Mount Kenya University

P.O. Box 342-01000
Thika
Email: Info@mku.ac.ke
Web: www.mku.ac.ke

DEPARTMENT OF BUSINESS AND SOCIAL STUDIES

COURSE CODE: ENT 322

COURSE TITLE: PROJECT ANALYSIS AND MANAGEMENT

Instructional Material for BBM - distance learning

ENT 322: PROJECT ANALYSIS AND MANAGEMENT

Contact hours*:* 42
Pre-requisites: BBM 212

Purpose: To familiarizing students with feasibility studies and at enabling them to understand how investors and appraisers make decisions affecting the profitability of a venture and a project's viability in economic and social terms

Expected Learning Outcomes of the Course:
By the end of the course, students should be able to:-

i) Describe the relationship of projects and plans
ii) Describe the project cycle
iii) Discuss project financing
iv) Discuss project implementation, monitoring and evaluation

Course Content:
Projects and plans relationship; Project cycle, project appraisal; Project identification; Project preparation (feasibility study)- Market and Demand analysis, Raw material and supply study, Location, site and environmental analysis, Production program and plant capacity, Technology and engineering study; Human recourse and organization; Financial and economic analysis; Project financing; Project document and; Project monitoring and evaluation

Course Outline

WEEK 1
CHAPTER ONE: INTRODUCTION

- Definitions- A project; Project Plan; Project Planning National Plans; Sectoral Plans; Project Management
- Relationship between projects and plans
- History of Project Management

WEEK 2
CHAPTER TWO: PROJECT CYCLE AND PROJECT IDENTIFICATION

- The Warren C. Baum (World Bank) Project Cycle
- The UNIDO Project Cycle: *New Industrial Projects*
- The UNIDO Project Cycle: *Rehabilitation and Expansion Projects*

WEEK 3
CHAPTER THREE: MARKET AND DEMAND ANALYSIS

- Situational Analysis and Specification of Objectives
- Collection of Secondary Information
- Conduct of Market Survey
- Characterization of the Market
- Demand Forecasting
- Market Planning

WEEK 4
CHAPTER FOUR: RAW MATERIAL AND SUPPLY STUDY

- Classification of Raw Materials and Supplies
- Specification of Requirements
- Availability and Supply
- Costs of Raw Materials and Suppliers

WEEK 5 & 6
CHAPTER FIVE: LOCATION ANALYSIS

- Natural environment,
- Socio-economic policies,
- Environmental impact assessment
- Infrastructural service, conditions
- Assessment of Location
- Site Selection

WEEK 7
CHAPTER SIX: PRODUCTION PROGRAM, PLANT CAPACITY, TECHNOLOGY AND ENGINEERING STUDY

- Production program-Determination of the production program
- Plant capacity
- Technology and Engineering Study- Definition of technology; Selection of Technology;
- Civil Works

WEEK 8 & 9
CHAPTER SEVEN: HUMAN RECOURSE AND ORGANIZATION

i) Categories and functions
ii) Social economic and cultural environment
iii) Project related requirements
iv) Organizational set-up
v) Availability and recruitment
vi) Training plan

WEEK 10 & 11
CHAPTER EIGHT: FINANCIAL AND ECONOMIC ANALYSIS AND PROJECT FINANCING

- Total Investment Costs
- Production Costs
- Marketing Costs
- Project Cash flows
- Financial Evaluation-Basic assumptions underline cash flow discounting in financial evaluation; Methods of Financial Evaluation- Net Present Value (NPV) Method;

Internal Rate of Return (IRR); Profitability Index (PI)/ present value index (PVI)/ benefit-cost ratio; Discounted Payback period

WEEK 12

CHAPTER NINE: PROJECT DOCUMENT

- The Main Body of the Project Document
- Preliminary Section of the Project Document

WEEK 13

CHAPTER TEN: PROJECT MONITORING AND EVALUATION

- Performance indicators
- The logical framework approach
- Theory-based evaluation
- Formal surveys
- Rapid appraisal methods
- Participatory methods
- Public expenditure tracking surveys
- Cost-benefit and cost-effectiveness analysis
- Impact evaluation

Course Assessment

Examination	- 70%
Continuous Assessment Test (CATS)	- 20%
Assignments	- 10%
Total	- 100%

Recommended Text Books:

i) Hansen, (1992), "Manual for the Preparation of Industrial Feasibility Studies", UNIDO

ii) Phil Baguley (2009), *Project Management*, Hodder & Stoughton

iii) Choudhury S. (2004), *Project Management*, Tata Mgraw Hill

iv) Chandra Prasanna, (2002), *"Projects: Planning, Analysis Financing Implementation and Review",* 5th Ed, Tata McGraw-Hill New Delhi

Text Books for further Reading:

i) Lock Denis, (2000), *"Project Management"*, 7th Ed, Gower Publishing Ltd: Vermont.

ii) Kezner Harold, (2002), *"Project Management: A System Approach to Planning*,

MODULE COMPILER: KENNEDY M. WAWERU

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CHAPTER ONE: INTRODUCTION

Learning Objectives

By the end of this chapter the learner should be able to:

i) Define a project, Project Plan, Project Planning and Project Management
ii) Discuss the advantages of project planning and project management
iii) Distinguish between Sectoral Plans and National Plans
iv) Explain the history of project management

1.1 Project

A project is a finite endeavor--having specific start and completion dates--undertaken to create a unique product or service which brings about beneficial change or added value. This finite characteristic of projects stands in sharp contrast to processes, or operations, which are permanent or semi-permanent functional work to repetitively produce the same product or service.

1.2 Project Plan

A ***project plan*** is "A formal, approved document used to guide both project execution and project control. The primary uses of the project plan are to document planning assumptions and decisions, facilitate communication among *stakeholders*, and document approved scope, cost, and schedule *baselines*. A project plan may be summary or detailed."

A project plan is alternatively defined as "a statement of how and when a project's objectives are to be achieved, by showing the major products, milestones, activities and resources required on the project."

In some industries, particularly information technology, the term "project plan" can to refer to a Gantt chart or other document that shows project activities along a timeline. While common, this use is inaccurate. These types of documents are more accurately described as ***project schedules*** and are only one component of a true project plan.

At a minimum, 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 milestones, be complete?

To be a complete project plan according to industry standards such as the PMBOK or UNIDO, the project plan must also describe the execution, management and control of the project. This information can be provided by referencing other documents that will be produced, such as a Procurement Plan or Construction Plan, or it may be detailed in the project plan itself.

1.3 Project Planning

Project planning is part of project management, which relates to the use of schedules such as Gantt charts to plan and subsequently report progress within the project environment.

Initially, the project scope is defined and the appropriate methods for completing the project are determined. Following this step, the durations for the various tasks necessary to complete the work are listed and grouped into a work breakdown structure. The logical dependencies between tasks are defined using an activity network diagram that enables identification of the critical path. Float or slack time in the schedule can be calculated using project management software. Then the necessary resources can be estimated and costs for each activity can be allocated to each resource, giving the total project cost. At this stage, the project plan may be optimized to achieve the appropriate balance between resource usage and project duration to comply with the project objectives. Once established and agreed, the plan becomes what is known as the baseline. Progress will be measured against the baseline throughout the life of the project. Analyzing progress compared to the baseline is known as earned value management

Advantages of Project Planning

i) Finish the project on time

ii) Continuous, uninterrupted work flow with no delays

iii) Cost Control

iv) Reduced amount of re-work, fewer changes

v) Increased knowledge of project status via timely reports to management

vi) Knowledge of scheduled times for key project parts

vii) Stability of people, defined responsibility and authority

viii) Clear understanding of who does what, when and for how much

ix) Integration of all work to insure a quality project for the owner

x) You run the project instead of the project running you

1.3.1 National Plans

These are cross-sectoral plans that address national issues they focus on a single nation. In countries with federal systems, provincial, state or territorial plans are similar in scope. National plans include national development plans usually undertaken by the ministry of finance or development planning, they are usually for a specific periods and include 5 year rolling plans they usually focus on increasing productivity, fiscal targets major infrastructural projects, human resources, structure of manufacturing industry, public sector enterprises and employment creation

1.3.2 Sectoral Plans

A Sectoral Plans concentrate on specific sectors of the country's economy such as the tourism sector, agricultural sector, mining, fishing, etc. The Sector Plan provides general guidelines directed towards ensuring the orderly and efficient development of a sector.

1.4 Project Management

Project Management is the discipline of *planning*, *organizing*, and *managing resources* to bring about the successful completion of specific project goals and objectives.

The primary challenge of project management is to achieve all of the project goals and objectives while adhering to classic project constraints--usually scope, quality, time and budget. The secondary--and more ambitious--challenge is to optimize the allocation and integration of inputs necessary to meet pre-defined objectives. A project is a carefully defined set of activities that use resources (money, people, materials, energy, space, provisions, communication, motivation, etc.) to achieve the project goals and objectives.

Benefits of project good management

i) **Better efficiency in delivering services**: Project management provides a "roadmap" that is easily followed and leads to *project completion.* Once you know where to avoid

the bumps and pots holes it stands to reason that you're going to be working smarter and not harder and longer.

ii) **Improved/increased/enhanced customer satisfaction**: Whenever you get a project done on time and under budget, the client walks away happy. And a happy client is one you'll see again. Smart project management provides the tools that enable this client/manager relationship to continue.

iii) **Enhanced effectiveness in delivering services**: The same *project management strategies* that allowed you to successfully complete one project will serve you many times over.

iv) **Improved growth and development within your team**: Positive results not only command respect but more often than not inspire your team to continue to look for ways to perform more efficiently.

v) **Greater standing and competitive edge**: This is not only a good benefit of project management within the workplace but outside of it as well; word travels fast and there is nothing like superior performance to secure your place in the marketplace.

vi) **Opportunities to expand your services**: A by-product of greater standing. Great performance leads to more opportunities to succeed.

vii) **Better Flexibility**: Perhaps one of the greatest benefits of project management is that it allows for flexibility. Sure project management allows you to map out the strategy you want to take see your project completed. But the beauty of such organization is that if you discover a smarter direction to take, you can take it. For many small-to-midsize companies, this alone is worth the price of admission.

viii) **Increased risk assessment**: When all the players are lined up and your strategy is in place potential risks will jump out and slap you in the face. And that's the way it should be. Project management provides a red flag at the right time: before you start working on project completion.

ix) **Increase in Quality**: Goes hand-in-hand with enhanced effectiveness

x) **Increase in Quantity**: Often the result of better efficiency, a simple reminder regarding the benefits of project management.

1.5 History of Project Management

As a discipline, project management developed from different fields of application including construction, engineering, and defense. In the United States, the forefather of project management is Henry Gantt, called the father of planning and control techniques, who is famously known for his use of the Gantt chart as a project management tool, for being an associate of Frederick Winslow Taylor's theories of scientific management, and for his study of the work and management of Navy ship building. His work is the forerunner to many modern project management tools including the work breakdown structure (WBS) and resource allocation.

The 1950s marked the beginning of the modern project management era. Again, in the United States, prior to the 1950s, projects were managed on an ad hoc basis using mostly Gantt Charts, and informal techniques and tools. At that time, two mathematical project scheduling models were developed: (1) the "Program Evaluation and Review Technique" or PERT, developed by Booz-Allen & Hamilton as part of the United States Navy's (in conjunction with the Lockheed Corporation) Polaris missile submarine program and (2) the "Critical Path Method" (CPM) developed in a joint venture by both DuPont Corporation and Remington Rand Corporation for managing plant maintenance projects. These mathematical techniques quickly spread into many private enterprises.

At the same time, technology for project cost estimating, cost management, and engineering economics was evolving, with pioneering work by Hans Lang and others. In 1956, the American Association of Cost Engineers (now AACE International; the Association for the Advancement of Cost Engineering) was formed by early practitioners of project management and the associated specialties of planning and scheduling, cost estimating and cost/schedule control (project control). AACE has continued its pioneering work and in 2006 released the first ever integrated process for portfolio, program and project management (Total Cost Management Framework).

In 1969, the Project Management Institute (PMI) was formed to serve the interest of the project management industry. The premise of PMI is that the tools and techniques of project management are common even among the widespread application of projects from the

software industry to the construction industry. In 1981, the PMI Board of Directors authorized the development of what has become *A Guide to the Project Management Body of Knowledge* (PMBOK Guide), containing the standards and guidelines of practice that are widely used throughout the profession. The International Project Management Association (IPMA), founded in Europe in 1967, has undergone a similar development and instituted the IPMA Competence Baseline (ICB). The focus of the ICB also begins with knowledge as a foundation, and adds considerations about relevant experience, interpersonal skills, and competence. The United Nations Industrial Development Organization has also developed a manual for the management of industrial projects.

Review Questions

i) Define a the following terms:
   a) A project
   b) A Project Plan
   c) Project Planning
   d) Project Management

ii) Differentiate project planning from project management and give the benefits of each

iii) Distinguish between Sectoral Plans and National Plans

References for further reading

iii) Lock Denis, (2000), *"Project Management"*, 7th Ed, Gower Publishing Ltd: Vermont.

iv) Kezner Harold, (2002), *"Project Management: A System Approach to Planning*,

CHAPTER TWO: PROJECT CYCLE

Learning Objectives

By the end of this chapter the learner should be able to:

i) Describe the key aspects of a project cycle

ii) Distinguish the project cycle of a new project and that of a rehabilitation project

This course takes a look at the key aspects two project cycles, the World Bank and the UNIDO project cycles

2.1 The Warren C. Baum (World Bank) Project Cycle

Project lending by the World Bank involves governments of underdeveloped countries in a series of activities and procedures which is designed to ensure that Bank funds are invested in sound, productive projects that contribute to the development of the borrower's economy as well as to its capacity to repay the funds advanced. Project development in relation to the aims and methods of the Bank, proceeds in a self-regenerating cycle of six phases, each following upon the last and the last in turn allowing the Bank to define new approaches and ideas which lead to the identification of new projects. These phases are identification, preparation, appraisal, negotiation, implementation and supervision, and evaluation**.** The project cycle is illustrated below:

1. Identification

Identification involves both Bank and borrower in the selection of suitable projects that support national and sectoral development strategies. Economic and sector analyses by the Bank provide an understanding of the development potential of the borrowing country, and a framework for assessing creditworthiness and for evaluating national and sectoral policies and problems. Continuing dialogue between Bank and country based on this analysis leads to the formation of a coherent development strategy and to the identification of projects which fit into it. These projects must meet the Bank standards of feasibility-they must involve technical and institutional solutions at costs commensurate with expected benefits. Once identified, they are incorporated into the Bank's lending programme for the particular country.

2. Preparation

In the preparation phase, feasibility studies are carried out to compare different technical and institutional alternatives, and to identify the solution most appropriate to the country's resource endowment and its stage of development. The borrower examines the technical, institutional, economic, and financial conditions necessary to achieve project objectives, while the 'Bank provides guidance and makes financial assistance available for preparation, or helps the borrower obtain assistance from other sources. This process typically requires one to two years.

3. Appraisal

Preparatory work culminates in the appraisal phase of the cycle, which involves a comprehensive; and systematic review of all aspects of the project by the Bank, and lays the foundations for project implementation and evaluation. Appraisal may take three to five weeks in the field, and covers four major aspects: technical, institutional, economic, and financial. During this process, the project may be extensively modified or redesigned. An appraisal report is drafted at Bank headquarters outlining the findings of the appraisal mission and making recommendations for the, terms and conditions of the loan. After extensive review, a Staff Appraisal Report is issued which serves as the basis for negotiations with the borrower.

4. Negotiations

Negotiations involve discussion between Bank and borrower on measures needed to ensure project success. The agreements reached are converted into legal obligations set forth in loan documents. The loan documents embody all of the principal issues that have been raised prior to and during appraisal, and ensure that borrower and Bank are in agreement on objectives, on the actions necessary to achieve them, and on the schedule for implementation. The appraisal report is amended to reflect the agreements reached, and is presented together with the loan documents to the executive directors of the Bank for approval. Once approved, the loan agreement is signed and the project is ready for implementation.

5. Implementation and Supervision

Project implementation is the responsibility of the borrower, while the Bank exercises a supervisory function. Supervision by the Bank, through progress reports from the borrower and periodic field visits, is intended to ensure proper execution of the project by identifying and correcting implementation problems. Monitoring and evaluation units incorporated into the project are used to gather information on project experience, to improve policies and procedures and for use in future planning. Procurement of goods and works for the project must follow official bank guidelines for efficiency and economy, and supervision focuses on ensuring that procurement rules are observed in practice. As a final step in supervision, the government prepares a completion report on the project at the end of the disbursement period. An annual review of Bank supervision experience on all projects under way is intended to stimulate continual improvement in policies and procedures.

6. Evaluation

Evaluation follows the final disbursement of Bank funds. An independent department of the Bank, the Operations Evaluation Department (OED), reviews the completion report and prepares its own audit of the project, usually by reviewing materials at headquarters, though field trips are made when needed. These reports re-estimate the economic rate of return on the basis of actual implementation costs and updated information on operating costs and expected benefits. The borrower is asked to comment on the OED audit. This ex post evaluation provides lessons from experience which are incorporated in the identification, preparation and appraisal of subsequent projects.

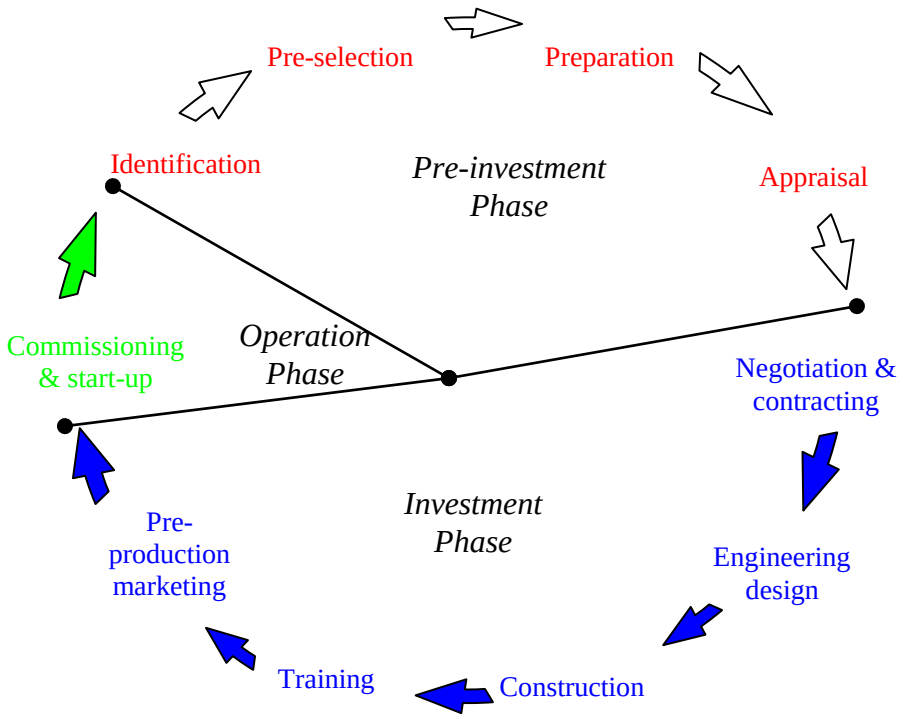
Discussion

World Bank procedures differ substantially from those of other financing agencies, and the criteria of different donors should be compared to determine which are least restricting to implementation and therefore most likely to lead to sound investments.

World Bank requirements could be less complex and more consecutive, and greater flexibility in adapting to their specified needs during project preparation would be much appreciated by the governments concerned. Procurement procedures are so complicated and time-consuming that it is frequently impossible to obtain the required materials within the time-frame specified and excessive conditions and provisions lead to great waste of time and resources, resulting in the escalation of project costs. Furthermore, lengthy planning risks disappointing the local people in their expectation of early realization of benefits, and worse, it allows a complete change in conditions to occur between the beginning of the planning period and the time when implementation is begun, which can invalidate the original project plan.

Originally conceived for the development of infrastructure, the World Bank cycle does not seem appropriate to the requirements of rural development, in particular to those of pastoral projects. For the latter, the planning process should be simplified and made more dynamic, and should enable project proposals to be tested on a small scale before being fully implemented in the field. Greater flexibility should be allowed in the implementation process, and operation evaluation must occur early enough for results to be incorporated into subsequent stages. Finally, it was confirmed that while project supervision should provide an opportunity for effecting changes in implementation, it can be counterproductive when the advice of successive missions is contradictory and ill-informed as a consequence of changes in personnel.

