Course Title

Project Engineering

Chapter 1

Introduction to Project and Project Management

Lecture 2 (week 2)

Classification of project, setting project goal and objective, project life cycle and phases, project cash flow.

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Learning Objective

The main objective of this lecture is to understand about:

- The classification of project.
- Setting project goal and objective.
- Project life cycle and phases.
- Project cash flow.

1.6 CLASSIFICATION OF PROJECT

Project is a unique, one – shot, goal directed, single entities designed towards the attainment of particular objectives. As every Project is different from one another, Projects can be classified based on several different criteria The classification of projects in project management varies according to a number of different factors such as complexity, source of capital, its content, those involved and its purpose. [1]

(a) According to the sponsorship (Who is the sponsor??)

(i) Customer sponsorship (sponsorship by an individual or a party)
(ii) Organization sponsorship (by firm or company)
(iii) Contractor sponsorship
(iv) Government Organization (sponsorship by department, ministry)
(v) International nongovernmental organization

(b) According to nature (Assigned to whom??)

(i) Individual

This sub class of project is one in which one individual (may be from within the organization or an independent person) is assigned with the responsibilities to complete it. [2]An INGO may identify individual from its organizational setup or independent person.

(ii) Staff

This sub class of project refers to assigning the project activities to a particular department. The research and development or engineering department within a company may be assigned to develop a project on new product development.

(iii) Special

This sub class is one in which an independent researcher is identified and entrusted with the responsibilities to conduct a research. This is similar to the individual project but will address a special issue. Example: national expert on security issue.

(iv) Complex

This sub class of project refers to one which is much larger in magnitude. It requires a bigger team to work out and resources are pooled from various resources. [2]Generally, functional or line and staff organization may not be effective and may require a matrix organizational structure.

(c) According to Source of Funding

(i) Indigenous Project

It is based on local thinking, technology, and environment and carried mostly by local people. It is mostly the blend of indigenous materials, technology and resources. It helps to preserve and protect tradition and culture and help to expand people friendly market for local products. [3]

(ii) Bilateral Project

All the projects which are carried on under the agreement of two countries are called bilateral projects. It involves both technology as well as capital. These projects are mostly funded through the financial resources of the donor. They could be in the form of grants. [4]These projects are governed by an agreement and memorandum of understanding between two governments. [2] Example: JICA, USAID, GTZ, KOICA etc.

(iii) Multilateral Project

All the projects which involves the funding of projects through the resources directed by the donors through multilateral agencies are called multilateral projects. [4] The financial resources are mobilized from the international financial institutions by way of credit or loans. Multilateral agencies might be European Union (EU), World Bank, Asian Development Bank (ADB), International Finance Corporation (IFC), World Bank etc.

(iv) Joint Venture Project

Any project undertaken to produce goods and services through collaboration of foreign and local investors is joint venture project. The ownership is proportionally shared in an agreed ratio. It is associated with transfers of technology, capital, or managerial skills. Due to globalization and advancement in information technology, joint venture business is becoming very popular. Examples: Maruti-Suzuki in India,

(d) According to the Orientation

(i) Product oriented

The focus is on the technical content of the project. The outcome of the project is a product which fulfills consumer needs. Examples – building, road, bridge etc.

(ii) Process oriented

No consideration is given to technical context. Examples- person focused training, repair of cement plant etc.

(e) According to the Scale and Size

(i) Mega Project

It is a big size complex project for 10 to 20 years involving huge investment and high technology, includes multiple public and private stakeholders and impact millions of people. These projects required environmental screening like EIA (Environmental Impact Assessment).

(ii) Major Project

It is smaller in size than mega project. The project requires relatively large amount of fund, large number of people and more activities to be performed is known as major project. [5]

(iii) Medium Project

It is small in size than major project. These project requires IEE (Initial Environment Examination).

(iv) Micro Project

It refers to a very small project for short duration. The financial resources involved is also very small.

(f) According to the Time and Speed

(i) Normal Project

In this category of projects, adequate time is allowed for Implementation of the project. All the phases in a project are allowed to take the time they should normally take. This type of project will require minimum capital cost and no sacrifice in terms of quality. [6]

(ii) Crash Project

Crashing is the process of shortening the project duration. When the project duration exceeds the normal completion time, crashing is encouraged. Saving in time is achieved by spending extra resources in terms of money, materials and manpower with compromising quality. Overlapping or shortening of project phases is encouraged.

1.7 SETTING PROJECT GOAL AND OBJECTIVE

Goals are purpose and mission for initiating a project which is set at the start of project. It is the specification of what is hoped to be achieved at the end of the project. It allows stakeholders to specify the target then work towards their own objectives. Goal should clearly state what the project will deliver. Goal setting takes time, energy and dialogue. Goals are outcomes whilst objectives are activities that will result in the desired outcome.

Objectives are the ends towards which the activities of a project are directed. A project has clearly defined (specific objectives). It is focused on end result. Project exists when the objectives have been achieved. Hence the first step in any project is to define the objective. We define the project objective in order to:

- Make sure that we have identified the right target.
- Create team commitment and involve all interested parties in achieving the successful project outcome.

