ENGINEERING ECONOMICS AND PROJECT FINANCING

By:
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DEDICATION

This book is dedicated

to my parents particularly my father
Haji Amanullah Khan,
MA (Persian), LLB, BA (Hons.),
who has been the source of inspiration and
guidance for me through my life.

To my wife and children
who always supported me in my personal endeavors

To my students
who always provided me opportunities to learn with them.
ACKNOWLEDGMENT

The author is indebted to the
Higher Education Commission (HEC),
staff of the Central Library HEC,
and
the learned reviewers of the book
for their kind support and guidance
in making this work possible.
The course of Engineering Economics is a basic Non Engineering part of the Curriculum for all Engineering Programs in Pakistan. The course covers various terms relating to basic knowledge regarding Economics, Project appraisals, project management, role of banks and financial institutions and optimization theory in the constrained environments. The author having diversified knowledge in the areas of Civil Engineering, Economics and Project Management has been teaching the courses for about a decade to different disciplines of Engineering. The existing recommended books of Engineering Economic and Project Finance are mainly based on the case studies from advanced nations. The proposed course of Engineering Economics for Engineers approved by Higher Education Commission and Pakistan Engineering Council has been based to develop this with major focus on the global trends and local issues in the area.

The objectives of the course of Engineering Economics as per the curriculum of Engineering Program 2012, are as follows
- To introduce the fundamentals of engineering economics.
- To enable students to perform economic analysis of different projects

At the same time, the project analysis and project financing has also been included in the cited curriculum, hence the book covers the major concepts of the Engineering Economics and Project Financing. This book has been written with the following objectives in mind:
- Provide a comprehensive book for Engineering students, to enable them to understand, the basic concepts of Engineering Economics, Project Management, Project financing, Project monitoring and evaluation, capital budgeting, decision making process etc.
- To enable the students to understand various project approval bodies, their constitution and financial limits in Pakistan
- To familiarize the students with the Engineering problems relating to economic decisions during selection and evaluation of the projects.
- To understand various project preparation and executing, monitoring and controlling documents used in Pakistan including, PC-I, PC-II, PC-III and PC-IV etc.
- To enable the Engineering students to understand various capital markets, capital generation process and role of Central Bank etc.

It is expected that the book will provide a holistic approach for a highly diversified subject area of Engineering Economics and Project Financing to the Engineering Students, with special reference to Pakistan. The case studies used by the author will also help the students to develop better understanding about the real life problems in the subject areas after their graduation. The author would always encourage critical review of the book by experts and students for its improvement.
I pray that the book provides better knowledge, for the students of Engineering to understand the basic concepts of Engineering Economics and project financing and apply these to the real life at later stage- Ameen.

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1.1 Basic Concepts of Economics
1.1.1 The Subject matter of Economics
Economics has emanated, as a separate discipline from the basic dilemma of scarcity. The natural resources at the disposal of the human beings are not only scarce but also depleting continuously, whereas the human population is increasing exponentially. The human wants on the other hand are not restricted. Hence there is always a competition between the limited natural resources and unlimited human wants. This fact is sometimes attributed to the creation of “Economics” as a field of study. According to George.N. Mankiw (2004)\(^1\) …….., it is the study how society manages its scarce resources. The way how, society chooses to allocate its scarce resources among competing demands to improve human welfare is also called Economics, sometimes. Economics is also defined as “A science that deals with the allocation, or use, of scarce resources for the purpose of fulfilling society’s needs and wants”—Addison-Wesley.

In any society, the human wants are satisfied with production and consumption of products and services. Products are tangible, which can be easily visualized, stored, transported and assessed. The consumer products like dairy products, beverages, food items etc. are some examples. The services on the other hand are intangible, which can neither be stored nor easily judged. For example teaching, consultancy services, health services, financial services etc.

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In simple model, the society is hypothetically divided into two groups i.e. Businesses and Households. The businesses produce goods and service for the consumers and acquire resources as well as inputs provided by the households. Whereas, households consume goods and services and provide inputs to them. This simple model is given in Fig. 1.1. The inputs provided by the consumers are in the form of capital, labor, land and entrepreneurships etc.

Some of the Economics problems faced by this model are
- The nature of goods and services to be provided by the businesses.
- The ways and means to produce goods and services.
- How the good and services need to be distributed amongst the consumers.

Economics as a discipline is attempting to search answers to such questions.

1.1.2 Macro Economics and Micro Economics

**Macroeconomics**

Macroeconomics is branch of economics that studies the behavior of the whole economy at the national or international level. The economic variables such as employment, income, general price levels at the national level are aggregated. The macroeconomics addresses the issues of inflation, deflation, unemployment and poverty as a whole at the national level. Thus the focus of macroeconomics is always the whole system.

**Microeconomics**

Microeconomics on the other hand deals with the behavior of individual firm and family. Microeconomics is mostly applied to operational level in the organizations. It covers the important areas like demand, supply pricing of product, consumption and economic welfare.

There is an apparent relationship between the two, as the aggregate production and consumption of goods and services would depend upon the individual choices made by the households and firms.

1.1.3 Concept of Value in Economics

The concept of economic value is very important while making economic decisions. It is someone is willing to pay for a good or service. It measures the preference and priority of the consumer. The value has two aspects, one is “value in use” and other is “value in exchange”. The concept of Value Analysis is more commonly used to deliver the required products and services to deliver the desired functions at the minimum costs. Value Analysis is a systematic design review concentrating on the reduction of the direct manufacturing cost of the product.