2.2.1 The UNIDO Project Cycle: *New Industrial Projects*



1. The Pre-investment Phase

This phase comprises several stages:

*i) Identification of projects or investment opportunities (opportunity studies)**

ii) Analysis of project alternatives, preliminary project selection and project preparation (pre-feasibility and feasibility studies)

iii) Project appraisal and investment decision (appraisal report)

a) Opportunity Studies

The identification of investment opportunities (projects) is the starting point of a series of investment-related activities. To generate information on viable investment opportunities, two approaches could be used: *the macro-economic approach and the micro-economic approach*

i) Macro-economic Sources of Project Ideas

This is often associated with the compilation of area industrial, sector and resource-based studies. These studies analyze the following:

- Natural resources with potential for processing and manufacture. e.g. timber for wood based industries
- Existing agricultural patterns that serve as a basis for agro based industries
- Imports in order to identify areas for import distribution

- Environmental impact
- Possible backward or forward integration for existing industries e.g. a downstream petrochemical with a refinery
- Possible inter-linkage with other industries indigenous or transnational
- Manufacturing sectors successful in other countries with similar economic background and levels of development, capital labor and natural resources
- Diversification possibilities e.g. from a petrochemical complex into the pharmaceutical industry
- General investment climate
- National, sectoral industrial policies
- Availability and cost of production factors
- Export possibilities
- Constraints to development such as infrastructure and desire for self sufficiency in critical area such as energy etc

ii) Micro-economic Sources of Project Ideas

This approach is mainly concerned with the review of the investment ideas of:

- Industrialists, Entrepreneurs and Venture capitalists etc
- Investment promotion offices
- Financial institutions
- Research institutions
- Corporations both domestic and foreign

These investment ideas spring from identification of unsatisfied needs, underutilized natural or human resources, constraints to development, desire to complement or expand existing investments etc

Opportunity studies are rather sketchy in nature and rely more on aggregate estimates rather than on detailed analysis. Cost data are usually taken from comparable existing projects and not from quotations of sources such as suppliers. Depending on the prevailing situation, either a ***general opportunity study*** (sector approach) or a ***specific opportunity study*** (enterprise approach) or both will have to be undertaken.

General opportunity studies

General opportunity study may be divided into three categories:

- Area studies to identify opportunities in a given area
- Industry studies to identify opportunities in a delimited industrial branch
- Resource-based studies to reveal opportunities based on the utilization of natural resources

Specific project opportunity studies

A specific project opportunity study may be defined as the transformation of a project idea into a broad investment proposition. This study usually springs from general opportunity studies, in the form of products with the potential for domestic manufacture. The purpose of Specific project opportunity studies is to arrive at a quick and inexpensive determination of the salient facts of an investment possibility. It therefore should not involve any substantial cost in it preparation

b) Preliminary screening (pre-selection)

In order to reduce the potential project to a manageable number, Preliminary screening is necessary. Preliminary screening is usually done by experienced professionals with the aims of eliminating project ideas that are technically unsound and risky. The promising project ideas can then move to the pre-feasibility study stage

c) Preparation (pre-feasibility and feasibility studies)

i) Pre-feasibility studies

Since feasibility studies are costly and time-consuming, before assigning larger funds for such a study, a further assessment of the project idea might be made in a pre-feasibility study.

The objectives of the pre- feasibility are to determine whether:

- All possible project alternatives have been examined
- The project idea justifies a detailed analysis by a feasibility study
- Any aspects of the project critical to the project that may require in depth investigation through functional studies
- Environmental situation at the planned site and the potential impact of the projected production process are line with national standards.

The structure of a pre-feasibility study is the same as that of a feasibility study, the difference being in the degree of detail of the information obtained and the intensity with which the project alternatives are discussed. As such the pre-feasibility study should be viewed as an intermediate stage between a project opportunity study and a detailed feasibility study.

The pre-feasibility study is structured to review the following:

- Project or corporate strategies and scope of the project
- Market and marketing concept
- Raw materials and factory supplies
- Location site and environment
- Engineering and technology
- Organization and overhead costs
- Human resources, in particular managerial (entrepreneurial), staff, labor costs and training requirements and costs
- Project implementation schedule and budgeting.

The economic implication of each of the above mentioned factors should be assessed. Occasionally investors with complete knowledge of project conditions may prepare a comprehensive opportunity study and then bypass the pre-feasibility study to the feasibility study

Functional (support) studies

Functional or support studies cover specific aspects of a project and are required as prerequisites for, or in support of, pre-feasibility studies and feasibility studies, especially for large-scale investment proposals. Examples of such studies include the following:

- Market studies of products to be manufactured, including demand projections in the market and the anticipated penetration
- Raw material and factory supplies, covering current and projected availability and price trends
- Laboratory and pilot-plant tests, done to the extent necessary to determine raw material suitability
- Environmental impact assessment
- Economies of scale studies
- Equipment selection studies

When a basic input may be a decisive factor in determining the viability of a project, the support study is carried out before commissioning a pre-feasibility study. In most cases the results of a feasibility study, when undertaken prior or together with a feasibility study form an integral part of the latter and lessen its burden and cost.

ii) Feasibility studies

A feasibility study should provide all data necessary for an investment decision. The commercial, technical, financial, economic and environmental dimensions of the project should be defined and critically examined. The final estimates of the above factors should be worked out with the greatest accuracy an iterative optimization process, with feedback and inter-linkages including identification of all commercial, technical and entrepreneurial risks. All assumptions in data and solutions selected should be described and justified to facilitate appraisal. A feasibility study must not necessarily lead to investment recommendation. Where a project is deemed unviable by a feasibility study, this should be stated and the reasons given. A feasibility study should only be carried out if the necessary financing for the project can be identified because the is no point in a feasibility study if there will be no funds for the project. Thus project financing should be considered as early as the feasibility stage.

c) Appraisal

When a feasibility study is completed, the various parties involved will carry out their own appraisal of the project in accordance with their individual objectives. Irrespective of the individual objectives, the aspects of project appraisal will include: technical commercial, financial, and managerial. The better the quality of feasibility study the easier the appraisal work. Project appraisal carried out by financial institutions deals with the financial health of the company to be financed, the returns to equity holders and protection of its creditors. Each proposal is subjected to sensitivity analysis in order to take care of multiple adjustments of input and output factors. Appraisal reports deal with not only the project but also with the industries in which it will be carried out and its implications for the economy as a whole. The implications deal with such issues as: whether the project is the least cost alternative in reaching the sector objectives, whether the timing is right, whether the sector needs additional investments, whether the project meets the most urgent needs of the sector etc

2. The Investment Phase

Also called the implementation phase, it begins once the decision to invest is reached; the phase is divided into the following stages:

i. Establishing the legal, financial and organizational basis for the implementation of the project.

ii. ***Technology acquisition and transfer, including basic engineering.***

iii. ***Detailed engineering design and contracting, including tendering, evaluation of bids and negotiations***. Detailed engineering design will include site preparation final selection of technology construction planning and time scheduling as well as flow charts and scale drawings preparation. Negotiations are concerned with legal obligations arising from the acquisition of technology, construction of buildings, purchase and installation of machinery, and financing

iv. ***Acquisition of land construction work and installation.*** This involves site preparation construction of buildings and other civil works, together with erection and installation of equipment

v. ***Pre-production marketing, including the securing of supplies and setting up of the administration of the firm.*** This and secures critical supplies prepares the market for the new product

vi. ***Recruitment and training of personnel.*** This stage proceeds simultaneously with the construction stage to ensure timely commissioning and the expected growth in productivity and efficiency in plant operations.

vii. ***Plant commissioning and start-up.*** It is usually a brief but technically critical span in project implementation. It links the preceding construction phase with the operational (production) phase. The success achieved in this stage demonstrates the effectiveness of implementation planning and execution of the project and has a bearing on the future performance of the project.

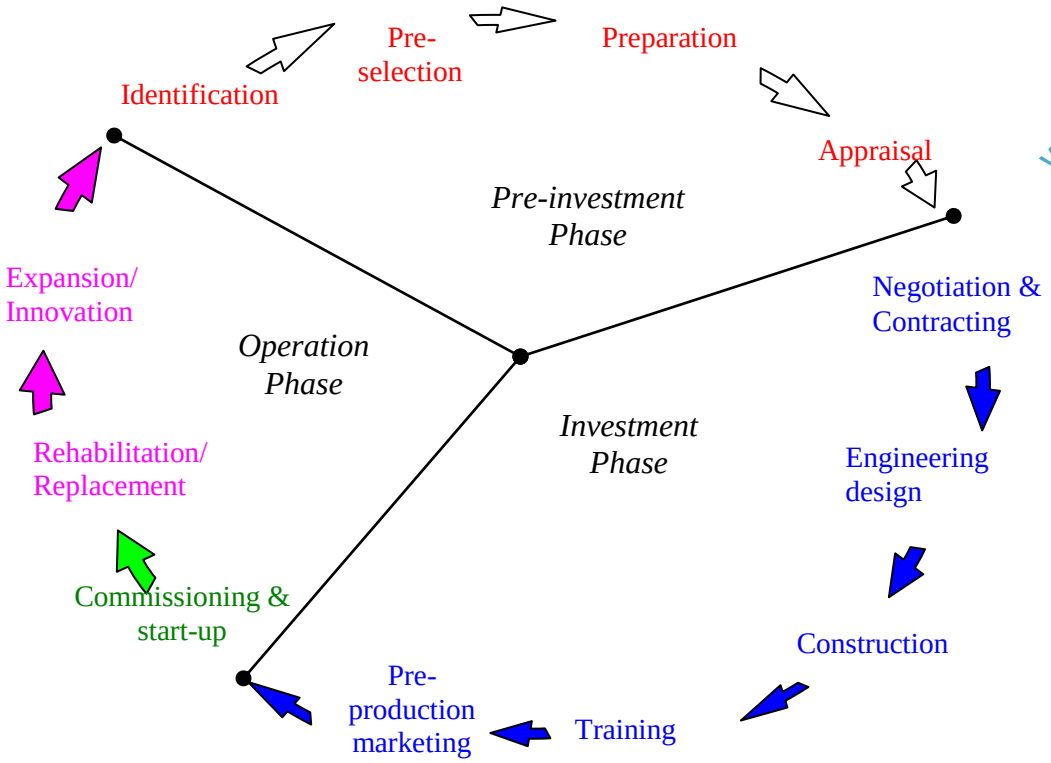
Good project planning and efficient project management must ensure that the necessary action is taken such as training of personnel and the delivery of all the production inputs before start-up. Any delays or gaps in planning would have negative impacts on the successful implementation. Methods such as CPM and PERT have been developed to ensure careful scheduling. A continuous comparison of forecasts made in the feasibility study with actual investment and production cost data accruing during the investment phase is necessary in order to monitor and control the resultant changes in profitability, which may in turn require adjustments in the financing of the project.

3. The Operational Phase

This is the production phase that commences after commissioning and start-up. The resultant challenges of this phase are viewed from the short-term perspective and long-term perspective. In the shot-term challenges may arise with regard to application of production techniques operation of equipment, inadequate labor productivity etc. The long-term view relate to the chosen strategies and the associated production and marketing costs as well as sales revenues. These have a direct relationship on the projections made during the pre-investment phase. If they prove faulty any remedial measure will not only prove difficult but may be too expensive.

2.2.2 Rehabilitation and Expansion Projects

The UNIDO project cycle that incorporates rehabilitation and expansion projects is illustrated below:



NOTE: *It should be noted that rehabilitation and expansion are not stages flowing from commissioning and start-up of the project, but rather conceptually different activities each with their own cycle*

Rehabilitation

Rehabilitation involves subjecting ailing factories/projects to complete technical, commercial, financial and economic reviews, in order to increase the efficiency of their operations and their profitability and to maintain them as independent entities, as well as decide on their amalgamation with other plants or even their complete shut down. Rehabilitation proceeds in the following carefully planned stages:

a) ***Pre-diagnostic stage.*** This involves the survey of the economy and industrial sector or branch, to identify the potential candidate enterprises and to choose the enterprises to be rehabilitated

b) ***Diagnostic stage.*** The weaknesses in the chosen industries as well as the means of rehabilitation are identified. This stage covers each aspect of the enterprise including

management, energy utilization, environment, marketing, technology and equipment. In this context, ***rehabilitation feasibility studies*** are implemented.

A comprehensive study on rehabilitation (rehabilitation study) needs to be undertaken before rehabilitation process can begin. This study should examine the scope and cost of the work to be done compared with the expected benefits over the project lifetime. The results of the feasibility study should give an indication whether to rehabilitate or abandon the idea. A team of experts is required to perform a rehabilitation study. Its composition depends on the complexity of the work involved, but basically the team should have a management and financial analyst (team leader), an industrial economist, a marketing specialist a process specialist, and eventually an environmental and sociology consultant. The structure of a feasibility study for a new project and that of rehabilitation should ideally be the same, with the main objective of determining whether the project is viable or not. The rehabilitation study may however be more difficult to carry out due to the various inherent constraints such as location, existing equipment and employees. The rehabilitation study analyses and makes recommendations on the following:

(i) General management
(ii) Corporate objectives and strategy, business plan
(iii) Marketing concept (strategic and operational aspects)
(iv) Raw material and factory supplies
(v) Location site and environmental impact assessment
(vi) Engineering and technology aspects: plant capacity, production programs, technological development and transfer, maintenance, energy audit quality control laboratory testing etc
(vii) Plant organization and overhead costs
(viii) Human resources
(ix) Project implementation
(x) Financial evaluation

c) ***Short-term rehabilitation measures.*** During this stage short-term reorganization and restructuring measures may be undertaken (in the areas of financial management,

inventory control, quality control etc) which do not yet require major capital investment.

d) ***Appraisal of project and fund raising.*** Investors and financiers evaluate the viability of the rehabilitation project during project appraisal.

e) ***Rehabilitation.*** This stage concludes with the rehabilitation of the project proper. The stage includes a number of activities ranging from technical and technological overhauling, investment or divestment, quality control, improvement of general management, advice on sectoral strategy and planning.

Expansion

Expansion projects are usually carried out with the following main objectives:

(i) To increase the quantitative output of products and by products without changing the product range.

(ii) To change the production program by adding new products of the same line.

(iii) A combination of the above two objectives.

These objectives can be achieved using the following strategies:

(i) Introduction of shift work

(ii) Raising the capacity of the weakest sections of a production line in order to increase total capacity

(iii) Upgrading the technology or increasing the capacity of the entire production lines.

In order to formulate a comprehensive expansion project proposal, the data for the expansion project should be synchronized and consolidated with those of the existing plant. The financial impact of expansion may be expressed in terms of marginal cost and benefits as well as the economic implications of undertaking the expansion and those of not doing so. The procedure for the preparation of feasibility study for expansion projects is the same as that of new projects, but this time taking into consideration determinant factors existing in the enterprise.

Review Questions

i) How does the world bank project cycle differ from the UNIDO project cycle

ii)	State the objectives of expansion projects and explain how these objectives can be achieved
iii)	Discuss how project ideas can be generated
iv)	Describe the stages of the investment phase of the project cycle
v)	Describe the areas that a rehabilitation study should analyze

References further reading

v) Hansen, (1992), "Manual for the Preparation of Industrial Feasibility Studies", UNIDO

vi) Chandra Prasanna, (2002), *"Projects: Planning, Analysis Financing Implementation and Review",* 5th Ed, Tata McGraw-Hill New Delhi

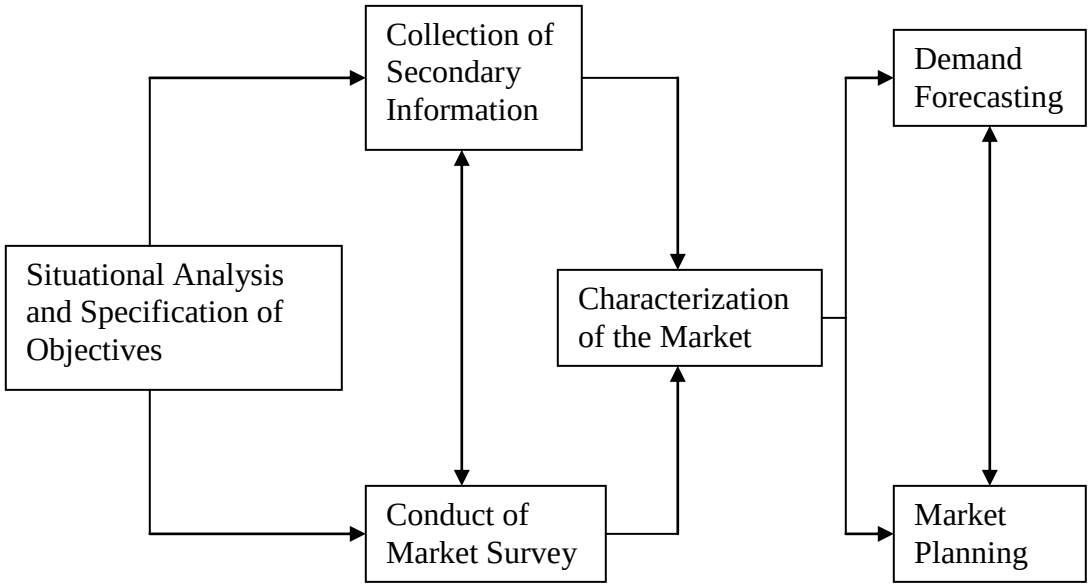
CHAPTER THREE: MARKET AND DEMAND ANALYSIS

Learning Objectives

By the end of this chapter the learner should be able to describe:

i) Situational Analysis and Specification of Objectives
ii) Collection of Secondary Information
iii) Conduct of Market Survey
iv) Characterization of the Market
v) Demand Forecasting
vi) Market Planning

The key steps in market and demand analysis and their inter-relationships are illustrated in the figure below:



3.1 Situational Analysis and Specification of Objectives

A situation analysis provides one with the current status of the key aspects of the market and is participants. The aspects include customers, competitors, and middlemen. It analyses the characteristics of this aspects such as customer's preferences and purchasing power, strategies and actions of competitors, and practices of middlemen. A situation analysis may generate data that will provide a vague idea of the market and provide a basis for rough demand and revenue projection. If the situation analysis paints a promising picture for the project, a formal market study is warranted to provide more accurate and reliable data that can be used for investment decision making.

To carry out such a study it is necessary to specify the objectives as clearly and as comprehensive as possible. A common approach to do this is to structure them in the form of questions. To illustrate suppose Sony Corporation developed technology to produce superior plasma television set and the management wants know where and how to market the TVs the objectives of the market and demand analysis may be to answer the following questions:

a) Who are the buyers of the TVs?
b) What is the current demand the TVs?
c) How is the demand distributed geographically and seasonally?
d) What is the component demand of TVs of various sizes?
e) What prices will the customers be willing to pay for the superior TVs?
f) What price and warranty will ensure acceptance?
g) What distribution channels are the most suited for the TVs and what margins will induce distributors to carry it?
h) What are the prospects for immediate sales?

3.2 Collection of Secondary Information

Secondary information is information that has already been gathered in some other context and is available while primary information will constitute information collected for the first time to meet a specific on hand purpose. Secondary information indicates what is known and provides leads for gathering primary information that will be required for further analysis.

Sources of Secondary Information

a) Census reports
b) National economic survey reports
c) Annual survey of industries
d) Stock exchange reports*
e) National bank of Ethiopia bulletins
f) Ministry of trade/ commerce annual abstracts
g) Industry specific sources such as industry association publications.

