

## **Development Planning**

### ***Learning Outcome:***

The main objective of the session is to learn about fundamentals of development planning. It includes learning development perspectives and the conceptual base of planning process that consisted of objectives, type of planning, mode of planning and means and ends analysis. It also reviews the concept of strategic planning with a broader perspectives. Thus the learning outcome of the session would be to enhance graduates' knowledge on applying fundamentals of planning for economic development. The lesson consists of five sections i.e. development, planning, means and end analysis, strategic planning and stakeholder analysis,

### **Development**

Basically, development is defined as a change. It is an ongoing or intended change that desire to achieve or become a better state or the higher position of the society. Essentially it is a normative value judgment about human beings and the process of societal change (Marks, 1847). Accordingly, it should be able to determine who gets the benefits from societal change.

According to Robert Chambers (1983) development is a people focused concept that related to human problems either to be removed or alleviated i.e. poverty or deprivation. Thus various indicators were used to measure development. Dale (2000) suggests a general typology of dimensions of development;

- 1) Economic Features/Indicators such as GDP, GNP and rate of employments etc.
- 2) Social Features such as life expectancy, mortality rates and school enrolments

- 3) Dependent and independent positions
- 4) Marginalized verses integrated positions
- 5) Degree of freedom from violence
- 6) Degree of mental satisfactions
- 7) Development related attitudes

Many of these indicators are normative or qualitative. But economic and social indicators are quantitative and numerical.

## Planning

According Wikipedia, “***Planning is the process of thinking about and organizing the activities required to achieve a desired goal***”. It combines with forecasting and how reacting through a sequence of action steps to achieve some specific goals. Planning is regarded as the most important project management and time management techniques. ***Plan is like a road map which shows how much progressed towards the target and how far away from the destination***

After Second World War economic planning become core economic activity of many countries because price mechanism was not effective to solve macro-economic problems that occurred during the war period and the after the war. So the government intervention was emphasized by economic planning.

### The Need and Importance

The need and the importance of economic planning was considered on several views;

- 1. Market failure argument
- 2. Resource allocation argument
- 3. Foreign aid allocation argument
- 4. Attitudinal and Psychological argument

Healey (1994) distinguish five main kind of planning systems;

- I. Economic Planning
- II. Physical Planning

- III. Policy Analysis and Planning
- IV. Interpretative (Communicative) planning
- V. Collaborative Planning

Economic and physical planning are recognized as the main and common planning Systems. Policy analysis and planning is linked with subject matters such as production system and Centre structures. Subject matter planning is referred to as “object oriented”, substantive or technical planning (Faludi, 1973). It also expressed as procedural, decision centered, process oriented and institution oriented (Dale, 2004); and strategic planning.

Interpretative and Collaborative Planning emphasis on mechanism or process of planning.

Similarly, Mankar (1995) also distinguishes six types of economic planning.

- 1. Physical planning and financial planning
- 2. Planning by direction (command) and planning by inducement (indicative planning)
- 3. Capitalist planning and socialist planning
- 4. Democratic Socialist planning and Totalitarian Socialist planning
- 5. Planning from above (centralized planning) and planning from below (decentralized planning)
- 6. Functional planning and structural planning

Physical planning is planning in terms of resources i.e. land, labour, raw materials and equipment etc. planning in terms of financial resources is referred as financial planning. Both types of planning are complementary not contradictory. Planning by direction is called planning by command. Planning by inducement or the price mechanism is known as inducement planning (Laisser-faire). So there is no compulsion or command (Lewis, W. A. 1956).

***Further Reading: Mankar, w. G. (1995) Economic Policy and Planning, New Age International (P) limited, New Delhi.***

## **Modes of Planning**

Modes of planning refers to planning **mechanism** and **process**. It means how to plan in accordance with explorations of problems to be addressed, which **related to opportunities and constraints, decision making, intended achievements on committed tasks, resources and organizations, time horizon and timing of activities.**

Thus development planning is a **normative process**. Planning focuses explicitly on assuring quality of people. Therefore it refers as **people focused perspectives** that based on the **need and interests** of deprived people or who are expected to participate various ways.

### Means and End Analysis

Means and End analysis is meant that **planners are assessed the end results or the outcome of the intended work to be done and select the suitable methods to be followed**. Thus means and end analysis is used as the focal point of planning process as a technical mode of reasoning. It also refers as formal rationality, institutional rationality and technical rationality. Conceptually all development plans should be rationalized by considering objectives (ends) and strategy (means) along with policy and policy instruments (Mollett, 1984). See the example given in fig 1.1.

Fig1.1: Ends and Means

Objective/Outcome (END)	Self Sufficiency in Rice production	
Strategy (Means)	Use High yielding Varieties	
Policy (Means)	Chemical Fertilizer	Farm Mechanization
Policy Instruments (Means)	Fertilizer subsidy	Tractors / Harvesters
Public and private sector Planning		

Planning is done by both public and private sectors and thus it names as public projects and private projects. Public projects are development oriented that based on the main (macro) issues' of the country such as poverty, malnutrition, water supply and technology development etc. The goals of these projects are to assure public welfare and the economic wellbeing of the nation. On the other hand, private projects or the individual projects are economic and mainly based on the profit maximization. These projects are vivid and based on various fields such as industry, agriculture and services. Public-private partnership programs are also implemented in collaboration with both sectors. It became a common and accepted practice by many governments under liberal economic policy syndrome.

One of the main feature of public sector planning is plans are formulated at national (macro) level, sectors level and sub sectors levels. (See Fig. 1.2). If the main objective of the national planning is to ensure the food security of the nation, its main mean or strategy would be to implement national food drive. National food production drive is implemented as agriculture sector plan. Under agriculture it belongs to crops cultivation such as paddy and vegetables. So the plan will be implemented as an agriculture sector major crop plan by cultivating rice or vegetables at different levels.

Fig. 1.2 Stages of National Planning

National	Sectors	Sub Sectors	Branch/Project
National Food Production Drive	Agriculture	Main Crops Livestock Fisheries	Rice Vegetables Fruits Poultry farming Inland farming

### **Prosperous Nation through “Balagathu Sri Lanka”: PM**

We want to create an economy where everybody will benefit and not a handful. We have started work and the first phase was completed in 2016.

The government had two weaknesses and they affected the country. The severe debt burden was a problem to the country and shortfall in the Balance of Payments. This affected the employment generation and the income of the people.

To create long term employment and improve the income we should move towards an export economy. Our aim is to improve the income by generating employment through an export economy. The plan Balagathu Sri Lankavak plan outlines how the government is going to achieve it.

## **Formatting a Plan**

Irrespective of public or private sector plans a common format is followed in formulation or designing a plan. Basically following components are included.

Vision – Expected Outcome

Mission- Action to be taken to achieve the vision

Goal- The end result of the project/program or policy/plan

Objectives- Intended actions to realize the vision and the mission. To be SMART

Strategy- The method and the Policy to be taken to achieve mission

Rationale – Justification of the plan and the activities

Programs – Well defined set of activities

Activities – Actions to be taken to realize objectives (outputs)

Projects – An endure

Resources (Inputs)

Stakeholders- Beneficiaries, project staff, suppliers and

Time Horizon- Gannet plan

### **Vision and Mission**

To become a Centre of excellence in creation and dissemination of knowledge for sustainable development.

#### **Mission**

To nurture intellectual citizens through creativity and innovation, who contribute to the national development

## Strategic Planning

The concept of strategy is defined *as the mediating force between the organization and its environment*. It depicts the relationship between organization and environment in achieving intended objectives. As defined earlier the concept of development means qualitative changes in the human beings. So the development strategy means to find best possible solutions to upgrade living standers of target beneficiaries.

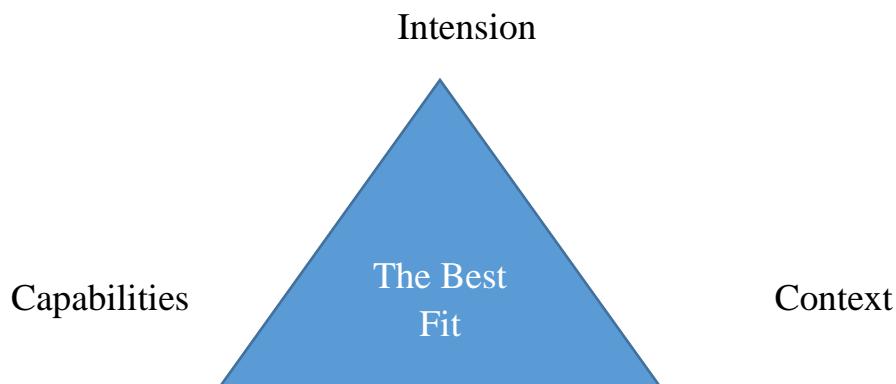
As a new planning concept strategic planning is practiced by both public and private sector organizations. Basically strategic planning is defined as ‘obtaining the best possible fit (congruence) between an intended action, the resources and abilities for undertaking it, and its societal context’ (Dale, 2004: PP.17). This triangle relationship was illustrated as follows.

The intended action or the intension should clarified through a general statement of purpose or the objective. This statement is also referred as mission of the organization. The objective should be elaborated by sub objectives and targets to be performed.

