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ANALYZING THE USE OF MICROSOFT PROJECT IN PROJECT SCHEDULING AND ESTIMATION IN CONSTRUCTION

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ABSTRACT

This research investigates the integration of Microsoft Project in construction project scheduling and estimation. Through interviews, surveys, and a case study, it optimizes resource allocation and cost assessment, enhancing communication and decision-making. The study underscores precise scheduling's pivotal role in project success, highlighting Microsoft Project's contributions. Implications encompass software mastery for stakeholder collaboration. Future research might explore real-time data integration. In conclusion, Microsoft Project empowers construction managers to navigate complex projects, ensuring successful outcomes. Its tools facilitate efficient planning, nurturing project excellence amid multifaceted challenges. By streamlining processes, the software significantly enhances project management practices, leading to consistently successful results.

Keywords: Microsoft Project, project scheduling, project estimation, construction industry.

1.INTRODUCTION

Effective construction management relies on precise scheduling and estimation. Microsoft Project streamlines these processes, enhancing outcomes. This research explores its integration, analyzing implementation via interviews, surveys, and a GAGAN CASCADES case study. As construction complexity increases, Microsoft Project becomes pivotal for strategic planning, resource utilization, and communication. Scheduling precision and resource allocation are essential in this context, where Microsoft Project significantly enhances project management. This study outlines methodology, case study, Microsoft Project processes, construction phases, data analysis, and implications. Microsoft Project's transformative potential is underscored, benefiting

resource allocation, communication, and decision-making. In conclusion, Microsoft Project empowers project managers, ensuring successful project navigation.

2.METHODOLOGY

The research methodology involves qualitative interviews with professionals from the construction industry and quantitative surveys to gather insights on Microsoft Project's practical application.

Furthermore, a detailed case study of the GAGAN CASCADES construction project is conducted to illustrate the real-world utilization of Microsoft Project.

2.1 CASE STUDY: GAGAN CASCADES Project

The GAGAN CASCADES project serves as an empirical case study to showcase the practical implementation of Microsoft Project. The case study includes project plans, elevations, sections, and construction phases, providing a holistic view of the project. Refer to the following figures:

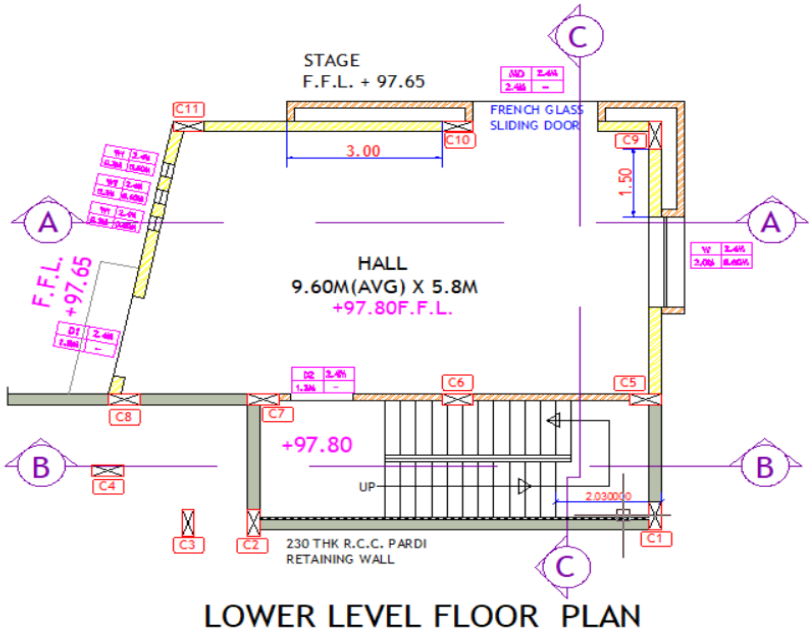


Fig. 1: GAGAN CASCADES Plan

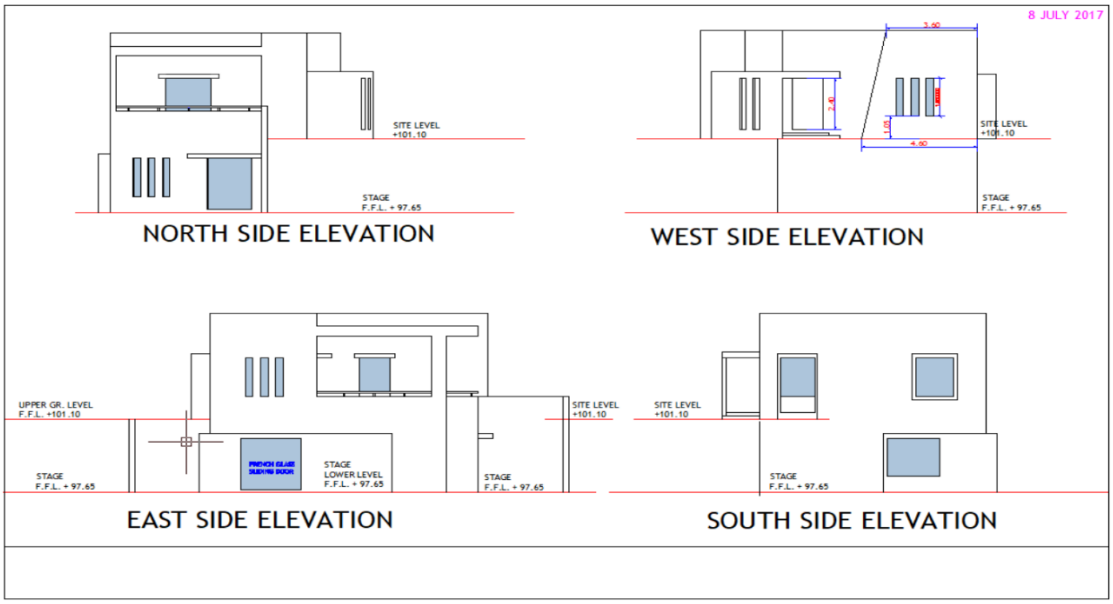


Fig. 2.1: Elevation

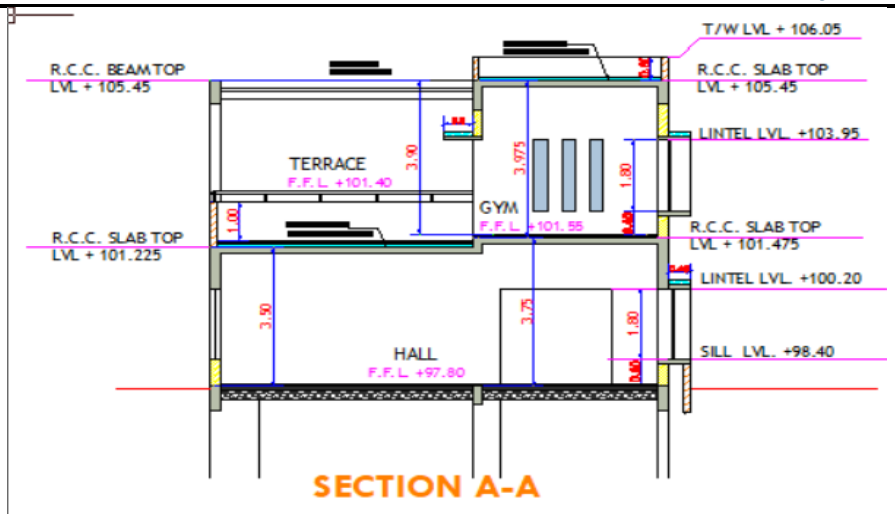


Fig. 2.2: Section

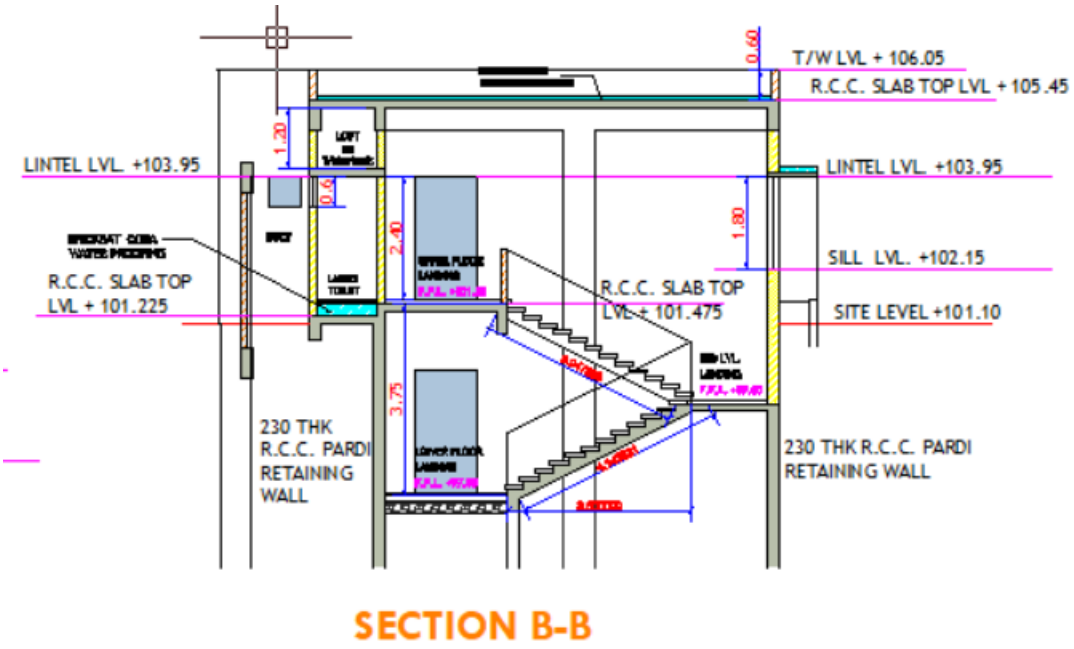


Fig. 3: Another Relevant Figure

2.2 MICROSOFT PROJECT PROCESS

This section provides a comprehensive step-by-step guide on how to utilize Microsoft Project for project scheduling and resource estimation. It covers defining project calendars, selecting task modes, entering tasks, creating a work breakdown structure (WBS), setting task dependencies, assigning resources, and estimating costs.

Step 1: Start a New Project:

Open Microsoft Project and select "Blank Project."

Enter the project's name, start date, and other details.

Step 2: Define Project Tasks:

Click on the "Task Name" column and enter the tasks required for the project.

Set task durations and dependencies by adding predecessors for tasks that need to be completed before others can start.

Step 3: Create a Work Breakdown Structure (WBS):

Organize tasks into phases or categories to create a clear structure.

Indent and outdent tasks to show hierarchy and relationships.

Step 4: Set Task Dependencies:

Select a task and go to the "Predecessors" column.

Add tasks that must be finished before the selected task can start.

Step 5: Estimate Task Durations:

Click on a task and enter the estimated duration in days, weeks, or hours.

Consider historical data or expert input for accurate estimations.

Step 6: Allocate Resources:

Switch to the "Resource Sheet" view.

Add resources like people, equipment, and materials.