1.1.4 Price Demand and, Supply

The demand for various goods and services is affected by the price. According to Law of demand, “The demand of a product decreases with the increase of its price, provided that other things remain the same”. Demand of goods and services is also affected by income of the people, prices of the substitute and complimentary goods, and tastes and habits of the people.

On the other hand, according to Law of Supply, “The supply of goods/products increases with the increase of prices and vice versa”. The supply of goods is also affected by the following factors
- **Cost of inputs**
  When the cost of inputs is increased, the production cost also increases and as a result the supply of related goods decreases. With the increase in the prices of fertilizers, seeds and pesticides, the supply of wheat also reduces.
- **Technology**  
  With the advanced technologies, the cost of production decreases, and the supply of goods increases. For example, with the improvement of microprocessors, the cost of production of Laptop computer has decreased and as a result, its supply has increased.

- **Weather**  
The demand of warm and woolen clothes increases in severe winter.

- **Prices of related goods**  
  If prices of related goods decrease, the prices of main goods are also affected. For example when the prices of LCD decreases, the prices of TV also decrease.

![Figure 1.2 Demand and Supply Curve](image)

### 1.1.5 Elasticity of demand and supply

The responsiveness of demand or supply due to change in prices, income, prices of other commodities, is called "Elasticity of Demand or Supply"

#### 1.1.5.1 Price Elasticity of demand

The degree of response of demand to the change in the prices is called "Elasticity of demand". Mathematically Price Elasticity of demand is given as

\[
Ped = \frac{\% \text{ Change in quantity demanded}}{\% \text{ change in price}}
\]

- If \(Ped > 1\) The goods are elastic
- If \(Ped = 1\) The goods are unitary elastic
- If \(Ped < 1\) The goods are inelastic

#### 1.1.5.2 Income Elasticity of Demand

It represents the degree of change in demand with the change in income of an individual. For normal goods, the demand increases with the increase in income but for inferior goods, demand falls as income rises and vice versa. Income elasticity of demand is given as

\[
Yed = \frac{\% \text{ Change in quantity demanded}}{\% \text{ change in income}}
\]
Where $Y_{edr}$ represents, income elasticity of demand

1.1.5.3 Cross Elasticity of Demand
It is the responsiveness of demand of one good due to change in prices of other goods. These goods may be complementary like tea and sugar or substitute such as ghee and oil. In case of supplementary goods, the increase in price of one good will also reduce the demand of other goods and vice versa. For example when the prices of fuel increases, the demand for large fuel inefficient cars decreases. The cross elasticity is negative or inverse. In case of substitute goods like oil and ghee, the increase in price of ghee will lead to increase in demand of oils and vice versa. The cross elasticity $X_{ed}$ is given as:

$$X_{ed} = \frac{\text{% Change in quantity demanded of product X}}{\text{% change in Price of product Y}}$$

1.1.5.4 Elasticity of Supply
The degree responsiveness of the supply of a goods is to change in prices, is called “Elasticity of Supply”. When the supply of goods can’t react quickly to the changes in prices, the price elasticity of demand is called “Inelastic”. In case the supply react quickly to changes in prices, these are inelastic. The price elasticity of supply $Pes$ is given as:

$$Pes = \frac{\text{% Change in quantity supplied}}{\text{% change in Price of product Y}}$$

The elasticity of demand or supply depends on the following major factors:
- **Duration of assessment** when the period of assessment is more, the elasticity is likely to be more.
- **Availability of number of substitute goods** greater the number of substitute goods, more will be the elasticity.
- **Income use for a particular good**: More the income used for a particular product, more will be the elasticity.
- **The nature of product**: If the product is necessity, despite of increase of price, the demand may not reduce due to its essential nature.

1.1.6 Factor of Production and Law of Diminishing Returns
In economics, the factor of production is the inputs which are used to make economic profit, which include Land, Labor, Capital and Entrepreneurship. The land mainly refers to all raw material which we derive from land. Labor refer all types of human resources used for physical and intellectual works. Capital is used for all tools, machinery, buildings, equipment etc. used for production of goods and services. Entrepreneur is a person which provides innovative ideas and creativity to make used of other factors effectively and efficiently.

**The Law of Diminishing Returns**
If one factor of production such as labor, is increased, while other factors of production remain unchanged, the production level will initially increase, but after some period it will eventually diminish. The marginal returns of a factor, is change in production with unit change in the input of the factor. The marginal returns would thus decrease with the increase in the increase of single factor of production, while other factors are kept constant (Ceteris Paribus). The Law of Diminishing Reteunes is the fundamental principle for the Production Theory.

Richard A. Bilas describes the law of diminishing returns in the following words "*If the input of one resource to other resources are held constant, total product (output) will increase but beyond some point, the resulting output increases will become smaller and smaller*". The net increase in the production with the unit increase of a particular input, is also called marginal production. This marginal production would decrease gradually and at a point, it will become zero and beyond...
that, the marginal production will be negative. Certainly production at beyond zero marginal production is not advisable.

The Total production curve and marginal production curve can be illustrated with the help of following Table 1.1. The curves for TP, AP and MP are shown in Fig 1.

Table 1.1 Total Product (TP), Average Product (AP) and Marginal Product (MP), for Various Levels of Labor for Constant Resource of Land.

