

Project Execution Planning for High-rise Construction Project

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ABSTRACT – The project execution planning sets out the strategy for managing the project, describes the policies, procedures and priorities that will be adopted. Project Execution Planning is more than a chart showing timescales. It is a process describing how, when and by whom a specific target or set of goal is to be achieved. It is recognize that the impact identification of the constraints in project execution planning is necessary. Impact identification of the constraints helps in developing effective & efficient execution planning with appropriate construction methods. It helps to project managers for taking better decision and achieve higher performance in construction projects. In this research paper, Impact analysis for various project constraints is carried out on High-rise residential project in Mumbai region with detailed information. Project constraints need to be well planned & monitor during project planning & execution stage otherwise it leads to delay in project work progress.

Keywords – Project constraints, Impact Analysis, Project execution planning

I. INTRODUCTION

The project execution planning sets out the strategy for managing the project, describes the policies, procedures and priorities that will be adopted. It may also define strategies in relation to items outside of the scope of the main contract (as the client's overall project might include multiple contracts for the supply of goods and services, both from external organizations and from within the client organization itself such as operational and maintenance contracts, the supply of equipment and so on). Project Execution Planning creates a safe, productive, collaborative and highly motivated work culture in construction projects. In large scale development Project execution planning acts as necessary control to accomplish the following factors:

- Plan and design the new facilities to maximize productive efficiencies.
- Ensure that environment, health and security requirements are fully incorporated and properly implemented into the project's design and construction.
- Update the safety basis documentation & supervision to minimize accidents on site.
- Optimize space usage for day to day ongoing activities on site e.g. Traffic Control, Storage & stacking area, Labour Hutments, Plant & Equipment areas etc.

II. LITERATURE SURVEY

Recent research has shown that development of project execution planning is the best control process for completing projects within stipulated time frame. Nevertheless, many authors of textbooks on construction project management have discussed this vital topic. Arumuga Raj A.P (2012) presented that, "Today's global, fast-track projects require engineering, procurement, and construction contractors to successfully manage and perform projects involving concurrent participation of multiple design centres worldwide, while still keeping a handle on project schedule and costs. They also have the need to preserve their "best practice" design information for re use on the future projects, to increase productivity and preserve their corporate knowledge. The results of the engineering execution plan have demonstrate the effectiveness to improve the optimize method of engineering execution to use multiple design centres". Hesham M. Osman (2014) analyzed that, "The efficient layout planning of a construction site is a fundamental task to any project undertaking. This task usually consists of identifying the temporary facilities needed to support construction operations, determining their size and shape, and positioning them in the unoccupied areas within the site boundaries".

Project Execution is typically the part of the lifecycle of a project when the majority of the actual work to produce the product is performed and the majority of the Project Budget is expended. The purpose of Manage Project Execution is to manage every aspect of the Project Plan as work is being done to make certain the project is a success.

III. SCOPE OF STUDY

The project execution planning highlights the critical drivers and accordingly helps management focus on a clear path forward to support the project effort. It is a tool to be referred to for valuable decision making and communication to assist the project management team in implementing the planned strategies & policies.

A Project Execution Plan will typically comprise descriptions of the following sets of information:

- a. Overall Description of the Project – Scope and Summary Design Basis
- b. Project Organization and Responsibilities
- c. Project Execution Locations
- d. Listing of Major Contractors and Suppliers (as available)
- e. Equipment Certification and Validation Processes (as applies)
- f. Quality Assurance
- g. Risk Assessment and Mitigation
- h. Health, Safety & Environment
- i. Management of Variation Orders
- j. Correspondence and Document Control
- k. Project Reporting, Meetings
- l. Schedule and Milestones
- m. Critical Equipment Ordering
- n. Cost Control and Cash Management
- o. Project Deliverables and Project Measurement
- p. Regulatory Issues

IV. OBJECTIVES OF STUDY

The aim of this project is to develop the project execution plan for major construction project because various team members & departments are work together in construction industry. Some of the major projects have received less attention, relationships with coordination methods and performance in terms of proper project execution planning are not known. The objectives of this project are to identify, analyzed and define the proper development of project execution plan for major construction projects. The above study can have following five main objectives.

1. To study concept of Project Execution Planning for construction project.
2. Case study on high-rise construction of buildings for project execution planning.
3. Data survey & analysis of constraints to identify its impact on execution planning.
4. To give effective recommendation & suggestions on Project Execution Planning.

V. METHODOLOGY

A two-stage research methodology was adopted: First, detailed literature survey and interviews with site officials such as General managers, site engineers, project managers on the high-rise construction site were conducted to identify factors affecting the success of high-rise construction project. Second, a Questionnaire survey methodology was adopted to evaluate and rate these factors using Impact Rating Scale method. The Impact rating survey was conducted on the high-rise construction site with General Managers, site engineers, project managers. The methodology adopted to achieve objectives of project mainly involves following steps.

