**CHAPTER ONE፡ STRATEGIC CONSTRUCTION PROJECT MANAGEMENT**

**INTRODUCTION: CONSTRUCTION PROJECT**

The existing construction projects are full of financial and managerial problems. Most projects do not complete within the scheduled time and budgeted cost. For successful accomplishment of construction projects, there should be sufficient amount of resources and technical as well as managerial know how. Construction project is a mission, undertaken to create a unique facility, product or service within the specified scope, quality, time, and cost In practice, however, some construction projects encounter problems and challenges on cost or completion time planning. hardly few projects get completed on time and within budget since construction projects are exposed to uncertain environments because of such factors as construction complexity; presence of various interest groups such as the project owners, end users, consultants, contractors, financiers; materials, equipment, project funding; and climatic environment, so the projects not completed on time and budget therefore, the construction disputes will be raise between the contracting parties.

Construction projects are time and cost bound. Generally, construction projects objectives are stated in terms of project completion time, budgeted cost and stipulated quality specifications. Construction projects consume a huge amount of resources. One of the major resources and the resource by which to own other is cash, so managing and utilizing cash flow efficiently is essential and to perform this, firms should prepare cash flow forecast. Cash flow forecast is necessary to understand projects cash demand with respect to time, the time when projects demand external financial support, and to plan in advance from where to get it. Contractors in Ethiopia, who are the main actors of construction projects, have low financial capacity. In our study, projects in Ethiopia are full of financial constraints. To solve this contractors try to finance projects from different sources. Generally, there are two sources of finance for construction firms that are internal (*depreciation allowance, accounts payable, wages payable, retained earnings,* *and accrued taxes*) and external (*term loan, equipment loan, construction* *loan, overdraft facility, and bridge financing*). The external sources of finance need the involvement of the third party like banks. *(Ancliffe,* 1978)Projects differ from each other in one or more influencing factors such as clients and contractors, quality specifications, resources employed, responsibilities delegated and the project environments. But projects do share several characteristics with ongoing activities. They have budget and relationships among their activities or resources or stakeholders or all integrative to attend.

Most organizations often inclined to use projects as their main handling mechanism of their business, i.e. management by projects. Projects are understood with the following four major identifying characteristics.

 **Unique,** involving a degree of innovative characteristics depending on the type of projects; and hence employ Process-Orientation, Management of Uncertainty & Changes and flexible approach to its management;

**Temporary,** for it has a definite beginning and ending constrained by finance and other resources and requirements; and hence, Finite and Constrained

**A component of a certain business or program**, requiring predetermined goals and courses of actions; and he

nce Performance- Oriented and Constrained; and

**Complex** (if applicable), associated with size, variety, handling difficulty, importance, urgency, changes or a combination of two or more of them.

In general, construction works are time and cost bound and employs huge resources of labor, material, and equipments. They involve heavy investments, of million to billion of birr. They require a high level of technology and need an effective management of these resources. The execution of major construction capital work is undertaken by projecting them, that is, by organizing them in to one or more construction projects for implementation.

Construction projects have one or more of the following characteristics associated with them:

* Time and cost is bounded
* Details of works are not precisely defined.
* Scope of work gets modified during execution
* Nature of work varies from job to job
* Place of works are spread out
* Resource requirements and organization of works differ with each task
* Investments involved are large and the decisions entail risks

 **STRATEGIC MANAGEMENT**

Strategic management is defined as the art and science of formulating, implementing, and evaluating cross-functional decisions that enable the organization to achieve its objectives." Generally, strategic management is not only related to a single specialization but covers cross-functional or overall organization.

* Strategic management is a comprehensive area that covers almost all the functional areas of the organization. It is an umbrella concept of management that comprises all such functional areas as marketing, finance & account, human resource, and production & operation into a top level management discipline. Therefore, strategic management has an importance in the organizational success and failure than any specific functional areas.
* Strategic management deals with organizational level and top level issues whereas functional or operational level management deals with the specific areas of the business.
* Top-level managers such as Chairman, Managing Director, and corporate level planners involve more in strategic management process.
* Strategic management relates to setting vision, mission, objectives, and strategies that can be the guideline to design functional strategies in other functional areas
* Therefore, it is top-level management that paves the way for other functional or operational management in an organization.

In construction, all projects are constraint bound: a project needs to be finished within a given time period, below a specific budget and to a given quality and standard. Thus, for the project to be realized and labeled as success, it has got to overcome the constraints. The best way construction managers prepare themselves against these constraints is to prepare a thorough plan for the execution of the project.