<table>
<thead>
<tr>
<th>Fixed Resource-Land (Acres)</th>
<th>Input (Labor)</th>
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<th>Average production (tons)</th>
<th>Marginal Production (tons)</th>
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<tr>
<td>15 Acres</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>15 Acres</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15 Acres</td>
<td>3</td>
<td>14</td>
<td>4.67</td>
<td>-6</td>
</tr>
<tr>
<td>15 Acres</td>
<td>4</td>
<td>19</td>
<td>4.75</td>
<td>5</td>
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<tr>
<td>15 Acres</td>
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</tr>
<tr>
<td>15 Acres</td>
<td>6</td>
<td>26</td>
<td>4.33</td>
<td>3</td>
</tr>
<tr>
<td>15 Acres</td>
<td>7</td>
<td>28</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>15 Acres</td>
<td>8</td>
<td>29</td>
<td>3.63</td>
<td>1</td>
</tr>
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Figure 1.3: Total Production (TP), Average Production (AP) and Marginal Production (MP) curves

1.1.5 Theory of Economic Pricing
Price is the quantity of payment or compensation given by one party to the other party in return of goods or services. Historically, the price was measured in terms of products and service, under Barter Exchange. In modern economics, this exchange is commonly measured in the form of some currency for specified quantity of product such as Rupees per Kg of rice.
In perfect competitive market where all products are like and entry and exit to the market is free, price is determined at the equilibrium point of Demand and Supply, as shown in Fig 1.4.

![Graph showing demand and supply curves with the equilibrium point](image)

**Fig 1.4** Price at the equilibrium point of demand and supply curves for a perfect market

Pricing mechanism refers to the system, where free market forces of demand and supply of goods and services establish their prices. However in some cases, Government interventions are required to regulate the prices.

1.1.6 **Concept of Markets in Economics**

In Economics, the term market is a place having its specified boundary, where commodities including goods and services are traded and the customers and sellers are available to buy and sell them. The prices of the commodities are influenced by their supply and demand in the market. Market can be divided into local, regional, national and international markets, based on their territorial extent. The term market competition refers to the battle for vying the customers, where the firms exert to attract customers of the market at the cost of other firms operating in a market. Based on market structure, the degree of competition may vary from market to market. This competition may come from the same type of commodities and firms or other substitute commodities. For example competition to Bus service Company in a city may come from the new Bus service Company in the city, or the operation of new taxi services like Careem ® and Uber ® etc. The degree of such competition may depend on a number of factors such as

i. **Number of firms operating in the market**

When the telecom services and Cellular phones were introduced in Pakistan, only one firm "PakTel" was the sole operator in the market. However with more modern technologies, a number of new Cellular phone operators like Zong, Telenor, Warid, U-Phone etc. also got the licenses for operation in Pakistan and as a result, the mobile/Cellular phone market has become highly competitive.

ii. **Availability of substitute products**

Products have substitutes and in case of shortage of supply of such products or increase in demand, people opt for substitute products. For example, people would prefer to buy cheap forms of sweats, when the prices of sugar would increase and vice versa. The availability of substitute products, would also affect the competition in the market. On the other hand, for services like electricity, which is solely controlled
by Government through WAPDA, there is no reliable substitute product and the market is monopolized by the sole service provider.

iii. Market Control or barriers
Many markets are difficult to enter due to geographic or regulatory barriers. The ease of entry to the market also generates high degree of competition. The property market in Pakistan is relatively easy to enter as it does not require any license, qualification or huge investment.

Customers’ knowledge
It is generally believed that the customers have equal knowledge in a hypothetical market but in reality it seldom happens, as it would depend on the age, knowledge, education, income etc. of the customer and would vary from person to person, region to region. However with the advent of Information and Communication Technologies (ICTs), the access of the customers to correct and timely information about the products has increased, which can make the markets more competitive.

1.1.6.2 Market Structure and its determinants
The market structure determines the behavior of the firms and customers, based on the following major determinants

i. Pricing strategy
The pricing strategy of the market is the basic determinant of the market structure. This strategy is determined by the firms in view of the degree of competition in the market. There are two pricing strategies for a new product or firm to enter in the market, namely market penetration strategy and market skimming strategy. In penetration strategy, the firm hits the lowest possible price to grab major market share as we see in case of English Toothpaste, Dentonic toothpaste, Tapal tea etc. In skimming strategy, the firm targets top market share with high quality and innovative products. For instance “Colgate Sensitive Teeth”, which is 10-15 times costlier than the English toothpaste, is targeting the top 10% share of consumers.

ii. Supply of goods and services
In case of more supply of the products in the markets than the demand, surplus would be created, and this would affect the pricing and other attributes of the market, till market equilibrium is reached.

iii. Barriers to entry to the market
In highly regulated market, the entry of new firms is generally restricted or limited, which affects the market competition and structure.

iv. Efficiency of the market
In more efficient market like services markets, the returns are normally higher and the competitive strength and pricing etc. is accordingly affected.

v. Competition in the market
The nature and degree of the competition in the market, determines the structure of the market, these various types of the markets are discussed in the next section.

1.7 Types of Market Structures
Markets may be having perfect completion on one hand and monopoly on the other. The various types of the market structures are discussed as follows

- Perfect Competition
This is more or less a hypothetical market, where firms are free to enter the market, sell and buy their products which are assumed to be homogenous, their number is large,
Perfect competition rarely exits, yet some of the market like Stock Exchanges, Financial, bond markets and vegetable & fruit markets are closer to perfect markets, where extensive competition, availability of large number of products and buyers & sellers make it more like perfect competition.

- **Imperfect or monopolistic competition**
  It is the other extreme of the market, where relatively lesser number of firms have monopoly over the products and the products are differentiated. The examples of imperfect competition are restaurant chains, Engineering goods, professional services etc.

- **Oligopoly**
  Competition amongst few sellers, such kinds of markets is dominated by few firms with very restricted entry. The products are differentiated with apparently less price competition. The profit margins are normally very high and there is high tendency of collusion to establish high prices. Some of the examples are Supermarkets, Banking, Oil Companies and Broadcasting etc.