Capabilities refer to resources, organizational strengths and organizational weaknesses

Context refer to present and future opportunities, present constraints and future threats

Fig 1.3: Triangulation of Main Concepts



## Stakeholder Analysis

Stakeholder analysis is one of the essential element in strategic planning. Stakeholder analysis was defined as identifying beneficiaries and other bodies with an interest in the program or project, assessing their stakes and clarifying their involvements (Grimble and Chan, 1995).

Stakeholders were recognized as all the parties involved in the project or programs as either external or internal participants. Thus project/program beneficiaries, funders, planning staff, supporting staff, input suppliers, advisors and partner organizations are known as stakeholders. In a development program that focused on improving quality of human beings, target group beneficiaries, implementing officers, funders, local government institutions, input suppliers, members of the community become stakeholders. Following steps to be followed in a stakeholder analysis.

1. Identify the stakeholders by their stakes- they may include: those who are affected by the problem, those who cause the problem, those who may be affected by measures against the problem etc.
2. Categorize the stakeholders by main relevant criteria (individuals, private organizations, government agencies etc.
3. Get an overview of the needs and interests of each category of stakeholders
4. Discuss and decide on whose needs, interests and views should be given priority.
5. Analyze further the needs and interests of the prioritized individuals, groups and organizations
6. Analyze the strengths and weakness of potential external contributors, groups and organizations
7. Analyze the constraints or threats posed by the hostile individuals, groups and organizations
8. Feedback to the problem analysis

## Questions

1. What are the main characteristics of development planning?
2. Distinguish the differences between operational planning and the strategic planning

## Lesson Two

# Projects and project Planning

The lesson two is focused on learning projects and project formulation. It includes characterization of project concept, project cycle and main steps to be followed in project formulation. Learning outcome of the session would be to realize fundamentals of projects planning, project cycle, and distinguish public and private sectors projects and knowing project formulation. The lesson consists of four sections i.e. what is project, public and private sector projects, project cycle and main components of project cycle.

### 2.1 What is Project?

The word project comes the Latin word projectum from the Latin verb proiacere, it means "**before an action**" which in turn comes from pro-, which denotes precedence, something that comes before something else in time and iacere, "to do". Thus the word "project" originally meant "before an action"(Wikipedia, 2016).

Project planning is inherently uncertain as it must be done before the project is actually started. Therefore the duration of the tasks is often estimated through a weighted average of optimistic, normal, and pessimistic cases. The conceptual linkage of a project derive from plans and programs as shown below. A program is a Portfolio (collection) of related projects that help to achieve strategic objective. So program management is important to set the overall direction, coordination and control of portfolio of projects.

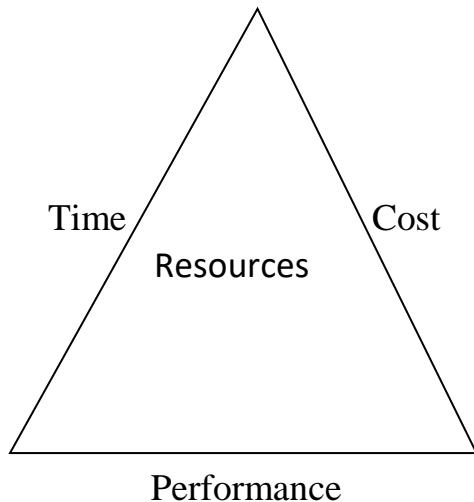
Plan → Program → project

The definitions of project are wide-ranging and vary according to public and private projects. A Public project is a government intervention to change the existing situation or initiation of new system for the betterment of the society. On the other hand, the private project is an initiation or intervention by an individuals, a group or a company for the betterment or the profit maximization

In any context it is a **temporary organized endeavor** to change existing situation that bound by constraints. According to Wikipedia, the project is *a set of interrelated tasks to be executed over a fixed period and within certain cost and other limitations.*

In contemporary business and science literature, a **project** is a collaborative enterprise, involved research or design and planned to achieve a particular intended outcome. It also defined as temporary endeavor that are created by stakeholders to accomplish particular tasks under triple constraints i.e. Time, cost and performance. It reflects as triple constraints as shown in figure 2.1.

Fig 2.1: Triple Constraints



In a public development project, it is a clearly delimited and highly specified undertaking (Dale, 2004). It is a planned intervention for achieving one or more objectives, encompassing a set of interrelated activities that are undertaken during a delimited period of time using human and physical resources (ibid).

In a business project, it is an undertaken task to create a unique product with an ultimate objective of changing positions by **knowledge, attitudes and practices** effectively and efficiently.

Irrespective of either public or a private projects, Project Plan is a contract or document that the project sponsor and project manager use to agree on the initial

vision of the project (scope, baseline, resources and objectives). A project plan answers basic questions about the project:

- **Why?** - What is the problem or value proposition addressed by the project? Why is it being sponsored?
- **What?** - What is the work that will be performed on the project? What are the major products/deliverables
- **Who?** - Who will be involved and what will be their responsibilities within the project? How will they be organized?
- **When?** - What is the project timeline and when will particularly meaningful points, referred to as milestone to be completed?

A project plan typically answer to above questions and executes according to vision and the objectives.

## 2.2 Type of Projects

According to type and the functions of the projects four type of projects were identified (Molllett, 1984).

1. **Experimental Projects:** refers to projects that are implemented for defining problems in a new ways and assessing alternative solutions. It is regarded as the best way of finding best means of overcoming constraints prevailed at local conditions.
2. **Pilot Projects:** Projects implementing for testing applicability of new methods and approaches. It allows to test new ideas at low risks.
3. **Demonstration Projects:** These projects are implemented to disseminate ideas to stakeholders or the users of the project or products.
4. **Production Projects:** projects which gone through one or more of the preceding stages. Many projects belongs to this category as it implement for public benefits or the profit maximization.

By nature and activities, classification of projects was specified as follows

### 1 Quantifiable and Non- Quantifiable Projects

Economic projects such as electricity, energy and infrastructure development projects are regarded as quantifiable projects. Inputs and outputs of these projects are quantifiable in terms prices, cost and numbers. Some service oriented projects

such as health, education projects are regarded as non-quantifiable projects because outcome of these projects cannot measured either numbers or economic values. However these projects are also measured in terms of social cost benefit indicators

**2. Sector based projects:** Projects are designed on sector- wise such as agriculture, industries, fisheries, forestry and irrigation etc.

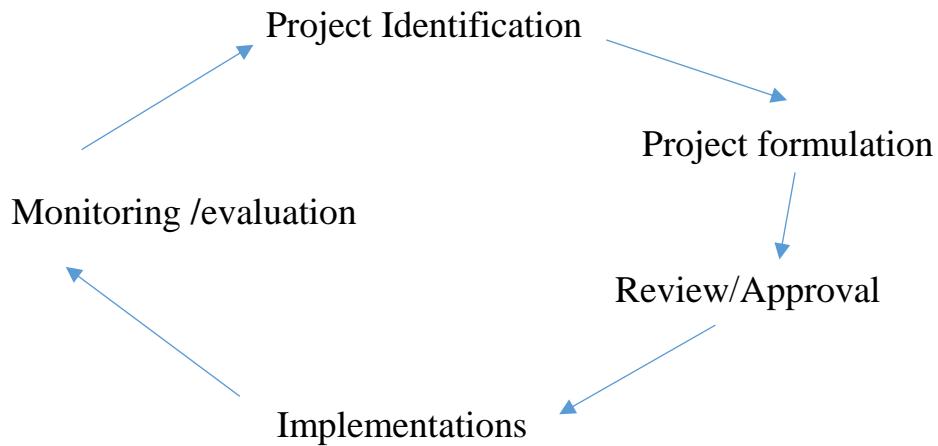
**3. Techno Economic Projects:** techno and economic projects are also categorized as follows;

- Factor intensity Projects:
- Demand Based Project: projects which are based on demand for raw materials and semi-products.
- Small and Medium scale projects that based on the quantity of investments:  
Projects are designed on the Small farmers projects, micro finance projects and cottage industry projects belonged to this category.

## **Project cycle**

Project cycle is a logical framework which indicates the sequence of the main activities of an intended work/task. Project identification, formulation, Review/approval, Implementation, monitoring and evaluation are the main activities and its cyclical relationship is referred as project cycle (Fig 2.2). The five phases of the project cycle should be viewed as iterative steps, not as a linear set of sequential steps.

Fig. 2.2: Project cycle



### Main Components of the project cycle

According to **UNEP Project manual**, there are five phases in project cycle. Activities related each and every activities were summarized as follows.

#### Phase 1: Project identification

- I. Situation analysis
- II. Identification test
- III. Preparation of a concept project proposal for sponsorship

#### Phase 2: Project formulation and preparation

- I. Feasibility study
- II. Project document formulation
- III. Establishment of baseline and target data
- IV. Project implementation planning

#### Phase 3: Review and approval

- I. Inter -Divisional Review (IDR)
- II. Project Approval Group (PAG) decision on the approval of the project

#### Phase 4: Project implementation

- I. Project implementation to achieve projects objectives/results
- II. Project sustainability ascertained
- III. Monitoring and reporting
- IV. Risk assessment and management

#### Phase 5: Monitoring and Evaluation

- I. Mid-course evaluation for amendments and improvements
- II. End of the project evaluation
- III. Generation of lessons learned

### **Project identification**

Project identification starts from an understanding of the mandate, vision and objectives. It involves

Identifying environmental problems to be addressed and the needs and interests of possible beneficiaries and Stakeholders.

