

“The role of time, cost and quality in project management.”

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Abstract - Project management has emerged as a field of practice that is being used increasingly by organizations to achieve their business goals. Since the concept 'survival of the fittest' best describes today's business environment, good project management performance assessment tools are needed in order to make an organization 'the best of the best'. Project completion within time and cost, while maintaining quality is very important for the success of projects. Therefore, the purpose of this paper is to analyse the key variables of time, cost and quality and determine their roles in project management performance. A problem was constructed together with different scenarios to analyse the relations of these variables according to conditions given. With the help of Microsoft Project, the authors were able to narrow down the findings in all scenarios and summarize the patterns of strategies based on these variables to make an appropriate decision on planning the project.

Key Words: Project Management, project success, project performance, Cost.

1.INTRODUCTION

A project is a temporary endeavor undertaken to create a unique product, service or result. One of the biggest problems of project managers is to harmonize project cost, time and quality. It is difficult to achieve this because cost, time and quality are related in the way that changes of one influence on the other two. Project managers typically try to balance the three when meeting project objectives, but they may make trade-offs among the three during project implementation in order to meet objectives and satisfy customers. There are many examples in practice that projects were delivered on time and within budget but failed to meet the expectations of end users. Every project has an anticipated level of quality for the project deliverables. The details and specifications set out by the customer determine what the expected level of quality is deliverer. The implementation activities selected by some construction companies in developing nations around the world have been marred by flaws and occasionally failures because of the rise in cost or the low level of quality, as determined by the field survey, in addition to the difficulty of work methods and the many different types of waste of construction materials, which will lead to the inadequate quantity of experience in this field despite its growing

influence. As a result, the research aims to develop and apply general project planning mechanisms along with the development of detailed plans to control the time factor in addition to controlling the project's cost and the caliber of the works that are executed.

1.1 PROJECT SUCCESS

There is a vast literature covering the factors that influence project success. It suggests that project success depends on effective multidisciplinary efforts, involving teams of people and support organizations interacting in a highly complex, intricate, and sometimes even chaotic way. It improves both the speed and success of new product development (NPD) projects by combining members from multiple functional specialties to bring greater diversity of view point and richer sources of information for the many decisions inherent in the development process. Some engineers regard their projects as a success simply because of the good relation among the stakeholders, even though all of the project cost, time and quality are performed below the project baselines. In this study, we narrow down the key variables relating to the success of project performances to be time, cost and quality. Since they are the most standard measures used

1.2 TIME:

In project management, time is an intangible resource that is unique because it is absolutely finite and time availability of a project is defined as the availability of time needed to do a job assigned. Project time over run indicates an extension of project completion time from the planned duration. According to project managers manage three areas relating to project time which involve maximizing construction speed, maximizing delivery speed and minimizing schedule growth. However, the project's completion time, sending it over budget, and damaging team morale. Usually, the longer it takes to identify project discrepancies, the more serious the potential damage is and the more complex and costly the corrective measures will be to the project.

1.3 COST:

From a mathematical point of view, it suggests that each activity has duration and corresponding cost attributes. It further emphasizes that the activity control increases with the shortening of the duration and the duration increases if we decrease the activity cost. In reality, most large, complex development projects experience substantial cost and schedule overruns. Usually, projects taking more time cost more money. In a rapidly growing construction market, the need to estimate the cost of quality in projects becomes a vital task seeing as the objective of achieving a product with a good quality is not only to meet the customer requirements, but also to do it at the lowest cost.

1.4 QUALITY:

While project management success focuses upon the project processes and the successful accomplishments of cost and time objectives, product success deals with the quality of the project's final product and the quality objectives of the project. They point out that successful commercialization of quality products requires due attention to the complete supply chain (both suppliers and distributors). However, high failure rates suggest that management's knowledge of the transformation process whereby ideas are turned into successful quality products is far from perfect, particularly for more innovative development projects. Although the ability to quickly introduce new products and adopt new processes has become an important way of competing, the introduction of successful products has become exceedingly complex and requires a wide variety of assets, resources, and capabilities.