- **Duopoly**
  In Duopoly, two firms are operating the market. Such markets are restricted due to high barrier to entry. The two firms closely watch the actions and strategies of each other and respond immediately to it. The example of Airline Services, Electricity services, Gas services etc. he salient aspects various types of market structures are given in Table 1.2

<table>
<thead>
<tr>
<th>Characteristics of Market</th>
<th>Nature and Type of Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perfect Competition</td>
</tr>
<tr>
<td>No of Firms/Competitors</td>
<td>Many</td>
</tr>
<tr>
<td>Easy of entry</td>
<td>Easy</td>
</tr>
<tr>
<td>Similarity of goods and</td>
<td>Similar</td>
</tr>
<tr>
<td>Services</td>
<td></td>
</tr>
<tr>
<td>Control over price by the</td>
<td>None</td>
</tr>
<tr>
<td>firm</td>
<td></td>
</tr>
<tr>
<td>Examples</td>
<td>Retail shops</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1.2 Role Engineering Economics

#### 1.2.1 Definition and subject matter of Engineering Economics

Engineering decisions cannot be significant unless these are supported by strong economic value. Exploring cost effective and efficient solutions to the Engineering problems has been the cornerstone of all Engineering related recommendations. Any Engineering project has to be technically sound, socially acceptable, environmentally sustainable and economically feasible. Hence Engineering decisions are always based on sound knowledge of economics.

Engineering Economics deals with the concepts and techniques of analysis useful in evaluating the worth of systems, products, and services in relation to their costs. The major objective of the Engineering Economics is to maximize the value of investment to improve the system, processes,
products and services for the welfare of the society. Engineering decisions are critical to the social, technological and physical welfare of the human beings. These decisions will be aimed at maximize benefits and minimize costs to the society.

1.2.2 Importance of Economics for Engineers and why “Engineering Economics”
Albert Einstein differentiated between Engineers and Scientists as, “Scientists deals with the problems of existing things, whereas Engineers create new things”. Creativity and innovations is the major asset of the Engineers.

Dean Gordon Brown said “‘Engineering is, not merely knowing and being knowledgeable, like a walking encyclopedia; engineering is not merely analysis; engineering is not merely the possession of the capacity to get elegant solutions to non-existent engineering problems; engineering is practicing the art of the organized forcing of technological change... Engineers operate at the interface between science and society’......”

In practical life Engineers are faced with multitude of situations, where economics analysis becomes the major driver for Engineering decision making. Some of such questions and scenarios are discussed as follows:

- **Project Investment related decisions**
  The nature of project design, the level of investments in the projects and mix of projects (Project portfolio) all involve Engineering analysis.

- **The Analysis of various alternative solutions**
  Engineers always provide multiple solutions to the problems faced by organization and society. The selection of best suitable solution for a particular situation will involve economic analysis of all feasible solutions.

- **Life Cycle costing of equipment and facilities**
  The two major components of cost for acquiring of products and services is Capital Expenses (CAPEX) and Operational Expenses (OPEX). The Life Cycle Cost analysis of any Engineering procurement will involve economic analysis of all costs the required product or service may need during its entire life cycle, such as design and feasibility cost, testing charges, capital cost, operational cost, repair and maintenance cost, salvage and disposal cost. The comparative analysis of project procurements would need detailed economic analysis of all anticipated cost associated with the product and service.

- **Cost Estimation of various projects**
  Engineering is an interesting profession which involves both abstract thinking and quantitative analysis of the decisions. The qualitative and imaginative strength of Engineering is very important for the success of Engineers as “The power of human imagination has been the most driving force for the designing and development of new products and services. At the other hand, the quantitative aspects of the decisions in terms of Time Value of Money (TVM) are also an equally important consideration for Engineers. Hence an Expert Engineer will have developed and groomed his quantitative skills to the extent that for every decision small or large they make, will have economic analysis at the back.

Economic Analysis of Engineering decisions, rational decision making is not possible, without in depth understanding of fundamental concepts of the Engineering Economics. The decision making process reveals that at the heart of rational decision making , always lies in strong Economic analysis to finally recommend the most cost effective and innovative solutions.

**Some Facts about the Economic Survey 2016-17**
Pakistan Economic Survey is presented by the Finance Minister every year towards the close of the financial year, which reflects the performance of the Government of Pakistan in the
perspective of major economic indicators such per national income, Gross Domestic Production (GDP), GDP growth rate, employment rate, inflation rate etc. The finance Minister presented the Pakistan Economic Survey for the FY 2016-17 in May 2017. Some of the major achievements of the Government are given as follows

i. Overall GDP growth rate for the year 2016-17 5.28% as against 4.51% last years. The GDP crossed $300 billion in the year.
   - Agriculture sector contributed 19.53% to the GDP and provided employment to 42.3% of the workforce. The growth rate of this sector was recorded as 3.46% against only 0.46% last year
   - Industrial growth rate was witnessed as 5.05% as against 5.8% last year.
   - The manufacturing sector recorded as growth of 4.93% as compared to 2.94% last year. The last Scale Manufacturing (LSM) recoded a growth of 4.93% against 2.94%
   - The construction sector recorded a growth rate of 9.05% against the growth rate of 14.6% last year.
   - Pakistan Stock Exchange has been declared the best 5th in the world during 2016.
   - Consumer Price Index based inflation remained 4.1%
   - FBR tax collection increased from Rs. 2590 Billion in FY 15 to Rs 3112 Billion in FY16.
   - Per Capita Income increased from $1333 to $1629 in FY16.
   - Service sector recorded growth rate of 5.98% as against 5.55% last year.
   - The total investment increased from Rs. 4527 Billion to Rs.5027, recording an increase of 11%
   - Total investment recorded growth of 11 per cent.