The problems and the most realistic and effective interventions are analyzed, and ideas for Projects and other actions are identified and screened.

#### 1. Situation analysis

An environmental situation needs to be assessed and analyzed. This objective analysis enhances understanding of the likely causes and linkages between existing problems and the needed actions. A Situational analysis based on a scientifically sound conceptual framework generates key actions and strategies

To be applied for the intended project intervention. Latest country reports and statistics prepared by Governments, researchers, or international organizations on the relevant environmental, social and economic issues, including gender and poverty, can be facilitated the assessment.

A situation analysis should include analyses of needs, interests, strengths and weaknesses of key stakeholders and beneficiaries.

These analysis are depend on the levels of projects whether i.e. it implements at national, provincial or the divisional levels.

## The identification test

A proposal may be considered to have passed the identification test and be ready for detailed preparation when: Major options and alternatives have been identified and some initial choices made;

1. The principal institutional and policy issues affecting project outcome have been identified and deemed amenable to solution;
2. The project options selected are expected to be justified, given rough estimates of the expected costs and benefits;
3. There is justifiable expectation that the project will have adequate support from the relevant political authorities, other stakeholders and the intended beneficiaries;

## 3. Preparation of concept proposal for sponsorship

Project formulation begins with the drafting of a proposal for sponsorship (a short concept proposal of 4–5 pages) that lays out preliminary ideas, objectives, results, strategies, outputs and activities. This proposal issued as the basis for consultations with implementing partners and Governments. Section IV details the format and procedures for preparing concept proposals for sponsorship.

Some technical project may adopt particular approach to identify all the requirements. It includes

Functional Decomposition: each components should be decomposed (disintegrate) until all the requirements are met

Gap Analysis: Compare the present state and the desired state

Reverse Engineering: Use existing object Steps in Selecting Best projects

1. List potential projects
2. Determine the need of opportunities to each projects
3. Establish rough delivery dates
4. Prepare preliminary cost and budget
5. Establish overall feasibility of each projects
6. Assess the risks of each projects
7. Review project lists with project management team
8. Eliminate inappropriate projects
9. Prioritize the other projects
10. Select the best project.

## The Lesson 3

### Project preparation and formulation

The learning objective of the lesson 3 is to know how project preparation and formulation done in accordance with project cycle process. Thus the session 3 would focus on two components such as preparation of feasibility report/study and logical framework. Learning outcome of the session 3 would be to familiarize in preparing project document as the project planning techniques.

Preparation of a good project proposal is not an easy task. It should fulfill all the requirements of the stakeholders particularly beneficiaries, donors and the government while achieving project goals. Thus, project formulation is linked with a compressive work related to technical, economic, institutional and environmental aspects and the task may vary in accordance with size of the projects and the cost as follows;

Mega projects which are above \$ 10.000 million,

Large scale projects between \$ 1000-10. 000 million,

Medium scale projects between \$ 100-1000 million and

Small scale projects less than \$ 100 million

#### 3.2 Feasibility study

A feasibility study should form the core of the project proposal preparation process. Its purpose is to provide stakeholders with the basis for deciding whether or not to proceed with the project and for choosing the most desirable options. It is expected to judge feasibility in terms of cost and benefits to be attained from the project. The feasibility study must provide answers to the following basic questions:

- Does the project conform to the development and environmental objectives and priorities of the specific country and or region?
- Is the project technically and scientifically sound, and is the methodology the best among the available alternatives?
- Is the project administratively manageable?

- Is there adequate demand for the project's outputs?
- Is the project financially justifiable and feasible?
- Is the project compatible with the customs and traditions of the beneficiaries?
- Is the project likely to be sustained beyond the intervention period?

Basically, there are two type of feasibility studies (Mollett, J.A.1984 and Pathirage, P. 2013).

### 1) Pre-feasibility Study:

Pre-feasibility study is conducted at the project identification stage in order to assess needs, interests, strengths and weaknesses of the project. It helps project implementers, stakeholders and sponsors to understand the viability of the project. If the project is not viable then it could be rejected or changed as the requirements. If it viable then policy planners hope to implement it by conducting a detailed feasibility study.

### 2) Detailed Feasibility Study:

Thus a detailed feasibility is a comprehensive and in-depth analysis that explore the, market feasibility, technical feasibility, Economic feasibility, and financial feasibility, environmental and legal feasibilities of the project. Following is a description of the various feasibilities to be conducted (Pathirage, 2013, www. project feasibility, 2017).

#### **Market feasibility**

Market feasibility is a study conducted for assessing marketability of the project. Particularly it involves testing geographic locations for a real estate development project related to parcels of real estate land. Market Feasibility takes into account the importance of the business in view of demand, market segments, periphery and alternative products etc. Basically two issues are addressed by a market study.

- What is the expected aggregate demand for the proposed good or service?
- What is the market for the proposed good or service?

Most market feasibility studies include five aspects (<https://www.quora.com>, 2018)

1. Current Market Analysis
2. Competition or presence of competing products.
3. Anticipated future market potential.
4. Potential buyers and sources of revenues.
5. Sales projections.

## Technical feasibility

Technical feasibility is an assessment about technical viability of input, processes, output, fields, programs and procedures related to proposed project or the product. Thus the assessment is based on an outline design of system requirements, to determine whether the company has the technical ability to handle the project. At this level, it concerns whether the project is viable technical and legal aspects..

The technical assessment is focused on gaining use of existing technical resources of the organization and their applicability to the expected needs of the proposed system. It is an evaluation of the hardware and software and how it meets the need of the proposed project. When writing a technical feasibility report, following aspects are considered mainly.

1. Location of the project
2. Availability of raw materials
3. Power
4. Man Power
5. Management
6. Technical Knowhow

## Financial feasibility

The financial feasibility is an assessing commercial profitability of the project in order to determine whether the financial investment is profitable or not. Financial feasibility is calculated by two approaches and methods.

1. Static Analysis
  - Pay Back Period
  - Average Rate of Return
2. Dynamic Analysis
  - Net Present Value (NPV)
  - Internal Rate of Return (IRR)
  - Benefit Costs Ratio (BCR)

Thus, financial viability can be judged on the following parameters:

- Total estimated cost of the project
- Sources of financing of the project in terms of its capital structure, debt to equity ratio and promoter's share of total cost

- Existing investment by the promoter in any other business
- Projected cash flow and profitability

## **Economic feasibility**

The purpose of assessing economic feasibility is to determine the effects and impact of the project on the society both in terms of economic and social values, particularly in terms of social costs and benefits. It includes quantitative and qualitative assessment on the costs and benefits..

## **Legal feasibility]**

Determines whether the proposed system conflicts with legal requirements, e.g. a data processing system must comply with the local data protection regulations.

## **Environment (Resource feasibility)**

This involves questions such as how much time is available to build the new system, when it can be built, whether it interferes with normal business operations, type and amount of resources required, dependencies, and developmental issues.

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development.

The operational feasibility assessment focuses on the degree to which the proposed development projects fits in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture, and existing business processes.

To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters such as reliability, maintainability, supportability, usability, reducibility, disposability, sustainability, affordability and others. These parameters are required to be considered at the early stages of design if desired operational behaviors are to be realized. A system design and development requires appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the design.

Therefore, operational feasibility is a critical aspect of systems engineering that needs to be an integral part of the early design phases.<sup>[8]</sup>

