

Planning and Scheduling of Project using Microsoft Project (Case Study of a building in India)

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Abstract : Every one of us is a manager of projects of our own life. From a house wife to an employee to financial analyst, from banker to doctor, from engineer to administrator, from a teacher to a student, we all work on different tasks with deadlines. Regardless of our occupation, norms, or location in an organization, we all work on tasks that are eclectic and involve people who do not usually work together. The project may have a simple goals that does not require many people or a great deal of money or it may be quite complex, calling for diverse skills and plethora of resources. But the bottom line is that every one of us manages projects. Owing to this the purpose of dealing with the project should not be only execution but effective and efficient execution of project is essential which is needed to be highlighted. Construction Firms in India, Construct the Projects in a Traditional ways, this sometimes proves Uneconomical & Tedious too. Traditional way also proves to be Time Consuming and Confusing. The presented work will provide them an Opportunity to clearly observe the difference between the Microsoft Project (MSP) and the Traditional Planning Techniques which speeds up Construction and also make the Project Cost Effective with Proper Planning with the help of the case study on the single wing of project executed in Pune, Maharashtra, India. For finding out various aspects that proves efficient planning & execution of the project, disparate methodologies adopted and to find out remedial measures, international journal papers were referred. Methodology adopted includes defining of problem statement, insinuating the objectives from the data collected in two part viz. Primary data and secondary, analyzing the data and finally coming to the conclusion.

Keywords – Microsoft Project, Project Management, Planning, Construction Organization, Activities

I. Introduction

Project Management is the Application of knowledge, skills and Techniques to project activities to meet project requirements. It is a strategic ability to do something successfully for organizations, enabling them to patch the project results to Organizational goals and thus, better compete in their markets. It can be also defined as the process and activity of planning, organizing, inspiring, and controlling resources, procedures and protocols to achieve specific goals in scientific or daily problems. A project is a temporary aim designed to produce a special product, service or result with a defined starting and end (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 stands in contrast with business as usual (or operations), which are recurring, permanent, or semi-permanent functional activities to produce products or services. In implementation, the management of these two systems is often quite distinct, and as such requires the development of divergent technical skills and management strategies. It has always been practiced casually, but began to evolve as a prime profession in the mid-20th century.

1.1 Importance of Project Management

Project gets started at the right way but as it proceeds further, gets off the track. Owing to this its important to manage the activities in the right way, thus project management plays a vital role in arranging the critical activities of the project which is called as task to function in the appropriate way. Project Management aid the project in better efficiency to deliver services.

1.2 Traditional Approach to Project Management in Construction Sector

A traditional phased approach identifies a sequence of steps to be completed. In the "traditional approach", five developmental components of a project can be distinguished:

- Initiation
- Planning & Designing
- Execution and Construction
- Monitoring and controlling systems
- Completion

Not all projects will have every stage, as projects can be aborted before they reach completion. Some projects do not follow a hierarchical planning or supervising the process. And some projects will go through steps 2, 3 and 4 multiple times.

It has been found that most of that most of the small scale construction organization in India uses Microsoft Excel with the main Categories of summaries of activities shown. Unique colors are chosen for representing the process of the activities, this lead to the confusion and complexity in execution of main substructures and super structure activities.

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|----|---|------|------------------------|------|------|-----|-----|-----|-----|------|------|-----|-----|---|
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | | | | 2010 | 2011 | | | | | | | | | |
| 4 | | S.No | Particulars | DEC | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | |
| 5 | | A | A BLDG | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 7 | | 1 | INITIATION | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | |
| 9 | | 2 | FOUNDATION | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | |
| 11 | | 3 | FRAME WORK | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | |
| 13 | | 4 | UNDERGROUND WATER TANK | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | |
| 15 | | 5 | MASONRY WORK | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | |
| 17 | | 6 | PLUMBING | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |

Fig.1. Sample representation of Construction Activities using Microsoft Excel.

1.3 About Microsoft Project

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

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, which 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 is resource 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 task work based on the 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. Additionally, Microsoft Project can identify divergent classes of the 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 global which is accessible by all users.

II. Brief Overview Of Literature

Young Hoon Kwak & Frank T. Anbari (2008) observed that the ranking of occurrences of the eight allied project management disciplines from most to the least appeared subjects over the last 50 years are:- (1) Strategy/Portfolio Management; (2) Operations Research/Decision Sciences; (3) Organizational Behavior/Human Resources Management; (4) Information Technology/Information Systems; (5) Technology Applications/Innovation; (6) Performance Management/Earned Value Management; (7) Engineering and Construction; and (8) Quality Management/Six Sigma.