Chapter Summary
This chapter has discussed the basic concepts of Economics, micro and macroeconomics, market structure and competitions. Law of demand and supply, law of diminishing returns and its application in the production has been explained. The study and understanding of the Engineering Economics is essential for the rational decision making by Engineers. Various circumstances in the Engineering decision making have been explained, where better understanding of the concepts of Engineering Economics can help the Engineers for more rational decision making.
Q 1.1 Economic Analysis of Procurement of Generators for AIOU

During procurement of generators by the Project Directorate of Allama Iqbal Open University, it was desired to procure 4 generators of 100KW capacity each to strengthen the power backup system. The Open bidding process was adopted for the procurement of the generators based on generic specification and standards of the equipment. The advertisement for the procurement was published in national dailies to generate sufficient competition in addition to Govt. regulatory authority website and Institution’s website.

The bids were opened in the presence of Tender Opening Committee and representatives of the bidders who preferred to join. The tenders were participated by four firms and their unit price and total price is given in the Table 1.3

<table>
<thead>
<tr>
<th>Name of Firm</th>
<th>Quoted Unit Price (Rs. Million)</th>
<th>No of Units</th>
<th>Total Price (Rs. Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Co.</td>
<td>2.5</td>
<td>4</td>
<td>10.000</td>
</tr>
<tr>
<td>IJK Co.</td>
<td>2.8</td>
<td>4</td>
<td>11.20</td>
</tr>
<tr>
<td>L Co</td>
<td>3.0</td>
<td>4</td>
<td>12.00</td>
</tr>
<tr>
<td>XYZ Co</td>
<td>3.2</td>
<td>4</td>
<td>13.8</td>
</tr>
</tbody>
</table>

Source: Project Directorate Allama Iqbal Open University Islamabad (www.aiou.edu.pk)

The finance department of AIOU was of the opinion that the project must be awarded to the lowest bidder, whereas the Engineering and Procurement department was of the opinion that detailed economic analysis is required for the quoted equipment. Please check and discuss the questions:

- Do you think that the procurement method adopted was suitable for the nature of procurement under considerations?
- Do you agree with the contentions of Accounts department and if not, then why?
- What are the important parameter you deem necessary for the economic evaluation of the procurement?
- What other options can be considered for the procurement of Generators for the AIOU?

Q 1.2 Define the term economics and its significance for a society and nation.

Q 1.3 Explain Law of demand and Supply

Engineering Economics

Q 1.3 Describe scope and importance of Engineering Economics for engineering professionals.

Q 1.4 Define break-even point. Draw a break-even chart and explain its components.

Q 1.5 Husnain and Sons Pvt., Ltd. has the following details:
Fixed cost = Rs. 60,00,000
Variable cost per unit = Rs. 400
Selling price per unit = Rs. 600

Find
(a) The break-even sales quantity
(b) The break-even sales
(c) If the actual production quantity is 1,20,000, find the following:
(i) Contribution
(ii) Margin of safety by all methods
FUNDAMENTALS OF PROJECT MANAGEMENT

2.1 Project and Project Management

An American Scientist Brute Pittman said, "Projects are usually undertaken to either solve a problem or take advantage of an opportunity. The probability that the project – even if precisely executed – will complete on time, on budget, and on performance is typically small. Project management is utilized to increase this probability. So in a sense, project management is risk management" – (PMI – USA).

The definition of project may vary based on the personal experience of the project manager, organization’s internal and external environment and complexities of tasks involved. However, some of the common features of projects are as follows:

i. Projects have well defined objectives, purpose and results.

ii. Projects are constrained by Cost, Time (Schedule) and Technical performance (Quality). These are sometimes referred as triple constraints of Projects. The scope of project is the fourth constraint of the project, which is usually covered under the technical performance.

iii. Project have well defined life cycle i.e. the project, while completing its limited life span has to pass through certain distinct and identifiable stages. The project starting and ending point has to be fixed. The project life cycle is like a system life cycle or product life cycle.

iv. Projects utilize human and non-human resources to achieve the objectives.

v. The activities involved in the projects are cross functional and interdependent.

vi. Finally the end product has to satisfy the customer and stakeholders.

Project Management is the application of different management knowledge, skills and attitudes (KSA) for the successful completion of projects. The Project Management Institute of America (PMI) has defined the Project management as “The art of Directing and coordinating the human and nonhuman Resources throughout the life of project by using modern management techniques to achieve pre-determined objectives of scope, cost, time, quality and participants satisfaction”.

2.2 Project Life Cycle

The life of a project is comprised of a series of major steps in the process of conceptualizing, designing, execution and operating the project deliverables. The distinct phases of project constitute the “Project Life Cycle”. The understanding of these phases is essential for better control of the project by managers, as every phase requires specific knowledge, skills and resources to deal with. Every phase has specific deliverables. Typically a project is comprised of the following phases:

i. Conceptual phase
   The preliminary evaluation of the idea is very important phase of the project, where preliminary analysis of risk is involved and its impact on the time, cost and performance requirements of the project is analyzed.

ii. Planning phase
   The resources required for the project are normally identified in this phase. Initial documentation of the project is taken care of. The approximate cost of the project is
determined and cost benefit analysis is conducted. Usually feasibility study of the project is undertaken in this phase, which includes important elements like economic viability, financial and technical feasibility, social acceptability and environmental sustainability.

