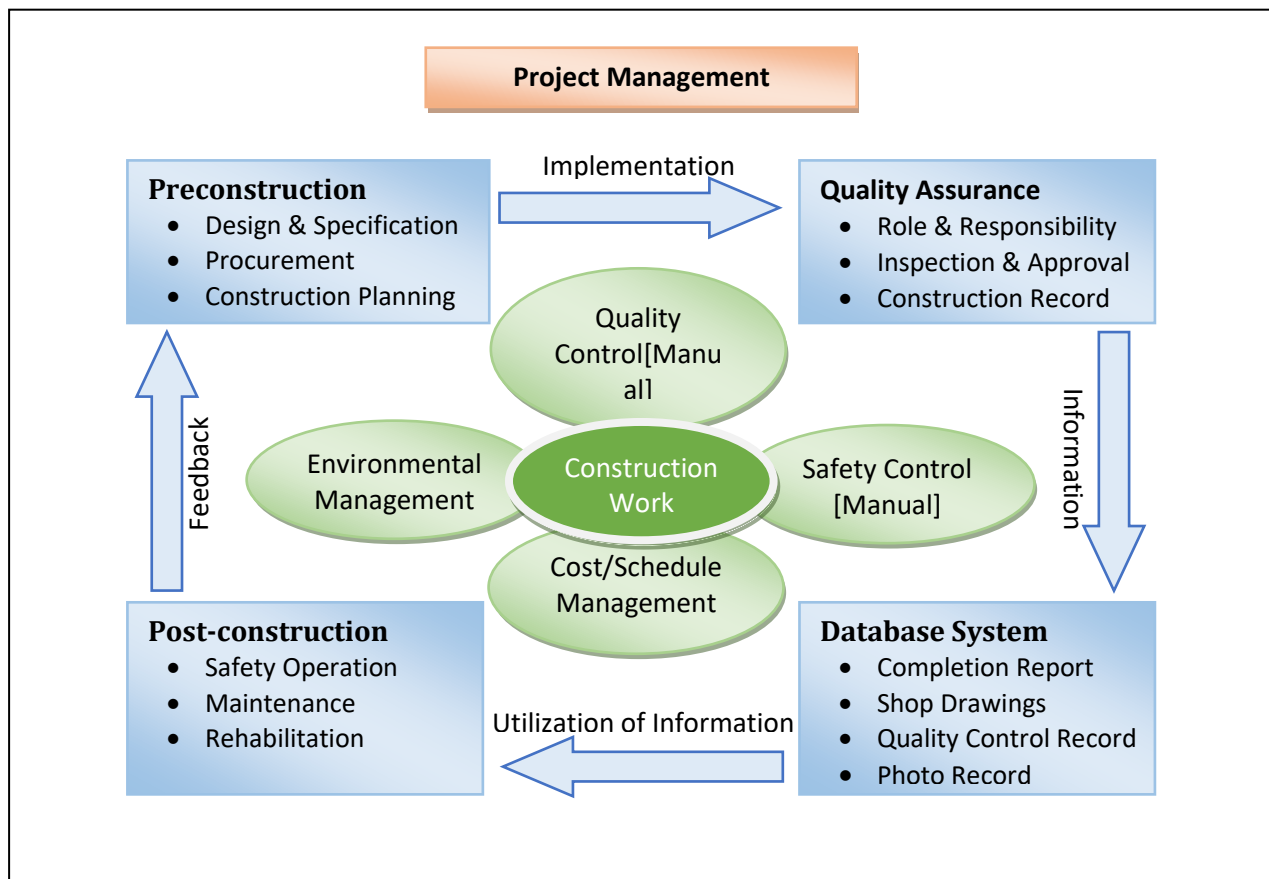


Figure 1 Component of the Project Management

1.3 Objective of project management in project

- The purpose of this project is to identify the crucial aspect of the expressway construction project.
- Identifying the activities which could be start parallel so that the duration could be reduced time duration.
- Identifying the optimal use of resources and purchasing of materials.
- Planning the project according to the project achieved within the minimum investment.
- To adopt the proper activity sequencing by assigning the appropriate relationship between activities.

1.4 About Microsoft Project

Microsoft Project is a project management software program developed and sold by Microsoft, designed to assist a project manager in developing a plan, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads.