GOAL SETTING CRITERIA

Goals are to be SMART

S = Specific (Clear and Well defined)

- What needs to be accomplished?
- Who is responsible for it?
- What steps need to be taken to achieve it?

The thought process of above question helps to achieve what is aimed for.

M = Measurable (outcome can be measured and compared)

- When setting goals, make sure you set goals whose progress you can measure.

- Quantifying the goal makes it easier to track progress and know when you have reached the finish line**.**

A = Achievable / Attainable and Agreed by all the members of the team

- Based on current restrictions, such as schedule, workload, and knowledge, do you believe you can attain the objective you set?
- If not, then set a different goal, one that is attainable for you in the present moment.
- By setting unattainable goals, it will only make you feel like a failure for not accomplishing the target you set for yourself.

R = Realistic

- It should be possible under the limited set of resources.

T = Time frame

- If there is not pressure to complete the project it will never get completed.

Examples of SMART goal

Bad example of a SMART goal:

"I want to write a book".

Good example of a SMART goal:

"I want to write a work book on "How to add 10 years to your life" that is at least 150 pages in length and get it completed by June 30th 2024. I will write at least 4 pages every weekday until I complete the book."

1.8 PROJECT LIFE CYCLE AND PHASES

Project is a temporary job. It cannot continue endlessly. The life span of the project is divided into phases. A project depending upon its nature, size and type, undergoes through different well defined phases right from its inception to successful completion. Collectively, the project phases are known as project life cycle phases. The breakdown and terminology of these phases differs depending upon the nature of the project or organization.

Project life cycle defines what technical work should be done in each phase and who should be involved in each phase. [7]The project life cycle refers to a logical sequence of activities to accomplish the project goal or objective. A lucid understanding of these phases permits project manager to better control the resources in the achievement of desired goals. [3]

Generally for engineering project (infrastructure related project), five basic phases contribute to develop an idea into reality.

1. **Initiation Phase**

- The project need is identified in this phase and it signals the commencement of the project. This phase includes:

(a) Conceptual study:

- Projects are born with creative ideas. It includes preliminary evaluation of ideas, such as project identification and project formulation.
- Creation of the project charter**.**

(b) Feasibility study:

- The objective of the feasibility study is to have more detailed information about the location, nature, dimensions, raw material needed, equipment, cost-benefit analysis, and the detail about the users who will be benefitted from the project.

(c) Market study:

- It includes the study of the marketing prospects and demand of the product, considering (a) potential size and composition of the market (b) present and projected demand of the product/services.

After the completion of this phase, a go/no-go decision is made.

2. **Planning Phase**

Planning is deciding in advance the future course of actions which is the primary function of management. [8] Major activities carried out in this phase are:

(a) Work breakdown structure:

- The project is broken down into small elements so that all the activities to be performed in the project are included.
- Allocation of roles and responsibilities to the different stakeholders.

(b) Cost and Schedule Planning:

- After breaking down the project, the time and cost of each activity is determined and overall time and cost of the project is determined.

(c) Contract terms and condition:

- Procurement related works are also carried out in this phase which involves two major type of activities: [9]

(i) Contracting and sub-contracting for services of general and speciality construction contractors.
(ii) Obtaining materials and equipment required to construct the project.

3. **Engineering and Design Phase**

This Phase includes:

(a) Preliminary Engineering and Design:

- It stresses architectural concepts, evaluation of technological process alternatives, size and capacity decisions, and comparative economic studies. [9]

- For example: In designing dam, hydropower, irrigation channel preliminary design requires analysis of hydrological characteristics, geological condition, precise location of dam etc.

(b) Detailed Engineering and Design

- It involves the process of successively breaking down, analyzing and designing the structure and its elements.
- It gives the information to the constructors exactly how to build the structure in the field considering the standard of safety. [9]
- This detailed phase include architects, interior designers, landscape architects, and several engineering disciplines including chemical, civil, electrical, mechanical etc.

4. **Implementation and Controlling Phase**

This phase is also known as the execution or construction phase. Relatively this is the longest phase in a project life cycle. This phase involves about 80% of the total project work and the resources are also extensively used. It is the mark or signal that something starts growing in the project site and stakeholders can see the project visibly. [3] This Phase includes:

- Application of the paper work physically in the real field.
- Mobilization of human and non-human resources in accomplishing the activities defined in earlier phases.
- Manufacturing, installation of machines and testing and civil works.
- Controlling is performed to check project performance at any point of time during implementation.
- Risk management
- Resolves issues if any
- The facility is substantially completed at this phase.

5. Divestment/ Phase out/ Termination

- This phase is the end of project and project is brought to its completion.
- The final testing and maintenance of the project is done and handed over to the customer and resources are released to other projects.
- The basic tasks in this phase are evaluation and handover of the project output to the beneficiaries.