A plan prepared well before the commencement of construction is instrumental in formulating directions, coordinating functions, setting targets, forecasting resources, budgeting costs, controlling performance and motivating people. On the other hand, not properly setting out the plan in the early phases of a project may have far reaching consequences in crippling the project or its product.

*Planning* is preparation of alternatives for achieving specified objectives. Items, which need to be adequately planned, include:

* The identification of specific activities of work required and the inter – relationships b/n those items (precedence relationships)
* The proper sequencing of the specific activities of work so as to complete the project in the optimum amount of time.
* The time of delivery of materials and installed equipment.
* The types, quantities, and duration of construction plant and equipment
* The classification and numbers of workers needed and the periods of time they will be need
* The amount and timing of financial assistance that is needed.

Therefore *Construction planning* is a fundamental and challenging activity in the management and execution of construction projects. It involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks, and the identification of any interactions among the different work tasks.

* 1. **Construction Project Planning Processes**

Traditional scheduling procedures emphasize the maintenance of task precedence’s (resulting in *critical path scheduling* procedures) or efficient use of resources over time (resulting in *job shop scheduling* procedures). Finally, most complex projects require consideration of cost and scheduling over time, so that planning, monitoring and record keeping must consider both dimensions. In these cases, the integration of schedule and budget information is a major concern.

The planning process which, under normal circumstances, starts with the client providing the project’s terms of reference produces various plans to be used for the proper execution of the project. Table 2.1 below provides that the major project inputs, processes and outputs of project planning in each phases of the project life time/ life cycle.

|  |  |  |  |
| --- | --- | --- | --- |
| **Concept** | **Design** | **Implementation** | **Commission** |
| **Inputs** |
| Problem or opportunity, project brief, project charter | Approval to go ahead with design and development | Approval to implement project | Commissioning plan, notification of completion |
| **Processes** |
| Feasibility study | Design product, develop detailed program: WBS, CPM, budget | Solicit tender and award contracts, administer contracts, make the product/solve problem | Start-up and test the product. produce as built drawings, compile knowledge learnt |
| **Outputs** |
| Feasibility study, Project proposal, Execution strategy | Baseline plan, design drawings and specifications | Completed project output | Project closeout report |

**Table 2.1: Project inputs, processes and outputs throughout the life cycle**

In developing a construction plan, it is common to adopt a primary emphasis on either cost control or on schedule control as illustrated in Fig. 2.1. Some projects are primarily divided into expense categories with associated costs. In these cases, construction planning is cost or expense oriented. Within the categories of expenditure, a distinction is made between costs incurred directly in the performance of an activity and indirectly for the accomplishment of the project. For example, **borrowing expenses for project financing and overhead items are commonly treated as indirect costs.** For other projects, scheduling of work activities over time is critical and is emphasized in the planning process. In this case, the planner insures that the proper precedence’s among activities are maintained and that efficient scheduling of the available resources prevails. So the below points listed are the project planning phase

1. **PROJECT PLANNING AT THE INITIATION PHASE**

Project initiation/concept phase aims at formulation of project scope and implementation strategy by project need identification, feasibility studies, investment appraisals, financial appraisal, statutory clearance, project definition; development of strategy for execution (project charter) and finally structuring of project organisation including selection of the project manager (if project is approved for implementation). End of initiation phase marks the client go-ahead/no-go decision. Project planning at the concept phase include:

* Problem or opportunity, project brief, project charter
* Feasibility study
* Project proposal and Execution strategy
1. ***Problem or opportunity, project brief, project charter***

A project initiation involves the process of formally recognizing that a new project exists [or that an existing project should continue to its next phase]. For the client, this is usually documented in the form of a *project charter*, also known as *terms of reference* (TOR) or *project mission.* Thus project charters are documents [usually supplied by clients] signifying the initiation of a project. A project charter is a tightly worded document outlining what is to be done and the boundaries of the project. For example, most part of charter from a client can be summarized as: to build an 80,000 seator stadium in Addis, to Olympic standards, to be completed six months before the next CAF African Nation’s Cup tournament, for X Million birr.

A project charter should generally include:

* Background to the project
* Key assumptions
* Business needs and other commercial needs
* Scope of work
* Identify key activities, budgets and milestones
* Comment on how the project is to be managed
1. **Feasibility study**

Techno-economic feasibility study is the next stage of the project development phase where the project scope is described, its size and methods determined; suitability of the site, the required natural resources and raw materials investigated and more accurate estimates made of process and non-process equipment, buildings, offsite facilities and other assets, their costs, etc. and the total feasibility of the proposal studied in-depth and cleared. Several institutes have published feasibility study guidelines. These institutions include UNIDO Geneva, the World Bank, Industrial Development Banks, and Planning Commission and so on. The important facets covered in project feasibility analysis are:

* **Market analysis**
* **Technical analysis**
* **Financial analysis**
* **Economic analysis**
* **Ecological analysis**
* **Market Analysis**

It is concerned primarily with aggregate demand and market share.