The project creates budgets based on assignment work and resource cost. As resources are assigned to the task, and the program calculates the cost equal to the work times, the rate rolls up to the task level and then to any summary tasks level and finally to the project level. Resource definitions (Labour, equipment, and materials) can be shared between projects using a shared resource pond. Each resource can have its individual calendar, which defines what days and time a resource is present. Resource rates are used to calculate resource assignment costs. Each resource can be assigned to multiple tasks in multiple projects, and each task can be assigned numerous resources. The execution of the scheduled work is based on resource availability as defined in the resource calendars. All resources can be defined in Work, Material, and Cost. Therefore it cannot estimate how many finished products can be obtained with a given amount of raw materials. This makes Microsoft Project unsuitable for solving problems of available materials constrained production. The application creates critical path schedules, and critical chain and event chain methodology third-party plug-ins are also obtainable. Schedules can be resource leveled, and task networks are visualized in a Gantt chart.

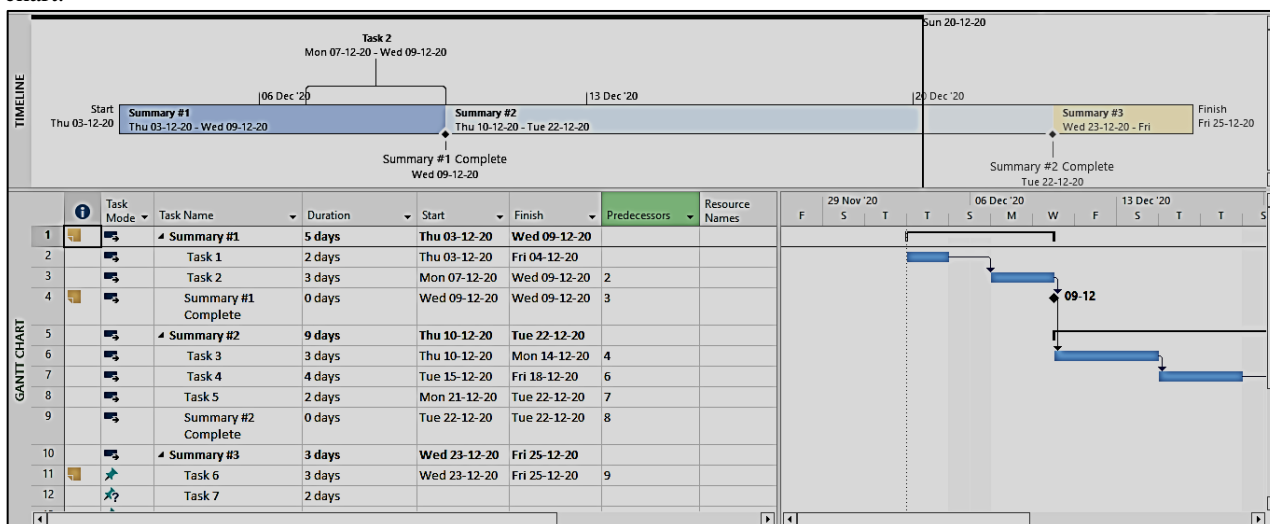


Figure 2 Gantt Chart

Additionally, Microsoft Project can identify divergent classes of users. These different classes of users can have differing access levels to projects, views, and other data. Customization of aspects in Microsoft Project such as calendars, views, tables, filters, and fields are stored in an enterprise globally accessible by all users.

1.4.1 Benefits of Microsoft Project

1.4.1.1 Simple Planning and Schedules

Planning and scheduling form the backbone of any financial project. Microsoft Project helps your users prioritize tasks, define the activities required for each and then assign them to the relevant team members. It also has a shared team calendar, giving complete visibility across your teams. The calendar will send meeting notifications and enable users to sync work schedules. For financial firms that juggle an array of projects at any one time, this is crucial for organizing your time.

1.4.1.2 Complete collaboration

The more people are involved in the project, and there is a greater need for enhanced communication and collaboration. Microsoft Project is the perfect solution for your communication needs. File sharing across both team members and clients makes documentation more accessible and workflows more efficient. What's more, you can store client data in Microsoft Project to be referenced or used as required, meaning you'll never lose track of client tasks again.

1.4.1.3 Visual dashboards

Dashboards are another feature that provides complete visibility across teams, offering vital information and insights on a project's progress. The dashboard feature lets you create customized graphs, charts, and other data visualizations to

keep your work, tasks, and progress organized and easily digestible. Visual representations are always helpful in meetings and can be used as a KPI report.