**For countries with stock exchanges*

Secondary information should be used with great caution. Its reliability accuracy and relevance for the purpose on hand should be determined before use. The user should know:

a) Who gathered the information and the objective

b) When the information was gathered
c) Target population
d) Representativeness of the information gathering period and sample
e) Degree of sampling bias and misrepresentation by respondents.
f) Suitability and accuracy of analysis

3.3 Conduct of Market Survey

Secondary information is not sufficient to provide the necessary information for market and demand analysis. Consequently primary information is sought through a market survey. The survey could be a census; where the entire population is covered or a sample survey; only a proportion of the population is covered. Census studies are prohibitively costly and infeasible because proper sampling can produce the same or even more accurate results than census studies. Information sought in a market survey may cover one or more of the following areas:

a) Total demand and rate of demand growth
b) Demand in different segments of the market
c) Income and price elasticities of demand
d) Purchasing plans and intentions
e) Attitude towards various products
f) Social economic characteristics of buyers
g) Customer preferences etc

Steps in a Sample Survey

a) Define the target population
b) Select the sampling technique and size
c) Develop the questionnaire*
d) Recruit and train field investigators
e) Obtain information as per the questionnaire from the sample of respondents
f) Scrutinize the information gathered
g) Analyze and interpret the information gathered

**You may refer to your research methods course on the steps in questionnaire development*

The results of a market survey depend on the following: representativeness of the sample, precision and adequacy of the questions, comprehension of the questions by the respondents,

honesty of the respondents in answering the questions, integrity of the investigators and appropriateness of data analysis methods

3.4 Characterization of Market

Based on the information accruing from the secondary information survey and the market survey, the market for a product may be described in terms of the following:

a) Effective Demand; Past and Present

In competitive markets *effective demand* is the *apparent consumption* which is defined as: production + imports – exports – changes in stock level. This figure has to be adjusted for the consumption of the product by the producers. Consumption series can then be computed.

b) Breakdown of Demand

Total / aggregate demand may be broken in to different segments which may be defined by: nature of product; consumer groups; geographical region etc

c) *Price*

It may be wise to distinguish between the following prices: manufacturer's price; wholesaler's price; retail price etc

d) Methods of Distribution and Sales Promotion

Since methods of distribution and sales promotion vary among different products, it will be helpful to describe the fore going aspects for the product on hand

e*) Consumers*

Consumers may be characterized demographically using such attributes as age, income sex etc or attitudinally using such attributes as preferences, habits intentions etc

f) Supply and Competition

The location, present production, planned expansion, capacity utilization level of competitors is crucial information. Substitutes and near substitutes should be noted too.

g) Government Policy

The role of the government in influencing the market and demand of a product may be significant; as such government policies and legislations that have an impact on the product should be spelt out

3.5 Demand Forecasting

After gathering information about the various aspects of the market, demand forecasting can be attempted. A number of methods are available for this purpose. These methods can be grouped in three categories

a) *Qualitative Methods*

(i) ***Jury of executive opinion method*:** under this method opinions are sought from a group of managers on the expected future sales they are then translated into sales estimates

(ii) ***Delphi method:*** opinions are sought from a group of experts who don't know the identity of each other, any divergent opinions are then mailed back to back for further opinion until a consensus is obtained

b) Time Series Projection Methods

(i) ***Trend projection method:*** This involves determining the trend of consumption by analyzing past consumptions data and then projecting future consumption by extrapolating the trend. The most common method of extrapolation is the linear regression. This is given by the expression $Y_t = a + bT$ where;

Y_t = demand for years t

T = time variable

b = slope / gradient. Given by the expression; $b = \dfrac{\sum TY - n\bar{T}\bar{Y}}{\sum T^2 - n(\bar{T})^2}$ where n = number of observations

a = Y intercept. Given by the expression; $a = \bar{Y} - b\bar{T}$

Illustration: Assume the following are the demand figures (Y) for the past six years (T)

T	Y	TY	T^2
1	23	23	1
2	22	44	4
3	24	72	9
4	24	96	16
5	25	125	25
6	27	162	36
$\sum T = 21$ $\bar{T} = 3.5$	$\sum Y = 145$ $\bar{Y} = 24.17$	$\sum TY = 522$	$\sum T^2 = 91$

$$b = \frac{\sum TY - n\bar{T}\bar{Y}}{\sum T^2 - n(\bar{T})^2} = \frac{522 - 507.57}{91 - 73.5} = \frac{14.43}{17.5} = 0.825$$

$$a = \bar{Y} - b\bar{T} = 24.17 - 0.825(3.5) = 21.2825$$

The forecasted demand 3 years from now, which will be year 9 from our analysis will be:

$Y_9 = a + bT = 21.2825 + 0.825(9) = 28.71$

(ii) ***Exponential Smoothing Method:*** the forecasts from the preceding method may be modified by exponential smoothing if large deviations of the forecasts from actual values are noted. If the forecasts value for year t, (F_t), is less than the actual value for year t, (S_t), the forecast for year t+1 (F_{t+1}), is set higher than F_t. If $F_t > S_t$, F_{t+1} is set lower than F_t. In general $F_{t+1} = F_t + \alpha e_t$, where; α = smoothing parameter chosen so as to minimize the deviation (error) and ranging from 0 to 1, and e_t = deviation (error) in the forecast for year *t*, given by $S_t - F_t$.

(iii) ***Moving Average Method:*** under this method, the forecast for the next period is equal to the average of the sales for several preceding periods

c) *Casual methods*

Casual methods seek to develop forecasts on the basis of cause-effect relationship specified in an explicit quantitative manner examples include:

(i) ***Chain ratio method:*** potential sales of a product may be estimated by applying a serried of factors to measure aggregate demand. E.g. in estimating the aggregate for a beard shaver in Ethiopia, one may begin from the number of adult male population, say 15 million this is them multiplied with the proportion of males shaving their beard say 0.3. This gives 4.5 million as the male population using shavers. This figure is then multiplied by the proportion of shavings done using shavers: say 0.2 to give 0.9 million. This figure is then divided average number of shavings, per shaver say 6 (one saver every 6 days). This figure is then multiplied by 360/6 to get the total demand for shavers in a year as 9 million. The figure is then multiplied by market that the firm could capture; say 0.35 to give 3.15million as the potential sales for the shavers per year.

(ii) ***Consumption method:*** this is useful for products that are directly consumed. It estimates consumption on the basis of elasticity of demand. Income elasticity of demand (E_1) is measured as follows:

$$E_1 = \frac{Q_2 - Q_1}{l_2 - l_1} x \frac{l_1 + l_2}{Q_1 + Q_2}$$

Where: Q_1= quantity demanded in the base year

Q_2 = quantity demanded in the following year

I_1= income level in the base year

I_2 = income level in the following year

The project per capital demand is then given as: *(present per capital demand) × [1+ (per capital change in income level) × (income elasticity of demand)]*

Illustration: The following information is available on quantity demanded for *teff* and income level of Ethiopian Q_1 = 50, Q_2=55, l_1=1000, l_2= 1020. The projected annual per capital income five years from now is expected to be 5% higher and the present per capital demand for *teff* is 50 kg. If the population is estimated to be 70 million in five years, what will be the aggregate demand for *teff* in five years?

$$E_1 = \frac{55-50}{1020-1000} \times \frac{1000+1020}{50+55} = 4.81$$

Projected demand = (50) [1+ (0.05) (4.81)] =62.025 kg

Aggregate demand = Projected demand x Projected population

= 62.025×70m = 4341.75 million kg

(iii) ***End use method (consumption coefficient method):*** This method is suitable for intermediate products. It involves the following steps.

a) Identify the possible uses of the product
b) Define the consumption coefficient for the product for various uses
c) Project the out put levels for the consuming industries.
d) Compute the aggregate demand for the product by multiplying the consumption coefficient of the various uses with their respective projected outputs and then summing up the projected demands for the various users

(iv) ***Leading indicator method:*** leading indicators are variables which changed ahead of other variables (the lag variables). Hence the changes observed in the lead variables may be used to predict changes in the lagging variables. In this method, appropriate leading are first

identified then the relation ship between the leading indicators and the lag variables is established for the forecast to be in the form or single equation or simultaneous equations.

(v) ***Econometric method:*** this involves mathematical presentation of economic relationships derived from economic theory. It may be in the form of single or simultaneous equations.

Uncertainties in demand forecasting

Demand forecasting is subject to error and uncertainly that arise from three main sources

(i) Data about past and present market, lack of standardization, few observations, influence of abnormal factors etc.

(ii) Methods of forecasting inability to handle unquantifiable factors, unrealistic assumption, excessive data requirement etc.

(iii) Environmental changes, shift, in government policy, international development, discovery of new sources of raw materials.

3.6 Market planning

The following are the steps followed in market planning

a) ***Current marketing situation.*** This deals with:

(ii) Market situation e.g. size, growth rate etc.

(iii) Competitive situation e.g. the competitor's objectives, strategies, strengths etc.

(iv) Distribution situation e.g. distribution capabilities of competitors

(v) Macro-environment e.g. social, political economic technological variables etc.

b) ***Opportunity and issue analysis***. In this section SWOT analysis is conducted

c) *Objectives.* Objectives which have to be clear, specific and achievable are spelt out

d) ***Marketing strategy.*** The marketing strategy covers the following: Target segment, positioning, product line, price, distribution, sales force, sales promotion and advertising.

e) ***Action program*****.** This entails operationalizing the strategy in to time phased activities.

Review Questions

i) Describe the steps in a sample survey
ii) Discuss the basis of characterization of market
iii) Describe the methods of demand forecasting
iv) Explain the steps involved in market planning

References for further Reading

i) Choudhury S. (2004), *Project Management*, Tata Mgraw Hill
ii) Hansen, (1992), "Manual for the Preparation of Industrial Feasibility Studies", UNIDO

CHAPTER FOUR: RAW MATERIALS AND SUPPLIES STUDY

Learning Objectives

By the end of this chapter the learner should be able to:

i) Discuss the objectives of supply marketing

ii) Explain the rationale for classification of raw materials and supplies

The selection of raw material and supplies depends primarily on the technical requirements of the project and the analysis of supply markets. Important determinants for the selection of raw materials and factory supplies are environmental factors such as resource depletion and pollution concerns, as well as criteria related to project strategies for example, the minimization of supply risks and the cost of materials inputs.

In order to keep the cost of the study low, key aspects are to be and identified analyzed in terms of requirements availability cost and risks which may be significant of the feasibility of a project. *The approach taken in this respect is first to classify the raw materials and supplies then to specify the requirement check their availability and then estimate their cost.*

4.5 Classification of Raw Materials and Supplies

a) Raw Materials (Unprocessed and Semi Processed)

(i) Agricultural Products

The quality must be identified of the quantities currently and potentially available. In food processing industries, this should be the residue remaining after the quantities required for consumption and sowing by producers have been subtracted from the total crop. In the case of commercial crops the market surplus is the total production minus sowing requirements.

In order to estimate the supplies and availability of agricultural products it may be necessary to collect the data on past crops and their distribution by market segment. Projects based on agricultural produce to be grown in the future may call for actual cultivation on experimental farms under varied conditions.

(ii) Livestock and Forest

In most cases of livestock produce and forest resources, specific surveys are called for to establish the viability of an industrial project.

(iii) Marine Products

For marine based raw materials, the major problem, to assess the potential of availability, the yields and the cost of collection. Availability of marine products may not only depend on ecological factors but also on national policy and bilateral and multilateral arrangements.

(iv) Mineral products

Detailed information on the proposed exploitable deposit is essential. Unless the reserves are known to be very extensive, the study should give details of the viability open cast or underground mining, the location, size, depth and quality of deposit and the composition of the ore with other elements i.e. impurities. A detailed analysis of physical, chemical and other properties of the subject ore be processed and the results ought to be in corporate in the feasibility report.

b) Processed Industrial Materials and Components

Such inputs can be generally classified under base metals; semi processed materials relating to a wide variety of industries in different sectors and manufactured parts, components and subassemblies for assembly-type industries, including a number of durable consumer goods and engineering goods industry. In all these cases, it is necessary to define requirements, availability and costs in some detail to ensure that the specification in the case of the two latter categories suit the production programs envisaged for the projects.

For base metals availability during a particular time may depend on unstable international markets, as such their substitutability should be carefully examined. In case of process intermediates a careful analysis of their external availability and cost coupled with the implication of their domestic manufacture should be made. While the same considerations prevail for assembly-type industries, backward linkages considerations should be made.

c) Factory supplies

(i) Auxiliary Materials and Utilities

A part from basic raw materials and processed industrial materials and components all manufacturing projects require various auxiliary materials and utilities, usually subsumed as factory supplies. A detailed assessment of the utilities required (electricity, water, steam, compressed air, fuel, effluent disposal) can only the made after analysis and selection of location, technology and plant capacity, but a general assessment of these is a necessary part of the input study.

An estimate of utilities consumption is essential for identifying the existing sources of supply and any bottlenecks and shortage that exist or are likely to develop so that appropriate measures can be taken to provide for either internal or external additional supplies in good time.

Electricity: An analysis of the energy situation must specify the requirements and the sources, availability and cost of supply of electric supply power. The maximum power demand, the connected load peak- load and possible stand-by requirement as well as the daily and annual consumption both by shift and in total, must therefore be estimated in a feasibility study.

***Fuel*:** When using large quantities of solid and liquid combustion materials all the relevant environmental protection technologies will have to be integrated in the planning and calculation of a project. Consequently, the price of energy inputs will have to be increased by the costs of disposal measures.

Water: A general estimate should be made of water requirement (taking in to account recycling arrangement) for the production process, auxiliary purposes (cooling, heating and boiling, rinsing, transport, facilities, grading, steam generation) and general purposes so that these can be considered in location decisions, at which stage the cost can be specifically defined.

Packaging materials and containers: All types of containers and packaging materials serve in principle the following two purposes: physical holding and protection of a product (semi-finished) and achieving the marketing objectives defined in the marketing concept.

(ii) Other supplies

General requirements for other utilities such as steam, compressed air conditioning and affluent disposal should also be identified, so that they can be analyzed in the course of selection of location.

d) Recycled Waste

The issue of waste disposal is assuming increasing importance in developing countries, depending on the type of production process. Waste combustion of high-risk waste is

technically feasible provided adequate measures are taken and appropriate technologies are applied. The disposal of effluents is technical feasible provided the appropriate installations have been selected.

e) Spare Parts

In spite of regular maintenance all machinery and equipment will finally break down after a certain lifetime. Various spare parts will be required to keep a plant in operation. The importance of correctly identifying essential spare parts, the quantities required and available suppliers cannot be overemphasized because interruption of production owning to lack of essential spare parts is often the reason for projects failure.

f) Supplies for Social and External Needs

A remote location or some other reason might require the project (or the company) to provide and pay for foodstuffs, medicine, clothing, education and training materials etc. for the employees and perhaps also their families. Sometimes it may be necessary for the investing company to take responsibility for maintenance of external infrastructure.

4.6 Specification of Requirements

In order to estimate the requirement of materials and supplies during the future operation of the plant, such requirements should be identified, analyzed and specified in the study both quantitatively and qualitatively. A number of factors could have a strong influence on the type quantities and qualities of the project inputs in particular the following:

a) ***Socio-economic factors:*** social and cultural environment, socio economic infrastructure(social and economic policies and regulation, infrastructural service, transport and communications system etc)

b) ***Commercial and financial (business) factors:*** projects size, skills and production of the labor force, market demands regarding product quality, product mix, competition for material supplies and services etc.

c) ***Technical factors:*** type of industry, technology and production process, type machinery and equipment, production capacity and estimated production etc.

Normally specifications will be based on preliminary project design, and only when the detailed specifications of the inputs available are known, the final engineering design of the project can be prepared. However, it is very important to consider during this stage of project design that there exists not only a relationship between material input and engineering design,

but also interdependence with the market and marketing concept location aspects and the availability of human resources.

Project Characteristics and Material Inputs

The nominal and feasible plant capacity will have to be defined on the basis of carrying supply conditions. Any significant dependencies on raw materials and factory supplies of the product mix and production target will have to be identified and should be analyzed *inter alia*, in view of market potential, expected sales, transport facilities and the production capacity. The feasible capacity and projected production level will depend on not only on engineering factors as discussed above (technology, machinery and equipment, processes), but also on the number of shifts and products, the numbers and skills of the labor force, marketing strategies, management and availability of external infrastructure. This rather complex list of interdependencies clearly illustrates the need for all conditions, prerequisites and assumption to be identified and presented as a starting- point and basis for further analytical work on, for example, requirement of materials and inputs.

A useful means of facilitating a better understanding of the project design is to draw up flow sheets. ***A process flow sheet*** should identify vital section of the process and illustrate how the processes are interrelated. Each section of a process flow sheet can analyze in more detail in separate section diagrams.

Requirement of Raw Materials and Factory Supplies

The requirement of raw material and factory supplies can be express different ways that supplement each other. The overall objective should be to describe and analyze features and characteristics in such a way that an understanding of what the project requires is developed. This will form the basis for the supply program and the subsequent cost estimate. *The specification of requirement described below may form a useful check list.*

a) User Demands.

Users of the produced finished goods have expectations on demands that will have consequences not only for the choice of technical machinery and equipment, but also for the materials and inputs used.

b) Quantities Required

In order to allow greater flexibility in the conduct the study (for example, sensitivity analysis of variation in assumption inputs data), the quantities required can be expressed in the following terms:

(i) Units produced (for example, items, tones, cubic meters) application raw materials, intermediates, components auxiliary materials etc.

(ii) Section of the production process applicable to raw materials intermediates, components

(iii) Machines or labor hours

(iv) Employees, application to foodstuffs medicine and other social costs

c) Qualitative Properties

The types analysis required to identify the characteristics of materials and inputs depends on the nature of the inputs and their usage in the particular project. An analysis may cover the following:

(i) *Physical properties:* size, dimension, form, density, viscosity, melting and boiling point etc.

(ii) *Mechanical properties*: formability, machinability, tensility compressive and shearing strength etc.

(iii) *Chemical properties:* form (emulsion, suspension) composition, purity, oxidizing and reducing potentials etc

(iv) *Electrical and magnetic properties*: magnetization, resistance, conductance and dielectric constants etc.

4.7 *Availability and Supply*

The source and the constant availability of basic production materials are crucial to the determination of the technical and economic viability as well as the size of most industrial projects. A feasibility study must show how the materials and inputs required will be provided. General availability, data about materials potential users and supply sources and programs will have to b analyzed and descried. A final assessment of input requirement can be made on only after the plant capacity as well as the technology and equipment to be used are defined.

If a basic input is available within a country, its location and the area of supplies, whether concentrated or dispersed should be determined. The alternative uses likely to be made of such materials and the consequent impact on availability should be assessed for the project in question. The question of transportability and transport costs should be carefully analyzed. When the basic material has to import either in whole or in part, the implication of such imports should be fully assessed. First the sources imported inputs have to be determined. Secondly, the uncertainly inputs should be sated. Thirdly, the implication of domestic production of basic materials that was being imported should be analyzed. In most developing countries such production is accompanied by imported control and user industries have to adjust to domestic supplies of basic materials of basic materials.

Input Alternatives

In many projects different raw materials can be used for the same production. When this is the case of the raw materials must be analyzed to determine which is most suitable taking all relevant factors in to consideration. If alternative materials are used discussion should be also include an assessment of the environmental impact of each material.

Supply Marketing and Supply Program

a) Supply marketing

The objectives of supply marketing are basically cost minimization, risk minimization (reliability or supplies) and the cultivation of relation with supplier.

(i) Cost Minimization

Input costs can be reduced, *inter alia*, by selecting appropriate suppliers and by choosing a proper volume and frequency of the orders. Any cost minimization opportunity not identified and considered during the feasibility study is difficult to make up later during plant operation. This could have then a significant impact on the financial feasibility of the project by reducing the net cash flows and net profits generated. Supply marketing is therefore a vital factor for success.

(ii) Risk Minimization and Reliability of Supplies

Reliability as regards quantities, qualities, deadlines and prices is significant for the entire manufacturing process. Late deliveries lack of quality or poor maintenance services may have

serious consequences for the entire manufacturing process. These risks must therefore also be considered in the purchasing strategy to ensure that supplies are in accordance with the production requirements.

(iii) Cultivating Relations with the Suppliers

Purchases should be focused not only on acceptable prices, but also on establishing smooth and productive relations with the supplier. In the long run, it can be very advantageous to establish a relationship of mutual trust.

Supply marketing should be designed to reinforce the bargaining position of a project or enterprise. Purchasing prices and conditions largely depend on the bargaining power of the project and its management. Both short and long term considerations should prevail.

Supply marketing must carried out all the more intensely in the following cases:

- The higher the share of a product in the total purchase volume (*the 20-80 rule*). Therefore, any increase in the price of one of the goods in the 20 percent group may have severe consequences on the profitability of the total project.
- The higher the risk of having additional processing costs or production failure (loses, damage,) because of delivery constraints or lack of quality.