iii. **Execution phase**
The work involved in the projects are physically performed at project sites, which includes procurement of products and services, develop support requirements and testing commissioning of the facility.

iv. **Termination phase**
The project deliverables are transferred to clients and functional managers. Necessary training of the relevant staff is arranged and responsibilities are assigned to them. The project resources are demobilized to some other project and the project teams are either laid off or adjusted in other projects. The various activities and tasks involved in the construction project life cycle are described in Table2.1

<table>
<thead>
<tr>
<th>Project Life Cycle Phase</th>
<th>Major Activities involved</th>
<th>Process adopted in public</th>
</tr>
</thead>
</table>
| Feasibility Phase        | - Project opportunity analysis (Identification)  
- Project selection and project formulation  
- Pre-feasibility Study (PC-II)  
- Feasibility Study (PC-II)  
- Strategy design and approval | Normally PC-I is submitted for common projects. For mega projects, involving high degree of risk, PC-II is submitted first, which covers the major aspects of the project. This pilot study then clears the initial concepts for detailed feasibility (PC-I). The authorization of the project is normally conveyed through Administrative Approval (AA) which covers the cost, scope and time duration for the project |
| Planning and Designing phase | - Preliminary design  
- Cost and schedule analysis  
- Types of contracts etc.  
- Detailed planning | |
| Construction Phase       | - Detailed design  
- Pre-qualification of contractors  
- Tendering and negotiations  
- Construction and development of the facility  
- Testing and deployment  
- Operationalization | For monitoring and controlling of projects in public sector, PC-III (A) is used for monthly reporting and PC-III (B) is used for quarterly reports. |
| Closeout and Termination | - Detailed testing  
- Handing and Taking over (Commissioning)  
- Demobilization of resources  
- Contract close out | After successful completion of the project, Completion Report on PC-IV is submitted. |

### 2.3 Project Management Profession
The volume of global project outlay has increased exponentially over the last many decades. Almost every 4th dollar in the world is being utilized in the projects. The increased project volume as well as the advent of modern project management tools and techniques, has developed a new area of Project Management professionals. The Project Management Institute PMI (USA) has played a spearhead role in developing the education and research in project management. As professional body, PMI administers the training & development and certification of professionals.
from diversified background of Engineering, IT, healthcare, services and telecom etc. PMI offers
two types of certification namely Project Management Professionals (PMP) and Program
Management Professional (PgMP). Both the certifications require specific knowledge and
experience in the various specialized areas of project management. PMI is offering new
certification programs and the number of project management professionals has surpassed
100,000 in the world.

For the successful delivery of projects, expertise in the general management, understanding of
project environment, effective inter personal communication, familiarity with the standards and
processes in the application area and understanding of current state of the project management
knowledge is required. PMI has compiled together all these requisites to a book known as
“Project Management Body of Knowledge (PMBoK®).

2.4 PMI approach of Project Management

According to PMI, Project Management is accomplished through processes, using project
management knowledge, skills, tools, and techniques that receive inputs and generate outputs.
The project team must ensure the following to make the project successful

i. Select the appropriate project process from the process groups, defined by PMI to
meet the project objectives.

ii. Develop and use well defined approach for adapting the specification and plan for
various project deliverables to meet the project objectives and product requirements.

iii. Develop a rigorous system for compliance to the customer’s needs and expectation.
For this purpose involvement of major stakeholders is required.

iv. Balance the competing demands of scope, time, cost, quality, resources, and risk to
produce a quality product. The tradeoff amongst these project attributes is the art of
project management.

PMI has given five major processes for the project management which are given below

i. **Initiating**
   Authorizing the project or phase of the project. Initiation would involve formal
   approval of the project and project charter,

ii. **Planning**
   Defining Objectives of the project and selecting approaches to achieve these
   objectives. This is the most important part of the project management as a well-
   planned project is half done.

iii. **Execution**
   Managing human and nonhuman resources to execute the project. This is the real
   challenge of the project management as all these resources have competing
   demands and the project managers are supposed to optimize their use.

iv. **Controlling**
   Monitoring the actual performance of the project, evaluation by comparing the actual
   and standards performance and in case of any deviation correcting the course of the
   project.

v. **Closing**
   Once the project is successfully completed the, process of closing will be deployed,
   which will mainly include the formal acceptance and close out of the project.

In addition to five processes, PMI has prescribed ten knowledge areas in terms of capacity of the
project managers. These mainly include four Core Knowledge areas of Time, Quality, Cost, and
Scope as well as four support areas of Human Resource, procurement, communication and Risk.
The common area, which is affected by all other areas or which affect the other areas is called
Integration Management. A good knowledge of all these areas is important for project managers.
A further detail of the knowledge areas is given as follows.
2.4.1 Project Integration Management
Project Integration Management refers to coordinating all activities and processes through the project life cycle with an aim to complete project within the allocated time, budget, defined scope and desired quality performance level. Three major components of the integration management are discussed as follows

- Develop Preliminary project
  Project scope cannot be static and it has tendency to change owing to the expectations and demands of the end users, yet it has to be defined at the earliest stage of the project, so that the scope baseline is established. This is often called “Project Preliminary Scope”. A good project manager would always try to minimize the changes in this scope.

- Develop Project Management Plan
  In this step, the entire plan for the entire life cycle of the project. The most important part is developing the project charter a basic document to authorize the project, which encompasses the role and responsibilities of the project manager, project sponsors and other major stakeholders. The authority vested with the project manager is also given in the project charter. It is more appropriate to assign the project manager and define the project charter at the earliest possible stage of the project.

- Develop Project Monitoring and Controlling Plan
  The project execution and project monitoring and control plan go side by side. Project Monitoring and controlling involves rigorous project performance data collection and its evaluation to take corrective and timely decisions.