They also concluded that project management shouldn't only be studied in academics but we should deal it in every domain of life in practical ways – both reflection on action and reflection in action.

Vittal Anantatmula (2010) found out that Similar to a traditional project, managing an academic degree is related to the triple constraints of time, cost, and scope. It is concluded that by applying project management concepts, tools, and techniques, undergraduate degree program advising and planning can be improved after comparing the planning aspects of a conventional business project with the planning of an

academic degree. Author also helps to explain the application of project planning techniques to manage the multiple constraints and the complexity associated with academic advising and planning.

R. Prabhakar and G. Ravichandran (2014) analyzed that; Construction planning is an important part of the overall management process. The planning and management includes organizing the work, executing the work, correlating plan and progress information and controlling the work, the three inter-related factors of time, money and quality need to be managed in a proper way. Completion of many of the projects nowadays is not in estimated duration. This will direct to an increase in overheads as well as various other factors. It will not only reduce the expected revenues but also will affect the reputation of the contractor. Scheduling is one of the vital functions in construction project to determine the sequence of activities necessary to complete a project.

Hoang, Nhat Minh Shrestha, Swostik (2014) hinted that the main function of a software is to offer help, and enhance the quality of output with less effort than manual ways. A project has disparate requirements and the aim of the adopted software is to fulfill those requirements effectively in terms of time and cost. In addition, the issues of scheduling, tracking and physical element must be considered while adopting the project management software.

Aftab Hameed Memon and Ismail Abdul Rahman (2014) suggested that time is the biggest element that every contractor has to deal with while practicing the construction activities. Variety of approaches and tools has been introduced over the past decades to cherish the management of the projects. Author identified commonly used techniques and software of time management together with their effectiveness level in large construction projects. Data was collected from the construction organization that deals with huge projects. Relative Importance Index calculation was employed to assess the level of effectiveness for time management techniques and software packages adopted in the construction project. The results depicts that most common and effective time management technique and software Package are CPM and Microsoft Project respectively. Although this techniques are brought into practice but practitioners did not accomplished the goals of respective organization.

III. Research Methodology

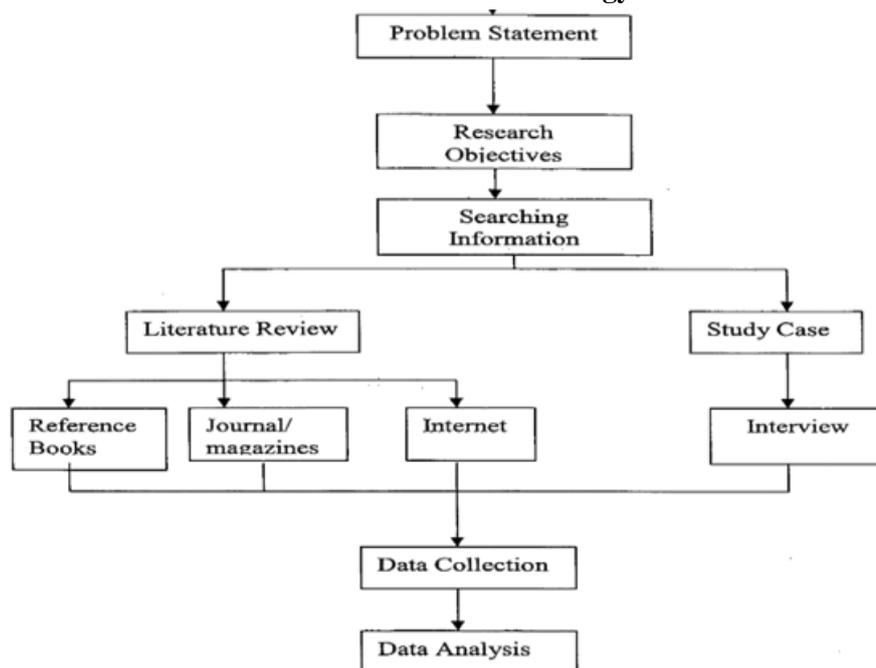


Fig.2. Flowchart Showing Research Methodology adopted.

