



Risk Analysis & Management of Road construction using Primavera P6

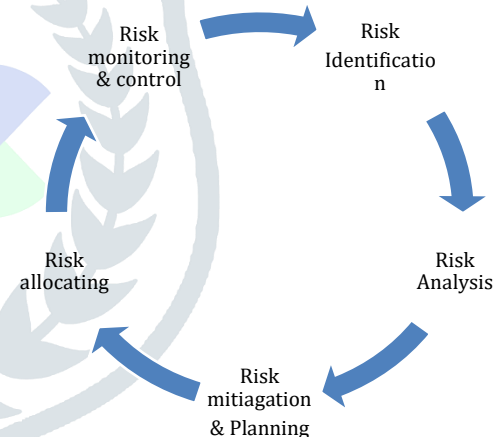
Shubham Chandgude, Sayali Shelke, Vaishnavi Jaiswal, Salunke Kiran, Aditya Thorat

Project Guide-Dept of Civil engg, Dept of Civil Engg, Dept Of Civil Engg, Dept of Civil Engg, Dept of Civil Engg

Abstract

Road Construction has become primary and basic requirement for any developing country. Strong Road networks lead to better connectivity of villages, cities and towns. Road construction comes with lots of risks. Some risks can be listed as Time Overrun, Cost Overrun, Lack of Labours, Storage problems, Political issues and many more. 42 factors were identified as risks in construction of road. A Site Visit was organized at Tathawade where 80% of road construction was done. Questionnaire was arranged for the labours including the risk factors. The analysis and research led to a cessation that time overrun is an issue, also political party agreements and material management shouldn't be overlooked and risks should be acknowledged as early as possible. Further risk factors are according to their impacts.

6. Land acquisition
7. Traffic Risk
8. Labor management, safety of labors



1. INTRODUCTION

Risks are not an exception in road construction. What is risk? Risk is some kind of uncertainty in project that is not planned. Risk is defined as an uncertainty of outcome, whether positive opportunity or negative threat, of actions and events.

Risks in road construction cannot be pre-determined it can be based on political, environmental or financial problems.

Some of the Risks can be listed as:

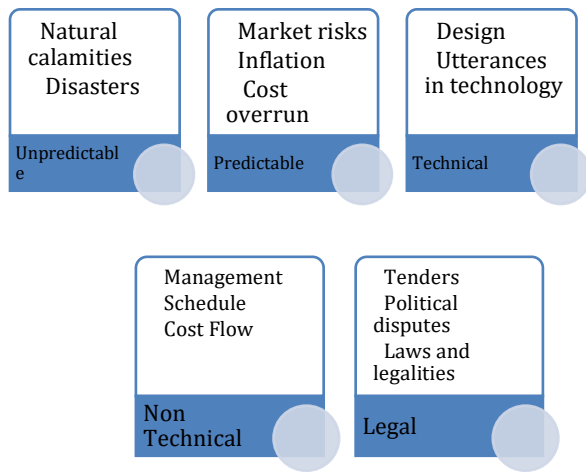
1. Material & Manual Handling
2. Time Overrun
3. Cost overrun
4. Political disputes
5. Utilities risk

Process firstly starts with the identification of risks followed by their analysis, mitigating and planning, allocating, monitoring & control. This is cyclic nature of risk management process.

Risk Identification and analysis:

The change in identification process will depend on the nature of the project and the risk management skills of the team members, but most identification processes begin with an examination of issues and concerns created by the project development team. Nominal group, Delphi, Crawford slip methods are used in identification of risks.

Risk Identification can be classified as: Unpredictable, predictable, non-technical, Technical, Legal



The risk is analyzed by risk management software process by using primavera risk analysis.

The risk should be calculated by the impact of the risk after taking place and probability of happening. Non availability of labours, funds and weather conditions are the common risks. And the political, environmental, etc. We calculate the period of construction by this risk analysis process by using **Primavera P6 risk analysis software**.

Project managers use Primavera P6 for scheduling and incharge of project. When a site is investigated and risks are identified they are entered in the software. According to the risks entered the risk score will be generated. Adding or selecting a response description can be done. We can also add, delete, avoid or mitigate risk manually.

Risk Mitigation and planning:

Team should work on mitigating Risk factor by brainstorming planning and scheduling the project before-hand. Scheduling the project in Primavera P6 software will save time and resist us from time overrun.

Risk Allocating:

Risk allocation at every site surely affects costing of materials, time, quality of material, and the potential for disputes, environmental issues..

Risk monitoring and control:

Risk monitoring is crucial in the process of management of a project. Risk can be monitored manually as well as using software. Using Primavera P6 software will notify us prior before the risk can damage much.