Possible supply alternative purchases may be carried out as follows:

- Directly by the individual enterprise
- Through agents, purchasing on their own account or on behalf of enterprise
- Through purchasing cooperative formed by a number of enterprise

Suppliers should be identified and the input quantities to be purchase from each should be determined in the study, taking in to account:

- Price competitiveness (including stock, transport, and insurances costs)
- Extras (condition of payment, warranty terms just in time delivery repair and spare part service, customized packaging etc)
- Expected suppliers compliance with quality requirements
- Risk to, further in-house processing in case of a deviation from specific quality requirements.
- Expected stability of suppliers relations
- Reorganization cost incurred through a later change of supplier.
- Possibility of purchasing directly from manufacturers or wholesalers

b) Supply Program

The overall purpose of the outline of a supply program in the feasibility study is to show how supplies of materials and inputs will be secured. Evidence should be presented to justify the assumption and suggestions. Cost estimates should be based on the supply program presented. A supply program should deal with the following:

i) Identification of Supplying Sources and Suppliers

In the identification of a particular key supplier, consideration should be given to its geographical location, ownership, main activities, financial strength and profitability production capacity, output over the last years, key customers and business experience with the type of products and the country concerned. An estimate of the level of priority that the supplier is likely to give the contract is crucial.

ii) Agreement and Regulations

Letter of intent regarding supply contacts and obligation should be referred to and the general terms of suggested agreements, such as period of validity, payment terms, currency conditions and guarantees, outlined. Import policies and regulations including application procedures for obtaining import licenses validity periods, permits to acquire or use foreign currency possible tax exemptions, and duty free imports, the existence of import restrictions etc., should be described and their consequences for the project analyzed.

iii) Consignments

The quantities and qualities that can be supplied from various sources should be indicated. This means that a comparison with the specific input requirements must be made taking in to account not only quantity but also environment and health aspects physical and chemical properties etc.

iv) Means of Transport

Means of transport for key materials and inputs by air, water, road or rail should be identified in the study. The availability, capacity, reliability and technical condition of the facilities must be analyzed. The study should consequently not only identify existing means of transport but also analyze their condition, describe how they can be used and suggest measures to be taken by the company concerned in order to obtained some confidence on the level of reliability and capacity. Loading and unloading facilities should be analyzed too.

v) Storage

Storage facilities are usually required at the plant, but may also be needed at ports, railway stations, or other places. The study should indicate the capacity of such facilities describe their utilization and present estimated quantities to be stored on the basis of anticipated production levels and delivered of materials and inputs

vi) Risk Assessment

Identification and assessment of risks and uncertainties in the supply program should be presented. A distinction should be made between external and internal project risks factors, including failure of suppliers to meet their obligations, delayed consignments, supply shortages, quality defects, transport breakdown, utility malfunctions, strikes, climate variations, changed import regulations and shortages of foreign exchange for imports.

4.8 Costs of Raw Materials and Suppliers

a) Unit Costs

Not only the availability but also the unit costs of basic materials and factory supplies have to be analyzed in detail as this is a critical factor for determine project economies. In the case of domestic materials current prices have to be viewed in the context of past trends and future projections of the elasticity of supply.

The cost of alternative means of transport should also be considered. For imported materials inputs *C.I.F* prices (including costs, insurance and freight) should be invariably be adopted together with clearing charges (including loading and unloading) port charges, tariffs, local insurance and taxes, and costs of internal transport to the plant.

The prices of imported inputs generally fluctuate least except when:

(i) International markets are rather volatile

(ii) Monopolistic or oligopolistic conditions prevail

(iii) Suppliers are linked contractually to a particular source as between a foreign subsidiary and its parent firm

(iv) There is governmental action by way of tariffs or duties or major changes therein.

b) Annual Costs

The price basis for the estimates (price level, quotations from suppliers, world market prices comparisons with similar inputs in other projects etc) should be stated in order enable the

reader to check their reliability. The price mechanism should be explained and the cost estimates divided in to foreign and local currency components.

It should be made clear whether the cost estimates refer to a hypothetical level of production at full capacity utilization during the operation phase or to the first year (or some other year) of operation phase according to the time schedule for project implementation.

Some costs vary with the production level the plant in question, while others are more or less fixed. Taking into consideration the expected variations in the proposed plant it is advisable to divided cost time into *variable* and *fixed costs*.

Costs estimates for materials and inputs can be expressed either as the cost per unit produced or in terms of a certain production level for, example 100,000 units per year. The later alternative can also be expressed as full capacity utilization which is equivalent to a certain production level. In either case, it will be possible to carry out a sensitivity analysis of different levels production and of capacity utilization in the financial calculations. The study should also identify the unit costs applied using the following guidelines:

i) Type of material and input
ii) Unit of measurement (barrels, tonnes, cubic meters etc)
iii) Number of input units consumed per unit produced divided into direct (predominantly variable) and indirect (predominantly) fixed cost components
iv) Direct cost per unit produced divided into foreign an local current component (although expressed in one common currently)
v) Indirect cost per unit produced divided into foreign and local current component.

When calculating indirect costs, the amounts resulting from environment protection and pollution control measures should be established per production or per accounting period, whichever is appropriate. In order to arrive at the total operating costs by product as well as by total costs per year, the estimated costs per unit are multiplied by the total number of unit to be produced.

c) Overhead Costs of Supplies

When estimating material and input requirements of the project, the project planner has to plan not only for the level of production cost center but also at the level of service, administration and sales cost centers.

Review Questions

i) A number of factors could have a strong influence on the type quantities and qualities of the project inputs, describe them

ii) Discuss the objectives of supply marketing

iii) Explain the rationale for classification of raw materials and supplies

iv) Why is it necessary to estimate the costs of raw materials and supplies

References for further Reading

i) Choudhury S. (2004), *Project Management*, Tata Mgraw Hill

ii) Chandra Prasanna, (2002), *"Projects: Planning, Analysis Financing Implementation and Review",* 5th Ed, Tata McGraw-Hill New Delhi

CHAPTER FIVE: LOCATION ANALYSIS

Learning Objectives

By the end of this chapter the learner should be able to:

i) Discuss key geographical considerations in location analysis
ii) Describe social economic considerations in location analysis
iii) Explain the Infrastructural service, conditions and requirements in location analysis
iv) Describe the process of environmental impact assessment

Introduction

Location and site are often used synonymously but must be distinguished. The choice of location should be made from a fairly wide geographical area, within which several alternatives sites can be considered. For each project alternatives the environmental impact of erecting and operating the industrial plant should be assessed.

The main criteria or key requirements for selecting proper locations and sites should always be identified at an early stage of the study. The quantitative analysis of these key requirements would then allow the assessment of a number of potential locations and sites and the rejection of those not fulfilling the key requirements. The remaining alternatives are then subject to a more in depth qualitative and quantitative analysis of technical and financial criteria including social, environmental and economic aspects of location and site selection. Location analysis has to identify a location suitable for the industrial project under consideration. The feasibility study should also indicate on what grounds alternatives locations have been identified and give reasons for leaving out other locations that were suitable but not selected.

Key Factors in Location Analysis

1. *Natural environment,* geographical conditions and project requirements.
2. Ecological impact of the project, *environmental impact assessment*
3. *Socio-economic policies,* incentives and restrictions and government plans and policies
4. *Infrastructural service, conditions* and requirements, such as the existing industrial infrastructure, the economic and social infrastructure the institutional framework, urbanization and literacy.

The strategic orientation of the choice of suitable locations requires an assessment of, inter allia market and marketing aspects, the availability of critical projects inputs such as raw

materials and factory supplies, technical project requirements the types of industry, technicality and process, characteristics and products or outputs size of the plant organizational requirements and management structure. The study should not go into unnecessary details but rather aim at an understanding of the background to and relevance of the aspects identified.

5.1 *The Natural Environment*

Climatic conditions a part from the direct impact on project costs of such factors as dehumidization, air conditioning, refrigeration or special drainage the environmental effects may be significant. Information should be collected on temperature, rainfall, flooding, dust, times and other factors for different locations.

Climatic conditions are relevant in different ways; means of transport may become less reliable products to distant markets. The construction, operation and management of the plant may be less efficient or more expensive if an inadequately skilled labor force is reluctant work areas with extreme climate conditions.

Climate conditions can be specified in term of air temperature, humidity, sunshine hours winds, precipitation hurricane, risk etc.

Geodesic aspects are general more relevant for the selection of suitable sites. There include soil water levels and a number of special site hazard such as earthquakes and susceptibility to flooding all of which extend over grater areas.

Ecological requirements some projects may not have a negative environmental impact themselves but rather be sensitive to such effects. Management or labor may be reluctant to work in a factory located in a polluted area with health risks.

5.2 Environment Impact Assessment

The site environment impact analysis will cover the impact of the project and its alternatives (in terms of size, technology etc) on the surrounding area, including its population, flora and fauna. This analysis should be integrative and interdisciplinary, assessing the overall impact which takes into account the synergetic effects of inter linked systems.

These consequence and the beneficial or adverse effects of such human activities on the environment are assessed and evaluated from a technical, financial and social – economic point of view, to extent that they are significant for the project implementation decision.

Environmental impact assessment is part of the project planning process. Through statute or practice, it is an integral part of feasibility analysis.

Environmental benefits or costs of a project are usually externalities or effects that affect the society in whole or in part.

In countries where the analysis of environmental impact is alternatives required by law, the usual procedure is for the promoters of the projects prepare an extensive environmental impact statement.

Where such legal provision for environmental protection do not yet exist an environmental impact assessment should be made in the interest of the investor, in particular when the intention is to apply for international financing. A growing consciousness and concern for environmental problems and ecological consequences have in fact become noticeable world wide. Therefore, trends anticipated in the industry life cycle should also be consideration investment planning especially for industries with high potential environmental impact unexpected costs for later plant adaptations, conversation rehabilitations or even the shut down of operations can be avoided or minimized in countries where environmental protection standards and guidelines are not yet defined standards published by United Nations organizations such as the United Nations Environment Programme. (UNEP) may be used as reference for environment impact assessment.

Environment Conflicts

Some projects may have environmental impacts that will obviously rule out certain locations. If serious or irreparable pollutions and damages are to the avoided, Environmental conflicts might also lead to compensation claims, substantial costs for prettification and equipment, and possibly a risk that the plant will have to be closed down. The potential risks related to the location of projects with have to negative environmental impact are usually so high that these aspects must be seriously considered in the feasibility study. Including potential conflicts with existing an future neighboring industries, urban settlements and other elements, which should be identified and analyzed in so far as they may affect the investment decisions.

5.2.1 Objectives of Environmental Impact Assessment

The general objective of environmental impact assessment in, project analysis is to ensure that development projects are environmental sound.

The specific objectives of environmental impact assessment are as follows:

i) To promote a comprehensive, interdisciplinary investigation of environmental consequences of the project and its alternatives for the affected natural and cultural human habitat.

ii) To develop an understanding of the scope and magnitude of incremental environmental impacts (with and without the project) of the proposed projects for each of the alternatives project designs.

iii) To incorporate in the design any existing regulatory requirements

iv) To identify measures for mitigation of adverse environmental impacts and for possible enhancement of beneficial impacts.

v) To identify critical environmental problems requiring further investigation

vi) To assess environmental impact quantitatively and quantitatively, as required, for the purpose of determining the overall environmental merit of each alternative.

5.2.3 Phase and Structure of Environmental Impact Assessment

The performance of an environmental impact assessment also involves the following steps:

i) The definition of the problems

ii) The technology description and forecasts

iii) The social description and forecast and forecast

iv) Identification analysis and evaluation of impacts

v) Determination of a suitable investment strategy

vi) Determination corporate environmental policy

vii) Environmental impact statement

Some times only three phases of environmental impact assessment is performed. The first stage involves using a checklist or standardized set of criteria to ensure consideration of all relevant environmental factors and to determine which impacts would need to be analyzed in detail during the second phases of the assessment and which administrative actions are to be taken.

Second phase consists in the identification and evaluation of environmental impacts resulting from the projects. A site visit with all members of the assessment tam is essential if the environmental situation is complex and significant for the investment decision. An in depth

study if the incremental impacts with and without the projects) is then prepared, leading to a disciplinary study by each specialist using the full scope of research tools and resources available.

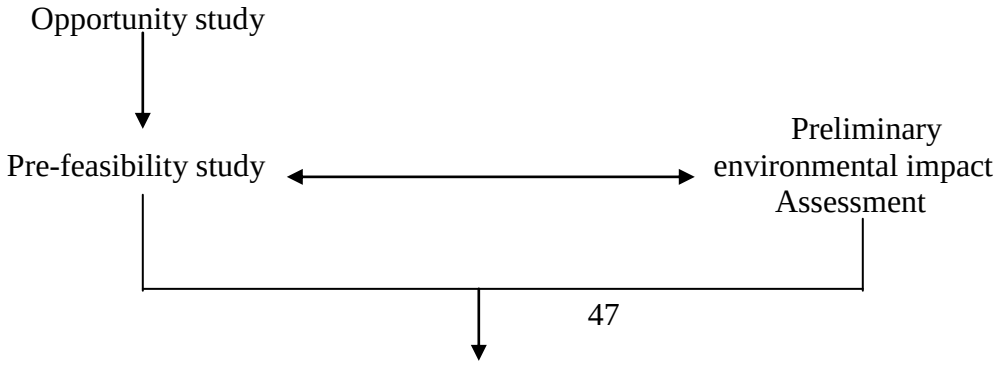
The third phase of environmental impact assessment consists in the preparation of the environmental impact statement, this statements, which is now often required as condition for project implementation, should reflect the interdisciplinary made in which it was prepared. The final environmental impact statement should specify any mitigation measures that would make the recommended alternative environmentally acceptable.

The primary purpose of the environmental impact statement is to serves a means of including consideration of environmental consequence of project and its alternatives in the process of projects appraisal to ensure that the policies, goals and aspirations of the proponents the government and affected populations are incorporated in the decision process. It should be provide full and fair discussion of significant impacts and inform decisions makers an the public of reasonable alternatives that would avoid or minimize advantages impacts or enhance the quality of the human environmental

5.2.4 The Assessment Process

The preliminary environmental impact assessment is reviewed along was the pre feasibility study, with comprehensive consideration of the technical, socio-economic and environmental features. Screening is needed to determine the level of environmental analysis appropriate to a particular project. If project warrants no further environmental analysis and is technically financially feasible, it can be recommended for approval. If further assessment should is recommended the authority, scope of the assessment should be established in consultation between the environmental authority and the promoters of the project and the environmental agency.

Phases of Environmental Impact Assessment



Screening review
decision

Environmental impact
Assessment required

Environment impact
assessment

Feasibility study

Environmental impact
Assessment

Interims reports
Preparation of the Environmental Impact Statement

5.2.5 Methodologies and Tools

Several methodologies and tools that are useful in the performance of environmental impact assessment have been developed. *They as a requirement should be able to describe the following:*

i) Comprehensive identification of all relevant impacts.

ii) Cause and effect relationships between project and environmental factors and impacts

iii) Promotion of an interdisciplinary approach to assessment

iv) The temporal distribution of impacts, for examples, differences between impacts in the construction and operational phases

v) Criteria of assessment in both qualitative and quantitative terms

vi) Indication of the dynamic of environmental impacts producing primary, secondary tertiary etc. impacts

The methodologies include the following:

(i) Interaction Matrices: Matrices are arrays of data with a horizontal list of project activities across the top and a vertical listing of environmental parameters. Quantified and

graded matrices provide a means of analyzing impact magnitude and importance. Numerical weightings of the probable impacts using various methods of compilations provide an indication of where the impact is likely in concentrate spared out produce compensating effect etc. matrices are generally not sufficient for decision making as they usually do not meet all of the criteria indicated above.

***(ii) Over lays*:** use a set off transparent sheet on each of which is indicated the degree of impact of the project on a particular environment parameter. The degree of impact is shown by the intensity of the shading or cross hatching computerized overlays have been developed which include not only the shading feature but also weighting models that indicate the relative importance of each impact. The overlaps method is most useful in screening alternative projects sites.

(iii) Networks: are used to analyses the cascaded series of effects resulting from project activities. A set of possible primary, secondary, tertiary etc impacts is identified from similar experience and the likely impacts are identified for the project under study. The network effectively displays factual information, but does not contain information on witting or social valuations. It is organized in the form of a tree. Where primary effects give rise to secondary effects secondary tertiary etc

(iv) Systems Analysis: (usually requiring a computer model) is a method that can deal with multiple criteria for selection among project alternatives. In this approach the criteria must be clearly defined and the project impacts clearly understood. The development of an analylitical model requires the interdisciplinary contributions of experts.

a) *Simulation models* provide a replica of the project and its environment. Parameters are varied to gain under - standing of the complex interactions between the project and environmental parameters. Stochastic and temporal features can be built in to the model

b) *Optimization models* seek the best solution in consideration of project and environmental constrains according to an objectives function. Techniques such as goal programming permit the simultaneous consideration of project and multiple objectives that are weighted by “penalties” for derivation from the ideal.

* Analytical tools include the instruments of objectives measurement of environmental quality. Standards for the use of these instruments must be respected in order to obtain reliable data. Instruments should be selected according to criteria of accuracy and precision

5.2.6 The following basic steps should be observed when performing environmental impact assessment.

i) Identification of Impacts

a) Define development objectives and key constraints on projects implementation: Identify key linkage of proposed development with naturally resources, ecological, social and social economic systems and other development activities.

b) Determine requirements for environmental impact assessment requirement, including procedures for project approval a environmental impact statements.

c) Determine the scope of environmental impact assessment (term of reference):

d) Assemble baseline data for natural and social economic cultural) system potentially conflicting development policies projects and key resources implication:

e) Analyze the proposed investment project to identify resources demands and out puts and their environmental impacts.

ii) Environmental Impact Forecast

Prepare a projection of the magnitude and severity of the problem future effects of the proposed investment project

iii) Evaluation

Assess the significant distribution and performance of problem effects from the point of view of the affected population, economic impacts (competitions for scarce natural resources) and ecology consequence establish real resources costs and benefits in to the overall economic evaluation.

iv) Communication

Determine how to present the results of environmental impact assessment, indicating tradeoffs key decisions factors sources data, benefits into the overall economic evaluation.

5.2.7 Cost-benefits analysis of environment impacts

Environmental impact assessment and cost benefit analysis are in respects parallel and overlapping activities.

If a cost benefits analysis relevant to the choice among environmental different alternatives being considered for the proposed action it shall be incorporated by reference or appended to the statement as an aid in evaluating environmental consequences

Cost Benefit Analysis Models: Several cost benefit models have been constructed for use in developing countries but are primarily oriented towards the use and management of natural resources. These would include the UNEP test model of extended cost benefits analysis. Graphs developed by the Vietnam Environmental Research Programme.

As parallel activities the primarily of cost-benefits analysis verses environment impact assessment depends upon the context in which the project is being reviewed. For the environmental review and decisions process environmental impact assessment is the primarily evaluation instrument. In the case of socio-economic, evaluation the reverse is true.

Cost	*Benefit*
Financial and economic cost of compliance	Improvement of environment quality to regulated limit
Financial cost of compliance to the project	Possible environmental improvement
Environmental degradation	Possible environmental improvement

5.2.8 Assessment of Environment Costs and Benefits

The basic principle underlying the quantitative assessment of environment impacts is the value that may be placed by society or individual on environmental improvement or degradation. These benefits or costs can be expressed monetarily in terms of willingness to pay for environmental improvement or willingness to accept as compensation for environmental degradation.

i) Direct Monetary Methods

The cost saving (or cost impact) methods estimate the charges in house holding expenditures and in production costs for other industrial activities affected by the environmental changes attributable to the project under study.

ii) Direct Surveys-Based Methods

The contingent valuation method uses surveys to determine the value that the affected population places on environmental changes and are asked for the maximum amount they would accept as compensation or to prevent the change in the case of environmental degradation.

iii) Indirect Market -Based Methods

The hedonic pricing method attempts to input values for environmental change by identifying their effect on the market price and price movement of economic resources. The level of environmental quality may be reflected for example in total housing prices labor markets.

5.2.9 Environment Parameters

For the purpose of environmental impact assessment it is classify the environmental impact factors.

i) Physical and chemical impacts including noise emissions and impacts on energy resources economic pass the effects on physical and chemical characteristics of the whole ecologies system consisting of the atmosphere water hand fundamental and flora.

ii) ecological factors include the flora and fauna separately and conjointly in terms of ecosystems, in which the population, growth rate interacts and inter species interaction,

iii) Aesthetic factors are concerned primarily with sensory impacts primarily visual, of land use and installations of the proposed project.

iv) social factors deal with the cultural and economic impacts such as the quality of human life in terms of health, welfare and social infrastructure

5.3 Socio-Economic Policies

a) Role of Public Policies

Government regulations and restrictions may be critical for the location of project. Project with certain characteristics may be allowed only in certain regions.

Even when public policies are not very restrictive on industrial growth in particular areas or regions, knowledge of location policies is necessary to enable the various concessions and incentives that may be a part of such policies to be adequately considered.

Investment in export processing zones and other specified regions are sometimes exempted from taxes or would benefit from other types of subsidy

b) Fiscal and Legal Aspects

The fiscal and legal regulations and procedures applicable for alternatives locations should be defined. The corporate and individual income taxes, exercise duties, purchase taxes and other national or local taxes should be ascertained for different locations together with the incentives and concessions available for new industries.

5.4 Infrastructural Conditions

a) Infrastructure dependence
   i) Technical infrastructure
   ii) Transport and communication
b) Factory supplies
   i) Water
   ii) Electricity
   iii) Fuel
c) Human resources
d) Effluent and waste disposal
e) Final choice of location

5.5 Resources or Market Orientation

Criteria to location selection is the impact on a particular project of factors such as the availability of raw material and inputs the proximately of centers of consumption and the existence of basic infrastructure facilities. Project based on specific raw materials are for obviously reasons located at the source.

The simplest location model is to calculate the transport, production and distribution costs at alternative locations determined principled by the availability of raw materials and principal markets.