2. LITERATURE REVIEW

- [1] **Prachi Ingle (2020)** In the study Schedule, cost, and quality are crucial performance areas that shouldn't be overlooked. Project management teams should concentrate on project activities, identify crucial tasks, and reach precise milestones. They receive guidance on how to improve cost-related areas by keeping an eye on cash flows and performing earned value analysis. The final path model in terms of quality. The project should conduct quality audits and prevent nonconformities for projects.
- [2] **H M A Asfoor (2021)** By utilizing contemporary computer technologies like linear programming, which can be explained in greater detail to investors or stockholders to make the central plan more clearly reduced the project fulfilment period and the critical activities of time pressure technology programme at the lowest cost to control both time and cost, excellent results have been achieved in terms of both time and cost management.
- [3] **Pravin Namdev Pharne (2022)** The goal of this study was to comprehend the role of planning, monitoring, and

controlling in the development and timely completion of a construction project, as well as the necessity and effectiveness of project management software like Primavera P6. By using the Primavera software, construction project delays are reduced to a minimum. Primavera is used to manage resources and materials more effectively. The study served as a reference for understanding how construction projects were progressing and for identifying the particular issues that cropped up along the way. As a result, the study provides information about project management effectiveness and cost reduction. The findings of this study demonstrate the shortcomings of the current project management methodology. A new that is effective and economical.

- [4] **Dušan Aničić (2019)** Due to the influence of different factors affecting project implementation costs and time, as well as the income from specific project implementation, it primarily refers to the financial part of project construction. Numerous methods for choosing projects have been developed by economic theory and practise, including financial, marketing, logical, etc. The cost-benefit analysis, evaluation models, and various economic models based on cash flow analysis are just a few of the mathematical models and benefit measurement techniques used in PMI standards. With net present value, profitability index, and internal return rate being the most prevalent in practise, investment project profitability evaluation is frequently carried out using static methods (which do not evaluate time value of money) and dynamic methods.
- [5] **Žaneta Ljevo (2020)** The research findings in Bosnia and Herzegovina are the quality models of the project management process of the phases throughout the project life cycle (construction projects). They are simple to use in similar environments because we are aware that not all quality models will be effective in all circumstances. However, in the case studies, interviews were conducted face-to-face with participants of that project phase. The survey covered investor, contractor/subcontractor, designer, project manager, and consultant like different management perspectives included in the project management process. Planning and control are extremely simple to accomplish when using some of the project management software packages.

3 MANAGING CONSTRUCTION PROJECTS SUCCESSFULLY

Implementing the design specifications will enable the project to succeed and fulfil the goal it was intended to achieve.

By making available all sources for project management in this integration between these elements and suitable use to

complete any section with the best possible use of time when implementing, project management must reach the equilibrium between the highly efficient with lower cost in the shortest time. Project preferences must also be recognized.

Start creating various work environments for employees so they can form an efficient work team. This can be done by: Care should be taken in the leader staff selection at the top of management administration. Creating a workplace where a welcoming atmosphere predominates

Coordination meetings between project participants, including implementers and designers, as well as supervision and follow-up are held in order to change designs, address issues and challenges, quickly implement alternatives, and cut down on time.

Delivering all the materials and tools required for the project's establishment and success in accordance with pre-planned schedules to minimize time and money wasted. This can be achieved by selecting raw material suppliers nearby the worksite with simple processing capabilities. The projects whose implementation utilised project management. It was noted that time is regarded as the project's most important factor, followed by quality and cost, and that the three must be balanced. The following drawbacks frequently show up because construction projects place so much emphasis on timing:

- a. Because of speed, poor implementation affects the quality level.
- b. There will be an increase in the amount of waste in construction materials.
- c. Using up employees' energy by making them work overtime, which has a negative impact on the level of productivity and output.

3.1 CONCEPTUAL PLAN

The integration of all the major production and implementation components is a requirement for achieving a standard central plan for the expedited implementation of the construction project. Because of the activities' shorter duration, consideration of the factors affecting cost and quality needed for the project, and full compliance with the standards of the designer and the stakeholders at the same time, the main goal of the production process is stability.

The project's central concern, along with the fact that these variables, such as raw materials, instruments, equipment types, or work activities, can be understood, adjusted, or fixed, has stimulated the project's implementation. Possible suggestions for project planning in this study include an expedited implementation process (see fig).