Risk graphs and chart tell us which action should be taken to avoid failure. Control mostly comes from risk monitoring. A well monitored project os always in control.

2. LITERATURE REVIEW

K Swarnakumari and J Yikranth international journal of engineering research and application volume 2, issue (4th July –August 2012).The present construction practices in India is still adopt the methodology of as and when required resource management. Which results in Lack of professionalism, training programs no real time records. Equipment cost for any project comprises of mainly 20-30% of project cost.

Satish K. Kamane and Sandip A. Mahadik (2013) found that it may be stated that risk Management is the core of project management. The success of every project depends on how efficiently and effectively the Risk avoidance may include a review of the overall project objectives leading to a reappraisal of the project as a whole.

Pethe S. And Adavi P. (2013) suggested that project management concepts are no longer theoretical but have got converted to technology driven means. There are some more parameters of Primavera such as primavera architecture, calendars, scheduling, work breakdown structure, resource assigning, its analysis and leveling, updating, etc. But here we have discussed the major parameters which affect the construction industry in a far bigger way.

Mohamed A Aderbag and Mohamad A Sherif (2018) stated that in order to carry the process perfectly, an efficient program tool was used called the PERT-Master Primavera risk analysis tool. By using information gathering techniques a total number of forty-four risk events related to different risk categories were identified by the end of risk identification process.

Belu Nadia, Anghel Daniel Constantin and Iliesorin (2010) Concluded that Primavera software products management needs of organizations that manage large numbers of project at one time. These integrated applications use project management to support the management needs of project teams in different locations and at varying levels of the organization.

X. Regina Mary and V.Rathinakumar (2015) Stated that schedule made by using techniques that reduce the constraints helps for the project to complete earlier of five to seven months from the actual base schedule of the project and thereby increase the profit outcome from the project.Divyang Solanki J.D.Raol (2015) Found that using this software we conclude that whatever work is going on if it is collected in particular format, we can easily identify the problem among that and find alternatives.

(Y. Umesh 2015) Proper planning and scheduling are very essential in projects for sinking and scheming delays of the project. Extensive amounts of time, money, resources are wasted each year in a construction industry due to improper planning and scheduling. With globalization the construction projects have become infinite and complex. Planning of such projects need huge amount of documentation work, which can be minimize with the help of project planning software.

(T Subramani, M.Shekar May 2015) "Preplanning And Scheduling Of Road Construction By Using PPM" T Subramani, M.Shekar International Journal Of Application Or Innovation In Engineering Management Volume 4 Issue 5, (May 2015). Planning project management is required to give complete project management solution, helps to schedules the working period in a proper manner and also purchase the goods at the right time. Advantages of using this software are having flexibility to manage

Mohammad and Devanand et al. (2014) Made "analysis on resource planning, cost estimation and tracking of project by earned value management" by taking a duplex apartment as a case study. The key focus was on planned expenditures and actual cost. Earned value concept explore the future opportunities and it also examines actual accomplishment. So, the key point here that EVA that enable us to spot a potential problem early in the project and rectified the situation that rose in the project.

Satish K. Kamane and Sandip A. Mahadik (2013) Found that it may be stated that risk Management is the core of project management. The success of every project depends on how efficiently and effectively the Risk avoidance may include a review of the overall project objectives leading to a reappraisal of the project as a whole.

Ehsan N. and Alam M. (2010), Formal risk analysis and management techniques are rarely employed by Pakistani construction industry owing to the lack of experience and knowledge in the area. The industry also holds disbelief that these techniques are suitable to be employed in construction projects, much in the same manner as employed in other industries.

Belu Nadia, Anghel Daniel Constantin and Iliesorin (2010) Concluded that Primavera software products management needs of organizations that manage large numbers of project at one time. These integrated applications use project management to support the management needs of project teams in different locations and at varying levels of the organization