- Integrated Change Control Plan
  Though the project manager would rarely allow the change in the project scope, yet the change is natural and there must be a well-organized and well defined process for evaluating and authorizing the changes in the project. A more formal change control process, would bring more control on the scope of the project.

- Develop project Closing Plan
  The project close out plan provides, details of the processes involved during closing of the project, to assure that all project deliverables have been acquired and the project liabilities have been fulfilled. Many projects remain incomplete just because, the projects are not formally close through an administrative process.

2.4.2 Project Scope Management
The boundaries of the project are defined by the scope of project. The project managers have to ensure that all the works required for the completion of the project are completed as per the desired standards. Various processes involved in Scope management include, scope initiation, Scope planning and scope change controlling. The success of the project is always ensues through minimizing the scope change, but one cannot freeze the project scope as human expectations always change leading to change in project scope. For authentication of project change, a well-defined Project Change Control system is required.

2.4.3 Project Time Management
Time Management is aimed at completion of the projects in the given time. The Time Management involves Activity definition, Activity sequencing and Activity Controlling. The tasks in the projects are indicated by the “Work Breakdown Structure (WBS)”, in which the project is divided into smaller manageable components like tasks and activities. Various estimates are used to determine the duration of activities such as parametric estimate, three point estimate, expert judgment and analogous estimation. On the basis of time estimates and relationship between the activities, the “Project Master Schedule” is developed, which established the base for later Time control and evaluation of the project.
2.4.4 Project Cost Management
Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange. Costs are usually measured in monetary units like Rupees, dollars, Pounds etc. Project cost management includes the processes required to ensure that the project is completed within an approved budget. It is comprised of the following three major parts

i. **Cost Estimation**
   Developing an approximation of the costs of the resources needed to complete project activities.

ii. **Cost budgeting**
   Aggregating the estimated costs of individual activities or work packages to establish a cost baseline, which is also called project estimated cost.

iii. **Cost Control**
   Influencing the factors that create cost variances and controlling changes to the project budget.

2.4.5 Project Quality Management
Quality of a product is defined by the extent to which the customer expectations are met or exceeded. The end user satisfaction is one of the most important objectives of all the projects. The project quality management processes are aimed at assuring that quality is achieved by deploying quality policies, well defined objectives and roles & responsibilities.

According to PMI, there are three sub processes of project quality management

i **Quality Planning**
   The identification of relevant quality standards is very important at the planning stage, as there is always cost associated with for quality of products and services. The quality and standards once agreed must not be compromised unless it leads to value addition of the product and services.

ii. **Quality Assurance (QA)**
   The processes required to implement the quality plans to achieve the desired objectives is Quality Assurance (QA). QA is the implementation side of quality management. QA involves rigorous implementation of the various plans of quality planning. Various tools like checklists, quality audits, process analysis etc. are used in the QA.

iii. **Quality Control**
   Once the desired quality standards are established and it is assured to achieve, them in true spirit, a continuous monitoring and evaluation process is required through Quality Control process. The QC process identifies the compliance to the standards and in case of any deviation, corrective measures are suggested.

2.4.6 Project Procurement management
Procurement is acquisition of product and services for the project. Procurement involves more than two third of the project resources. Procurement in projects is executed through formal contracts. Procurement Management thus involves contract management throughout the project life cycle and authenticates the changes. The project procurement management encompasses the following major sub processes.

- **Plan Contracting**
  Developing documentation for the products & services, bidding documents and identifying potential sellers, thorough wide dissemination in the press, organization website and PPRA website (www.ppra.org.pk). For construction projects and Electrical & Mechanical works, PEC bidding documents are used.
  According to Planning Commission notification, in 2004, tenders for projects sponsored under public Sector Development Program (PSDP) are required to be invited on PEC bidding documents, invariably.
- **Request Seller Responses**- This involves, opening of tenders, collecting quotations, bids, offers, or proposals, as appropriate based on the nature of goods and services. The process needs to be transparent and objective to generate healthy competition amongst the prospective bidders. The bids are required to be opened in the presence of the contractors or their representatives and in-house committee for procurement, on the same day, when tenders are received. Many departments collect the bids and open these at some future date at the convenience of the concerned committee, which is against the true spirit of transparency.

- **Select Sellers** – Analyzing, evaluating and reviewing offers. Choosing among potential sellers/bidders and negotiating a written contract with each seller. The evaluation criteria must be reflected in the bidding documents and bids received must be strictly evaluated on the given criteria. Any change in the evaluation criteria after opening of the bids is not admissible as it makes the procurement process biased and partial.

- **Contract Administration** – After award of the work to the lowest evaluated and technically responsive bids, contract are executed. Contract administration involves, contract execution, managing the contract and relationship between the buyer and seller, reviewing and documenting how a seller is performing or has performed to establish required corrective actions and provide a basis for future relationships with the seller, managing contract-related changes and, when appropriate, managing the contractual relationship with the outside buyer of the project.

- **Contract Closure** – When the project has been completed a project termination strategy is required to be devised, which must include completing and settling each contract, including the resolution of any open items, and closing each contract applicable to the project or a project phase.