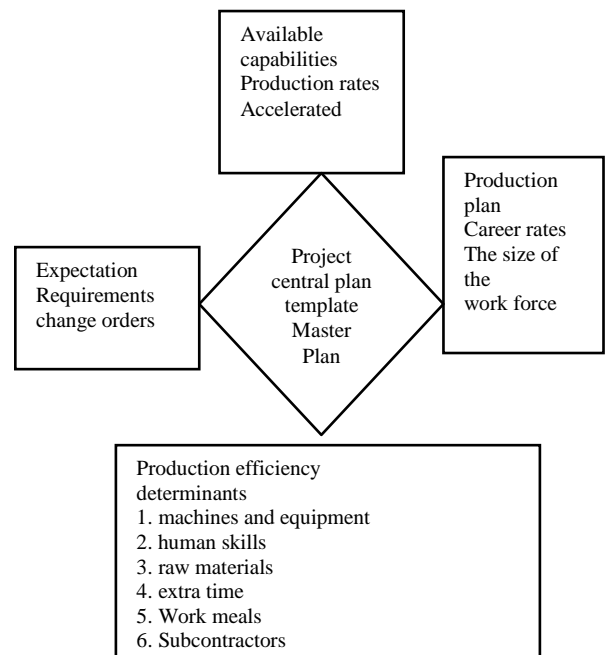


Fig 3.1: The main strategy for the quick project implementation.

The company's management will have opportunities to address needs that depend on the following variables] when using this model in general planning.

1. The size of the labour force has changed.
2. Benefit from overtime.
3. Include any meals required for the job.
4. Coping with potential difficulties.
5. Using contractors to split the workload.
6. Preparing for the possibility that the employer may issue change orders.
7. Anticipate price variations to meet needs.
8. Make the most of upcoming technological advancements.

The building construction project has 31 components and a 245-day overall duration. The following time and financial resources have been set aside by the company for the project during the study:

1. Under normal circumstances, the project will end up costing Rs. 10,800,000.00.
2. Under normal circumstances, the project will be completed in 365 days.

TABLE 1: DETAILS OF ACTIVITIES / DURATION AND ACTIVITIES PREDECESSOR

Activity	Description	Duration (Weeks)	Predecessor(s)
1	Preliminaries	3	
2	Earthwork (cut & Filling)	4	
3	External RCC retaining wall	2	
4	Pilling works	2	
5	RCC Pile Cap2	2	4
6	Stump	2	3,4
7	Ground beam	2	5
8	Ground floor slab work	1	6,7
9	RCC Column	1	7
10	Suspended RCC Beams, Slab, stairs	2	7
11	Steel structure work	2	8,9
12	Roofing work	2	10
13	Wall	4	11,12
14	Wall finishing	2	13
15	Floor finishing	1	13
16	Door & window	1	13
17	Drainage surrounding building	3	12
18	Apron & RCC Ramp work	2	17
19	Sanitary & Plumbing	2	17
20	Sanitary & plumbing work finishing	2	19
21	Painting	2	14,15
22	Electrical & telephone installation	8	12
23	Fire fighting Installing	8	12
24	Landscaping	1	7
25	Weight bridge office	8	7
26	T NB Sub station	10	7
27	Refuse chamber	4	7

28	External Drainage work	7	7
29	Road work	4	17
30	Main Entrance gate	7	29
31	Site Clearing work	1	30

The three possibilities are listed as follows:

Scenario 1: Despite the project's limited resource availability, the deadline for completion is set.

Scenario 2: The Company wants to shorten the construction period while imposing the lowest possible cost.

Scenario 3: The Company wants to maintain quality while shortening the construction period.

Microsoft Office Project will be used to analyze and model the three scenarios in this project. Additionally, a manual analysis is also completed in order to validate the results. A discussion and conclusion that are pertinent to the project management variables described in the preceding introduction can be drawn from the analysis' findings.