### **3.2. 2 Project document formulation**

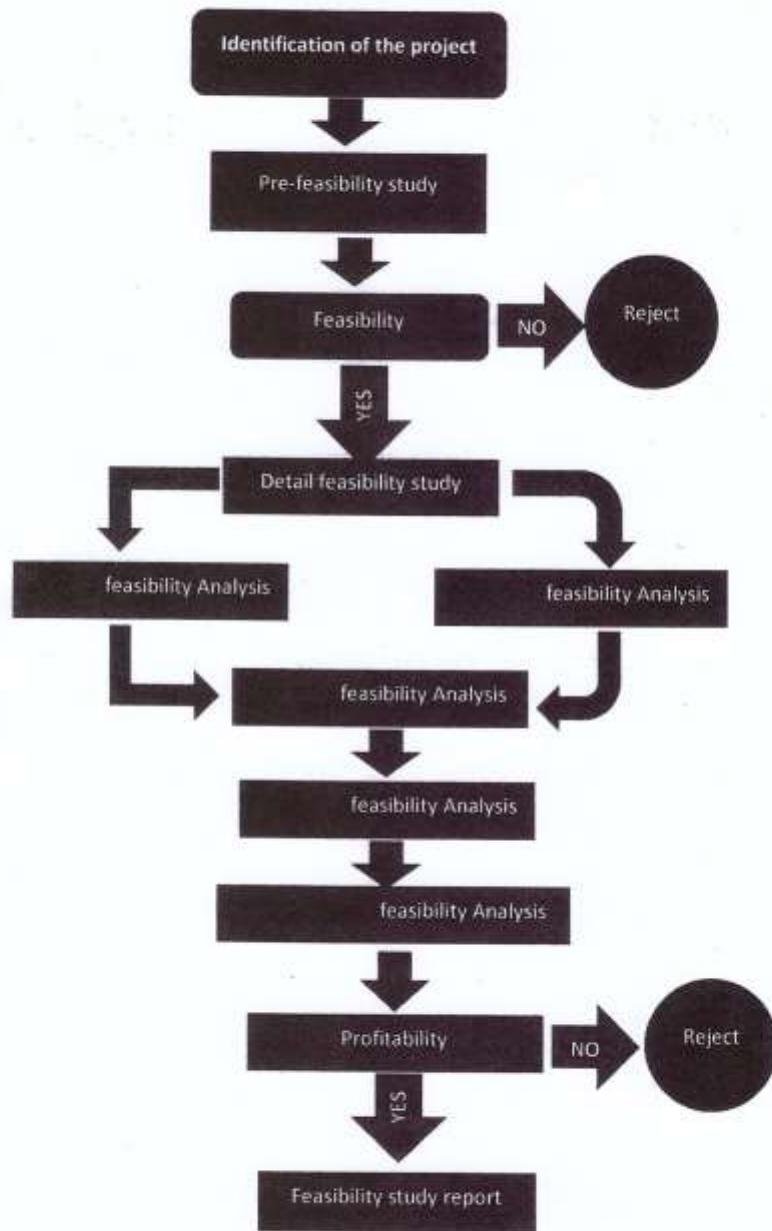
Project preparation, formulation and project document formulation are **simultaneous** processes. Once the feasibility study has taken place and implementation arrangements are agreed upon, the concept proposal (which would have been revised throughout the process) is transformed and expanded into a project document throughout the project preparation and formulation phase.

The project document is a summary of the situation assessment, justification of objectives, methodology and strategies for achieving the targeted changes, which come from each step taken through project cycle phases 1 and 2. Since project formulation is an iterative process, it is important to consult again with selected partners and colleagues as the document is formulated.

#### **3.2.3 Establishment of baseline and target data**

Data or information in the subject area of the intended project should be gathered during the project identification process (phase 1) and analyzed to assess the condition or situation of the targeted populations and areas. It is possible that the existing data or information are insufficient or not valid, or outdated.

The process of feasibility study



## The Lesson 4

### Logical Framework Analysis

#### 4.1 The Logical Framework

The logical framework is an important technique used in project formulation. According to Wikipedia, it was defined as a methodology that used for designing, monitoring and evaluation of international projects. It was developed in 1969 by the USAID for guiding its projects implemented in developing countries, as a method of Practical Concepts guidance. Thus Logical Framework Approach (LFA) was developed to improve its project planning and evaluation system. The methodology designed to address three basic concerns of project design as mentioned below.

1. Project planning is too vague, without clearly defined objectives and indicators that could be used to objectively monitor and evaluate the success (or failure) of a project;
2. Management responsibilities and tasks were unclear.
3. Evaluation of project implementation was often an adversarial process, because there was no common agreement as to what the project was really trying to achieve.

The LFA has been adopted as a project planning and management tool by most multilateral and bilateral development agencies. The European Commission has required the use of LFA as part of its Project Cycle Management (PCM) system since 1993, and it provides a core set of tools with which to undertake assessments of project quality based upon the LFA (see separate document and for further details refer to *European Commission, Project Cycle Management Guidelines, Volume 1, 2004*).

#### 4.1.1 Logical Framework Matrix (Log frame Matrix or LFM)

LFM is consisted of four-by-four project table. The rows represent goal, purposes, outcome and activities and the column represent Objectively Verifiable Indicators (OVIs, Means of Verification (MoV) and Assumptions. Thus Log frame matrix comprises 16 “boxes” (see fig 4.1), but establishing a Log frame matrix doesn’t

mean to “fill in the boxes” only. Behind every “box” there is careful analysis and logical reasoning that has to be pursued before filling in the boxes which is only the final activity, the product. If this process is not carried out during idea and project development, it applies to project development in general.

The log frame matrix as its principal outcome: flexibility in its use is essential as it based on the analysis of an existing situation, and situations or circumstances can change as the project develops. Those changes might have to be taken up by reviewing and adapting the project design – and the matrix consequently. A log frame matrix should reflect a project strategy derived from the careful analysis of an existing situation – not vice versa.

Within the **vertical logic (Axis)** of the matrix (first column = project strategy) it can be identified what the project intends to achieve and how (clarifying the causal relationships between the different levels of objectives), specifying important underlying assumptions and risks (fourth column of the matrix).

Within the **horizontal logic (Axis)** of the matrix indicators to measure progress and impact are specified and the sources or means by which the indicators will be verified. The matrix serves as a summary of the key information on the project. It provides an easy overview that allows a quick assessment of the consistency and coherence of the project logic.

## **4 .2 Benefits associated to the application of the LFA**

According Project Cycle Management manual adopted by the European Commission, benefits of Using LFA in project planning was recognized as improving the project design, fostering the project performance and facilitating project management ([www.dfid.gov.uk/pubs/files/toolsfordevelopment.pdf](http://www.dfid.gov.uk/pubs/files/toolsfordevelopment.pdf), 2016):

It also shows that the LFA can help to achieve:

**A structured project design process.** LFA suggests a logical sequence, interlinking the individual steps in the design process.

**Transparency.** The reasons why a certain project is meant to be implemented are laid open (what are the problems and whose problems are they?) as well as the internal logic of the project design (what is the project expected to achieve and how?).

**Participation** of the stakeholders involved in the project design and management, which is an essential prerequisite for the sustainability of a project.

**A consistent project strategy.** The LFA provides tools to clearly link causes and effects. It also takes into account risk as external factors that are crucial for the success of the project, but lie outside the control of the project.

**Objectively verifiable indicators.** Indicators describe objectives in measurable “empirically observable” terms and provide the basis for performance measurement and project monitoring and evaluation.

**Flexibility** in adapting to changing conditions (that are of relevance for the project). The LFA establishes a framework that makes the underlying rationales and assumptions transparent and helps to react to changes by, e.g., revising the design.

The most important benefit however has to be the coherence and compatibility of the LFA as a design approach for EU projects with the Project Cycle Management adopted by the European Commission in the early nineties. The structure of the LFA is matching the PCM-derived structure of the EC evaluation criteria which is also applied during the evaluation of proposals submitted in EU.

#### 4.2 .1 Advantages of the Logical Framework approach

According to Centre for International Development and Training of the University Of Wolver Hampton UK; the advantages of using LFA was summarized as follows.

**\*It brings together in one place a statement of all key components of the project or programme.**

Having all key components of projects or programme in a systematic, concise and coherent way helps you clarify and demonstrate the logic of how projects and programmes are expected to work. It can also help you separate the various levels in the hierarchy of objectives, and consequently ensure that inputs and outputs are not confused with each other or with objectives. This can be particularly helpful when there is a change of staff.

**\* It meets the requirements of good project design and enables possible responses to past weaknesses in many designs.**

It can help ensure that fundamental questions are asked and weaknesses are analyzed in order to provide decision makers with better and more relevant information. It can also guide you in systematically and logically analyzing the inter-related key elements which constitute a well-designed project. This approach can help you improve planning by highlighting linkages between project elements and important external factors.

**\* It is easy to learn and use.**

Effective training in the basics of the Logical Framework approach can be given in a few days. If this is combined with follow-up training and process consultancy to sort out difficulties a key group of project staff can be trained effectively in a short period of time.

**\* It does not add time or effort to project management, but reduces it.**

Like many other management tools the Logical Framework approach has to be learnt before it can be effectively used. Once learnt however, it can save you a lot of time. Many project staff report that they are often short of time and work against the clock on a regular basis. Any time saved in relation to project management work would be of great value.

**\* It can be used internally for design and appraisal process and can be used externally with consultants working for development organizations.**

The Logical Framework approach can be used to help both design and appraise projects internally. Likewise it can be used with external consultants who may be involved with design and appraisal processes. In addition the Logical Framework approach encourages a multidisciplinary approach to project design and supervision.

**\* It anticipates implementation.**

The Logical Framework approach helps sets up project activities with a clear purpose. The approach facilitates common understanding and better communication between decision makers, managers and other parties involved in projects. Likewise the use of Logical Frameworks, with systematic monitoring, ensures continuity of approach if and when any original project staff move or are replaced.

**\* It sets up a framework for monitoring and evaluation where planned and actual results can be compared.**

By having objectives and indicators of success clearly stated before the project starts the approach helps you set up a framework for evaluation. It is notoriously difficult to evaluate projects retrospectively if the original objectives are not clearly stated. The Logical Framework approach can help clarify the relationships which underlie judgments about the likely efficiency and effectiveness of projects, likewise it can help identify the main factors related to the success of the project.