1.4.1.4 All-encompassing timelines

The timeline view provides a top-down view of each project in its entirety. This allows you to share thorough information with management teams, clients, and other stakeholders. To add further value to this view, you can customize the features to include more data, introduce branding by changing the colors used, and alter the format depending on the way it is being delivered.

1.4.1.5 Streamlined reporting

A critical element of project management is reporting. Reporting allows your firm's project managers to monitor progress, the volume of work completed, and what is left to do. Microsoft Project allows you to easily create customized reports that meet your requirements. The variety of reports include (but are not limited to): cost overviews, pending tasks; goals achieved; available resources, and an entire project overview. These reports can not only allow you essential visibility into tasks; it can also help you piece together billable hours and ensure your employees are completing work appropriately.

1.4.1.6 Flexible resource management

Microsoft Project is a highly flexible tool. This is particularly highlighted when it comes to project availability and resources. When we say resources of this course are project-specific but could relate to allocated budget, materials, or team members, to name a few. Microsoft Project allows you to track available resources and assign costs to each, meaning that you can analyze how your most valuable resources are being used.

1.4.1.7 Remote-friendly

Microsoft Project is built for mobile experiences and flexible working initiatives. This means your teams can view, update and work on projects simultaneously, no matter where they are in the world. Additionally, you can build unique desktop and mobile experiences to enable continued productivity on an array of different devices.

1.4.1.8 A secure foundation

Financial firms that deal with large amounts of sensitive financial data require secure tools. The last thing you want is your critical data falling into the wrong hands. Fortunately, Microsoft Project is built on Azure. This enterprise-grade cloud platform comes built with top-of-the-line threat intelligence to ensure your data remains secure.

II. LITERATURE REVIEW

Young Hoon Kwok and Frank T Anbari (2008) stated that the rankings of eight affiliate project management disciplines arising from at least most of the subjects that have appeared in the last 50 years are as follows:- (1) Strategy/ Portfolio Management; (2) Operations Research / Decision Sciences; (3) Organizational Behavior/ Human Resource Management; (4) Information Technology/ Information Systems; (5) technology application/innovation; (6) Performance Management / Earned Value Management; (7) Engineering and construction; And (8) Quality Management / Six Sigma. He also concludes that project management should not be studied in academia. Still, we should deal with it in every area of life in practical ways - reflecting on the action and reflecting in action.

Vitthal Anantatmula (2010) found that a traditional project, similar to the management of an academic degree, relates to time, cost, and scope triple reduction. It is concluded that by applying the project management concepts, tools, and techniques, the graduate degree program advising and planning can be improved after comparing the planning aspects of a traditional business project with the planning of an academic degree. The author also helps apply project planning techniques to manage multiple constraints and provides educational advice, and explains planning complexity.

R. Prabhakar and G. Ravichandran (2014) analyzed it; Construction planning is an essential part of the overall management process. Planning and Management require organizing the work, executing the work, correlating planning and progress information, and controlling the work, for managing the three inter-related factors of time, money, and quality appropriately. Completion of many of the projects nowadays is not in the anticipated period. This will dictate an increase in overheads as well as various other factors. This will not only reduce the expected revenue but also going to affect the reputation of the contractor. Scheduling is an essential task in a construction project to determine the sequence of activities required to complete a project.

Hoang, Nhat Minh Shrestha, Swostik (2014) has indicated that the software's primary function is to help offer and enhance product quality with less time effort than manual methods. A project has different requirements, and the software adopted is intended to meet those requirements effectively in terms of time and cost. Besides, scheduling, tracking, and physical element issues should be considered while adopting project management software.

Aftab Hameed Memon and Ismail Abdul Rahman (2014) suggested that time is the most significant element that every contractor has while dealing with the practice of construction activities. Various approaches and tools have been introduced in the last decades to shape the management of projects. The authors identify commonly used techniques and software of time management together with their level of effectiveness in large construction projects. Data was collected from the construction organization, which deals with massive projects. Relative significance index calculations were performed to assess the effectiveness of the time management techniques and software packages adopted in the construction project. The results show that the most common and effective time management techniques and software packages are C.P.M. and Microsoft Project, respectively. Although this technique is put into practice, physicians have not met the goals of the organization concerned.

III.METHODOLOGY

The methodology used in this project is divided into three main steps. The adoption of planning and scheduling activities will form a logical path by schedule report, which will help execute. Resource availability can be known and assigned, analyzed, and leveled. The result obtained concludes. The entire project is integrated with Microsoft Project, and reports are generated. The flow chart then explains the steps.