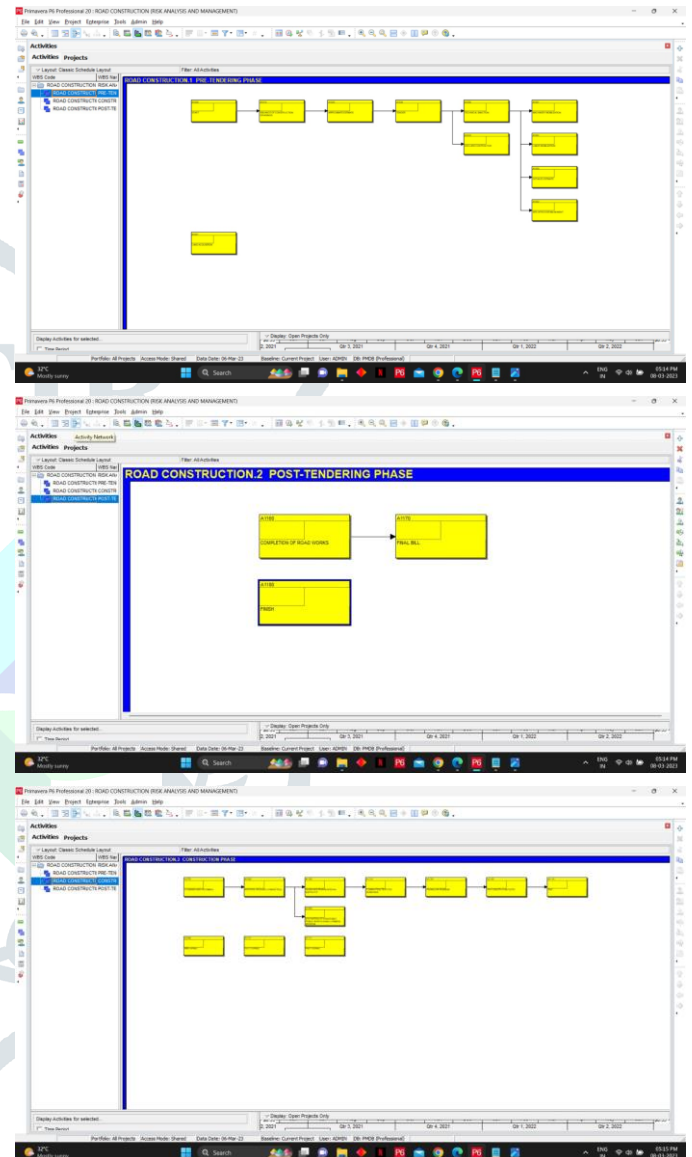
Joseph Ignatius Teye Buerter (2014) Concluded that the major risk factors affect the cost of construction. They said that level of knowledge and the application of risk in work is limited. Since this research paper is not challenges in estimation of cost of the construction project

Bhosekar and Subramani et al. (2012) Stated that Earn Value Analysis (EVA) includes unique characteristics that help project owners, consultants, and contractors. From the comparison of result of Microsoft Project and Primavera P6 they found that the final result gives almost 99.5% accuracy

T.ShivaNagaraju And Sri Lakshmana Kumar (22nd May 2016) "Schedule and Resources Optimization Using Primavera In Metro Rail Project" T.ShivaNagaraju And Sri Lakshmana Kumar IRF International Conference 22nd May 2016 .The main objective was to

understand the role of scheduling and proper usage resources to timely completion of a construction project. Results showed the drawbacks of the present project management system in station work project and the importance of efficient planning, as well as the need and effectiveness of project management software like Primavera P6 in a construction project.

3. METHODOLOGY



Planning:-

: The planning for the project involves collecting the data required and to identifying the construction tasks. The project which I have selected is Construction of 30m two way road from division 25 Ttathwade shani mandir to Marungigaon of road length 1303m, Pune,Maharashtra.

CASE STUDY DETAILS The Contractor : GANESH Constructions
The Client : P.W.D

Name of project : DIV 25 TATHAWDE SHANI MANDIR TO MARUNGIGAON Budget at Completion Rs.24,34,13,558/-

Project Actual Duration : 24 months 5.

Scheduling:

After collecting drawings and preparing quantities the activities are known.the scheduling of the project is done in primavera P6 software. The scheduling procedure in primavera is as follows: Structuring Projects

1. Setting-up and define EPS (Enterprise Project Structure).
2. Add a project to the EPS.
3. Defining WBS of Project.
4. Create Calendar for Activities & Resources.
5. Add activities to WBS
6. Input activity details.
7. Schedule project.
8. Updating progress after project starts.
9. Preview / Print reports.
- 10.Risk Analysis and management EPS (Enterprise Project Structure): projects are arranged in a order called Enterprise project Structure(EPS).

The EPS can be subdivided into as many levels or nodes.Each node can contain an unlimited number of projects. WBS (Work Breakdown Structure): Work Breakdown Structure is a hierarchical arrangement of the major tasks and services produced during and by the project. Creating Calendars Create and assign calendars to each activity.

These calendars shows available work-hours each day for the project to reach completion date.Calender also specify national holidays, organization's holidays, project-specific work/non-workdays, and vacation days. Activities Also known as tasks, events included in a project for its completion.Each activities has some duration in which it is expected to be done,it also has costs and resource or role requirements. Milestone activities, dows not have any particular duration or cost. Risks are any uncertain events or conditions that, if they occur, have a positive or negative effect on project objectives and can lead to cost overrun or project delay.