1.4 Problem Statement

Nowadays, almost every construction industry in India is experiencing delay problem. The problem occurs from various reasons; the extensive sources are caused by the construction activity which has been executed not according to planning and scheduling efficiently decided before actual execution of the project. Apparently, contractor will require time extension to accomplish the project. The Extension of time will be given to the delay in problem not caused due to lack of proper care (incautious, unaware) and mistake by the contractor, but it's normally caused by major forces such as inconvenience in supplying construction materials, variation order (VO) by customer owing to the nature disaster such as rainy season. Regarding to the extension of time in a project life, it will incur the cost increase to both associates, either the client or contractors.

The extension of time (EOT) given to the contractor does not cause inconvenience or error to contractor, if party is facing the problem, therefore they should be responsible and bare the extra cost due the procrastinations of the problems. As a consequence, the time will stretch, cost will increase and henceforth the quality of the project will degrade.

Furthermore, as the construction industry become more stringent and expand in growth, as a consequences it's is difficult to the project manager to monitor and control abortion caused by ineffectiveness 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 adamant. As a sequence, the conflict in activities sequence occurred due to inefficient planning and scheduling. In order to accelerate, it is important to focus on every aspect of construction activities before commencing its. The planning and scheduling efficiency depends on the methodology used. To achieve the goals of a project will be meaningless if the method used is not appropriate.

As we know, the project scheduling is very important in project's life, unfortunately not many civil engineer experts exercises implementation and applications of Microsoft Project in construction project. On other hand side, currently the contractors who used traditional method (Bar Chart in Microsoft Excel) 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.

1.5 Research Objective

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 reduce the total duration then the actual executed project's duration (Case Study).
3. Ease of work for the Labour.
4. To reduce the cost by proper allocation of resources.

1.6 Searching Information

1.6.1 Literature Review

1.6.1.1 Reference Book

Project management body of knowledge was used to understand the many concepts and technical definitions regarding project management. Few book for the reference of Microsoft project like Project Management Using Microsoft Project 2013: A Training and Reference Guide for Project Managers Using Standard, Professional, Server, Web Application and Project Online” to understand the functioning of software.

1.6.1.2 Journal/Magazines

Many International Journal viz. Indian Journal of research, Science Direct, IOSR for Mechanical and Civil engineering were referenced to perceive the knowledge regarding past development in Project Management and software which are optimizing the efficiency of project.

1.6.1.3 Internet

Plethora of information was gathered from internet with respect to the problems mainly occurred while executing the project in India and also how those problems are tackled with the enormous application of the Microsoft Project.

1.6.2 Study Case

In order to get the clear view of difference between the traditional way of Project Management and Modern way of managing the project with the help of software called as Microsoft Project the actual example was taken from the Construction organization in Pune, India that uses that uses the Microsoft Excel for the Scheduling and Execution of the project.

1.6.2.1 Interview

The interview was arranged with the Senior Engineer and Project Coordinator of the respective Construction Organization in Pune, India to identify the Problem they had occurred during the actual execution of the project like Duration, Resource Over allocation, Labour fatigue due to overtime of the work, reaching of threshold limit due to working of Labour during holidays etc. Also to know the arrangement of activities they had used while executing a building project.

1.7 Data Collection

Data like the Activities Starting Date, Finish Date, Duration of Activities and their Delays, Relationship of Activities and task, Amount of Resources used for the Activities etc. was collected from the Construction Organization of Pune, India to analogize the data and make the data use in the Microsoft Project with the proper changes were made

1.8 Data Analysis

The main activities from the data collected from organization was divided into sub activities for the proper functioning of the project and identification of the Parallel activities, Slacks and crushing of Non-Critical activities was recognized from the given data and appropriate alterations were made to meet the goals of the research.

IV. Analytical Facts And Results

1.9 Scheduling technique using network models

With the help of Microsoft Project, it's easily to understand and visualize the flow and network of the project. One can easily see the Critical Path which is the Longest Path of the Project, Parallel Activities, Slack which is also called as Total Float of the Activity can be visualized, Relation between activities is understood by networking. Owing to this there are fewer obligations while executing and project and right measure can be taken easily.