4. METHODOLOGY

This section describes the programmes and resources being used for this project to analyse the three scenarios as well as the procedures and terminology used to produce the analysis's results. Microsoft Office Project will be used in this project to create a Gantt Chart schedule and analyse the critical path with regard to the scenarios listed in the previous introduction. Although third-party add-ons for the critical chain and event chain methodologies are available, the application only generates critical path schedules. Schedules can be resource levelled, and a Gantt chart is used to show chains. Microsoft Office Project can also distinguish between various user classes.

Different levels of access to projects, views, and other data may be available to these various classes of users. Custom data is stored in an enterprise global that is accessible to all users and includes calendars, views, tables, filters, and fields. The dates of the critical path tasks must be transferred if an earlier completion date for the project is required. The process of reducing a project's overall duration without altering the relationships between tasks is also referred to as "crashing" a project. Adding more resources to the task is typically necessary to prevent a project crash.

5. RESULT AND ANALYSIS

This section explains the Microsoft Project results in light of the three analyses that were taken into account. All three cases are presumed to have started on January 5, 2021.

- A. Scenario 1: The project Duration is Fixed and Material resources are limited. Due to a lack of resources, the project's duration must be fixed, and Saturdays and Sundays are not counted as working days. The completion date is January 6, 2022, and the overall timeline is 365 days.
- B. Scenario 2: Reduced Project Time with Minimum Costs Implied. The project's duration must be shortened, and a minimum cost requirement is imposed. Saturdays and Sundays are designated as the project's general working hours. The duration remains 175 days, but the completion date is moved up to September 27, 2021.
- C. Scenario 3: Keeping the Project's Quality While Shortening the Project's Duration. While maintaining quality, the project's duration must be shortened. The optimistic, expected, and pessimistic durations as well as duration weights are defined for each task using the PERT Analysis. The duration weights are assumed to be 1, 4, and 1, respectively, for the optimistic, expected, and pessimistic cases (the weight values must sum to 6). The pessimistic duration is 7 days later, the optimistic duration is 7 days earlier (for tasks whose durations are already 7 days, their optimistic durations are assumed to stick to 7 days), and the expected duration is the specified number of days as in Table I. The generated durations for these cases are displayed in Table ii.

TABLE 2: TYPE OF DURATION GENERATED

Types of Duration	Days
Optimistic	275
Expected	365

After using Microsoft Project to analyze this situation, the results show that our project's overall timeline would be 175 days if we did not count Saturdays and Sundays as working days. The duration of all activities and predecessors as organized in Table I currently not only satisfies the timeline but also outperforms expectations by being cut by a period of 70 days as compared to the scheduled target of project completion, which is 245 days. The activities and durations in Table I shouldn't change in this scenario because the project time needs to be fixed and resources are scarce. The results for this scenario simply show the durations and activities that are established in Table I.

6. CONCLUSIONS

1. The project's overall planning It appears that the value of developing levels of planning is commensurate with the characteristics of rapid implementation tools and includes specific plans to oversee all of these procedures while supporting and taking into account the factors of time, cost, and quality.
2. The development of the central plan model's goals are to improve the project's entire regulatory process by putting the project's goals, resources, production rates, and necessary skillfulness into the schedule applying in a way that ensures the project's ability to be completed practically.
3. This plan aims to achieve the highest possible level of workability by defining an element of a special system to control the production processes in the project and creating a model for procedures that determine the administration's scope, measure performance, compare it to standards and targets, identify variations, and take appropriate and ready corrective actions.
4. By applying contemporary computer technologies, such as linear programming, to the control of time and cost, excellent results have been achieved. Linear programming can be explained in greater detail to investors or stockholders to make the central plan more clearly reduce the project completion period and the critical activities of time pressure technology programme at the lowest cost to control both time and cost.
5. The availability of cash flow from the employer is one of the most crucial factors because it is essential to pay all project workers, material suppliers, equipment contractors, and others on time and without delay in order to maintain the flow of work within the timetable.
6. The paper led to the adoption of the accelerated implementation process in critical activities of circumstances that demand the project be completed within a specific short period of time, with the need to provide experienced and effective employees for this type of project, with the commitment of the construction companies to submit detailed plans and the central plan for the implementation of the project to the employer within the suggestions for the purpose of developing the In order to reduce planning time and costs, government agencies, private construction firms, and technical department staff may be required to use modern software and technology.

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