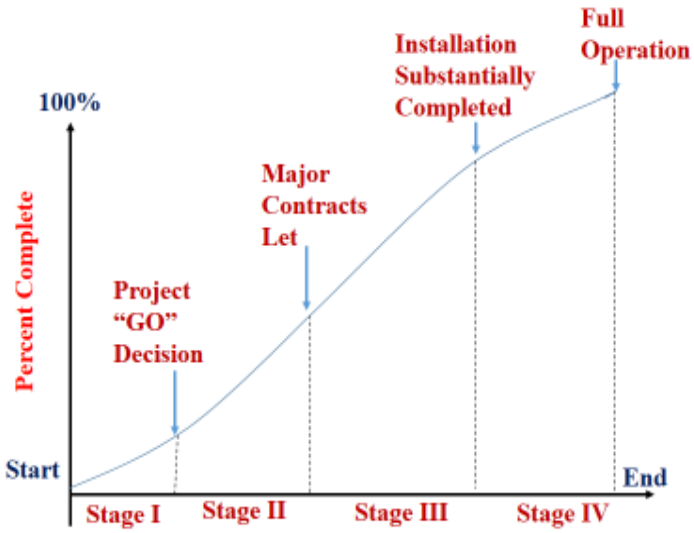
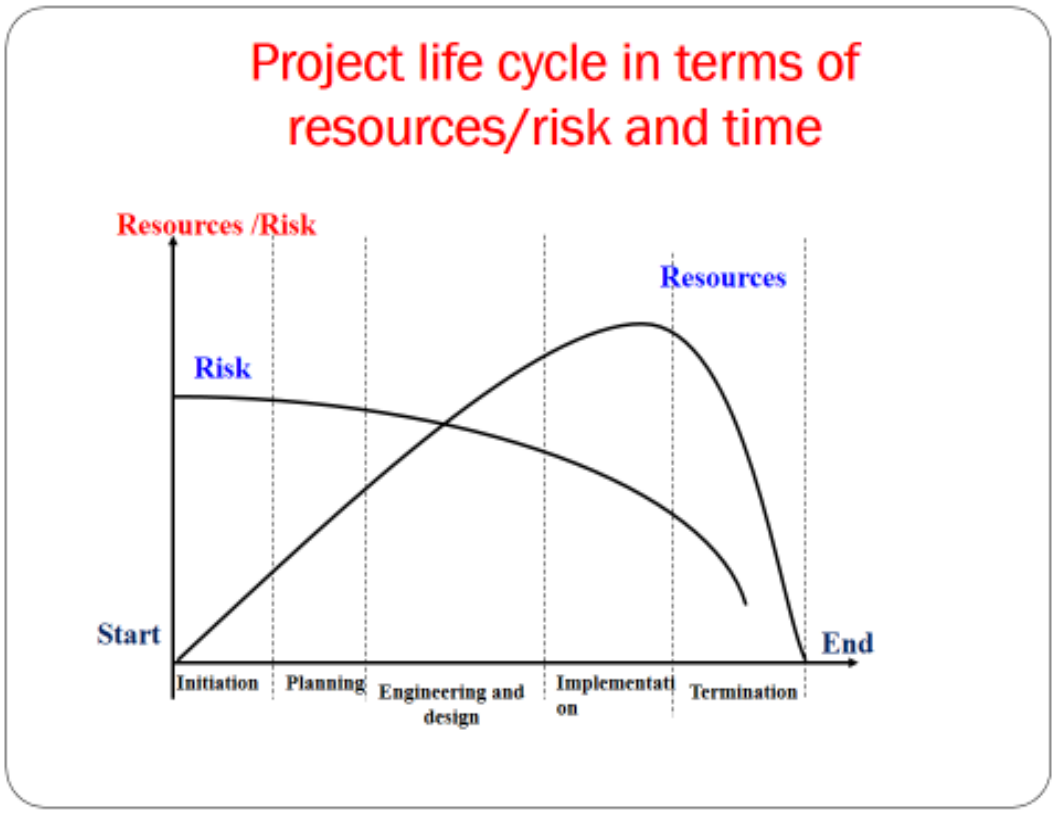


Fig: LIFE CYCLE STAGES [7]



1.8 PROJECT CASH FLOW

The movement of finances in and out of any project is called project's cash flow. Efficient money management is the key to succeed in every project delivery to meet the customer need and generate profit to the organization. It is used to determine the project's rate of return or value, the flow of money into and out of the project is used in financial models to determine the net present value and the rate of return respectively.

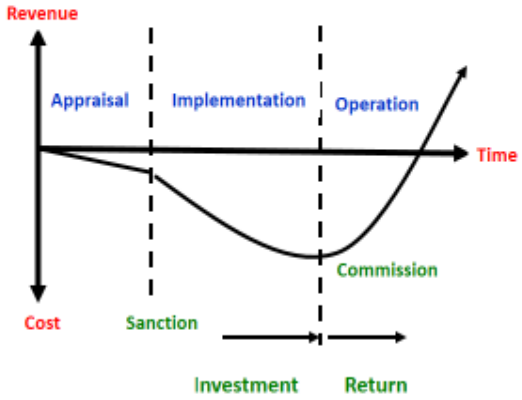


Fig: Project Cash Flow

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