1. Literature survey was carried out to describe, summarize, evaluate, clarify or integrate the content of information regarding Project Execution Planning. It is the first step in this project. In this step, the concept of project execution planning, various Phases & Elements of project execution planning are involved.
2. For the effective execution planning above study is involve on live high-rise construction project. The questionnaire survey at proposed construction site is carried out for analyzing the factors affecting on success of execution planning. Questionnaire survey is carried out from various site management officials by using “Impact Rating Scale” & outputs are plotted in tabular as well as in graph formats.
3. Result analysis is carrying out through current data and from the questionnaire survey information.

VI. CASE STUDY DETAILS

The high-rise building construction project in Mumbai Region is selected for study purpose. Then the interviews are arranged with Project team at site. The existing execution planning of site is analyzed for identification of impact & their implementation on impact. The data collection is done from the designed questionnaire for impact rating analysis. After that

the charts are prepare for the simplicity in observation, which method or which execution strategy is most effective in high-rise construction project. The table I shows the high-rise building details

Project comprises of 6 Residential towers with podium parking and total building height is approx. 268m. Out of 6 towers 3 towers will undergo construction in phase 1 then the remaining 3 towers will undergo construction in phase 2. This project occupied a 17.2 acre land in the heart of city. There are 6 Nos. skyscrapers of 83 floors (4 Basements+ 7 Parking+ 72 typical floors) & 6 acre garden with world class amenities.

Table I: Case Study: High-rise Construction Project Details

Scope of Work	Tower 1 <i>Rosewood</i>	Tower 2 <i>Pinewood</i>	Tower 3 <i>Oakwood</i>	Tower 4 <i>Redwood</i>	Tower 5 <i>Maple</i>	Tower 6 <i>Cedar</i>
Total BUA (Sq.ft)	10,96,657.2	10,96,657.2	10,96,657.2	11,35,912	11,35,912	11,35,912
Concrete (Cu.M)	61,750	61,750	61,750	62,947	62,947	62,947
Reinforcement (MT)	10,780	10,780	10,780	11,989	11,989	11,989
Structural (MT)	-	-	-	650	650	650
Shuttering (Sq.M)	3,29,000	3,29,000	3,29,000	3,90,000	3,90,000	3,90,000
Duration of Work (Months)	42	42	42	45	45	45
Govt. Car Parking Area (GCP) Sq.M	2,45,022 Sq.M (Level Occupied: B4, B3, B2, B1, P0, & P1)					
Residential Car Parking Area (GCP) Sq.M	1,95,750 Sq.M (Level Occupied: P2, P3, P4, P5, & P6)					

VII. DATA SURVEY & ANALYSIS

It is recognize that the impact identification of the constraints in project execution planning is necessary. Impact identification of the constraints helps in developing effective & efficient execution planning with appropriate construction methods. It helps to project managers for taking better decision and achieve higher performance in construction projects. In this study, the detailed case study carried out on live high-rise construction project in Mumbai Region. During this case study, various constraints & implementation on that particular constraint are analyzed for identification of impact. After that they are classified into five categories based on collected data. They are:

- (i) Legal constraints,
- (ii) Economic constraints,
- (iii) Technical constraints,
- (iv) Environmental constraints, and
- (v) Social constraints.