**\* It assists communications between project donors and implementers.**

As more and more institutions adopt the Logical Framework concept Communications between project implementers and donors will be facilitated. This will have major advantages for organizations who are continually presenting projects to donors for funding. In earlier times, budgets seemingly grew more easily and rapidly than now is often the case.<sup>4</sup>

### **3.3.4 Limitations to the Logical Framework approach**

It also mentioned that certain limitations of using LFA. It includes;

**\* It is not a substitute for other technical, economic, social and environmental analyses. It cannot replace the use of professionally qualified and experienced staff.**

The Logical Framework approach can help project design, Implementation and evaluation, **but clearly does not do away with the need for other project tools especially those related to technical, economic, social and environmental analyses. Likewise the approach does not replace the need for professional expertise and experience.**

**\* Rigidity in project management may arise when objectives and external factors specified during design are over emphasized.**

Rigidity in project administration and management can sometimes arise when Logical Framework objectives and external factors specified during design are over emphasized.

## **4.3 The LFA as a tool to improve project implementation and management**

The applicability of the LFA is not restricted to project design but also encompasses the project management during the implementation phase and allows strategic monitoring and evaluation. One of the major tasks of project management

during implementation is to verify that a project is actually achieving the intended objectives. An important means to do that is monitoring.

The logical sequence laid down in the LFA between activities (that, carried out lead to) – outputs (that lead to the achievement) and immediate objective helps to choose monitoring indicators. The milestones defined in the activity schedule (based on the LFM) form part of the basis for monitoring.

Monitoring helps to see whether objectives are achieved as intended, or whether there are deviations from the initial plan. If this is the case it can be analyzed why there are deviations, what the problems are in implementing the project as intended and what could be done to either keep the project on the planned track or, if necessary, what could be alternatives to the original plan. The transparency and structure provided through the application of the LFA during project design, laying open the basis for the planned action (analysis of initial situation) and the rationale behind the project design (logical sequence between different levels of objectives).

**Fig. 4 .1: Logical framework Matrix**

<b>Narrative Summary</b>	<b>Verifiable Indicators (OVI)</b>	<b>Means of Verification (MOV)</b>	<b>Important Assumptions</b>
<b><u>GOAL</u></b>			
<b><u>PURPOSE</u></b>			
<b><u>OUTPUTS</u></b>			
<b><u>ACTIVITIES</u></b>	Inputs		

- The **GOAL** is a bottom line condition of well-being of individuals, families, or communities. It is usually described in terms of quality of life improvement towards which the country programme will contribute
- The **PURPOSE** is determined by asking the question “how will this goal be achieved”
- The **OUTPUTS** are the deliverables through which the purpose will be achieved.
- The **ACTIVITIES** are the main elements of component projects through which the outputs are achieved

It is a participatory Planning, Monitoring & Evaluation tool that highlights the full range of views of intended beneficiaries and others who have a stake in the programme design. It is a tool for summarizing the key features of a programme and is best used to help programme designers and stakeholders

Thus LFM is a "temporal logic model" that runs through the matrix that connected with hypothetical views as shown below.

- If these Activities are implemented, and these Assumptions hold, then these Outputs will be delivered.
- If these Outputs are delivered, and these Assumptions hold, then this Purpose will be achieved.
- If this Purpose is achieved, and these Assumptions hold, then this Goal will be achieved.

These are viewed as a hierarchy of hypotheses

([https://en.wikipedia.org/wiki/Logical\\_framework](https://en.wikipedia.org/wiki/Logical_framework), Down loaded 03.04.17)

An Example

### **Goal**

- Contribute to improved Eye Health

### **Purpose**

- Contribute to increased utilization of Eye Health services and knowledge in x district

### **Outputs**

1. Increased Access to Eye Health Services
2. Provision of cost-effective, comprehensive and high quality EH services

#### **3.5.7 Objectively Verifiable Indicators (Quantity & Quality)**

- **Indicator** -Increase CSR
- **Add Quality** -CS with IOL increased from 60% to 90%
- **Add Quality** -CS with SICS technique increased from 60% to 80%
- **Add time** -CSR increased from 4000 to 6000 by 2005
- **Add place** -in x region/district

#### **4 .5. Means of Verifications**

The specific sources from which the status of each of the indicators can be ascertained.

#### **3.5.8 Assumptions and Risk**

Assumptions and risks are external conditions that are outside the control of the programme. The achievement of aims depends on whether or not assumptions hold true and the risks do not materialize.

If cause and effect is the core concept of good programme design, necessary and sufficient conditions are the corollary. The sufficient conditions between the levels in the hierarchy of aims are the Assumptions. This is the external logic of the programme.

When working on a programme, we make assumptions about the degree of uncertainty between different levels of aims. The lower the uncertainty that certain assumptions will hold true, the stronger the programme design. Any experienced manager will agree that the assumptions - the failing assumptions - can derail a programme as often as poorly executed outputs.

Log Frame Analysis reflects how important are the assumptions, how big the risks and should the program be redesign or abundant etc.

## The Lesson 4

# Project Management

### 4.1 What is Project Management?

Project management (PM) is “ the application of knowledge , skills, tools and techniques to project activities in order to meet or exceed stakeholders’ needs and expectations from the project” (Project Management Body of Knowledge (PMBOK guide, 2000). According to Wikipedia, the virtual encyclopedia, it was defined as the discipline **of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria.** The idea of project management gives various meanings as it defined and practiced by various institutions and peoples.

Project management was conceptually discussed in the project cycle analysis and logical framework analysis Thus project management has applied various ways and means. Thus it applies to public work as well as private projects, use for many different disciplines such as engineering, information technology, constructions, finance and sports and practice as the means of scoping project, targeting and dealing with stakeholders.

### 4.2 Viewpoints of Project Management

Management propositions and methodology of PM was evolved systematically over the past (Nicholas, 2006).

**Classical Viewpoint:** Basically it based on scientific and bureaucratic management principles and applied for all situations. It originated at the beginning of 20<sup>th</sup> century and established for formal principle for planning, organizing, leading and controlling.

**Behavioral Viewpoint:** Focused on human and social aspects of organizations. This method was applied since 1930s and it was greatly helpful to improve leadership, group dynamics and social environment

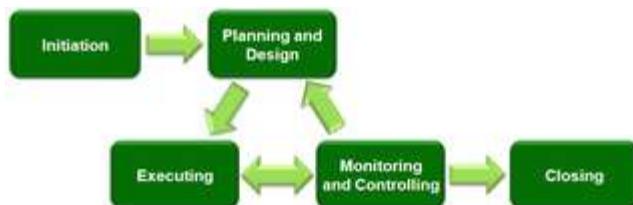
**System Approach:** It was applied during World War II and it was sought to simplify management through reviewing complexity and causal relationship of the situation

**Contingency viewpoint:** The present management system practiced by many organizations were developed by combining above three approaches and it is known as contingency viewpoint

A number of approaches followed for managing project activities. It includes traditional, lean, iterative, incremental, and phased approaches.

### The traditional approach

A traditional phased approach identifies a sequence of steps to be completed. In the "traditional approach", five developmental components of a project can be distinguished (four stages plus control):



Thus the management was based on the five development phases of an engineering project

1. Initiation
2. Planning and design
3. Execution and construction
4. monitoring and controlling systems
5. Completion and finish point

Project management applies to various purposes i.e. work as well as personal projects, different disciplines (IT, Construction, finance, sports and event planning etc.). The project management techniques can also apply to lives of everybody.

The system view of project management includes three parts.

1. System Philosophy: View things as system. Interacting components working within an environment to fulfill some purposes.
2. System Analysis; Use problem solving Approach
3. System Management; Address business, technological and organizational issues before making changes to systems.

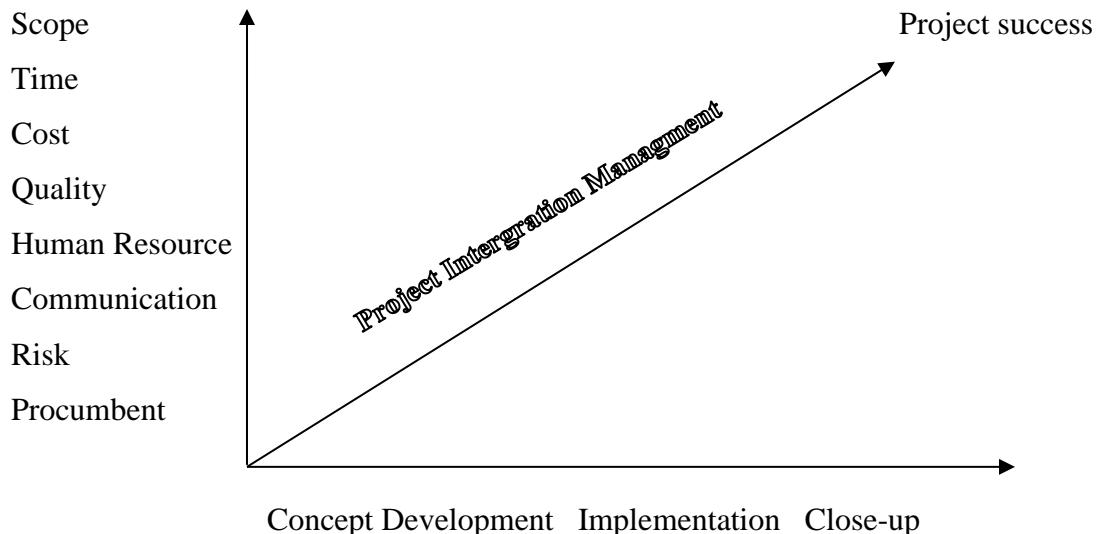
### **The project management body of knowledge (PMBOK)**

PMBOK is a practice in project management discipline as means of collection of possess and knowledge areas. It includes nine knowledge areas as follows.