Assign resources to tasks by entering their names in the "Resource Names" column.

Step 7: Adjust Resource Availability:

Specify working hours and days for each resource.

This ensures accurate scheduling based on resource availability.

Step 8: Review the Gantt Chart:

Go back to the "Gantt Chart" view.

You'll see tasks on a timeline, connected by lines representing dependencies.

Step 9: Critical Path Analysis:

Click on "View" and select "Network Diagram" or "Critical Path."

The critical path highlights tasks that must be completed on time to avoid delaying the project.

Step 10: Optimize Resource Allocation:

Check the "Resource Allocation" view.

Balance resource workloads by adjusting task assignments.

Step 11: Update Progress:

As tasks are completed, mark them as "100% Complete."

Microsoft Project will adjust the timeline and update the project's progress.

Step 12: Generate Reports:

Go to "Reports" and choose from various built-in report templates.

Generate reports on task progress, resource allocation, and project timeline.

Step 13: Monitor and Adjust:

Continuously monitor the project's progress.

Adjust the schedule if tasks are ahead or behind.

Step 14: Compare Actual vs. Planned:

Compare the actual progress with the initial schedule.

Analyze differences and identify areas for improvement.

2.3 CONSTRUCTION PHASES

The construction phases observed in the GAGAN CASCADES project are outlined, encompassing initial investigation, planning, preliminary works, substructure construction, superstructure construction, mechanical and electrical installation, and finishing and finalization.