For projects that are not unduly resources or market-oriented optimum, location could well combine reasonable proximately to raw material and markets favorable environmental condition a good pool of labor, adequately power and fuel at reasonable cost, equitable taxes, good transports an adequate water supply and facilities for waste disposal.

5.6 *Assessment of Location*

As far as the financial feasibility of alternative locations is concerned, the following data, as well as related financial risks, should be assessed

i) production costs (including environmental protection costs)

ii) Marketing costs.

iii) Investment costs (including environmental protection)

iv) Revenues

v) Taxes, subsides, grants and allowances

vi) Net cash flows

A location that allows greater *flexibility* may in some cases be preferable. Possible changes may concern restraints regarding emissions from pollution industries, expansion of the plant, new products replacing the original ones, decreasing supply of specific raw materials need for another market orientation, deteriorating technical infrastructure and difficulties of keeping key personnel.

Experience and preferences: An important factor for the choice of location and site has in some studies in industrialized countries been undefined as the experiences and preference of the project promoter.

5.7 Site Selection

Once the location is decided upon, a specific project site and, if available, site alternative should be defined in the feasibility study. This will require an evaluation of characteristics of each site. The structure of site analysis is basically the same for location analysis and the key requirement, identified for the project give guidance also for site selection. For sites available within the selected location, following are the requirements and conditions are to be assessed.

i) Ecological condition on site (soil, site hazards climate etc.)

ii) Environmental impact (restrictions, standards, guidelines,)

iii) Social-economic conditions (restrictions, incentives, requirements)

iv) Local infrastructure at site location (existing, industrial, infrastructure economic and social infrastructure, availability of critical project impact such as labor and factory supplies)

v) Strategies aspects (corporate strategies regarding possible future extension, supply and marketing policies.

vi) Cost of land

vii) Site preparation and development, requirement and costs

5.8 Requirements and Relevant Factors

Site Requirement

A project may depend on particular site condition, which should be identified and described in the feasibility study. These conditions are:

i) Cost of land

ii) Construction requirements

iii) ***Local conditions-infrastructur****e*

The availability and cost of electricity is common for most sites within a given location.

Transport is very important when comparing the suitability of different sites. Where water is requirement for the manufacturing process such assessment is more important and the source and cost of the water supply has to be estimated are alternatives sites.

iv) Effluent and waste disposal

The disposal of effluent may be a problem for many industries. The possibilities for effluent disposal at different sites should be carefully studied bearing in mind the type of effluent

v) Human resources

Recruitment of managerial staff and labor may be a critical factor for the viability of a project. The study must therefore pay carefully attention to the question of labor availability, conditions related to recruitment and facilities for training. It may be necessary to develop a social infrastructure next to the envisaged site housing primarily school, medical and social centers to attracts the requirement staff and labor force.

Final site selection of plant location and site does not have to undertaken in two stages. Generally alternatives sites are considered in conjunction with wider locational consideration so that much of the information required is collected simultaneously. It is often necessary to

limit the choice of plant site and location in line with the provisions made by the project sponsors whether public institutional or private, which reduces the tasks of the feasibility study.

Review Questions

i) Discuss key geographical considerations in location analysis
ii) Describe social economic considerations in location analysis
iii) Explain the Infrastructural service, conditions and requirements in location analysis
iv) Describe the process of environmental impact assessment
v) Discuss the relevant requirements of a project site
vi) Describe the phases of environmental impact assessment

References for further Reading

i) Hansen, (1992), "Manual for the Preparation of Industrial Feasibility Studies", UNIDO
ii) Phil Baguley (2009), *Project Management,* Hodder & Stoughton

CHAPTER SIX: PRODUCTION PROGRAM AND PLANT CAPACITY

Learning Objectives

By the end of this chapter the learner should be able to:
i) Explain the determination of the production program
ii) Discuss the factors influencing plant capacity
iii) Describe the steps followed in assessment of the suitability of the technological alternatives
iv) Discuss the considerations influenced the choice of technology
v) Explain the various means of technology acquisition

6.1 Production program

Production program consist of the whole range of project activities and requirement, including production levels to be achieved under the technical ecological, social and economic constraints. This necessitates identifying the principal products or products range including by-products, determining the volume of production and relating production capacity to the flow of materials and performance of services at the selected site.

6.1.1 Determination of the production program

Market requirements and marketing concept: The range and volume of products to be produced depends primarily on the market requirements and the proposed marketing

strategies. This production program and volume have to be designed under the constraints determined for the market conditions and the availability of resources both at various levels of production, the latter determining the minimum sales price for products.

A production program should define the levels of output to be achieved during specified period and from this viewpoint, it should be directly related to the specific sales forecasts. It would be prudent to recognize that full production may not be practicable for most projects during the initial production operations. Owing to various technological, production operations and commercial difficulties most projects experiences initial problems that can take the form of only a gradual growth of sales and market penetration on the one hand and a wide range of production problems such as the adjustment of feedstock labor and equipment to the technology selected on the other. Even if full production were to be achieved in the first year, marketing and sales might prove to be a bottleneck.

Depending on the nature of the industry and local factor situations a production and sales target of 40-50 per cent of overall capacity for the first year should not be considered unreasonably low.

The determinants of a production program during the initial production years vary considerably from project to project. In the first case, the growth of sales may not be a great problem unless production capacity is in excess of local demand, but production problems may be more critical. In the second case, both production and sales problems may arise. In the third case, though production aspects may present difficulties,, obtaining a satisfactory order book would be critical. In the fourth case, the sales aspects in relation to price would be dominant.

Once a production program defines the levels of outputs in terms of end products, and possible of intermediate products and the interrelation between various production lines and processes, the specific requirements of materials and labor should be quantified for each stage. An important factor in determining the production program and plant capacity is the *technology and know-how* to be utilized in the project. Specific processes are often related to

certain levels of production or become technically and economically feasible only at such levels.

The nature of technology choice and usage constitutes a key factor in the determination of plant capacity. Each technically possible alternative must in addition consider social, ecological, economic and financial conditions, because production programs and plant capacity are functions of various interrelated socio-economic strategic and technical factors.

6.1.2 Plant capacity

Plant capacity (also referred to as production capacity) refers to the volume or number of units that can be manufactured during a given period. Plant capacity may be defined in two ways: ***feasible normal capacity*** and ***nominal maximum capacity.*** *Feasible normal capacity* refers to the capacity attainable under normal working conditions. This may be established on the basis of the installed capacity, technical conditions of the plant, normal stoppages, and downtime for maintenance, holidays, and shift patterns. The *nominal maximum capacity* is the capacity which is technically attainable and this often corresponds to the installed capacity guaranteed by the supplier of the plant.

Plant capacity is influenced by the following factors:

(i) Technological requirement

For many industrial projects, particularly in process type industries, there is a certain minimum economic size determined by the technological factor. For example, a cement plant should have a capacity of at least 300 tones per day in order to use to rotary kiln method: otherwise; it has to employ the vertical shaft method which is suitable for lower capacity.

(ii) Input constraints

In developing countries, there may be constraints on the availability of certain inputs. Power supply may be limited, basic raw materials may be scarce; foreign exchange available for imports may be inadequate. Constraints of these kinds should be borne in mind while choosing the plant capacity.

(iii) Investment cost

When serious input constraints do not exist, the relationship between capacity and investment cost is an important consideration. Typically, the investment cost per unit of capacity decrease as the plant capacity increase. This relationship may be expressed as follows:

$$C_1 = C_2\left(\frac{Q_1}{Q_2}\right)^a$$

Where C_1 = derived cost for Q_1 units of capacity

C_2 = known cost for Q_2 units of capacity

a = a factor reflecting capacity -cost relationship. This is usually between 0.2 and 0.9.

Illustration: suppose the known investment cost for 5,000 units of capacity for the manufacturer of a certain item is Ksh.. 1,000,000. What will be the investment cost for 10,000 units of capacity if the capacity-cost factor is 0.6?

The derived investment cost for 10,000 units of capacity may be obtained as follows:

$$C_1 = 1{,}000{,}000 \times \left(\frac{10{,}000}{5{,}000}\right)^{0.6} = Br.1{,}516{,}000$$

(iv) Market conditions

The anticipated market for the product/service has an important bearing on the plant capacity. If the market for the product is likely to be very strong, a plant of higher capacity is preferable. If the market is likely to be uncertain, it might be advantageous to start with a smaller capacity. If the market, starting from a small base, is expected to grow rapidly, the initial capacity may be higher than the initial level of demand-further additions to capacity may be effected with the growth of the market.

(v) Resources of the firm

The resources, both managerial and financial available to a firm define a limit on it capacity decision. Obviously, a firm cannot choose a scale of operations beyond its financial resources and managerial capability.

(vi) Government policy

The capacity level may be influenced by the policy of the government. Traditionally, the policy of developing countries was to distribute the additional capacity to be created in a certain industry among several firms regardless of economics of scale. This policy has been

substantially modified in recent years and the concept of 'minimum economic capacity' has been adopted in several industries.

(vii) Economies of scale

While production costs undoubtedly fall with increasing volumes of production, the economic, technical and ecological effects vary from country to country and industry to industry. Therefore plant capacity must be related to economies of scale.

(viii) Minimum economic size and equipment constraints

The concept of minimum economic size is applicable to most industries and projects but is of varying significance for different types of industries. A cement plant of less than 300 tons per day is for instance not considered economical

6.2 Technology and Engineering Study

6.2.1 Definition of technology

Technology is defined as the application of scientific knowledge for productive purposes. This entails the use of science to produce products, services or processes.

Assessment of technology required

The primary goals of technology assessment are to determine and evaluate the impacts of different technologies on the society and national economy (cost-benefits analysis, employment and income effects, satisfaction of human needs etc), impacts on the environment (environmental impact assessment) and techno-economic feasibility assessed from the point of view of the enterprise. To allow the careful assessment of the suitability of the technological alternatives a logical sequence should be followed: *problem definition, technology description, technology forecasting, social description, social forecast impact identification, impact analysis impact evaluation, policy analysis and communication of results.*

(i) Problem identification

The technology required is defined not only by the marketing concept and the available raw material and factory supplies but also by various social economic, ecological financial commercial and technical conditions. Problem identification should identify describe and assess the critical elements of the technology required and special consideration should be

given to existing or possible future constraints on the acquisition and use of availability technologies to further development needs and to the possibility of feasible technological alternatives.

(ii) Technology description and project layout

The preparation of a plant layout and design is essential for every project. The first initial stage should be the preparation of a preliminary project plan and layout on the basis of the production activities and the technology alternatives envisaged. These second stage of project layout and design can only be drawn when the details relating to technology plant capacity and machine specification are finalized.

The preliminary project layout should include several charts and drawings, which need not be according to scale, but which would define the various physical features of the plant and their relationship with one another. For most projects, functional charts and layout drawing at this stage should include the following:

a) General functional layout, defining the principal physical or location features and flow relationships of machinery and equipment, civil works and construction and various ancillary and service facilities
b) Basic characteristics of the technology
c) Material-flow diagrams, indicating the flow of materials and utilities
d) Transport layout, indicating roads, railway and other transport facilities up to their point of connection with public networks
e) Utility lines for electric power, gas, telephone, sewage and emissions, both internal and external up to the point connecting with pubic networks.
f) Areas for extension and expansion.

(iii) Technology market and alternatives

The selection of appropriate technology is undoubtedly one of the key elements of such a study. The study should identify both alternatives technologies and alternatives sources of technology. The evaluation would then aim at selecting the technology and the source from which is may be secured. The study should also discuss the contractual terms and conditions which may be of special significance in relation to the acquisition of a particular technology.

(iv) Assessment of availability

The market for industrial technology is highly imperfect with alternatives technologies and sources available from only one or a few sources and alternatives production technologies may be difficult to find. In this connection, the UNIDO Industrial and Technological Information Bank (INTIB) became operational in 1980, its main objectives being to ensure a quicker, easier and greater flow of information to people who need to select technologies.

(v) Technology forecast

Technological forecast provides an assessment and forecast of technological trends during the project implementation phase and the project life cycle, on the one hand or the period limited to the planning horizon for the project on the other. A technology forecast is especially important for investment projects in highly innovative.

(vi) Assessment of the local integration

An issue of major significance in technology choice is the level of integration or local value added that can be achieved with respect to a particular technological usage. The study should define the extent of integration that should be proven technology that has already been applied and utilized and which can be related to local conditions. The parameters of the appropriate level of integration should be indicated.

(vii) Description of the social economic impact

Public policies with regard to the acquisition of foreign technologies technology absorption and development have to be identified and the socio-economic infrastructure, including the structure of the labor force may have a significant impact on the feasibility of the technology to be selected for the project.

(viii) Environmental impact assessment

This subject was discussed at length in unit 4.3

6.2.2 Selection of Technology

The choice of technology is influenced by variety considerations this are:

Plant capacity, Principal inputs, Investment outlay and production cost, Use by other units, Product mix, and Latest developments, Ease of absorption, Ecological and Environmental impact.

(i) Plant capacity

Often, there is a close relationship between plant capacity and production technology. To meet a given capacity requirement perhaps only a certain production technology may be viable.

(ii) Principle inputs

The choice of technology depends on the principal inputs available for the project. In some cases, the raw materials available influence the technology chosen. For example, the quality of limestone determines whether the wet or dry process should be used for a cement plant.

(iii) Investment outlay and production cost

The effect of alternative technologies on investment outlay and production cost over a period of time should be carefully assessed.

(iv) Use by other units

The technology adopted must be proven by successful use by other units, preferably in the specific country.

(v) Product mix

The technology chosen must be judged in terms of the total product-mix generated by it, including saleable by-products.

(vi) Latest developments

The technology adoption must be based on the latest developments in order to ensure that the likelihood of technological obsolescence in the near future at least, is minimized.

(vii) Ease of absorption

The ease with which a particular technology can be absorbed can influence the choice of technology. Sometimes a high level technology may be beyond the absorptive capacity of a developing country which may lack trained personnel to handle that technology.

Appropriateness of technology

Appropriate technology refers to those methods of production which are suitable to local economic, social and cultural conditions. In recent years, the debate about appropriate technology has been sparked off mainly by Schumacher and others. The advocates of appropriate technology contend that technology should be evaluated in terms of the following questions:

(i) Whether the technology utilizes local raw materials?

(ii) Whether the technology utilizes local man power?

(iii) Whether the goods and services produced cater to the basic needs?

(iv) Whether the technology protects ecological balance?

(v) Whether the technology is harmonious with social and cultural conditions?

Technology Acquisition and Transfer

The sources of unpatented technological know-how can vary with the nature and complexity of the production process and range from individual experts to entire enterprises, domestic or foreign already engaged in the manufacture of the product in question. *Consultancy organizations* are usually a valuable source particularly for specialized product and technologies, *experienced workers* may be quite adequate for the transfer of know how *retired experts* may also prove adequate where simple product and components are involved.

Industrial property rights

Where a desired technology is patented or covered by registered trade mark, it is necessary to secure industrial right from their holders. The coverage and life of particular parents for a required technology should be investigated.

Means of Technology Acquisition

When technology has to be obtained from some other enterprises, the means of acquisition have to be determined. These can take the form of *technology licensing, outright purchase* of technology or a *joint venture involving participation in ownership by the technology supplier*. The implications of these methods of acquisition should be analyzed.

Contract Terms and Conditions for Technology Acquisition

The contractual terms and conditions for technology acquisition and transfer which are likely to be of particular significance to the project need to be highlighted in the feasibility. These may differ in emphasis from project to project, but certain contractual issues should be of significance in most cases. These are:

(i) Definition

The details of the technology including processes and products together with the technology service required from the technology supplier should be clearly defined. This should include all necessary documentation such as blue prints, specifications, production drawings etc.

(ii) Duration

Since the duration of a technology agreement must be adequate for affective technologies absorption, the period required for such absorption should be defined, together with the scope for progressive technological upgrading and renewal.

(iii) Warranty

The appropriate warranty or guarantee relating to the technology and know-how supplied should be indicated

(iv) Access to improvements

Provision should be made for the licensee to have access to improvements made by the licensor during the period of agreement.

(v) Industrial property rights

Patents and other industrial rights pertaining to a particular technology should be unidentified and suitable provision suggested for listing patent and acquired usage rights for the period of validity of the parents and also for possible violation of third party rights.

(vi) Payments

Technology payments can be in the form of a lump sum payment or continuing royalties or a combination of the two. The suggested form and appointed level of payment should be indicated.

(vii) Territorial sales rights

The implications of exclusive and non-exclusive sales rights for the country where the project is located and neighboring countries or other geophysical regions should be examined in the feasibility study.

(viii) Supply of imported inputs

The implications of securing imported inputs such as intermediate products and components from the technology licensors should be examined and suggestions made as to appropriate provision in this regard including provision on pricing such intermediate products.

(ix) Training

For the absorption of technology training is essential. The study should indicate where and when training would be required other in the plant of the licensor or through supply of expert personnel in the plant of the licensee.

6.3 Civil Works

Structures and civil works may be divided into three categories: site preparation and development, buildings and structures and, outdoor works.

(i) Site preparation and development

This covers the following (i) grading and leveling of the site, (ii) demolition and removal of existing structures (iii) relocation of existing pipelines, cables, roads, power lines, etc; (iv) reclamation of swamps and draining and removal of standing water, (v) connections for the following utilities from the site to the public network: electric power (high tension and low tension), water for drinking and other purposes, communications (telephone telex, internet etc,) , roads, railway sidings and (vi) other site preparation and development work.

(ii) Building and structures

Buildings and structures may be divided in to (i) factory or process buildings, (ii) ancillary buildings required for stores, warehouses, laboratories, utility supply centers, maintenance services, and others (iii) administrative buildings (iv) staff welfare buildings cafeteria and medical service buildings and (v) residual buildings.

(iii) Outdoor works

Outdoor works cover (i) supply and distribution of utilities (water, electric power, communication, steam, and gas) , (ii) handling and treatment of emission, wastages and effluents (iii) transportation and traffic signals; (iv) outdoor lighting (v) landscaping and (vi) enclosure and supervision (boundary wall, fencing, barriers, gates, doors, security posts etc,)

Review Questions

i) Explain the determination of the production program
ii) Discuss the factors influencing plant capacity
iii) Describe the steps followed in assessment of the suitability of the technological alternatives
iv) Discuss the considerations influenced the choice of technology
v) Explain the various means of technology acquisition

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CHAPTER SEVEN: HUMAN RESOURCE AND ORGANIZATION

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain the categories and functions project human resource requirements
ii) Discuss the social economic and cultural factors that influence project human resource requirements
iii) Describe the organizational set up of a project
iv) Explain the rationale for identification of project related human resource requirements

The human resources requirement at various levels and during different stages of the project must be defined as well as their availability and cost. On the basis of the quantitative human resource requirement of the project, the availability of personnel and training needs, the cost estimates for wages, salaries other personnel-related expenses and training are prepared for the financial analysis of the project. In this respect, the following aspects of human resources need special attention:

vii) Categories and functions
viii) Social economic and cultural environment
ix) Project related requirements
x) Organizational set-up
xi) Availability and recruitment
xii) Training plan

7.3 Categories and Functions

Human resources as required for the implementation and operation industrial project need to be defined by categories such as management as supervision personnel and skilled and unskilled workers and by functions such as general management, production management and supervision, administration (accounting, purchase etc.) production control, machine operation and transport. The numbers skills and experiences required depend on the type of industry the technology used, plant size, the cultural and socio-economic environment of the project, location as well as proposed organization of the enterprise.

(i) Managerial and Supervisory Staff

The provision of qualified and experienced managers is basic prerequisite for successful project implementation and operation. In many projects, key senior personnel need to be associated with the project during the pre-production stage and even during the prior stage of project formulation and the feasibility study. The timely provision of qualified staff to manage all the functions of the plant is most important. Many poorly performing investment projects suffer mainly from bad management. Thus before approving a new project the source and cost of managerial and supervisory staff should be determined. Local entrepreneurial and managerial capabilities, social factors (for example, the cultural environment and social policies) and sectoral and project-specific requirement including training and intercultural transfer of such capabilities should be covered in the feasibility study.

(ii) Skilled and Unskilled Workers

The timely provision of skilled and unskilled workers is of equal importance to the availability of managerial and supervisor staff. A definition of the kinds of profession staff, skilled labor and unskilled workers needed should be provided in order to specify the minimum training and professional experience required in order to qualify for the different posts identified. This is even more necessary because of the substantial difference in the availability public training programs for skilled workers in developing countries.

7.4 Socio-Economic and Cultural Environment

Human resources requirement not only depends on techno-economic and financial or commercial factors but also are determined to a certain extent by socio and socio-economic conditions in the country and location of the project.