1. Project integration Management; A process for ensuring that the project cycle is properly coordinated
2. Project Scope Management; A processes for ensuring that the project includes all the work required to complete successfully.
3. Project Time Management; A processes for ensuring that timely completion of the project
4. Project cost Management; A processes for ensuring that the project is approved within approved budget
5. Project Quality Management; A processes for ensuring that the project will satisfy the needs as anticipated
6. Project Human resource Management; A processes required to ensure effective use of human capital.
7. Project Communication Management; A processes for ensuring that collection, dissemination, storage of project information
8. Project Risk Management; A processes concerned with identifying, analyzing and responding the project risk
9. Project Procurement Management; A processes for acquiring goods and services for project completion.

These key components could be illustrated graphically as shown in figure 4.1. The vertical axis indicates the eight knowledge areas and the horizontal axis shows the project life cycle. The project integration path is determine at middle as a liner line upward to the right.

Fig. 4.1: Project integration Management



## **The Lesson 5**

### **Project Management System and Monitoring**

#### **Introduction**

The purpose of the lesson five is to study the relationship between project management in accordance with monitoring project operation, performance and the impact. Understand the basic concepts is important in this regard.

According to traditional forms of management there are three elements in project management (Nicholas, J. M. 2001)n;

The Project Manager: person whose single overriding responsibility is to plan, direct and integrate the work efforts of participants to achieve project goals.

The project team: Form a single cohesive team working toward a common goal.

The project management system: the project manager and project team must have available and utilize “project management system”

Thus project management system is composed of organization structure, information processing and practices and procedures that permit integration of the vertical and horizontal elements of project organizations (ibid). Vertical elements

includes the breakdown of all tasks in the project and the horizontal elements includes the functional units and the departments involved in the project (see fig 5.1) .Thus PMS use in structured and consolidated management functions such as planning, organizing, communicating and controlling as the means for (Ibid);

1. Identification of tasks
2. Identification of resource requirements and costs
3. Determines the priorities
4. Planning and updating schedules
5. Monitoring and controlling end-item quality and performance
6. Measuring project performance

According to Nicholas, J. M. (2001), the tasks of the PMS includes following steps.

1. Work Breakdown Structure and work package to define all work to be done
2. An organization structure to integrate people and functional areas with the WBS and responsibilities
3. Project schedule to provide a basis for work package resource allocation and work timing
4. Cost accounts that indicates the basis for project cost aggregation and control
5. Budget to define expected costs for each costs account and work package
6. Means for collecting and storing project management information and performing evaluation
7. Means for reporting information
8. Means for management direction and corrective action

If assumes that the essence of a project is converting resources into desired results, It means inputs (resources) were used for intended change (outcomes) through a process of input-output activity related with effects and impacts. Effects were defined as the short term outcomes derived from the project while the impact defined as the long term change in the welfare of individuals and the society.

As part of the project management process monitoring becomes the core activity to be performed throughout the project cycle. So monitoring become the key activity of measuring effects and the impacts of the project. More broadly monitoring was defined as follows:

“A continuous /periodic review and surveillance by management, at every level of implementation of an activity to ensure that input deliveries, work schedules, targeted outputs and other required actions are proceeding according to plan “ (Rajakutty, S. 2008):

Monitoring has defined by various meanings.

It is a process of measuring recording, collecting, processing and communicating information to assist project management decision making.

Thus it implies that monitoring system is an information system management decision making. It includes a project’s operations, performance and impacts that viewed concerning economic and technical efficiency. It should be aimed:

Whether the various tasks are carried out according schedule;

Whether projects results are likely to lead in realization of project objectives;

Whether project objectives /targets / execution needs adjustment;

Now it is clear that monitoring is a management function which begins with the initiation of the project and ends with completion of the project. It is a continuous process over the project cycle.

## **Tools of Project Planning and monitoring**

The technical content of project plans is designed on following tools. These tools are used as the means of monitoring project activities and the impact.

1. Work Breakdown Structure and work Package: used to define project work and break it down it into various tasks
2. Responsibility Matrix: Used to define project organization, key Individuals and their responsibilities
3. Events and Milestones: Used indicate critical points and major occurrence
4. Gantt Charts: Used to display the project master schedules and detailed activities

## **The Lesson 6**

## AN INTRODUCTION TO COST BENEFIT ANALYSIS (CBA)

CBA is an assessment method used for quantifying policies, programs, projects and demonstrations or any interventions in monetary terms with a view to see its all consequences (Boardman, E. et al, 2008). According to Benjamin Franklin, it is a systematic cataloguing of impacts as benefits (pros) and costs (cons). It values in dollars and then determines the net benefits of the proposal relative to the **status quo** (net benefits equal to Benefits-costs). Thus it is a systematic approach to estimating the strengths and weaknesses of alternatives that satisfy transactions, activities or functional requirements for a business (Wikipedia, 2016).

In CBA, it values all the costs and benefits to the society as whole. It refers as social cost benefit analysis and symbolizes as follows.

$$NSB = B - C$$

### 6.1 Purpose of Using CBA

CBA is mainly used by governments and private sector businesses in view of assessing the desirability of a given policy or expected balance of benefits and costs in accordance with foregone alternatives and the status quo. Thus as a technique that used to determine options of development interventions, it has two purposes:

1. To determine if it is a sound investment/decision (justification/feasibility),
2. To provide a basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much

CBA is used mainly for social decision making in view of more efficient allocation of society's resources and assess the effects and impacts (Boardman, E. et al, 2008).

### 6.2 Types of CBAs

Though CBA is related to cost effective analysis, it has some distinct features apart from CBA analysis. Thus four types of CBAs are used.

1. Ex-Ante: is commenced while the project or the policy is under consideration. It assist in the decision about whether scarce resources should be allocated by government to specific policy or project immediately
2. Ex-post: Ex post analysis is conducted at the end of a project or a policy.

3. In Medias Res: Studies are performed during the life of the project or the policy.
4. Comparison of Ex-Ante and Ex post: This sort of comparative CBA is useful to policymakers for learning efficacy of CBA.

### 6.3 Evaluation Process

Following steps are to be applied in the process of CBA (Boardman, E. et al, 2008).

1. List alternative projects/programs.
  2. Decide whose benefits and costs count (List stakeholders)
  3. Catalogue impacts and Select measurement indicators and measure all cost/benefit elements.
  4. Predict outcome of cost and benefits over relevant time period.
  5. Convert all costs and benefits into a common currency.
  6. Discount benefits and costs to obtain present value (Apply discount rate)
  7. Calculate net present value of project options.
  8. Perform sensitivity analysis
  9. Make recommendations
- 
1. List alternative projects/programs

Specify set of alternative projects by considering opportunities foregone due to the project. For instance, there would be many alternatives for a highway construction project i.e. rail way or a water canal. If we assume that a high way project designed by the government, it may determine on certain dimensions i.e. size (how many lanes), road surface, routing, fees and timing etc.

Since the CBA compare net social benefits with foregone or the displaced project, it refer as counter factual. According to Boardman, E. et al, 2008, counter factual **status quo** that indicate net social benefits as indicated in table 6.1. The table 6.1

shows social benefits of proposed high way project varied as with toll and without toll alternatives.

The table 6.1: CBA Analysis for the Proposed High Way

Item	No Tolls		With Tolls	
	Global Perspective	Provincial Perspective	Global Perspective	Provincial Perspective
<b>Project benefits</b>	A	B	C	D
Time and operating cost savings	389.8	292.3	200.4	217.8
Prospect value of High way	53.3	53.3	53.3	53.3
Safety Benefits (lives)	36.0	27.0	25.2	18.9
Alternative Route Benefits	14.6	10.9	9.4	7.1
Toll Revenue	-	-	-	37.4
New Users	0.8	0.6	0.3	0.2
Total Benefits	494.5	384.1	378.	334.7
<b>Project costs</b>				
Constructions	338.1	338.1	338.1	338.1
Maintenance	7.6	7.6	7.6	7.6
Toll Collection			8.4	8.4
Toll Booth Construction			0.3	0.3
Total Costs	345.7	345.7	354.4	354.4
<b>Net Social Benefits</b>	148.8	38.4	24.2	-19.7

Source: Quoted from Boardman, E. et al, (2008) Cost-Benefit Analysis: Concepts and Practice, Pearson Education

Note that sometimes, **status quo** is not the valid criterion to decide valid alternative. If the project would displace specific alternative, then the project should be evaluated by comparing displaced option instead of hypothetical option.

For instance, if the government decided to allocate limited resources for transport project either high way or new railway, then the project should compare with railway project cost and benefits, not on the **status quo**. But comparison with different projects is not easy because comparison is difficult with projects such as health, poverty, social development (Boardman, E. et al, 2008).