PHASE 1: INITIAL INVESTIGATION AND PLANNING

1. Site investigation
2. Soil testing
3. Surveying
4. Planning and design
5. Selection of planning and design
6. Scheduling of plan
7. Estimation
8. Project sanctioning

PHASE 2: PRELIMINARY WORKS AND FOUNDATION

1. Preliminary works
2. Site clearance
3. Necessary approval from municipal authority
4. Site levelling
5. Foundation
6. Excavation
7. Sand filling followed by compaction
8. P.C.C (Plain Cement Concrete)
9. Steel binding
10. Formwork for foundation
11. Concreting
12. Steel erection

PHASE 3: SUBSTRUCTURE CONSTRUCTION

1. Beams
2. Columns
3. Concreting
4. Floor slab
5. Sub base and building
6. Formwork and concreting
7. Masonry work
8. Lay masonry
9. Install roof drains

PHASE 4: SUPERSTRUCTURE CONSTRUCTION

1. Roofing
2. Installation of accessories
3. Door, windows and ventilators
4. Floor and ceiling works
5. Elevators and excavators

PHASE 5: MECHANICAL AND ELECTRICAL INSTALLATION

1. Electrical
2. Rough in electrical
3. Installing the terminal
4. HVAC equipment
5. Plumbing
6. Rough in plumbing
7. Set plumbing fixtures
8. Test and clean

PHASE 6: FINISHING AND FINALIZATION

1. Exterior work and finishes
2. Painting
3. Cladding if needed

RESOURSE LIST

1. Certainly, here is the list of resource names:
2. Concrete contractor
3. Finish carpentry contractor
4. Fencing Contractor
5. Masonry contractor
6. General contractor
7. Architect
8. Owner
9. Mortgage lender
10. Inspector
11. Electric company
12. Site excavation contractor
13. Electric contractor
14. Plumbing contractor
15. Framing contractor
16. Roofing contractor

17. Heating and AC contractor
18. Insulation contractor
19. Drywall contractor
20. Painting contractor
21. Flooring contractor
22. Appliance contractor

4. DATA ANALYSIS

Data analysis interprets the collected information, demonstrating Microsoft Project's positive impact on project management processes. The software's contribution to project calendars, task modes, WBS, task dependencies, resource allocation, and cost estimation is highlighted.

Resource	Work Type	Type	Completion	Costs
Concrete contractor	Work	C	100%	₹ 5,05,600.00
Finish carpentry contractor	Work	F	100%	₹ 16,666.67
Fencing Contractor	Work	Fe	100%	₹ 3,333.33
Masonry contractor	Work	M	100%	₹ 1,68,000.00
General contractor	Work	G	100%	₹ 4,00,000.00
Architect	Work	A	100%	₹ 5,00,000.00
Owner	Work	O	100%	₹ 0.00
Electric contractor	Work	E	100%	₹ 1,25,000.00
Plumbing contractor	Work	P	100%	₹ 89,600.00
Framing contractor	Work	F	100%	₹ 60,000.00

Painting contractor	Work	P	100%	₹ 50,000.00
Flooring contractor	Work	F	100%	₹ 6,00,000.00
Steel contractor	Work	S	100%	₹ 1,77,600.00
Structural designer	Work	s	100%	₹ 1,25,000.00
Surveyor	Work	s	100%	₹ 50,000.00

5. RESULTS

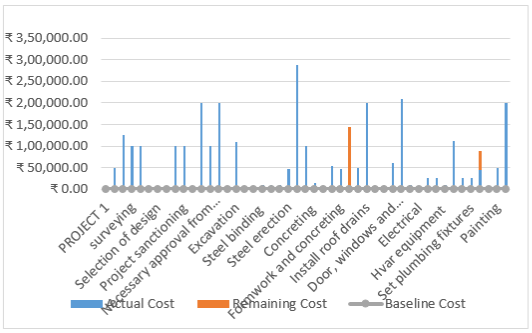
REPORTS

1.1 TASK COST OVERVIEW

TASK COST OVERVIEW

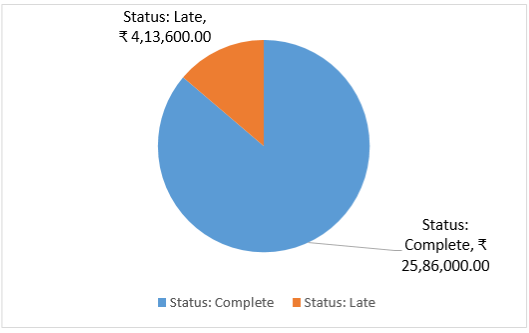
COST STATUS

Cost status for top-level tasks.