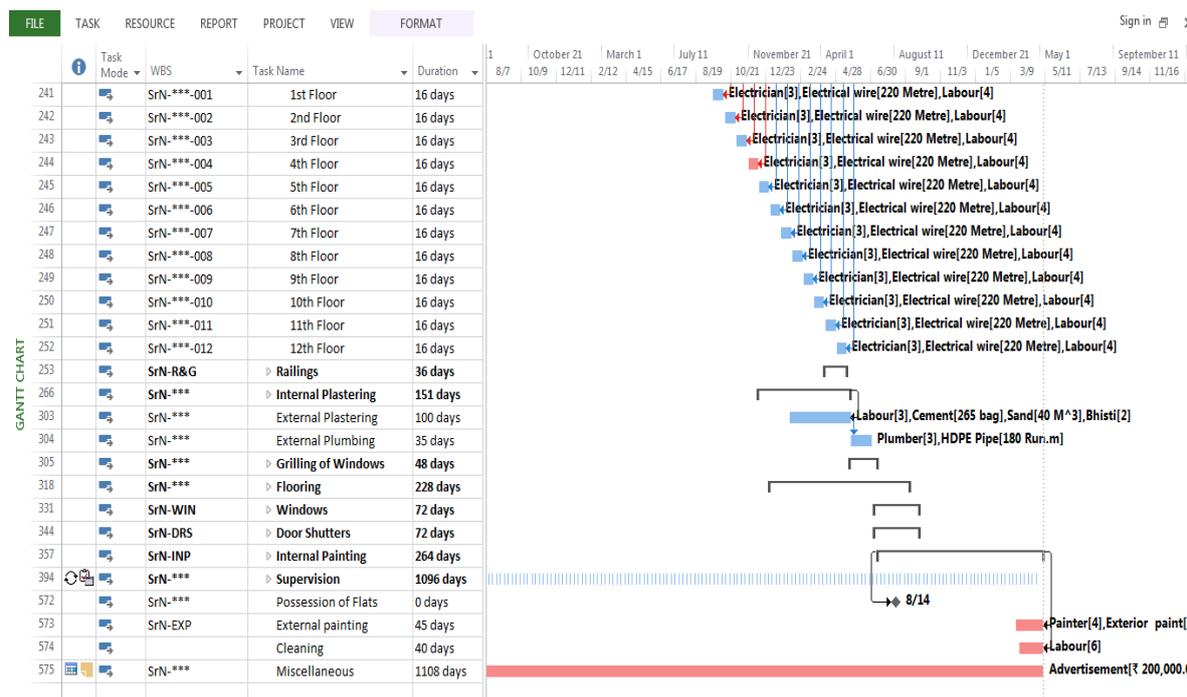


Fig.3. Networking of the Activities by Critical Path Method.

1.10 Reduction in the Total Duration of the Project

Microsoft Project gives a clear view to understand the project easily. After making proper alteration by using the slacks of parallel activity and crushing the parallel activities the duration of the project has been shown in Graphical form comparing the day required by traditional way and by use of Microsoft Project. The Graph clear indicates that duration to complete the project by Microsoft Project is less than the Traditional Method obtained from the data of Case Study.