## 2. Decide whose benefits and costs count (List stakeholders)

Selecting stakeholders are decide by the government or the implementing agency. But selections based on the domestic requirements are not always identical with global perspective that concern every one and eco system. E. g. global climate change.

## The Lesson 7

### Financial Analysis

## What is Financial Analysis?

According to Investopedia, financial analysis is the process of evaluating businesses, projects, budgets and other finance-related entities to determine their performance and suitability (Investopedia, May, 2017). Thus it is used to analyze whether a project is stable, solvent, liquid or profitable enough to warrant a monetary investment (Wikipedia, 2017).

**Profitability** – The ability of project to earn income and sustain growth in the short-run and long-run. A company's degree of profitability is usually based on the income statement which reports on the company's results of operations;

2. **Solvency** - its ability to pay its obligation to creditors and other third parties in the long-term;
3. **Liquidity** - its ability to maintain positive cash flow, while satisfying immediate obligations;

*Both 2 and 3 are based on the company's balance sheet, which indicates the financial condition of a business as of a given point in time.*

4. **Stability** - the firm's ability to remain in business in the long run, without having to sustain significant losses in the conduct of its business. Assessing a company's stability requires the use of both the income statement and the balance sheet, as well as other financial and non-financial indicators.

It also defined as financial statement analysis or accounting analysis or Analysis of finance that refers to an assessment of the viability, stability and profitability of a business, sub-business or project (Wikipedia, 2017).

According to literature, financial analysis could be conducted by two ways i. e. corporate (business) finance and investment finance settings.

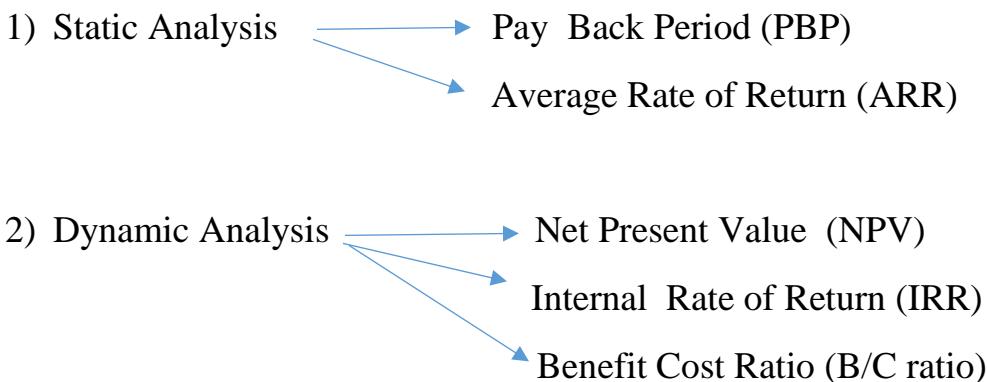
In business finance, the analysis is conducted internally, using measures such as net present value (NPV) and internal rate of return (IRR). A key area of corporate financial analysis involves generalizing a company's past performance, such as gross revenue or profit margin, into an estimate of the company's future performance. This allows the business to forecast budgets and make decisions based on past trends, such as inventory levels.

In investment finance, an outside financial analyst conducts financial analysis for investment purposes. It conducts as a top-down or bottom-up investment approach.

A top-down approach looks for macroeconomic opportunities, such as high-performing sectors and to find the best companies within that sector. A bottom-up approach, looks at a specific company and conducts similar ratio analysis to corporate financial analysis (ibid).

Financial analysis were distinguished as horizontal and vertical analysis. Horizontal Analysis which involve in analyzing financial statements for a number of years are regarded as dynamic factors. On the other hand, vertical Analysis is performed for counting financial ratios for one year only. So It is also known as static analysis.

So the financial analysis of private and public projects are based mainly on two approaches that determined on following methods.



## Static Analysis

### Pay Back Period (PBP)

According to Investopedia the payback period is the length of time required to recover the cost of an investment. It is an important determinant to undertake the project, as longer payback periods are typically not desirable for investment positions. Compared dynamic financial methods i. e. NPV, IRR and B/C it ignores the time value of money. It calculated by counting the number of years that takes to recover the cash invested. If it takes five years to recover the investment of project, it's payback period is five years.

### Counting Pay Back Period (PBP)

The formula to calculate payback period of a project depends on whether the cash flow per period of the project is even or uneven. If it is even, following formula is used:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Cash Inflow per Period}}$$

$$\text{PBP} = \frac{\text{Amount of Investment}}{\text{Annual Return}} = \frac{10,00,000}{3,00,000} = 3.3$$

According to above example it is assumed that the production capacity and the annual returns are not changed annually. But counting is somewhat complicated when the production capacity change annually because annual return are also varied accordingly.

When cash inflows are uneven, need to calculate the cumulative net cash flow for each period and then use the following formula for payback period:

$$\text{Payback Period} = A + \frac{B}{C}$$

**A** is the last period with a negative cumulative cash flow;

**B** is the absolute value of cumulative cash flow at the end of the period A;

**C** is the total cash flow during the period after A

Example:

Rice miller Gamini is planning to undertake another mill requiring initial investment of \$50 million and is expected to generate \$10 million in Year 1, \$13 million in Year 2, \$16 million in year 3, \$19 million in Year 4 and \$22 million in Year 5. Calculate the payback value of the project.

Solution

( in millions Rupees )		Cumulative Cash Flow
Year	Cash Flow	
0	(50)	(50)
1	10	(40)

2	13	(27)
3	16	(11)
4	19	8
5	22	30

### Payback Period

$$= 3 + (|-\$11M| \div \$19M)$$

$$= 3 + (\$11M \div \$19M)$$

$$\approx 3 + 0.58$$

$$\approx 3.58 \text{ years}$$


---

### Advantages of PPB

1. Payback period is very simple to calculate.
2. It can be a measure of risk inherent in a project.
3. For companies facing liquidity problems, it provides a good ranking of projects that would return money early.

### Disadvantages of payback period are:

It does not take into account time value of the money

It doesn't consider the profitability of project after the payback period. Hence it could come to wrong decision for the profitable projects in the long run. See the example 3.

Example 3: There are two projects i.e. C and D

Year	Project C	Project D
0	100,000	100,000
1	50 000	20 000
2	30 000	20 000
3	20 000	20 000

4	10 000	40 000
5	10 000	50 000
6		60 000

According to this example it could be regard the project C as the suitable project considering the short payback period, which is PBP is 3 years. But it seems that the project D is more profitable during 4, 5 and 6 year periods. According to the criterion more profitable projects could ignore.

So in order to avoid the limitations of PBP criterion It suggested to use discounted cumulative cash flow as follows (prasanna, 2009).

year	Cash flow	Discount rate 10%	Present value	Discounted cumulative cash flow

Financial Analysis <http://www.investopedia.com/terms/f/financial-analysis.asp#ixzz4htXPNptU>

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## The Lesson 8

### Sensitivity Analysis

What is Sensitivity Analysis?

According to the 2000 edition of CIMA Official Terminology, sensitivity analysis is a “modelling and risk assessment procedure in which changes are made to significant variables in order to determine the effect of these changes on the planned outcome.”

Thus, Sensitivity analysis is a useful decision-making tool that gives a feel for how a project's results might be affected by changes to the values of critical variables under uncertainty and different contingencies (Bob Scarlett, [www.cimaglobal.com/Documents/ImportedDocuments/ci\\_feb\\_03\\_p17-18.pdf](http://www.cimaglobal.com/Documents/ImportedDocuments/ci_feb_03_p17-18.pdf)).

So it is an analysis of uncertainty that focused on uncertainty quantification and propagation of uncertainty. The uncertainty may occur both in terms of predicted impacts and monetary valuation of each unit of the impact (Boardman, E. et al, 2008). For example, according our highway analysis, analyst may be uncertain about the predicted number of lives saved and the amount of cost saved from fuel. He / She may also uncertain about the suitable social discount ratio and level of standing. Therefore, the assumptions in a CBA analysis could be varied.

The process of calculating impacts of the project under different contingencies is based on the following steps (Wikipedia, 2017).

- Testing the robustness of the results of a model or system in the presence of uncertainty.
- Increased understanding of the relationships between input and output variables in a system or model.
- Uncertainty reduction, through the identification of model inputs that cause significant uncertainty in the output and should therefore be the focus of attention in order to increase robustness (perhaps by further research).
- Searching for errors in the model (by encountering unexpected relationships between inputs and outputs).
- Model simplification – fixing model inputs that have no effect on the output, or identifying and removing redundant parts of the model structure.
- Enhancing communication from modelers to decision makers (e.g. by making recommendations more credible, understandable, compelling or persuasive).
- Finding regions in the space of input factors for which the model output is either maximum or minimum or meets some optimum criterion (see optimization and Monte Carlo filtering).
- In case of standardizing models with large number of parameters, a primary sensitivity test can ease the calibration stage by focusing on the sensitive parameters. Not knowing the sensitivity of parameters can result in time being uselessly spent on non-sensitive ones.
- To seek to identify important connections between observations, model inputs, and predictions or forecasts, leading to the development of better models.