COST DISTRIBUTION

How costs are spread out amongst tasks based on their status.

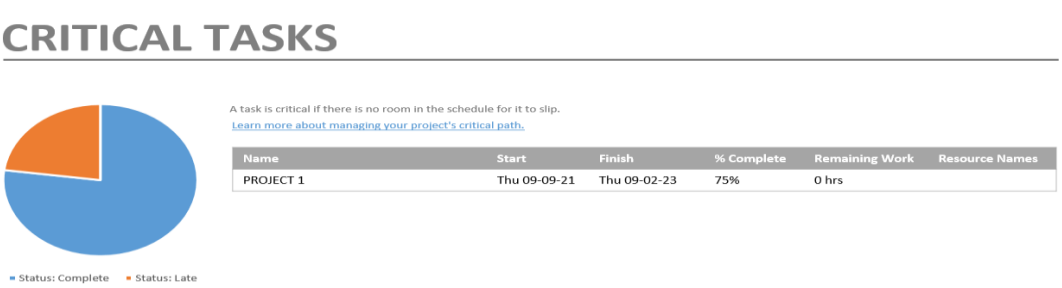


COST DETAILS

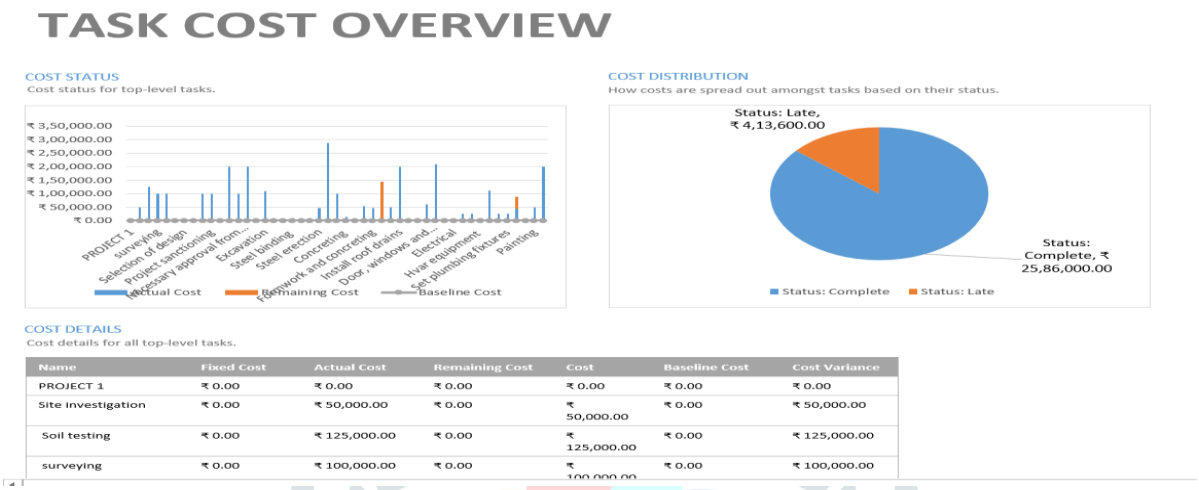
Cost details for all top-level tasks.

Name	Fixed Cost	Actual Cost	Remaining Cost	Cost	Baseline Cost	Cost Variance
PROJECT 1	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Site investigation	₹ 0.00	₹ 50,000.00	₹ 0.00	₹ 50,000.00	₹ 0.00	₹ 50,000.00
Soil testing	₹ 0.00	₹ 125,000.00	₹ 0.00	₹ 125,000.00	₹ 0.00	₹ 125,000.00
surveying	₹ 0.00	₹ 100,000.00	₹ 0.00	₹	₹ 0.00	₹ 100,000.00