* **Technical Analysis:**

It seeks to determine whether the prerequisites for the successful commissioning of the project have been considered and reasonably good choices have been made with respect to location, size, process, and so on.

* **Financial Analysis**

It ascertains whether the proposed project will be financially viable in the sense of being able to meet the burden of servicing debt and whether the proposed project will satisfy the return expectations of those who provide the capital.

* **Economic Analysis:** It refers to cost benefit analysis which may often be different from its monetary costs and benefits.
* **Ecological Analysis**: It is particularly required for major projects which have significant ecological implications like power plants and irrigation schemes, and environmental-polluting industries.
1. **Project proposal and Execution strategy**

Information generally contained in the project proposal and executive strategies are as follows:

* Project background and description,
* Market and plant capacity,
* Materials and input,
* Location and sites,
* Project engineering and investment cost,
* Plant organization and overhead cost,
* Manpower,
* Implementation schedule, and
* Financial and economic evaluation.

Before deciding on investment, the total financial viability of the project is to be examined closely from the angles of profitability or rate of return (ROR), cash flow, and pay-back of investment.

Profitability, cash flow and repayment capacity are computed and analysed from the angle of: [4th year Construction Cost Engineering course]

* **Net present value** of cash flow (NPV),
* **Internal rate of return** (ROR),
* **Pay-back period** (PBP),
* **Simple rate of return** (SRR),
* **Break-even point** (BEP), and
* **Sensitivity analysis** (SA).
1. ***PROJECT PLANNING AT THE DESIGN PHASE***

Project planning at the design phase of the construction projects include:

* Approval to go ahead with design and development
* Design product, develop detailed program: WBS, CPM, budget
* Baseline plan, design drawings and specifications
1. **Approval to go ahead with design and development**

The feasibility report, if found acceptable, is followed up with investment appraisal. The purpose of appraisal is to conduct an objective assessment for investment decision.

Appraisal of feasibility stage enables a client to:

* decide on the project concept, time and costs;
* outline the approach needed to taking the project;
* appoint key persons like construction project manager or project coordinator, to act as his representatives;
* nominate specialist associated agencies such as the architect, designer and consultants, as per requirements.
1. **Design product, develop detailed program**

Planning and design phase aims at formulation of plan of actions for coordinating project activities on a time basis so as to achieve specified objectives.

In a typical construction project, planning at the design phase covers the following:

* Basic designs and drawings planning,
* Time planning,
* Cost planning and budgeting,
* Communications planning,
* Quality planning,
* Organisational planning,
* Risk management planning,
* Procurement planning, and
* Project development integrated plan.
1. **Baseline plan, design drawings and specifications**

Design, drawings and specifications define the construction scope of the project. Design forms the base for determining the functional fitness of the proposed facility, development of the drawings, estimation of cost of the project and the quantity of work, deciding construction time and forecasting cash-flow. During the design process, project information is collected, analysed, communicated and recorded for incorporation into the proposed scope of work. Designing follows three sequential processes as given under.

***Schematic Design Process:*** In the project feasibility stage, the designer architect evaluates the client's requirements. After discussing the alternatives with the client, the designer then prepares conceptual design brief for the client's approval,

***Design Development Process:*** This phase commences after approval of schematic designs. The emphasis in this phase shifts to details of constructability, system integration and aesthetics. Drawings in this phase include plan, elevation and section of the facility. It also includes the design of the external services.

***Drawings and Specifications Documentation Processes:*** This process includes preparation of the construction drawings and specifications based on approved designs. The construction drawings and specifications form part of the contracted bids.

1. **PROJECT PLANNING AT THE EXECUTING/*IMPLEMENTATION* PHASE**

Project planning at the implementation phase of the construction projects include:

* Approval to implement project
* Solicit tender and award contracts, administer contracts, make the product/solve problem
* Completed project output
1. **Approval to implement project**

At this stage all the construction or contract documents are finalized. The construction documents translate the owner’s needs so that the contractor can execute them correctly. They are the communication link among all parties in the project. The standardization of construction documents have evolved through time. Current practice is to bind all the narrative pieces into one document that accompanies the drawings to form the complete package. The package is divided into three general sections –bidding, contractual, and technical –each of which is made up of many subsections. The bid requirements, the agreement, technical specifications, drawings, addenda, and contract modifications all form part of the construction document.