Sensitivity analysis is a more general approach than its more specific, quantitative equivalents, and it can be used in many areas of business decision-making with varying levels of refinement. Consider the following simple example of a project proposal to make and sell goods over three years: Initial capital cost of the business is £4,000. Its annual unit sales are 100 and selling price per unit is £60. Variable cost per unit is £35 and fixed costs per year is £900. If you evaluate this project using an appropriate discount rate – say, 6 per cent, you would get the following result:

Year	Cash flow (£)	Discount	PV
0	-4000	1000	-4000
1	1600	0.943	1509
2	1600	0.890	1424
3	1600	0.840	1343
Net Present Value		NPV =276	

Thus according to the example, it shows a positive NPV that indicating it is a viable project. Nonetheless in most practical situations there are uncertainties. So actual situation could represent the mean or most likely outcomes from a range of possibilities. According to the example, the figure of 100 unit sales per year is an estimated value. Actual sales in any one year could be above or below the estimated value.

Thus a sensitivity analysis aimed to predict the uncertainty under contingencies by predicting overall outcome of the project along with a range of alternative annual unit sales results under worst, normal and best scenarios. For example, it might be judged that a worst-case situation would be 90 annual sales units and a best case situation would be 110 units. Thus three alternative outcomes would be as follows.

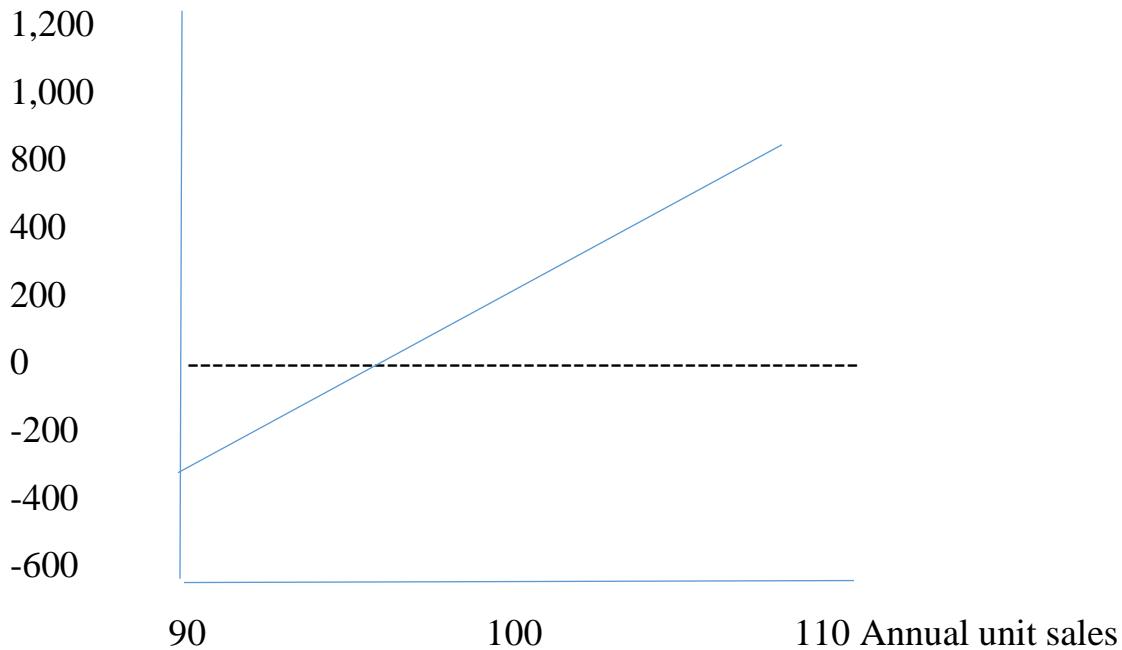
Worst Case scenario → 90 unit sales - NPV -391

Normal scenario → 100 sales unit – NPV 276

Best case scenario → 110 sales unit - NPV 945

The sensitivity analysis of the project could be illustrated graphically (see figure 8.1).

Fig 8.1: Sensitivity Analysis



The graph provides the following insights: around 70 per cent of possible outcomes in the range of 90 to 110 annual unit sales give a positive NPV. It shows annual sales of 96 units or greater are required to give a positive NPV. “Presenting the sensitivity analysis in this way gives an impression of the dynamics of the situation, but it’s still an imperfect one because it is unlikely that annual unit sales are the only uncertain element”

As mentioned in Cima global.com, It is possible that all elements are uncertain. You might conduct a sensitivity analysis to get an idea of which of them gives rise to the greatest uncertainty in the overall outcome. For example, you could consider the impact on the project’s NPV of a 2.5 per cent adverse variance in each element in turn. So NPV is recalculated with an initial capital cost of £4,100 (ie, £4,000 x 1.025) with all other factors held constant and so on. This process gives the following insights: 1 A relatively small proportional change in any one of the elements produces a much larger change in the overall outcome. The viability of the project is more vulnerable to some key variables than it is to others. The NPV of this project seems particularly sensitive to unit selling price,

given that a 2.5 per cent adverse variance in this element causes a 144 per cent adverse variance in NPV. It may be possible to re-engineer a project in some way to alter its risk/return.

## Limitations

Following limitations were recognized in applying sensitivity analysis (Sharma, Anand Kumar, 2006).

It merely shows what happens to NPV without providing any idea how likely that change will be.

In a sensitivity analysis, only one variable is changed at a time,. But in the real world, variables tend to move together.

It is inherently a very subjective analysis. So it might be accepted or rejected by a policy maker

## The Lesson 9

### Social Cost benefit Analysis

The social cost benefit analysis is a tool for evaluating the value of money of public investment. According to Wikipedia, it is a systematic approach to

estimating the strengths and weaknesses of alternatives. It is used to determine options that provide the best approach to achieve benefits while preserving savings. The need for the SCBA is that it does not accept that the actual benefits of projects adequately measure social benefits and the social cost that related to harmful consequences and damages on public. It may occur due to prevailing market prices does not reflect actual benefits and costs. For example, no perfect markets behavior in many developing countries and hence market distortions occurred. Thus the objective of social cost benefit is to secure and archive the value of money in economic life by evaluating the costs and benefits of alternative economic choices and select the best alternative which offers the largest social benefits. It is also a **known factor that though the NPV criterion leads to select more efficient allocation of resource, it doesn't select the most efficient alternative (Boardman, E. et al, 2008)**. The formula of SCBA is denote as follows:

$$NSB = B - C$$

SCBA involves the following steps ((Sharma, Anand Kumar, 2006).

1. Estimates of costs and benefits which will accrue to the project implementing body.
2. Estimates of costs and benefits which will accrue to individual members of the society as consumers or suppliers of factor inputs
3. Estimate of costs and benefits which will accrue to the community
4. Estimates of costs and benefits which will accrue to the national exchequer
5. Discounting the costs and benefits which will accrue over a period of time to determine the feasibility of project

## 9.1 Main Features of CBA

It covers 5 distinct features

1. Assessing the desirability of the projects in the public
2. Identification of costs and benefits
3. Measurements of costs and benefits
4. The effect of risk and uncertainty in investment appraisal
5. The presentation of results-The investment criteria

## 9.2 Discrepancies in SCBA

1. Market imperfections
2. Externalities
3. Concern for Savings
4. Concern for Redistribution
5. Taxes and Subsidies
6. Merit Wants

### 9.3 Main Tools used for SCBA

1. Little-Mirrlees Approach (L&M Approach)
2. UNIDO approach(United nation's Industrial Development Organization)

## The Lesson 10

### **Little-Mirrlees Approach (L&M Approach) and UNIDO Approach**

Despite the limitations in SCBA still it is applicable to the tactical decision making within the borderer planning framework that based on wider range of considerations (Sharma, A. K. 2006). Considering the main Discrepancies of counting SCBA i.e. Market imperfections, Externalities, Concern for savings, Concern for redistribution, Taxes and subsidies and Merit wants, SCBA evaluating methods were developed by economists. There are two famous methods used in SCBA analysis namely;

1. Little-Mirrlees Approach (L&M Approach)
2. UNIDO approach(United nation's Industrial Development Organization)

Those methods were focused mainly on counting shadow prices of capital, labour and non-traded goods.

### Little -Mirrlees Approach (L&M Approach)

This method was presented by J. M. D. Little and Mirless in 1969 and it was further developed in 1974 and published as a manual of industrial project analysis in developing countries. According to L&M approach all the costs and benefits of the project is assessed in terms of international price or world price using the boarder price. Savings or uncommitted social income is used as the measure. Unlike the UNIDO method which the analysis based on different stages L& M method viewed these considerations together.

The output and inputs of projects were classified into following categories;

1. Traded goods and Services
2. Non-traded goods and Services
3. Labour

Accordingly the shadow price of traded goods are counted as follows;

For Exports FOB price (Free on Board) price and

For imports CIF price (Cost Insurance freight)

The boarder price represent correct social opportunity cost and benefits.

### Accounting Price of Non Traded Goods

Goods like land, building transportation and electricity are not amenable to foreign trade. So there is no border price and it is defined in terms of marginal social cost and marginal social benefits.

It is estimated by counting weighted values of marginal utility and the increased income

### UNIDO (United Nations Industrial Development Organization's) Approach

This method was presented by Dasgupta, A. Marglin, S. and Sen, A. K. (1972) for UNDP and hence it known as the UNIDO approach.