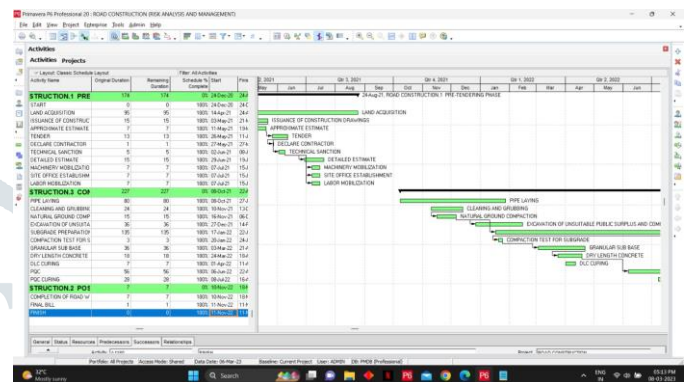
A Gantt chart is a graphical representation of the duration and sequence of activities or projects. It is useful for planning, scheduling, and monitoring progress against a timeline.

Benefits of Primavera Software:-

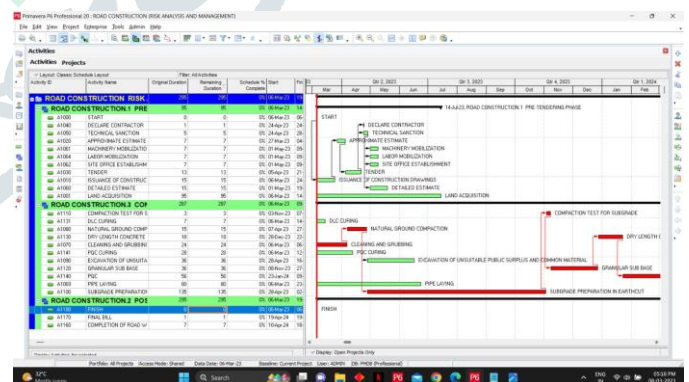
- a)Construction Projects can be planned, scheduled and monitored
- b) Risk Analyzing of projects

- c) Project activities relating
- d) Tracking the projects to know the current scenario
- e) Communication between the team members for the project is easy
- f) Helpful to know the further activities which has to be carried out
- g) Security level is well organized within the company.

4. RESULT AND DISCUSSION



The project case study we have took is "Construction of Rigid Pavement from Tathawade Shani Mandir to Marungigaon of length 1303m".the project duration as per PCMC was 24 months and estimated cost was 24,34,14,558/-. The project duration was extended by 6 months due to improper planning and scheduling,political issue and biological issue.As contractor has no proper planning to execute the project hence the project got delayed.Project was delayed due to covid pandemic and unavailability of cost and material prior to constrution activity due to political interference.



If the project had planned properly then there wouldn't have been unavailability of cost and material,here by using Primavera P6 user can schedule or plan each activity of project in advance before execution.hence there will be no sudden impact due to cost and material availability. The actual duration of the project as per original schedule is 24 months i.e. 720 days from 24-dec-2020 to 13-dec-2022. after subtracting holidays it will be 626 days . As per pre-planning and scheduling the project the project can be completed by 590 days , which gives 36 days earlier than the actual duration. As per scheduled

plan using primavera the Contractor or the management could get a profit of 19% of project budget at the time of completion. But in this case due to delay, the project was 17.12% below contract.

5. CONCLUSION

Construction sites may contain a lot of risks but Risks can be managed using Primavera P6 scheduling software. We can schedule projects set dates, enter rates of materials manually, and manages the entire project till final execution

6. REFERENCES

1. https://www.researchgate.net/publication/329864702_Experimental_Investigation_on_Preplanning_of_Road_Construction_by_Using_Primavera
2. https://www.academia.edu/39763043/IRJET-_Risk_Management_of_Construction_Projects_by_using_Primavera_Risk_Analysis
3. <https://www.irjet.net/archives/V6/i5/IRJET-V6I5328.pdf>
4. <https://www.theirmindia.org/blog/risk-management-software-utilised-in-the-construction-infrastructure-industry/>
5. <https://www.youtube.com/watch?v=dw-Ef6voHrY>
6. <https://www.ijaiem.org/Volume4Issue5/IJAIEM-2015-05-19-51.pdf>
7. <http://ignited.in/I/a/242446>
8. <https://1library.net/title/enterprise-project-management-using-primavera-p6-eppm>
9. <https://www.sciencedirect.com/science/article/pii/S2090447920302252>
10. <https://skill-lync.com/civil-engineering-courses/construction-management-primavera-p6>
11. FHWA+-+Risk+Assessment+and+Allocation.pdf

12. Risk Assessment and Allocation in Highway Construction Projects in the UAE | Journal of Management in Engineering | Vol 31, No 6 (ascelibrary.org)