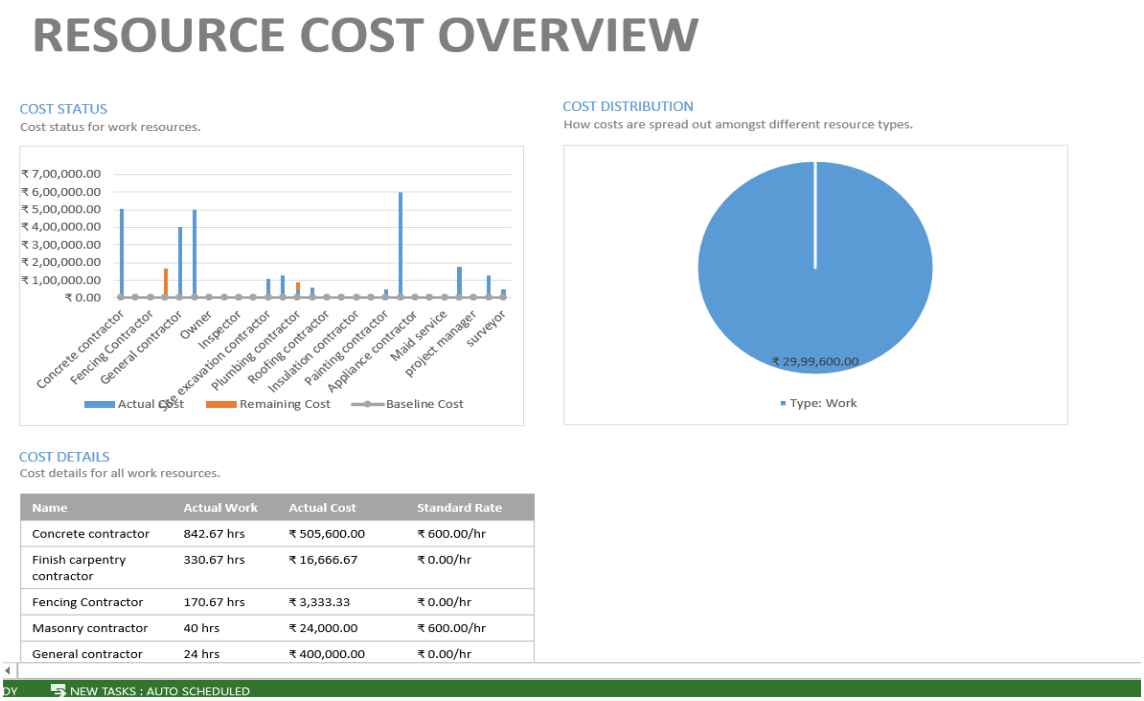
1.2 CRITICAL TASK



1.3 TASK COST OVERVIEW



1.4 RESOURSE COST OVERVIEW

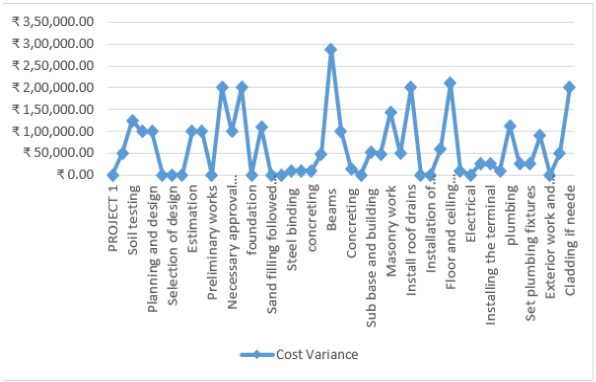


1.5 COST OVERVIEW

COST OVERRUNS

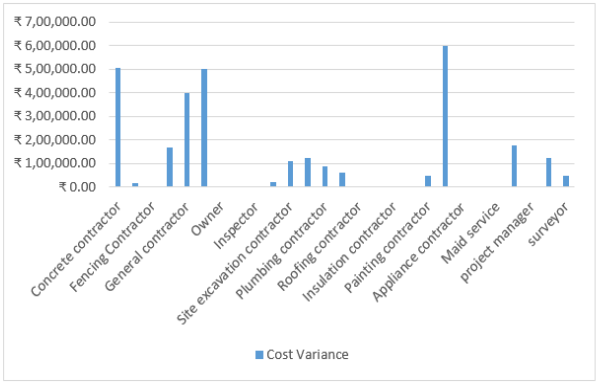
TASK COST VARIANCE

Cost variance for all top-level tasks in the project.



RESOURCE COST VARIANCE

Cost variance for all the work resources.