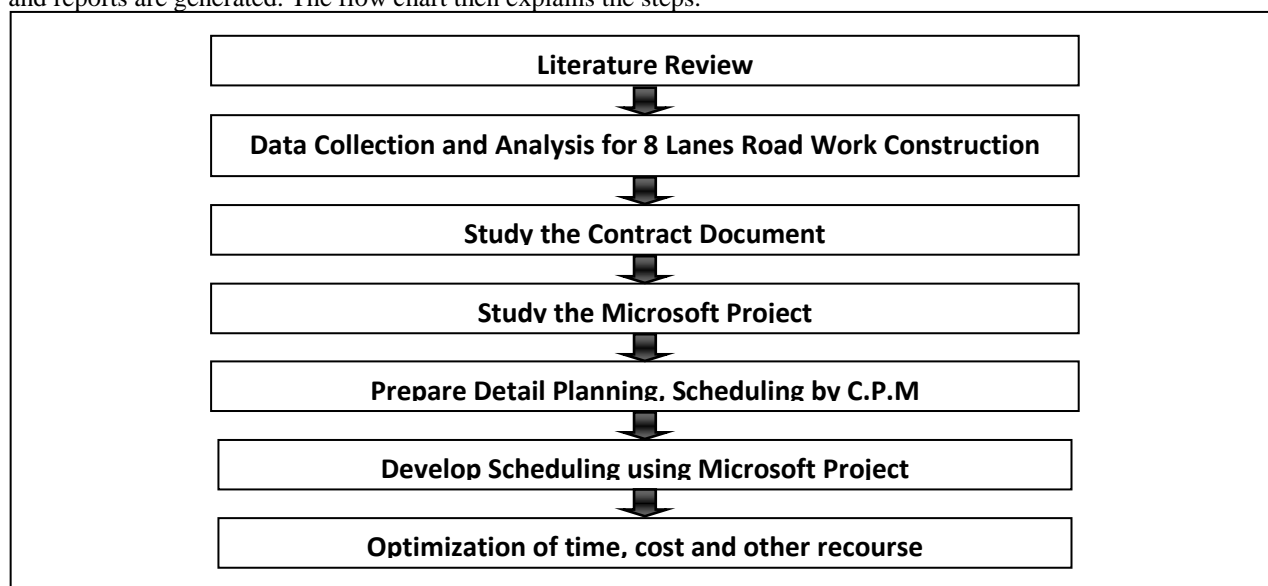


Figure 3 Flowchart for Project Management

1.5 PROJECT SCOPE STATEMENT

The project scope statement describes the project scope, major deliverables, assumptions, and constraints. The project scope statement documents the entire scope, including project and product scope. It describes, in detail, the project's deliverables and the work required to create those deliverables. It also provides a common understanding of the project scope among project stakeholders. It may contain explicit scope exclusions that can assist in managing stakeholder expectations. It enables the project team to perform more detailed planning, guides the project team's work during execution, and provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.

The degree and level of detail to which the project scope statement defines the work that will be performed and the work that is excluded can help determine how well the project management team can control the overall project scope. The detailed project scope statement, either directly or by reference to other documents

1.6 PLANNING

Planning is the function of management that involves setting objectives and determining a course of action for achieving those objectives. Planning requires that managers be aware of environmental conditions facing their organization and forecast future conditions. Data collections for the project involve collecting the data required like drawings, and for each, the quantities are calculated.

1.6.1 List of Data's collection

1.6.1.1 Agreements

Agreements are used to define initial intentions for a project. Agreements may take the form of contracts, memorandums of understanding (MOUs), service level agreements (SLA), letter of agreements, letters of intent, verbal agreements, email, or other written agreements. Typically, a contract is used when a project is being performed for an external customer.

1.6.1.2 Drawings

- Collect Typical cross-section, Plan and profile of the eight-lane expressway.
- Cross-section and G.A.D. Key box culvert and Hume pipe culvert (1200 mm dia.).
- Cross-section and G.A.D. of Pedestal Underpass & Vehicular Underpass.
- Cross-section and G.A.D. Of the Minor Bridge and Major Bridge.
- Cross-section and G.A.D. Flyover, Interchange, and Road Over Bridge (R.O.B.).
- Cross-section at other locations (e.g., chute drain, shoulder drain, tow drain, median drain, the metallic crash barrier, slope protection, signage, road furniture etc.
- G.A.D. and a drawing of the Retaining wall.