1. **Solicit tender and award contracts, administer contracts, make the product/solve problem**

Some of the major activities undertaken at this stage are includes:

1. **Tendering**

At this stage contractors are invited to offer their best technical and financial offers as per the conditions of contract and specifications depicted in the tender documents.

1. **Award of Contract**

After the negotiations have been successful, the contract will be awarded to the most responsible bidder.

1. **Procurement of Materials**

This is first and preliminary to all construction works to procure the required materials at site. The engineer should know the type of materials and their quantities required for the work beforehand. The material either should be brought at site before starting the work or its regular supply is ensured.

1. **Construction and Supervision**

Construction and supervision both are complementary to each other. At this stage the construction work (project) is actually executed as per designs.

Execution involves establishing direction, communicating vision, motivating and inspiring people to produce desired results. On a project, particularly a larger project, the project manager is generally expected to be the project's leader, Leadership is not, however, limited to the project manager, it may be demonstrated by many different individuals at many different times during the project. Leadership must be demonstrated at all levels of the project (project leadership, technical leadership, team leadership).Project Control follows system concept:

* Overall scope change control
* Resource control
* Schedule control
* Cost control
* Quality control
* Risk response control
* Performance reporting

 Each organisational unit in a project, usually referred as Responsibility Centre, can be viewed as a sub-system. These sub-systems are highly interdependent and interactive. The performance objectives of sub-systems are stated in terms of parameters to be controlled, these parameters include time progress targets, resources productivity standards and work package standard costs and sales targets. Each sub-system accounts for its performance and reports the actual, and the deviation between the planned and the actual performance, to the monitor.

**iii, Completed project output**

The completion of the construction phase of the project includes certain follow-up actions necessary to ensure that the facility constructed functions satisfactorily. Project close up includes the following tasks:

* Administrative Close,
* Contract Closeout, and
* Lessons Learnt.

For proper closing of project:

* The post-completion maintenance is usually entrusted to an agency familiar with the construction. In most cases, the contractor responsible for construction is given this responsibility for one year after completion; and this aspect is included in the scope of work of the contractor.
* A proper record of the operating instructions and as-built drawings is maintained.
* The staff and workers necessary for operating and maintaining the facility are trained prior to its taking over.
* The site is cleared of the left-outs of the construction and unwanted materials.
* The client fully safeguards his interests prior to rending the completion certificate to the contractor, and also before making the final payments.

After completion by the contractor, it is the project team of the client that hands over the project to him. The team also prepares a project completion report which includes the scope and schedule of work, the important events, the contract executed, the addresses of the suppliers of materials and equipment, the equipment maintenance manual, the as-built drawings, the costs involved, the problems encountered during execution, the lessons learned and the minor defects noticed at the time of handing over.

1. **Project Planning at the *Commission* Phase**

The project planning Outputs in construction projects include:

* Commissioning plan, notification of completion
* Start-up and test the product, Produce as built drawings, compile knowledge learnt
* Project closeout report

This is a significant event for both the owner and the contractor.

* The acceptance of a completed project is customarily based on a final inspection performed by the owner’s representative and conditioned upon the correction of any deficiencies noted.
* If the facility or a portion thereof is substantially complete, the owner’s representative will execute a certificate of substantial completion for the work. The contractor may then require and receive a final progress payment. However, sufficient retain age is withhold to ensure the correction of any remaining deficiencies.
* Final payment and its acceptance by the contractor usually constitute a waiver of all claims by either the owner or contractor except for unsettled liens and claims and deficiencies falling under warranty provisions.

In most, if not all, construction projects the major processes under this stage are two: Commissioning and Acceptance.

***Commissioning*** is a process whereby the contractor makes sure that all installed electro – mechanical and other parts are operational or functional.

***Acceptances: -*** it includes:

* **Provisional Acceptance: -** This is avoids of acceptance the completed work on provisional basis for a period of one year.
* **Final Acceptance:-**At this stage the owner completely accepts the works executed in total and the retention money is released to the contractor.

**Changes and delays**

* The document directing a change is referred to as a change order.
* The majority of changes are due to design modifications initiated by the owner or designer and other causes are changed conditions.
* All change orders issued should contain an adjustment in contract time and price which is mutually acceptable to the contractor and owner.
* The three general categories of delay include those beyond the control of either the contractor or the owner “acts of God”, those under the control of the owner, and those under the control of the contractor.