(i) Legislation and labor terms

Labor terms can be regulated by legislation of trade union contracts or be based on common practice. The prevailing rules regarding leave will have an impact on the effective numbers of working hours and days per year and therefore affect the human resources requirement s given the production targets and other conditions.

(ii) Labor norms

A common error in the definition of human resource requirement is the adoption of labor norms prevailing in industrialized countries. Realistic estimates should instead be made on the

basis of experience of and comparison with similar industrial projects in the project country and region

(iii) Occupational safety

In many developing countries minimum standards of occupational safety have not been established or are not enforced strictly enough. A feasibility study must therefore also assess the relevant existing regulations on occupations safety including future trends and analyze their impact on investment and production costs.

(iv) Health care and social security

The project analyst should also identify and consider necessary plant components regarding arrangements for health care and social security for the human resources to be employed. The cost of such components will have to be estimated and include in the cost tables of the study.

7.3 Project Related Requirements

a) Identification of requirements

Staff and labor requirements have to be planned for the implementation or pre-production phase as well as for the start-up and operation phases. Particular attention should be paid to those enterprise functions which are essential for the feasibility of the investment and for which special professional skills and experience of employment and workers are required as in the areas of enterprise management (entrepreneurial and management functions), marketing, raw material and factory supplies, production processes and product characteristic, organization, and personnel and construction management.

The identification of these significant requirements already at the stage of the feasibility study is both difficult and important. Some common examples of mistakes and their consequence are:

i.) Failure to provide the project implementation team with experienced and committed personnel often leads to delays and additional costs.

ii.) Bad timing of recruitment may lead to delays and poor utilization of production capacity during the first operating years. Over optimistic estimates regarding duration and quality of training as well as bad timing often have similar consequences.

iii.) Inadequate maintenance and supply of raw materials and utilities may lead to unplanned and costly production stops that could have been avoided with more experienced and skilled personnel.

iv.) Bad timing of marketing and sales, inexperienced sales persons and sales managers lack of legal advice before signing of contracting etc may result in sales volumes and revenues not keeping pace with production;

v.) Unskilled drivers may cause transport delays damages, losses and deteriorations in quality of the products being transported.

b) Timing of requirements

Pre-production phase: During the pre-production phase, it may be assumed that labor requirements occur mainly in conjunction with preparatory measures needed to start the operational phase. Thus the managerial staff, supervisors, some foremen, and special machine operators have to be recruited in advance, not only to be trained, but also to attend to the construction of building and the installation of equipment that they will later be operating.

Operational phase: Requirements during the operating phase may vary over time capacity utilization is usually improved gradually and additional shifts may be introduced bringing about production and possibly additional requirements in certain personnel categories. A distinction should be made between variable and fixed wage and salary costs as well between the local and foreign labor components.

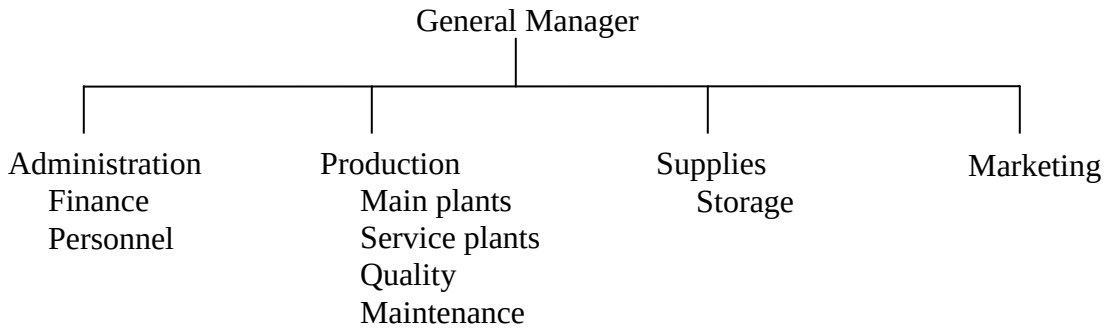
7.4 Organizational Set-Up

Human resource requirements will obviously also depend on the management structure, organizational layout, operating plan and other factors related to the financial and commercial features of the project. Organization is the means by which the operational functions and activities of the enterprises are structured and assigned to organizational, units represented by managerial staff, supervisors and workforce, with the objective of coordinating and controlling the performance of the enterprises and the achievement of its business targets.

The organizational structure of an enterprise indicates the delegation of responsibilities to the various functional units of the company and is normally shown in a diagram often referred to as an *organigram*. Usually, the organization is designed primarily in line with the different

functions in the enterprise such as finance marketing purchasing and manufacturing. However, there is no unique organization pattern. It is also possible to base organizational structures on products or productions lines (for instance profit or cost centers) or on geographical areas or markets; the latter are typical for marketing organizations.

Example of an Organogram for an Industrial Enterprise



The organization design for both the construction and the operating phase depends on internal and external project requirements and conditions and is prepared for the following two reasons: First, the organization of the project and enterprises should aim at the optimal coordination and control of all project inputs, which make it possible to implement the project strategic economically. Secondly, the organizational set up serves to structure the investment and production costs and to determine the costs linked with the corresponding organization units.

The design of the organization usually includes the following steps:

i.) The goals and objectives for the business are stated;

ii.) The functions that are necessary to achieve the goals are identified;

iii.) The necessary functions are grouped or related;

iv.) The organizational framework or structure is designed;

v.) All key jobs are analyzed designed and described,

vi.) A recruitment and training program is prepared.

The organizational planner will then have to consider some of fundamental aspects of optimal organization. These may include:

i.) The span of control that is the numbers of employees reporting of supervisor.

ii.) The number of organization levels

iii.) A subdivision of activities by functions process, equipments, location, product or classes of customers.

iv.) The distribution of responsibilities and authority.

Later, once the project is approved all information applicable to the organization will be collected in an organization manual, which may include:

i.) An overall description and identification of the strategies, objectives and policies of the company.

ii.) A description of the various functional units sections or divisions of company, specification in man tasks to be performed by the individual units.

iii.) Job description for at least all key personnel

iv.) Administration procedures according to which transactions are to be carried out both internally and externally and covering all function and all levels of the company.

***The organization structures are discussed below*:**

a) General management

Depending on the type and is of an enterprise the general managers with his office is responsible for the entrepreneurial function. These are management functions that are fundamental for the existence of an enterprise and are not be delegated.

b) Administration (Accounting and financial control)

An administrative unit or department has to be planned to provide the management with the financial and accounting information required for the efficient and economic operation of the enterprise. To facilitate cost planning and control during the pre investment phase the project should be divided into cost centers.

Production cost centers are those areas of activity where all major an industrial operations are performed. *Service centers* are those areas of activity that render supplementary service necessary to the smooth running of the plant. *Administrative and financial cost centers* comprise all activities related to managerial planning, control and performance evaluation.

c) Marketing organization

The marketing department is the organizational unit carrying out the marketing function description was established a marketing organization of a new project (or product) required

the prior careful determination of both the marketing objectives and the means required and available.

d) Organization of supplies

The supply system includes the provisions of inputs of materials and service shipping of the goods, storage and inventory control.

It is the responsibility on the purchasing department to contribution to the overall profit generation of the company by obtaining the best possible prices while avoiding the storage of larger quantities for input materials than are required for reasonably safeguarding the production requirement. Purchasing will normally cover the providing of both goods and services from domestic and over areas suppliers.

Typical tasks will therefore include:

i.) Selection and evaluation suppliers

ii.) Requesting bids or arranging international competitive bidding

iii.) Shipping and clearing, quality control of incoming goods

iv.) Warehousing

v.) Invoice control and payments of suppliers.

e) Organization of storage

Stock control must aim at keeping stocks of materials and products low to avoid unnecessarily high net working capital requirements, while maintaining the minimum stock required for safe and uninterrupted operation. Often the control of the entire materials and product flow including storage remains within production department. In this case the production program as well as products in stock would be planned jointed with the market in department and supplies would be ordered through the purchasing department.

f) Organization of quality assurance

The quality assurance department is responsible for the total quality of a product from its conception to its delivery to the end-user. The type and scope of quality assurance depends however on the industry and the size of the project. It may be part of production department or be subordinated to the purchasing department in the later cases the responsibilities of the quality assurance department are usually more restricted and the task limited to the control of production incoming goods and outgoing products.

g) Organization of maintenance

The maintenance function is often placed within the production department. However, the placement of the maintenance unit within the individual company organization depends on where it can best fulfill its main objectives of ensuring that the plant and equipment is ready and functioning as required in accordance with the production program. If a maintenance unit is wholly dependent on its own resources it will be responsible for both preventive and corrective maintenance of all plant equipments, auxiliary equipments and buildings. The unit should be mainly staffed with the technicians who would be directly involved in the daily maintenance operations.

h) Organization of personnel

The personnel unit deals with all subjects related to human resources such as recruitment and training of personnel and updating and developing skills and knowledge. The social-cultural environment of the project usually has a great impact on the organization and overhead costs of the personnel department. For example labor laws directly applicable to the hiring and laying-off of personnel, local cultural habits or customs may have a decisive impact on recruitment, employment and development of the human resources requirement in the project. In other projects potential conflict between different ethic or social groups may require social measures and entail significant costs.

Human resources development may be important task of a personnel department. Training may have to be organized to increases skills of staff and workers to secure increase the quality of products etc. Other important subjects could be training related to health protection, the introduction and maintenance of safety measures and the operational of machinery and plants in accordance with environment protection measures.

Manning tables: labor planning should start at the departmental level defining the labor and staff requirements by function and categories (workers –skilled, semi-skilled and unskilled; staff –managerial, supervisory, administrative and sales). The manning table of the entire project can be obtained by simply aggregating the departmental manning tables.

7.6 Availability and Recruitment

a) Assessment of supply and demand

The following factors should be given due consideration when the availability and employment of human resources are analyzed:

i.) The general availability of relevant human resource categories in the country and the project region

ii.) The supply and demand situation in the project region

iii.) Recruitment policy and methods

iv.) Training policy and program

The study should indicate the current supply and demand situation in the region as well as possible shortages in relevant categories strong demand from existing industries and expected demand from projects under construction might make it more difficult for the project in question to recruit human resources with the professional background and skills required.

b) Recruitment planning

Recruitment policy and methods and means of the retaining key personnel for long periods, probable terms or employment and possible fringe benefits to employees and their families should be identified. Difficulties in the recruitment of key personnel (such as managers, supervisors and skilled labor) can be dealt with in different ways:

i.) Recruitment is combined with intensive training of key personnel in order to meet quality requirements:

ii.) Foreign expertise is recruited.

An attempt is often made to compensate for the lack of experience of local managerial latent through the employment of foreign personnel, either by hiring individual expatriate or by signing management contracts with foreign companies. Although this is an expensive course and does not immediately serve the important aim of developing indigenous managerial skills (especially if it extends over long period as is often the case) the employment of expatriates may be necessary for the successful implementation of a project.

Training Plan

Since the lack of experienced and skilled personnel can constitute a significant bottleneck for project implementation and operation in developing countries, extensive training programme should be designed and carried and out at part of the implementation process of investment projects. Training can be provided at the factory by managerial and technical personnel and others, by specially recruited experts or by expatriate personnel. The timing of training programs is of crucial importance since personnel should be sufficiently trained to be able to take up their positions as and when required training requirements should be defined

separately for the preproduction and for the operation phase in order in provide adequately for production and operational training costs.

A training program can be prepared through the following steps:

i.) ***Analysis of personnel characteristics and conditions.*** Verifiable capacities, numbers, experiences and other characteristics are to be analyzed. Restrictions relating to unions and labor laws may be relevant .Socio-cultural characteristics (such as religion, tribal tradition regarding women and men working together tradition regards stability and working hours) should be considered.

ii.) ***Analysis of training requirements*** A job (task) analysis will provided information about the different tasks to be carried out. This is related to judgments regarding performance characteristics of different personnel categories. This knowledge will together with estimates regarding learning curves form a basis for defining the scope of the training required.

iii.) ***Formal training is usually related to managers and supervisory personnel.*** It can be carried out at the in the country or abroad depending on training facilities industrial traditional trainers available and other factors.

iv.) ***On the job training can be carried out in the form of individual or group training.*** It is usually out at the plant in question but can take place partly in other industries. This kind of training should not be exclusively technical but should also cover administrative and other duties.

v.) ***Updating during future plant operations may be required for management and administration staff as well as labor.*** The introduction of new plant equipment and methods of work will require motivated staff to maintain high standards on proficiency and productivity.

Cost Estimates

The manning tables prepared for each department can be used for estimating labor costs.

The costs are to be divided in to foreign and local currency components. When estimating the total wage and salary costs provision should be for the following personnel overhead costs.

i.) Socio security fringe benefits and welfare costs

ii.) Installation grant, subsistence payment and similar each costs that occur in connection with recruitment and employment

iii.) Annual deposits to pension funds

iv.) Direct and indirect costs of training

v.) Payroll taxes

Review Questions

i) Explain the categories and functions project human resource requirements
ii) Discuss the social economic and cultural factors that influence project human resource requirements
iii) Describe the organizational set up of a project
iv) Explain the rationale for identification of project related human resource requirements
v) Describe the steps involve in designing a training program for project human resource

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CHAPTER EIGHT: FINANCIAL AND ECONOMIC ANALYSIS

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain the preproduction expenditure and their treatment
ii) Describe the working capital requirements of a project
iii) Describe the production and marketing costs of a project
iv) Discuss the various methods of project cash flow evaluations

Basically, financial analysis should accompany the design of the project from the very beginning; this is only possible when the financial analyst is integrated into the feasibility study team at an early stage. From a financial and economic point of view, investment can be defined as a long term commitment of economic resources made with the objectives of producing and obtaining net gains (exceeding the total initial investment) in the future.

8.1 Total investment costs

Initial investment costs

Initial investment costs are defined as the sum of ***fixed assets*** (fixed investment costs plus pre-production expenditures) and ***net working capital*** with fixed assets constituting the resources required for constructing and equipping an investment project, and net working capital corresponding to the resources needed to operate the project totally or partially.

Investment required during plant operation

The economic life time is different for the various investments (buildings, plant, machinery and equipment, transport equipment etc). In order to keep a plant in operation, each item must therefore be replaced at the appropriate time and the replacement costs must be included in the feasibility study.

Pre-production expenditures

In every industrial project certain expenditure due, for example, to the acquisitions or generation of assets are incurred prior to commercial production. These expenditures, which have to be capitalized, include a number of items originating during the various stages of project preparation and implementation.

a) ***Preliminary capital-issue expenditures.*** These are expenditures incurred during the registration and formation of the company, including legal fees for preparation of the memorandum and articles of association and similar documents and for capital issues.

b) ***Expenditures for preparation studies*.** There are three types of expenditures for preparatory studies: Expenditures for pre-investment studies; consultant fees for preparing studies, engineering and supervisor of erection and construction; other expenses for planning the project

c) ***Other pre-production expenditures***. Included among other pre-production expenditures are the following:

i. Salaries, fringe benefits and social security contributions of personnel engaged during the pre-production period.

ii. Travel expenses

iii. Preparatory installation, such as worker's, camps, temporary offices and stores.

iv. Pre-production marketing costs, promotional activities, creation of the sales network etc.

v. Training costs including fees, travel, living expenses, salaries and stipends of the trainees and fees payable to external institutions;

vi. Know-how and patent fees

vii. Interest on loans accrued or payable during construction

viii. Insurance costs during construction

d) ***Trial runs, start-up and commissioning expenditures*.** This item includes fees payable for supervision of starting-up operation, wage, salaries, fringe benefits and socio security contributions of personnel employed, consumption of production materials and auxiliary supplies, utilities and other incidental start- up costs. Operating losses incurred during the running period up to the stage when satisfactory levels are achieved also have to be capitalized.

In allocating pre-production expenditures one of two practices is generally followed:

i.) All pre-production expenditures may be capitalized and amortized over a period of time that is usually shorter than the period over which equipment is depreciated.

ii.) A part of the pre-production expenditures may be initially allocated, where attributable to the respective fixed assets and the sum of both amortized over a certain number of years

e) ***Plant and equipment replacement costs.*** Such costs included all pre-production expenditure as described above and related to investment needed for the replacement of fixed assets. A gain the estimates include the supply, transport, installation and commissioning of equipment, together with any costs associated with down time, production losses as well as allowance for physical contingencies.

f) ***End-of life costs.*** The costs associated with the decommissioning of fixed assets at the end of the project life, minus any revenues from the scale of the assets are end of life costs. Major items are the costs of dismantling, disposal and land reclamation. It is often reasonable to assume that these costs can be offset against the salvage value of the corresponding asset

Fixed assets

As indicated above fixed assets comprise fixed investment costs and pre-production expenditures

Fixed investment costs

Fixed investment should include the following main cost items, which may be broken down further, if required

i.) Land purchases, site preparation and improvements

ii.) Building and civil works

iii.) Plant machinery and equipment, including auxiliary equipment

iv.) Certain incorporated fixed assets such as industrial property rights and lump – sum payments for know-how and patents

Net working capital

Net working capital is defined to embrace ***current assets*** (*the sum of inventories, marketable securities, prepaid items, accounts receivable and cash*) ***minus current liabilities*** (*accounts payable*). It forms an essential part of the initial capital outlays required for an investment project because it is required to finance the operations of the plant.

a) Accounts receivable (debtors)

Accounts receivable are trade credits extended to product buyers as a condition of sale; the size of this item is therefore determined by the credit sales policy of the company. It is given by the following formula

$$Debtors = \frac{credit, terms(in, months)}{12} \times value, of, annual, gross, sales$$

b) Inventories

Every attempt should be made to reduce inventories to as low as justifiable. Inventories include the following items:

i.) ***Production material.*** If the materials are locally available and in plentiful supply and can be rapidly transported, then only limited stocks should be maintained unless there are special reasons for keeping a higher stock (such as price fluctuations). If the materials are imported and import procedures are dilatory, then inventories equivalent to as much as six months consumptions may have to be maintained. Other factors influencing the size of investors are the reliability and seasonality of supplies, possibilities of substitutions and expected price changes.

ii.) ***Spare parts.*** Levels of spare parts inventors depend on the local availability of supplies, import procedures and maintenance facilities in the area, and on the nature of plant itself. The plant is usually provided with an initial set of spare parts.

iii.) ***Works-in-progress.*** To assess capital requirement for covering work-in-progress a comprehensive analysis should be performed of the production process and of the degree of processing already reached by the different materials inputs during each stage. The requirements are expressed in months (or days) of production depending on the nature of the product.

iv.) ***Finished products.*** The inventory of finished products depends on a number of factors, such as the nature of the product and trade usage. The valuation is based on factory costs plus administrative overheads.

c) Cash-in-hand and cash-in-bank

The surplus of receipt over payment may not fully cover the interest payments, addition short term finance would be required. It may also be prudent to provide for a certain amount of cash

in hand. This should be done by including a contingency reserve on working capital which depending on the case could be around 5 per cent.

d) Account payable (creditors)

Accounts payable will depend on credit terms provided by suppliers. Hence raw materials factory supplies and services are usually purchased on credit with a certain period elapsing before payment is affected. Accrued taxes are also paid after a certain period has elapsed, and may be another source of finance similar to accounts payable. The same holds true for wages payable. Such credited payments reduce the amount of net working capital required.

Calculation of net work capital requirements

When calculating the working capital requirements the minimum coverage of days of for current assets and liabilities has to be determined first. Annual factory costs, operating costs, and costs of products sold should then be computed since the values of some components of the current assets are expressed in these terms.

The next step is to determine the coefficient of turnover for the components of current assets and liabilities by dividing 360 days by the number components of current of days minimum coverage. Subsequently, the cost data for each item of the current assets and liabilities are divided by the respective coefficient of turnover.

Finally, the net working capital requirements for the different production stages are obtained by deducting the current liabilities from the sum of current assets. The required cash-in hand is calculated separately.

Structure of the balance sheet

	Assets	Liabilities	
Fixed assets	Preproduction expenditures	Equity and reserves	Permanent capital
	Fixed investments	Long-term liabilities	
Current assets			

Working Capital	
	Current liabilities

8.2 Production Costs

It is essential to make realistic forecasting of production or manufacturing costs for a project proposal in order to determine the future viability of the project

Definition of production cost items: The definition of production costs divides production costs in to four major categories; factory costs, administrative overhead costs, depreciation costs, and cost of financing. The sum of factory and administrative over head costs is defined as operation costs.

***Factory costs*:** Factory costs include the following:

i.) Materials predominantly variable costs such as raw materials factory supplies and spare parts.

ii.) Labor (production personnel) fixed or variables costs depending on type of labor and cost elements)

iii.) Factory overheads (in general fixed costs).