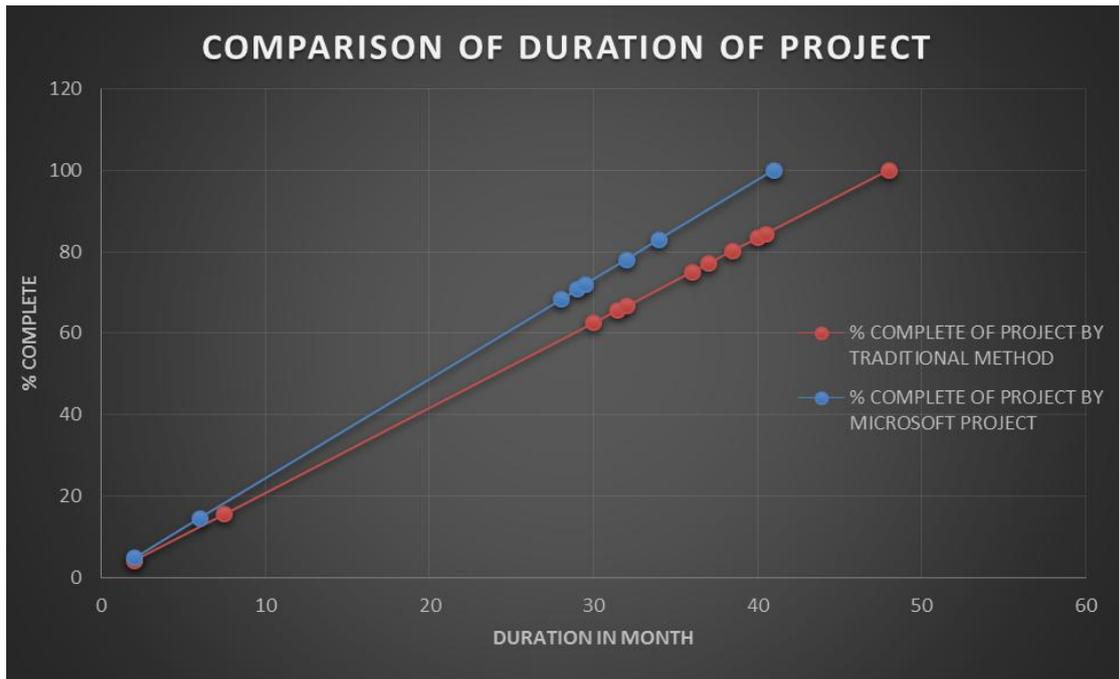


Fig. Comparison of Duration between Traditional & Microsoft Project Method of Planning.

1.11 Ease of work for Labour

By providing all the governmental holidays of India workers, it makes good environment for Labour to work in the organization. While on other hand, making workers to work for fix timing 9AM to 6PM with one hour of break helps stress free surrounding for workers which makes them willingly work on the field.

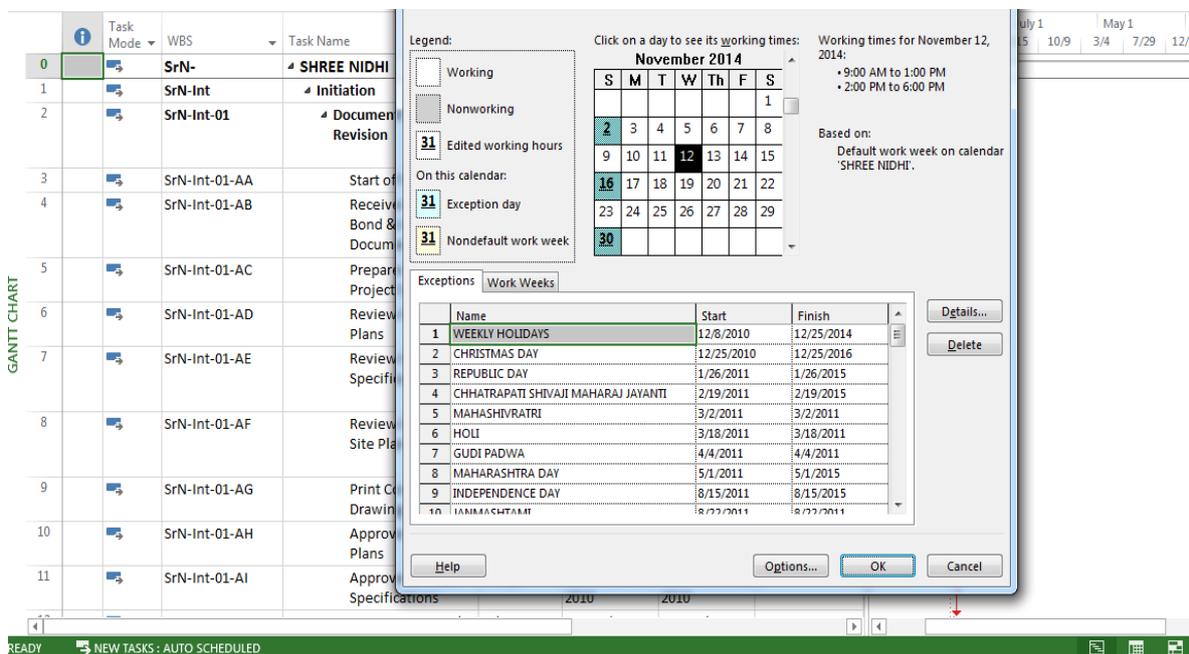


Fig.4. Showing the Calendar of Project with Holidays and Working time.

1.12 Reduction in the overall Cost of the Project

Proper analysis of the Resources and allocating them without being over allocated is possible using Microsoft Project. By using the fewer Resources where slack time is enough available helps to reduce the cost of the project by 2% of overall cost of the Traditional way of Management.

V. Conclusion

Construction of building using Traditional way proves to be uneconomical and consumes more time with many complexity and enormous error which actual execution of the Project. Traditional way of planning doesn't sub divide the main task which future gets the hurdle of over allocation of resources, improper judgment of resources for particular activities etc. Microsoft Project is the modern tool of Project Management that aid to overcome the obstacles faced owing to traditional way of Planning and Management. It helps for the optimum and effective organization of activities which helps to give the vision to complete the project in planned duration and within the Economy.

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