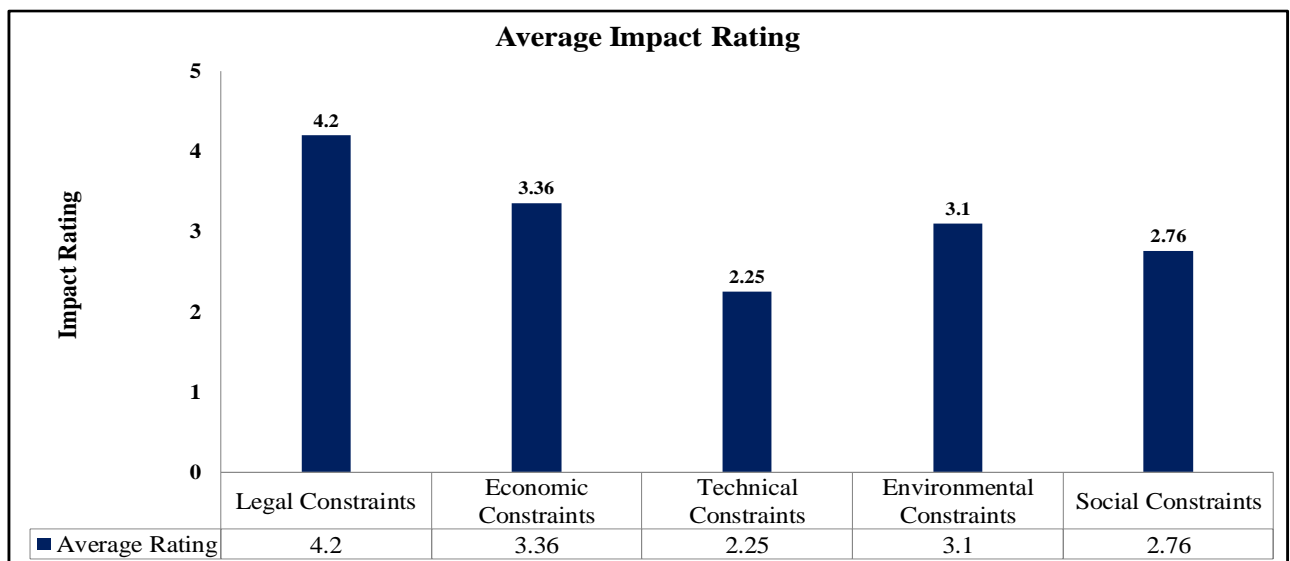
For identifying the impact, follow-up interviews & questionnaire survey were conducted with mentioned Project managers, site managers & engineers to elaborate the content of the data collected. For identification of impact, questionnaire papers were circulated to site project management team & the respondents were asked to explain the effect and level of impact, using a rating scale of 1-5 to the constraints on project execution planning performance and procedure. The interviews are recorded and the content of the communications were analyzed. 20 respondent rating is selected for analyzing the impact rating of each constraint. The nature of the constraints is elaborated and their impact on the site is analyzed as follows:

Table No. 1: Impact rating of Questionnaire Survey [(i) & (ii)]

(i)	No. of Respondents (R1 to R10)									
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Legal Constraints	3.8	4	5	4	3.8	4	4	4.6	5	4.6
Economic Constraints	3	4	3	2	3	3	3	5	3	3.2
Technical Constraints	2.2	2	2	1	3	1	2	2	3	3
Environmental Constraints	3.6	3	4	3	2.4	2	3	4	4	3
Social Constraints	3	3	3	2	1	3	3	3	3	3.2

(ii)	No. of Respondents (R11 to R20)									
	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20
Legal Constraints	3.8	4	4.2	4.2	4	4.6	4.2	4.2	3.8	4.2
Economic Constraints	3.6	3	3.6	3.2	3.8	3.4	3.6	3.6	3	4.2
Technical Constraints	3	2.2	3.2	3	2	2	1.4	2.4	2.4	2.2
Environmental Constraints	3.2	3	2.4	3	3.2	3.2	3	2.4	3	3.6
Social Constraints	2.4	3	2.8	3.8	2.4	2.8	2.2	3.4	2.8	2.4

Table No. 2: Overall Average Impact rating of Questionnaire Survey



VIII. RESULT

The legal constraint has the strongest impact on the construction project, economic and environmental constraints both ranked second among the constraints. The social constraint has a modest impact comparing with other constraints. Technical constraint has the lowest impact on the construction project. The results show that the legal, environmental and the economic constraints have the strongest impacts on the project. It is suggested that time and enough resources be allotted to these constraints in the planning stage of the project. The social constraint has special local and traditional features. Although not as important as the other constraints, it could not be ignored. If the social constraints could not be handled well, the project could not be proceeding well, and at project evolving stage, this may even lead to discontinuation of the project.

IX. CONCLUSION

1. From initiation to closure, assumptions and constraints set the stage for project execution planning and set out the strategy for managing a project.
2. As the project is planned, assumptions and constraints will be used to define and shape tasks, schedules, resource assignments and budget allocations. As such, each is used to manage an otherwise uncertain future, laying out a roadmap for how the project will proceed.

3. In initiation phase, it is need to analyzed project assumptions and identified constraints.
4. Proper execution planning set scope, cost and schedule baselines for progress measurement and control.
5. The identification of the constraints helps project managers not only understand the characteristics of the constraints, but also predict the time and stage that the constraints may be encountered.
6. The economic constraints, legal constraints and the environmental constraints are mainly appeared in the planning and definition stage. It affects the proposal and design of the project.
7. The technical constraints and social constraints are expected to be encountered during the project implementation and maintenance period.
8. A good prediction of the constraints helps make good project execution planning and resources allocation. The study has revealed the factors that construction industry faces as constraints in its endeavor to effectively deliver on projects in terms of time, costs, specifications and clients expectations.
9. Selection of appropriate construction methods, equipment's & resources helps to maintain quality & cash flow of work.

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