Administrative overheads: This include salaries and wages, social costs rents and leasing costs etc

Depreciation costs. Depreciation costs are charges made in the annual net income statement (profits loss account) for the productive use of fixed assets. Depreciation costs present investment expenditures (cash outflow during the investment phase) instead of production expenditures (cash outflow production) depreciation charges must therefore be added back of net cash flows are calculated from the net profits after corporate tax, as obtained from the net income statement. Depreciation costs do have an impact on net cash flows because higher the depreciation charges, the lower the taxable income and the lower the cash outflow corresponding to the payable on income.

Financial costs. Financial costs (interests) are sometimes considered as part of the administration overheads.

Unit costs of production

For the purpose of cash flow analysis it is sufficient to calculate the annual costs. At the feasibility stage, however, an attempt should also be made to calculate unit costs to facilitate the comparison with sales prices per unit. For single product projects units costs are calculated simply by dividing production costs by the number of units produced (therefore unit costs usually vary with capacity utilization)

Direct and indirect costs

Direct costs are easily attributable to a production unit or service in terms of costs of production, materials and production labor. Since indirect costs (factory administration overheads such as management and supervision, communications, depreciation and financial charges) cannot be easily allocated directly to a particular unit of output, they must first be apportioned to cost centers and thereafter to the units cost price by way of surcharges obtained from the cost accounting department. Direct costing is a method that avoids the problem of determining. Direct costing is an accounting method that avoiding the problem of determining surcharge rates. The direct variables and direct fixed costs are deducted from the revenue generated by a certain products (or product group) and the remaining surplus or margin together with the margins generated from other products is then available to cover the indirect costs. The surplus then remaining is called the *operational margin* (excluding including costs of finance).

8.3 Marketing costs

Marketing cost comprises the costs for all marketing activities and may be divided into ***direct marketing costs*** for each product or product group, such as packaging and storage (if not included in the production costs) sales costs (salesmen commissions, discounts, returned products, royalties, product advertisement etc) transport, and distribution costs. ***Indirect marketing costs*** such as overhead costs of the marketing department (personnel material and communications, markets research, public relations, and promotional activities, not directly related is a product etc).The analysis of these costs involves their assignments to various cost group such territories certain classes of customers (wholesalers, retailers, government institutions etc) and products to product group.

Marketing and distribution costs fall into the category of period costs even if variable and as such are charged against the operations of the accounting period in which they are occurred. For depreciable investments as required, for marketing and distribution (for example delivery trucks), depreciation charges are to be included in the computation of total marketing costs

8.4 Project cash flows

Cash flows are basically either receipt of cash (cash inflow) or payments (cash outflows)

Typical operational cash flows for a project are shown below

Operational cash outflows

i.) Increase in fixed assets (investment)

ii.) Increase in net working capital

iii.) Operating costs (less depreciation)

iv.) Marketing expenses

v.) Production and distribution losses

vi.) Corporate (income taxes)

Operational cash inflows

i.) Revenues from selling of fixed assets

ii.) Recovery of salvage value (end of project)

iii.) Revenues from decrease of net working Capital

iv.) Sales revenues

v.) Other income due to plant operations

8.5 Financial Evaluation

8.5.1 Basic assumptions underline cash flow discounting in financial evaluation

The basic assumption underlying the discounted cash-flow concept is that money has a time value in so far as given a sum of money available now is worth more than an equal sum available in the future. This difference can be expressed as a percentage rate indicting the relative change for a given period which, for practical reasons, is usually a year. Considering that a project may obtain a certain amount of funds *(F)* if this sum is repaid after one year including the agreed amount of interest *(I)* the total sum to be paid after one year would be

(F+I) where, *F+I= F (1+r)* and *r* is defined as the interest rate (in percentage per year) divided by 100 (if the interest rate is, for example 12.0 per cent then *r* equals 0.12)

8.5.2 Methods of Financial Evaluation

8.5.2.1 Net Present Value (NPV) Method

$$NPV = \sum_{t=1}^{n} \frac{C_t}{(1+K)^t} - Io$$

Where; C = cash flow at the end of period

K = required rate of return

n = useful life of project

Io = initial cost of project

NPV = present value of cash flow – present value of initial cost

Decision criteria for NPV

NPV > 0, Accept the project – it maximizes investors wealth

NPV < 0, Reject the project

NPV = 0, Indifferent

Illustration:

A firm is considering investing in a project which costs 6,000 Ksh. and has the following cash flows

YR	1	2	3	4
C.F	1500	3000	2000	2500

The cost of capital is 10% and the project has no salvage value. Using the NPV method advise the firm on whether to invest in the project

YR	CF	PVIF (10%)	P.Vs
1	1500	0.9091	1363.65

2	3000	0.8264	2479.20
3	2000	0.7513	1502.60
4	2500	0.6830	1707.50
		Total P.Vs =	7053.00
		Less project cost	(6000.00)
		NPV =	1053.00

Decision: Accept the project since NPV >0

Advantages of NPV

i) Considers time value of money

ii) Gives a decision criteria

iii) Recognizes uncertainty of cash flow by discounting

iv) Uses all project cash flows

Disadvantages of NPV

i.) Gives absolute values which cannot be used to compare project of different sizes

ii.) There is difficulty in selecting the discount rate to use

iii.) It does not show the exact profitability of the project

Note that NPV could be adjusted for risk through the certainty equivalent approach.

8.5.2.2 Internal Rate of Return (IRR)

IRR is the discount rate that equates the NPV of a project to zero. It is the project rate of return (Yield)

$$\sum_{t=1}^{n} \frac{C_t}{(1+R)^t} - I_o = 0$$

Where; R = IRR

It should be noted that IRR is computed using a trial and error method. However, financial calculators are programmed to compute IRR

Steps in the IRR trial and error calculation method

(i) Compute the NPV of the project using an arbitrary selected discount rate

(ii) If the NPV so computed is positive then try a higher rate and if negative try a lower rate.

(iii) Continue this process until the NPV of the project is equal to zero

(iv) Use linear interpolation to determine the exact rate

Linear interpolation is given by: $LR+(HR-LR)\left(\frac{NPV_{LR}-0}{NPV_{LR}-NPV_{HR}}\right)$ Where; LR = Lower rate and HR = higher rate

Illustration:

A project has the following cash flows

YR	1	2	3	4
C.F	300	400	400	900

The cost of the project is 1500 Ksh.. Determine whether project is acceptable if the cost of capital is 18% using the IRR method.

1. We first select an arbitrary discount rate say 9% and compute the NPV

YR	C.F	PVIF (9%)	P.Vs
1	300	0.9174	275.22
2	400	0.8417	336.68
3	700	7722	540.54
4	900	7084	637.56
		Total P.Vs=	1790.00
		Less cost	(1500.00)
		NPV at 9%=	290

2. Since, NPV at 9% is positive and large we select another discount rate larger than 9%, say 15%

YR	C.F	PVIF (15%)	P.Vs
1	300	0.8696	260.88
2	400	0.7561	302.44
3	700	0.6575	460.25
4	900	0.5718	514.62
		Total P.Vs	1538.19
		Less cost	(1500.00)

NPV at15%	38.19

3. Since, NPV at 15% is positive but not large, we select a slightly higher rate, say, 18%

YR	C.F	PVIF (18%)	P.Vs
1	300	0.8475	254.25
2	400	0.7182	287.28
3	700	0.6086	426.02
4	900	0.5158	462.22
		Total P.Vs	1431.77
		Less cost	(1500.00)
		NPV at 15%	- 68.23

Since NPV at 15 is negative, IRR therefore lies between 15% and 18%, and since zero NPV will the between -38.23 and 38.19, to get the correct (exact) IRR we have to interpolate between 15% and 18% using interpolation formula

$$IRR = 15 + (18 - 15)\left[\frac{38.19 - 0}{38.19 - (-68.23}\right] = 16.08\%$$

Decision: Reject the project since IRR is less than the required rate of return (cost of capital)

Advantages of IRR

(i) Can be used to compare projects of different sizes

(ii) Considers time value of money

(iii) Indicates the exact profitability of the project

(iv) Uses project cash flows

Disadvantages of IRR

(i) Some project have multiple IRRs if their NPV profile crosses the x-axis more than once (project cash flow signs change several time)

(ii) Assumes re-investment of cash flows occurs of project's IRR which could be exorbitantly high

(iii) Doesn't provide a decision criteria

(iv) Not conclusive for mutually exclusive projects

8.5.2.3 Profitability Index (PI)/ present value index (PVI)/ benefit-cost ratio

It is the relative measure of project's profitability and can used to compare project of different sizes

PI = present value of cash flows/Initial cost

Decision criteria:

If, PI >1, Accept project

PI < 1, Reject project

PI = 1, Indifferent

Illustration: A project has the following cash flows

YR.	C.F.
1	300
2	400
3	700
4	400

If the required rate of return is 9% and the project initial cost is 1500 Ksh., calculate the PI of the project and advice if the project is acceptable

YR	CF	PVIF 9%	PVs
1	300	0.9174	275.52
2	400	0.8417	336.68
3	700	0.7722	540.54
4	900	0.7084	637.46
		Total PV =	1790.00

$$PI = \frac{PVofCF}{\text{int}\,ial\,\text{cost}} = \frac{1790}{1500} = 1.193$$

Decision: The project is acceptable since PI > 0

Advantages of PI

(i) Recognized time value of money

(ii) Compares projects of different sizes

(iii) Gives a decision criteria

Disadvantages of PI

i.) Does not indicate the risk

8.5.2.4 Discounted Payback period

This is the number of year taken to recover the original (initial) investment from annual cash flows. The lower the payback period the better the project is

Illustration:
Assume a company wants to invest in two mutually exclusive projects of 1000 Ksh. each generating the following cash flows. If the required rate of return is 10%. Which of the projects should the company invest in?

Year	A	B
1	500	100
2	400	200
3	300	300
4	400	400
5	-	500
6	-	600

Year	Discounted cash flows of A	Cumulative frequency of A	Discounted cash flows of B	Cumulative frequency of B
1	454.51	454.54	90.91	100
2	330.58	785.09	165.29	256.20
3	225.40	1010.49	225.40	481.60
4	273.21	1283.70	273.21	754.81
5		1283.70	310.46	1065.46
6		1283.70	338.68	1403.95

Pay back for A = $2 + \left(\frac{214.91}{225.40}\right) = 2.95\, years$

Pay back for B = $4 + \left(\frac{245.19}{310.46}\right) = 4.79\, years$

The management should undertake project A since it has a lower pay bock period.

Advantages of pay back method

i.) Considers time value of money

ii.) Useful in assessing risk and liquidity of the project

Disadvantages of pay back method

i.) Does not use all project cash flows

ii.) Does not consider the performance of the project after the pay back period

Review Questions

i) Explain the preproduction expenditure and their treatment
ii) Describe the working capital requirements of a project
iii) Describe the production and marketing costs of a project
iv) Discuss the various methods of project cash flow evaluations
v) Assume a company wants to invest in two mutually exclusive projects of 1000 Ksh. each generating the following cash flows:

Year	*A*	*B*
1	*500*	*100*
2	*400*	*200*
3	*300*	*300*
4	*400*	*400*
5	*-*	*500*
6	*-*	*600*

If the required rate of return is 10%. Which of the projects should the company invest in if :

a) The internal rate of return is used
b) The discounted payback method is used

References for further Reading

i) Choudhury S. (2004), *Project Management*, Tata Mgraw Hill
ii) Chandra Prasanna, (2002), *"Projects: Planning, Analysis Financing Implementation and Review",* 5th Ed, Tata McGraw-Hill New Delhi

CHAPTER NINE: PROJECT DOCUMENT

Learning Objectives

By the end of this chapter the learner should be able to:

i) Describe the format and contents of a project document

ii) The importance of reviewing a project document

There are several variations of project documents we however present a summary of the main sections that a project document should have. There are two sections of the project document the preliminary section and the main body

9.1 Preliminary Section of the project document

i) Project Classification Code: The project classification code is obtainable form UNDP Programme and Projects Manual the codes are given at the end of this module.

ii) Project Title

iii) Project Description

iv) Sponsoring Body

v) Proponent's name and address

vi) Date of preparation:

vii) Proposed funding source:

viii) Project budget

Description	*Total Allocation ($)*
1. Contracts with Individuals	_____
2. Contracts with Organizations	_____
3. Equipment	_____
4. Supplies and Services	_____
5. Travel and per diem	_____
Total:	_____

9.2 The Main Body of the Project Document

i) Problem to be addressed

The first paragraph of the Project Document will define the problem (s) that the project will address. This section should be limited to a brief statement of the problem, as determined in

the problem analysis. In general, one project should focus on one large problem. The statement of a single problem will lead to the statement of a single objective.

ii) Background, problem analysis and justification

a) Background

The Background section of the Project Document should provide factual information about the context of the problem that is to be addressed. This section should also include description of the present situation, any related current and past activities, and the relevant policies and plans of action

b) Problem analysis and justification

The Problem Analysis and Justification section is the most important section of the Project Document. The section should present a logical analysis that justifies the project. The section should discuss the following topics and questions:

Problem analysis: What are the underlying causes of the problem to be addressed? Details from the problem analysis should be presented here.

Regionality: Is the problem regional in nature? Can the problem and its causes be effectively and appropriately addressed at the regional level? Answers to these questions derived from the regionality analysis exercise should be presented here.

Participation: Which member countries/communities etc want to participate in this project?

Beneficiaries: Who will be the likely beneficiaries of a solution to the problem or need?

Commitment and sustainability: What complementary national actions are interested Governments currently implementing to address the problem or would be needed along with regional action to fully address the problem? Are the concerned Governments committed to bearing the costs of required complementary national actions and the long-term costs of regional action?

iii) Possible solutions

The purpose of the Possible Solutions section of the Project Document is to ensure that alternative strategies or approaches to solving the project problem have been identified and assessed. What possible approaches to the problem were identified in the problem analysis? Are there other possibilities? What are the advantages and disadvantages of pursuing each option? What would be the consequences of doing nothing? What strategy has been selected as the best approach to solve the problem? Why is this option regarded as the best approach?

iv) Objective and success criteria

a) Objectives

This section of the Project Document, the highest element in the logical framework, should present the best approach as (1) the statement of the results to be achieved by the project or

activity (the objective) and (2) the statement of criteria for successful achievement (the success criteria). In other words, the objective should define a desired solution to the identified problem.

b) Success Indicators

The success criteria will set the ***qualitative*** standards for successful achievement. These criteria will enable the measurement of the extent of project success. Such measurement will enable the evaluation of the project in terms of the purpose for which it was formulated

c) Success Measures

The success criteria will set the ***quantitative*** standards for successful achievement. These criteria will enable the measurement of the extent of project success. Such measurement will enable the evaluation of the project in terms of the purpose for which it was formulated.

v) Outputs

Outputs are results or products that are produced and utilized in order to achieve an objective. Several outputs may be necessary to enable the achievement of an objective. The vocabulary chosen to define outputs should describe finished products or completed results, e.g., "a feasibility study" or "trained personnel". This section should list and briefly describe the outputs to be produced for the achievement of each project objective

vi) Indicative work plan

The indicative work plan should be prepared using scheduling software. This work plan should identify and graphically illustrate the activities in the logical order that is necessary for the production of each output. The vocabulary of activities should describe actions, e.g., "implementation of training" or "consultations with stakeholders' The activity lists for common outputs can be based on some standard models.

vii) Management and implementation arrangements

a) Management arrangements

The management arrangements should identify the project's Sponsoring Body, e.g. That body has the responsibility to designate a manager for the project who will be responsible for the achievement of the project objectives. The project manager must see that the planned work is actually done and that finished work actually achieves the objective. The management arrangements should specify to whom the project manager must report and with which other bodies he/she must coordinate the project's work

b) Implementation arrangements

The implementation arrangements define the organizational unit or the personnel who will actually produce the project's outputs. The implementers, who may be consultants, experts or personnel Governments, should be identified for each output. Reporting requirements and relationships should be explained as an element of the implementation arrangements. To ensure full understanding of roles and responsibilities, the project manager should identify "parties responsible" for implementation of each activity when he/she revises the indicative work plan into the actual work plan after project approval

c) Monitoring and Evaluation Arrangements

Describe the evaluation strategy for this project, including when the review/evaluation is to take place, the key evaluation issues to be addressed, and how it is to be financed. (It is recommended that the project budget include an allocation for the review/evaluation.)

viii) Inputs

There may be many possible combinations of inputs that can produce the proposed outputs. The formulator of the Project Document should seek to identify inputs that will enable efficient project implementation, that are appropriate to the work to be done, and that are cost effective. As an aid to the determination of inputs, the project formulator should refer to the indicative work plan. The questions that project formulators need to consider in regard to the selection of inputs include:

- Which inputs should be used?
- What kind of inputs?
- How many? (for consultants or equipment)
- What duration? (for personnel assignments)
- How much does it cost?

Major inputs required for the production of each output should be presented on a table. This table can be created using word processing or spreadsheet software. The purpose of the table is to facilitate the selection of appropriate inputs and to enable project implementers and appraisers to easily understand the relationships between inputs and outputs. The table should describe inputs in five categories: contracted personnel, contracted organizations, equipment, supplies and services, and travel and per diem. Additional details, such as TOR for contracts, should be provided and attached as annexes

ix) Budget and funding arrangements

The selected inputs and their costs are consolidated on a project budget which should be presented on a spreadsheet under the following headings: contracts (individual, corporate or institutional); equipment; supplies and services; travel and daily subsistence allowance (not related to contracts). If more than one funding source is proposed, a budget should be prepared for each one.

Attachments

The attachments listed and described below should be appended to the Project Document as necessary or appropriate.

a) Mobilization Plan

A plan should be prepared that describes how the project will be activated once it is approved. The preparation of this plan is especially important when the finalization of funding arrangements remains to be done. This plan could also include the designation of the project manager and any other steps that must be taken to enable the project manager to initiate implementation of the project.

b) Explanation of Budget Estimates

This attachment should explain how budget estimates were determined for major inputs. In many cases, this attachment may simply refer to pro forma figures for budgeting. Otherwise, supporting information should explain how budget figures were calculated.

c) Terms of Reference (TOR) for Contracts

In the event that important elements of the project will be done on a contractual basis, the TOR should be prepared in draft as attachments. Contracts can be for individuals, firms, non-governmental organizations or other institutions.

d) Specifications for equipment

An attachment should be prepared with the specifications for any high value equipment e.g. those over $10,000 in value or for multiple purchases of a smaller item whose aggregate value exceeds $10,000.

e) Other Attachments

Other attachments may be provided in order to explain or clarify the Project Document. These might include explanatory technical data or a bibliography. Such additional

attachments are not mandatory and should be prepared only if deemed essential for understanding of the Project Document by appraisers or potential funding agencies.

Review

The project proponent should review the draft project document for (1) clarity of the logical connections among elements of the project; (2) completeness, according the requirements of the project document format; and (3) correctness (facts, grammar, spelling).

Review Questions

i) Describe the format and contents of a project document

ii) The importance of reviewing a project document

iii) Problem analysis and justification is said to be the most important section of a project document. Why?

References for further Reading

i) Hansen, (1992), "Manual for the Preparation of Industrial Feasibility Studies", UNIDO

ii) Phil Baguley (2009), *Project Management*, Hodder & Stoughton

CHAPTER TEN: PROJECT MONITORING AND EVALUATION

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain the importance of delineation of project performance indicators
ii) Explain the rationale of a project logical framework
iii) Discuss the various methods of project monitoring and evaluation

Introduction

The monitoring and evaluation (*M & E)* chapter discusses the following

i) Performance indicators
ii) The logical framework approach
iii) Theory-based evaluation
iv) Formal surveys
v) Rapid appraisal methods
vi) Participatory methods
vii) Public expenditure tracking surveys
viii) Cost-benefit and cost-effectiveness analysis
ix) Impact evaluation

This list is not comprehensive, nor is it intended to be. Some of these tools and approaches are complementary; some are substitutes. Some have broad applicability, while others are quite narrow in their uses. The choice of which is appropriate for any given context will depend on a range of considerations

10.10 Performance Indicators

Performance indicators are measures of inputs, processes, outputs, outcomes, and impacts for development projects, programs, or strategies. When supported with sound data collection-perhaps involving formal surveys-analysis and reporting, indicators enable managers to track progress, demonstrate results, and take corrective action to improve service delivery. Participation of key stakeholders in defining indicators is important because they are then more likely to understand and use indicators for management decision-making. What can we use them for?

- Setting performance targets and assessing progress toward achieving them.

- Identifying problems via an early warning system to allow corrective action to be taken.
- Indicating whether an in-depth evaluation or review is needed.