1.6.1.3 Quantities of materials

- Quantities of Eight lane Expressway
- Quantities of Box culvert & Hume Pipe Culver (1200mm Dia.).
- Quantities of Pedestal underpass.
- Quantities of Vehicular underpass.
- Quantities of Minor Bridge and Major Bridge.
- Quantities of Flyover, Interchange & Road over Bridge (R.O.B.).
- Quantities of retaining wall.
- Quantities of Road furniture and a service road.

1.6.1.4 Scheduling details

- Date of start
- Date of completion
- Duration of activities

1.6.1.5 List of Resources used for the project

1.7 SCHEDULING

The activities are known after drawing and preparing the quantities. Scheduling is now done in Microsoft Project software. The scheduling process in M.S.P. is as follows.

- Creating Enterprise Project Infrastructure (EPS)
- Create User and User Preferences
- Creating Organization Fragmentation Framework (OBS)
- Build projects
- Creating Calendar and Assignment
- Creating a Work Breakdown Structure (WBS)
- Creating activities under WBS
- Creating activities
- Make connections between activities
- Scheduling activities
- Know the Grand Summary with the Gantt Chart

One of the methods used for scheduling is the critical path method (C.P.M.) that defines the project's activities, the duration of the activity, and the relationships between the activities. The schedule of activities connects the activities in a project; by scheduling to make the necessary calculations to complete the total duration, we can identify the reasons for the delay in a project. It also makes it easy to track a particular project that gives legal proof.

Scheduling project activities in a project, the intended start and finish dates that make the project move forward without any disturbance, by knowing the upcoming activity and requirements for the site engineers to execute the project helps with the listing of milestones efficiently.

Adopting and executing an appropriate scheduling prediction of subsequent workloads can be known and controlled according to conditions. This is very useful in understanding the requirements of the equipment which are necessary for the upcoming activity.

Microsoft Project is a project management program designed to assist project managers in planning, assigning resources for development tasks, managing budgets, tracking progress, and analyzing workloads. It also helps them to implement their strategies effectively and can achieve the goal.

IV.DISCUSSION

Almost every construction industry is facing the problem of delay. Due to extensive construction activity sources that have not been executed according to plan and have been efficiently fixed prior to the project's actual execution, the problem arises due to various reasons. The contractor needs a time extension to complete the project. The delay in the problem is given an extension of time due to lack of proper care by the contractor (disorganized, ignorant) and fault, but this is mainly due to significant forces such as inconvenience in the supply of construction material, order of variation (V.O.). By the customer due to natural disasters like rainy season. Regarding how to extend the time over the life of a project, it would be up to both partners to raise the value either to clients or contractors.

Extension of time (E.O.T.) does not cause inconvenience to the contractor or error to the contractor; if the party is experiencing the problem, they can be responsible and incur additional costs due to the issues' procrastination. As a result, time will be stretched, the cost will increase, and the project's quality will decline.

Furthermore, as construction industries become more rigid and expand in development, the project manager is challenging to monitor and control due to the inability to determine abortions and the inadequacy of construction information.

Accordingly, the planning and scheduling need to be implemented satisfactorily and carefully to successfully complete the project according to the time, cost, and quality requirements.

Furthermore, as the size increases the project, construction activities become more adamant. As a sequence, inefficient planning and scheduling caused conflicts in the sequence of activities. In order to accelerate, it is essential to focus on every aspect of construction activity before starting your own. Planning and scheduling efficiency depends on the methodology used. The goal of a project to achieve will be meaningless if the method used is not suitable.

As we know, project scheduling is essential in the project's life; unfortunately, not many civil engineer experts use Microsoft Project applications in the implementation and construction project. On the other hand, currently, contractors have used the traditional method (bar chart in Microsoft Excel), which still occupies the highest rank compared to modern software. Modern and efficient software producing accurate and effective planning and scheduling ease most of the contractor burden, although most small contractors still could not use it because of the expensive and high price.

V.CONCLUSION

The construction of the highway using the traditional method proves to be asymptomatic and consumes more time with more complexity and massive error, which is the project's actual execution. The traditional planning method does not divide the main task, which hinders over-allocation of resources, improper decision making of resources for particular activities, etc. Microsoft Project is a modern tool of project management that helps to overcome the obstacles encountered. Due to the traditional method of planning and management. This allows for optimum and effective organization of activities to complete the project in the planned period and within the economy.

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