Name	% Complete	Cost	Baseline Cost	Cost Variance
PROJECT 1	75%	₹ 0.00	₹ 0.00	₹ 0.00
Site investigation	86%	₹ 50,000.00	₹ 0.00	₹ 50,000.00
Soil testing	100%	₹ 125,000.00	₹ 0.00	₹ 125,000.00
surveying	100%	₹ 100,000.00	₹ 0.00	₹ 100,000.00

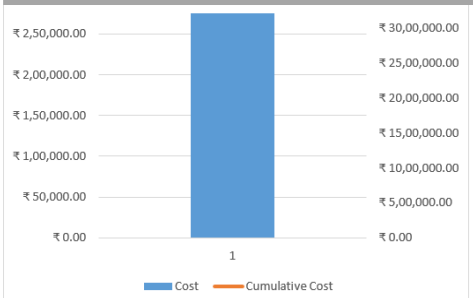
Name	Cost	Baseline Cost	Cost Variance
Concrete contractor	₹ 505,600.00	₹ 0.00	₹ 505,600.00
Finish carpentry contractor	₹ 16,666.67	₹ 0.00	₹ 16,666.67
Fencing Contractor	₹ 3,333.33	₹ 0.00	₹ 3,333.33
Masonry contractor	₹ 168,000.00	₹ 0.00	₹ 168,000.00
General contractor	₹ 400,000.00	₹ 0.00	₹ 400,000.00

NEW TASKS : AUTO SCHEDULED

1.6 CASH FLOW

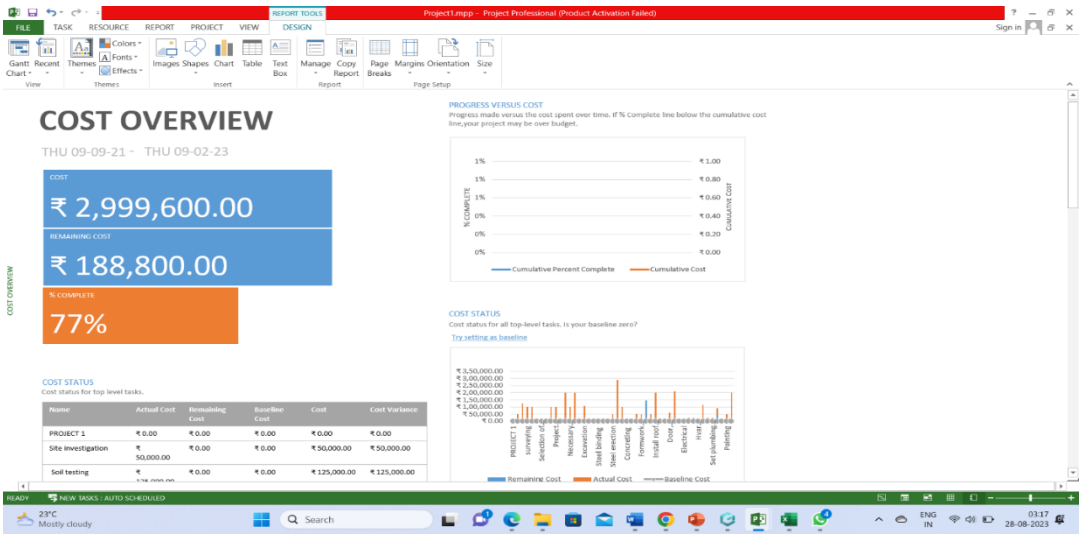
CASH FLOW

Actual Cost	Baseline Cost	Remaining Cost	Cost Variance
₹ 2,810,800.00	₹ 0.00	₹ 188,800.00	₹ 2,999,600.00