Advantages

- Effective means to measure progress toward objectives.
- Facilitates benchmarking comparisons between different organizational units, districts, and over time

Disadvantages

- Poorly defined indicators are not good measures of success.
- Tendency to define too many indicators, or those without accessible data sources, making system costly, impractical, and likely to be underutilized
- Often a trade-off between picking the optimal or desired indicators and having to accept the indicators which can be measured using existing data

10.11 The Logical Framework Approach

The logical framework (LogFrame) helps to clarify objectives of any project, program, or policy. It aids in the identification of the expected causal links-the "program logic"-in the following results chain: inputs, processes, outputs (including coverage or "reach" across beneficiary groups), outcomes, and impact. It leads to the identification of performance indicators at each stage in this chain, as well as risks which might impede the attainment of the objectives. The LogFrame is also a vehicle for engaging partners in clarifying objectives and designing activities. During implementation the LogFrame serves as a useful tool to review progress and take corrective action. What can we use it for?

- Improving quality of project and program designs-by requiring the specification of clear objectives, the use of performance indicators, and assessment of risks.
- Summarizing design of complex activities.
- Assisting the preparation of detailed operational plans.
- Providing objective basis for activity review, monitoring, and evaluation.

Advantages

- Ensures that decision-makers ask fundamental questions and analyze assumptions and risks

- Engages stakeholders in the planning and monitoring process
- When used dynamically, it is an effective management tool to guide implementation, monitoring and evaluation.

Disadvantages

- If managed rigidly, stifles creativity and innovation.
- If not updated during implementation, it can be a static tool that does not reflect changing conditions.
- Training and follow-up are often required.

10.12 Theory-Based Evaluation

Theory-based evaluation has similarities to the LogFrame approach but allows a much more in-depth understanding of the workings of a program or activity-the "program theory" or "program logic." In particular, it need not assume simple linear cause-and effect relationships. For example, the success of a government program to improve literacy levels by increasing the number of teachers might depend on a large number of factors.

These include, among others, availability of classrooms and textbooks, the likely reactions of parents, school principals and schoolchildren, the skills and morale of teachers, the districts in which the extra teachers are to be located, the reliability of government funding, and so on. By mapping out the determining or causal factors judged important for success, and how they might interact, it can then be decided which steps should be monitored as the program develops, to see how well they are in fact borne out. This allows the critical success factors to be identified. And where the data show these factors have not been achieved, a reasonable conclusion is that the program is less likely to be successful in achieving its objectives. What can we use it for?

- Mapping design of complex activities
- Improving planning and management

Advantages

- Provides early feedback about what is or is not working, and why
- Allows early correction of problems as soon as they emerge
- Assists identification of unintended side-effects of the program
- Helps in prioritizing which issues to investigate in greater depth, perhaps using more focused data collection or more sophisticated M & E techniques

- Provides basis to assess the likely impacts of programs

Disadvantages

- Can easily become overly complex if the scale of activities is large or if an exhaustive list of factors and assumptions is assembled.
- Stakeholders might disagree about which determining factors they judge important, which can be time-consuming to address.

10.13 Formal Surveys

Formal surveys can be used to collect standardized information from a carefully selected sample of people or households. Surveys often collect comparable information for a relatively large number of people in particular target groups. What can we use them for?

- Providing baseline data against which the performance of the strategy, program, or project can be compared.
- Comparing different groups at a given point in time.
- Comparing changes over time in the same group.
- Comparing actual conditions with the targets established in a program or project design.
- Describing conditions in a particular community or group.
- Providing a key input to a formal evaluation of the impact of a program or project.
- Assessing levels of poverty as basis for preparation of *poverty reduction strategies*.

Advantages

- Findings from the sample of people interviewed can be applied to the wider target group or the population as a whole.
- Quantitative estimates can be made for the size and distribution of impacts.

Disadvantages

- With the exception of CWIQ, results are often not available for a long period of time.
- The processing and analysis of data can be a major bottleneck for the larger surveys even where computers are available.
- LSMS and household surveys are expensive and time-consuming.
- Many kinds of information are difficult to obtain through formal interviews.

Example of Surveys

Multi-Topic Household Survey (also known as Living Standards Measurement Survey-LSMS) is a multi-subject integrated survey that provides a means to gather data on a number of aspects of living standards to inform policy. These surveys cover: spending, household composition, education, health, employment, fertility, nutrition, savings, agricultural activities, other sources of income.

Single-topic household surveys cover a narrower range of issues in more depth.

Core Welfare Indicators Questionnaire (CWIQ) is a household survey that measures changes in social indicators for different population groups-specifically indicators of access, utilization, and satisfaction with social and economic services. It is a quick and effective tool for improving activity design, targeting services to the poor and, when repeated annually, for monitoring activity performance. Preliminary results can be obtained within 30 days of the CWIQ survey.

*Client Satisfaction (*or *Service Delivery) Survey* is used to assess the performance of government services based on client experience. The surveys shed light on the constraints clients face in accessing public services, their views about the quality and adequacy of services, and the responsiveness of government officials. These surveys are usually conducted by a government ministry or agency.

Citizen Report Cards have been conducted by NGOs and think-tanks in several countries. Similar to service delivery surveys, they have also investigated the extent of corruption encountered by ordinary citizens. A notable feature has been the widespread publication of the findings.

10.14 Rapid Appraisal Methods

Rapid appraisal methods are quick, low-cost ways to gather the views and feedback of beneficiaries and other stakeholders, in order to respond to decision-makers' needs for information. What can we use them for?

- Providing rapid information for management decision-making, especially at the project or program level.
- Providing qualitative understanding of complex socioeconomic changes, highly interactive social situations, or people's values, motivations, and reactions.
- Providing context and interpretation for quantitative data collected by more formal methods.

Advantages

- Low cost.
- Can be conducted quickly.
- Provides flexibility to explore new ideas.

Disadvantages

- Findings usually relate to specific communities or localities-thus difficult to
- generalize from findings.
- Less valid, reliable, and credible than formal surveys.

Examples Rapid Appraisal Methods

Key informant interview- a series of open-ended questions posed to individuals selected for their knowledge and experience in a topic of interest. Interviews are qualitative, in-depth, and semi-structured. They rely on interview guides that list topics or questions.

Focus group discussion- a facilitated discussion among 8–12 carefully selected participants with similar backgrounds. Participants might be beneficiaries or program staff, for example. The facilitator uses a discussion guide. Note-takers record comments and observations.

Community group interview- a series of questions and facilitated discussion in a meeting open to all community members. The interviewer follows a carefully prepared questionnaire.

Direct observation—use of a detailed observation form to record what is seen and heard at a program site. The information may be about ongoing activities, processes, discussions, social interactions, and observable results.

Mini-survey- a structured questionnaire with a limited number of close-ended questions that is administered to 50–75 people. Selection of respondents may be random or 'purposive' (interviewing stakeholders at locations such as a clinic for a health care survey).

10.15 Participatory Methods

Participatory methods provide active involvement in decision-making for those with a stake in a project, program, or strategy and generate a sense of ownership in the M&E results and recommendations. What can we use them for?

- Learning about local conditions and local people's perspectives and priorities to
- design more responsive and sustainable interventions.
- Identifying problems and trouble-shooting problems during implementation.
- Evaluating a project, program, or policy.

- Providing knowledge and skills to empower poor people.

Advantages

- Examines relevant issues by involving key players in the design process.
- Establishes partnerships and local ownership of projects.
- Enhances local learning, management capacity, and skills.
- *Provides timely, reliable information for management decision-making.*

Disadvantages

- Sometimes regarded as less objective
- Time-consuming if key stakeholders are involved in a meaningful way.
- Potential for domination and misuse by some stakeholders to further their own interests.

Examples of Participatory methods

Stakeholder analysis is the starting point of most participatory work and social assessments. It is used to develop an understanding of the power relationships, influence, and interests of the various people involved in an activity and to determine who should participate, and when.

Participatory rural appraisal is a planning approach focused on sharing learning between local people, both urban and rural, and outsiders. It enables development managers and local people to assess and plan appropriate interventions collaboratively often using visual techniques so that non-literate people can participate.

Beneficiary assessment involves systematic consultation with project beneficiaries and other stakeholders to identify and design development initiatives, signal constraints to participation, and provide feedback to improve services and activities.

Participatory monitoring and evaluation involves stakeholders at different levels working together to identify problems, collect and analyze information, and generate recommendations.

10.16 Public Expenditure Tracking Surveys

Public expenditure tracking surveys (PETS) track the flow of public funds and determine the extent to which resources actually reach the target groups. The surveys examine the manner, quantity, and timing of releases of resources to different levels of government, particularly to the units responsible for the delivery of social services such as health and education. PETS are often implemented as part of larger service delivery and facility surveys which focus on the

quality of service, characteristics of the facilities, their management, incentive structures, etc. What can we use them for?

- Diagnosing problems in service delivery quantitatively.
- Providing evidence on delays, "leakage," and corruption.

Advantages

- Supports the pursuit of accountability when little financial information is available.
- Improves management by pinpointing bureaucratic bottlenecks in the flow of funds for service delivery.

Disadvantages

- Government agencies may be reluctant to open their accounting books.
- Cost is substantial.

10.17 Cost-Benefit and Cost-Effectiveness Analysis

Cost-benefit and cost-effectiveness analysis are tools for assessing whether or not the costs of an activity can be justified by the outcomes and impacts. ***Cost-benefit analysis*** measures both inputs and outputs in monetary terms. ***Cost-effectiveness analysis*** estimates inputs in monetary terms and outcomes in non-monetary quantitative terms (such as improvements in student reading scores). What can we use them for?

- Informing decisions about the most efficient allocation of resources.
- Identifying projects that offer the highest rate of return on investment.

Advantages

- Good quality approach for estimating the efficiency of programs and projects.
- Makes explicit the economic assumptions that might otherwise remain implicit or overlooked at the design stage.
- Useful for convincing policy-makers and funders that the benefits justify the activity.

Disadvantages

- Fairly technical, requiring adequate financial and human resources available.
- Requisite data for cost-benefit calculations may not be available, and projected results may be highly dependent on assumptions made.
- Results must be interpreted with care, particularly in projects where benefits are difficult to quantify.

10.18 Impact Evaluation

Impact evaluation is the systematic identification of the effects- positive or negative, intended or not- on individual households, institutions, and the environment caused by a given development activity such as a program or project. Impact evaluation helps us better understand the extent to which activities reach the poor and the magnitude of their effects on people's welfare. Impact evaluations can range from large scale sample surveys in which project populations and control groups are compared before and after, and possibly at several points during program intervention; to small-scale rapid assessment and participatory appraisals where estimates of impact are obtained from combining group interviews, key informants, case studies and available secondary data.

What can we use it for?

- Measuring outcomes and impacts of an activity and distinguishing these from the influence of other, external factors.
- Helping to clarify whether costs for an activity are justified.
- Informing decisions on whether to expand modify or eliminate projects, programs or policies.
- Drawing lessons for improving the design and management of future activities.
- Comparing the effectiveness of alternative interventions.
- Strengthening accountability for results.

Advantages

- Provides estimates of the magnitude of outcomes and impacts for different demographic groups, regions or over time.
- Provides answers to some of the most central development questions- to what extent are we making a difference? What are the results on the ground? How can we do better?
- Systematic analysis and rigor can give managers and policy-makers added confidence in decision-making.

Disadvantages

- Some approaches are very expensive and time-consuming, although faster and more economical approaches are also used.
- Reduced utility when decision-makers need information quickly.
- Difficulties in identifying an appropriate counter-factual.

Examples of Impact Evaluation Designs

Randomized evaluation designs, involving the collection of information on project and control groups at two or more points in time, provide the most rigorous statistical analysis of project impacts and the contribution of other factors. But in practice it is rarely possible to use these designs for reasons of cost, time, methodological or ethical constraints. Thus most impact evaluations use less expensive and less rigorous evaluation designs. The following table describes four approaches to impact evaluation designs in development evaluation. The first is an example of a randomized evaluation design; the second is a quasi-experimental design in which a "non-equivalent" control group is selected to match as closely as possible the characteristics of the project population; in the third example the project population is compared with a non-equivalent control group after the project has been implemented; and the fourth is a rapid assessment evaluation which combines group interviews, key informants, case studies and secondary data. Each successive model sacrifices methodological rigor, in return from which there are significant reductions in cost and time requirements

Model: Randomized pre-test post-test evaluation

Design

Subjects (families, schools, communities etc) are randomly assigned to project and control groups. Questionnaires or other data collection instruments (anthropometric measures, school performance tests, etc) are applied to both groups before and after the project intervention. Additional observations may also be made during project implementation.

Example

Water supply and sanitation or the provision of other services such as housing, community infrastructure etc where the demand exceeds supply and beneficiaries are selected by lottery

Model: Quasi-experimental design with before and after comparisons of project and control populations.

Design

Where randomization is not possible, a control group is selected which matches the characteristics of the project group as closely as possible. Sometimes the types of communities from which project participants were drawn will be selected. Where projects are implemented in several phases, participants selected for subsequent phases can be used as the control for the first phase project group.

Example

These models have been applied in World Bank low-cost housing programs in El Salvador, Zambia, Senegal and the Philippines

Model: Ex-post comparison of project and non-equivalent control group

Design

Data are collected on project beneficiaries and a non-equivalent control group is selected as for Model 2. Data are only collected after the project has been implemented. Multivariate analysis is often used to statistically control for differences in the attributes of the two groups.

Example

Assessing the impacts of micro-credit programs in Bangladesh. Villages where microcredit programs were operating were compared with similar villages without these credit programs.

Model: Rapid assessment ex-post impact evaluations

Design

Some evaluations only study groups affected by the project while others include matched control groups. Participatory methods can be used to allow groups to identify changes resulting from the project, who has benefited and who has not, and what were the project's strengths and weaknesses. Triangulation is used to compare the group information with the opinions of key informants and information available from secondary sources. Case studies on individuals or groups may be produced to provide more in-depth understanding of the processes of change.

Example

Assessing community managed water supply projects in Indonesia

Review Questions

i) Explain the importance of delineation of project performance indicators
ii) Explain the rationale of a project logical framework
iii) Discuss the various methods of project monitoring and evaluation

iv) What can we use formal surveys for during monitoring and evaluation

References for further Reading

i) Hansen, (1992), "Manual for the Preparation of Industrial Feasibility Studies", UNIDO

ii) Chandra Prasanna, (2002), *"Projects: Planning, Analysis Financing Implementation and Review",* 5th Ed, Tata McGraw-Hill New Delhi

Appendix 1: Project Classification Codes[1]

Sector	Sub-sector	Description
0100	Political Affairs	
	0110	Political and security activities
	0120	Peace-keeping
	0130	Disarmament
	0140	General international law
	0150	Trusteeship, decolonization and apartheid
0200	General development issues	
	0210	Global, regional and multisectoral economic and social development strategies and policies
	0220	Monetary and financial issues and policies
	0230	National development planning
	0240	Public administration and management
0300	General statistics	
	0310	Demographic and social statistics
	0320	Economic statistics
	0330	Other statistics
0400	Natural resources	
	0410	Water resources planning and development
	0420	Land use planning and development
	0430	Biological resources
	0440	Mineral resources
0500	Energy	
	0510	Energy planning and conservation
	0520	Conventional sources of energy (petroleum, coal and gas)
	0530	Nuclear energy
	0540	New and renewable sources of energy
0600	Agriculture, forestry and fisheries	
	0610	Policies and planning
	0620	Crop production and protection
	0630	Livestock and livestock products
	0640	Support services
	0650	Fisheries
	0660	Forestry
0700	Industry	

[1] Adopted from UNDP Programme and Projects Manual

Sector	Sub-sector	Description
	0710	Policies and planning
	0720	Industrial support services
	0730	Manufacturing industries
	0740	Service industries
0800	Transport	
	0810	Policies and planning
	0820	Road transport
	0830	Rail transport
	0840	Water transport and shipping
	0850	Air transport
0900	Communication and information	
	0910	Postal services
	0920	Telecommunications
	0930	Television, radio and print media
	0940	Development support communication
	0950	Information infrastructure
1000	Trade and development	
	1010	Global trade policies
	1020	Trade in commodities and manufactures
	1030	Trade in services, including tourism
	1040	Trade expansion, trade promotion and export development
1100	Population	
	1110	Population policies and dynamics
	1120	Data collection and analysis
	1130	Family planning
	1140	Population education and communication
1200	Human settlements	
	1210	Settlements
	1220	Housing
	1230	Urban development
1300	Health	
	1310	Health system infrastructure
	1320	Health promotion and care
	1330	Disease prevention and control

1400	Education	

Sector	Sub-sector	Description
	1410	Educational policy and planning
	1420	Educational facilities and technology
	1430	Educational systems
	1440	Non-formal education
1500	Employment	
	1510	Policies and planning
	1520	Employment promotion
	1530	Management development, technical and vocational training
	1540	Conditions of employment
	1550	Labour relations
1600	Humanitarian assistance and disaster management	
	1610	Protection of and assistance to refugees, returnees and displaced persons
	1620	Disaster prevention and preparedness
	1630	Emergency relief
1700	Social development	
	1710	Human rights
	1720	Integration of social groups
	1730	Advancement of women
	1740	Social welfare and services and social security
	1750	Crime prevention and criminal justice
	1760	Drug abuse control
1800	Culture	
	1810	Preservation and development of culture
	1820	Protection of authors' rights and neighbouring rights
	1830	Information and mass media
1900	Science and technology	
	1910	Natural and physical sciences
	1920	Social and human sciences
	1930	Meteorology
	1940	Development and transfer of technology

2000	Environment	
	2010	Policies, planning and legislation

Sector	Sub-sector	Description
	2020	Assessment and monitoring
	2030	Enhancement and management
	2040	Awareness and education
3000	Unspecified	
	3010	Sectors not specified

Appendix 2: Sample Test Papers

Mount Kenya University

DEPARTMENT OF MANAGEMENT
End of Semester Examinations
ENT 322: Project Analysis and Management

Time: 2 Hrs

Instructions to Candidates: *Answer question 1 (Compulsory) and any other TWO questions.*

QUESTION 1 (3mks each)

a) Differentiate project planning from project management and give the benefits of each
b) Explain how project ideas can be generated
c) Explain the rationale for classification of raw materials and supplies
d) Describe the steps in a sample survey
e) Why is it necessary to estimate the costs of raw materials and supplies?
f) Explain the considerations influenced the choice of technology
g) Explain the importance of delineation of project performance indicators
h) Explain the rationale for identification of project related human resource requirements
i) Describe the production and marketing costs of a project
j) Describe the phases of environmental impact assessment

QUESTION 2 (10mks each)

a) Describe the areas that a rehabilitation study should analyze
b) Describe the methods of demand forecasting

QUESTION 3 (10mks each)

a) Describe social economic considerations in location analysis
b) Describe the process of environmental impact assessment

QUESTION 4 (10mks each)

a) Discuss the factors influencing plant capacity
b) Explain the categories and functions project human resource requirements

QUESTION 5

a) Discuss the social economic and cultural factors that influence project human resource requirements (6mks)

b) Assume a company wants to invest in two mutually exclusive projects of 1000 Ksh. each generating the following cash flows:

Year	A	B

1	500	100
2	400	200
3	300	300
4	400	400
5	-	500
6	-	600

If the required rate of return is 10%. Which of the projects should the company invest in if :

a) The internal rate of return is used (4mks)

b) The discounted payback method is used (4mks)

c) Discuss the various methods of project monitoring and evaluation (6mks)

Mount Kenya University

DEPARTMENT OF MANAGEMENT
End of Semester Examinations
ENT 322: Project Analysis and Management

Time: 2 Hrs

Instructions to Candidates: *Answer question 1 (Compulsory) and any other TWO questions.*

QUESTION 1 (3mks each)

a) Distinguish between sectoral plans and national plans
b) State the objectives of expansion projects and explain how these objectives can be achieved
c) Describe the stages of the investment phase of the project cycle
d) Explain the steps involved in market planning
e) Explain the various means of technology acquisition
f) Explain the Infrastructural service, conditions and requirements in location analysis
g) What can we use formal surveys for during monitoring and evaluation
h) Explain the basis of characterization of market
i) Explain the relevant requirements of a project site
j) Explain the rationale of a project logical framework

QUESTION 2 (10mks each)

a) A number of factors could have a strong influence on the type quantities and qualities of the project inputs, describe them
b) Describe the organizational set up of a project

QUESTION 3

a) Describe the steps involve in designing a training program for project human resource (8mks)
b) Discuss the objectives of supply marketing (6mks)
c) Describe the working capital requirements of a project (6mks)

QUESTION 4 (10 mks each)

a) Discuss key geographical considerations in location analysis
b) Discuss the various methods of project cash flow evaluations

QUESTION 5

a) Describe the steps followed in assessment of the suitability of the technological alternatives (8mks)
b) Explain the determination of the production program (6mks)
c) Explain the preproduction expenditure and their treatment (6mks)