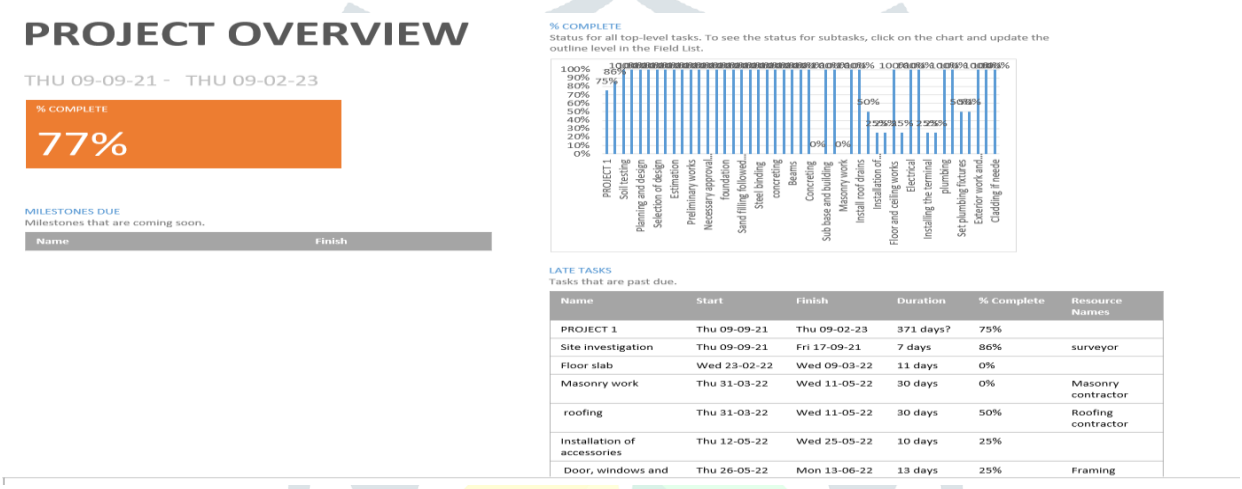


Name	Remaining Cost	Actual Cost	Cost	ACWP	BCWP	BCWS
PROJECT 1	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Site investigation	₹ 0.00	₹ 50,000.00	₹ 50,000.00	₹ 50,000.00	₹ 0.00	₹ 0.00
Soil testing	₹ 0.00	₹ 125,000.00	₹ 125,000.00	₹ 125,000.00	₹ 0.00	₹ 0.00
surveying	₹ 0.00	₹ 100,000.00	₹ 100,000.00	₹ 100,000.00	₹ 0.00	₹ 0.00
Planning and design	₹ 0.00	₹ 100,000.00	₹ 100,000.00	₹ 100,000.00	₹ 0.00	₹ 0.00
Selection of planning	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00

1.7 COST OVERVIEW



1.8 PROJECT OVERVIEW



Reports and visualizations generated using Microsoft Project provide insights into project analysis and management. The results section showcases task cost overviews, critical task analysis, resource cost overviews, cost overviews, cash flow projections, and project overviews.

6. CONCLUSION

In conclusion, this research paper underscores the transformative potential of Microsoft Project in construction project management. Accurate scheduling, efficient resource allocation, and precise cost estimation contribute to successful project outcomes. The research emphasizes the importance of effective project scheduling and estimation in construction projects and acknowledges Microsoft Project's role in enhancing project management practices.

Key Findings and Insights:

Our research revealed that Microsoft Project significantly enhances project management processes in construction. It empowers project managers to meticulously plan tasks, allocate resources efficiently, and visualize project timelines through dynamic Gantt charts. The software's critical path analysis aids in identifying mission-critical tasks, ensuring on-time project delivery. Stakeholders highlighted improved

communication, reduced ambiguity, and better decision-making as direct outcomes of using Microsoft Project.

Importance of Effective Scheduling and Estimation:

The study underscores the pivotal role of accurate scheduling and estimation in successful construction projects. These processes determine project feasibility, resource allocation, and overall project trajectory. Microsoft Project emerges as a vital tool that streamlines these tasks, leading to improved project outcomes and stakeholder satisfaction.

Implications and Future Directions:

The findings have far-reaching implications for the construction industry. Implementing Microsoft Project demands a balance between mastering the software's intricacies and fostering a collaborative environment for stakeholders. As the industry evolves, further research could delve into the integration of real-time data feeds and cloud-based solutions to address limitations related to data accuracy and accessibility.

Final Thoughts:

In conclusion, the study highlights the transformative potential of Microsoft Project in construction project management. As projects become more complex and time-sensitive, harnessing the capabilities of this software becomes paramount. Effective scheduling and estimation are not mere technicalities; they are the bedrock upon which successful construction projects are built. With Microsoft Project, project managers can navigate challenges with confidence, steering projects toward successful completion and exceeding stakeholders' expectations.

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