### 2.4.7 Project Risk Management

The timely and rational decision making is key to the success of projects. However the decision scenario is not always certain. In certainty, there is only one and distinct outcome and hence the decision making is straightforward and easy. For example if Rs. 100 is invested in a bank at 10% simple markup, it is certain that after one year, the bank will return Rs. 110. In case of more than one outcome, the exactness of each outcome can’t be ascertained. In risk scenario, there can be more than one outcomes and the probability of each outcome can be projected on the basis of previous historic data. For example if someone invests an amount of Rs. 100,000 in stock, there are chances of normal, high and low returns. However the investor’s decision would depend on the stock exchange performance. In uncertainty, the outcomes can’t be anticipated. Under situations like natural disasters like earthquakes, tsunamis, floods and human induced disasters like bomb blasts, accidents, riots etc. it is not possible to predict and anticipate the outcomes.

Project Risk Management includes the processes concerned with conducting risk management & planning, identification, analysis, responses, monitoring and control on a project. The various sub processes are further explained as follows:

- **Risk Management Planning**: The risk management planning cover the corporate approach and strategies for addressing various types of risks during execution of the project. The Planning for risk management covers the important considerations like methodology and approaches, data sources to be used, roles and responsibilities, budgeting, timing, risk categories and definitions of risk probability and impacts.

- **Risk Identification**: The nature and sources of various risks are identified through collective wisdom. Better identification of various types of risks, requires both involvement of experts and previous historic data. Various tools used for identification
of risks involve brainstorming, Delphi techniques, root cause analysis, *Strengths, Weakness Opportunities and Threats* (SWOT) analysis, interviewing with experts.

- **Qualitative Risk Analysis:** In qualitative analysis of risk, two important parameters i.e. Impact of the risk and probability of its happening. The assessment of likelihood of happening of an adverse event and its impact (Consequence level), on the project objectives such as time, cost, quality and scope etc. Based on these two aspects, risk matrices are developed and the risks are then categorized as Extreme, High, Moderate and Low. The particular category of risk is

![Risk Matrix](image.png)

**Figure 2.1 Risk Matrix for various levels of likelihood and consequences**

After qualitative analysis of risks, the major and even the minor risks are identified, their potential causes and various categories are also identified. The types of risks requiring immediate actions and where further investigation is needed are also identified. Once the qualitative analysis of risks is completed, the ranking of risks from extreme to low is decided, which is followed by quantitative analysis of risks.

- **Quantitative Analysis of Risks:** The identified risks are quantified in terms of its impacts on the objectives of time, cost and quality. The quantification of risks is a challenge for the project manager. However the experts’ judgments, historic data, experience of the project managers can help in arriving at most reasonable estimate. Some of the techniques used for quantification of risks include, Expected Monetary Values (EVM), Decision Tree Analysis, sensitivity analysis and simulation & modeling.

- **Risk Response Planning:** The process of developing options and determining actions to reduce risks and enhance opportunities. There can be various strategies to tackle with the negative outcomes of risks such as avoidance, transfer and mitigation. For small insignificant risks, the strategy of status quo can be used. For availing the positive risks or opportunities of the project, the strategies of exploitation, enhancement and sharing can be employed.

- **Risk monitoring and controlling:** Once response plan is deployed during currency of the project, there is a need to ominously monitor and control the risks appearing in the projects. Many new risks may occur or the existing risks change in nature or intensity. Hence the risk response plan may need to be re-evaluated on continuous basis. Some of the techniques for risk monitoring include Risk Audits, Variance & Trend analysis, Technical Performance Measurement, Risk Reassessment and Reserve analysis. The Reserves made for catering with project risks are normally called as “Contingency Reserves”. During risk monitoring process, the balance
reserves for contingency are also measured with respect to the anticipated risks in the remaining part of the project. For this purpose, Risk Status meetings are regularly held. Some of the major risks involved in the construction projects are given in Box 1.1.

2.4.8 Project Human Resource Management

Project management is the Art and Science of directing and coordinating the human and non-human resources during the project life cycle, to achieve the objectives of customer’s satisfaction. The most challenging task for all the project managers is to deal with the human side of the projects. Formation of the effective project teams, their motivation for high project performance remains the one of the dreams of project manager. The selection of right person at the right place and right time is one of the pre-requisite for developing good project team. Project Human Resource Management involve all processes to organize and manage projects teams, toward successful completion of the projects.

The various processes involved in the Project HR management are illustrated as follows:

i. **Project Human Resource Planning**
   The various projects roles, responsibilities and authorities as well accountability for each role are identified and documented. Most importantly the organizational reporting relationships are also established at this stage for effective and clear communication. Various tools like Organizational Charts, Staff management Plans, Responsibility Assignment Matrix (RAM) etc.

ii. **Acquire Human Project Resource**
   Once the roles, positions and number of the project team members are defined, the next important step is to acquire them. Different options are used for acquiring the most suitable person for a job.

   **Pre- Assignment**
   In pre-assignment of HR, experts are identified before the commencement of the projects or sometimes, they are included in the project charter. In such cases the HR department will negotiate with the pre-assigned staff for the perks and privileges. It is the responsibility of the functional (Human Resource) manager to facilitate the hiring of appropriate person at the right instant as per requirements of the project.

   **Acquisition**
   In case the requisite HR is not available within the performing organizations, then the required staff is acquired from the market. In projects the acquisition of human resource is usually made on temporary basis for the project life or phase. The selection process is undertaken by the HR department, but the job description and job specification are defined by the project manager in most of the cases. Similarly the project manager has to be member of selection committee/board. Good and experienced project staff can be explored through references and recommendation as well.

   **Virtual Teams**
   The development of ICT has created many opportunities for virtual and mobile teams, wherein people work from different parts of the world in virtual teams. For design projects like software design, R&D projects, Architectural designing etc., virtual teams are becoming more popular these days. The changing workplaces are creating many challenges for designers. In Box 1.2, some of the modern workplaces are given.

iii. **Develop Project Teams**
   The specific requirements change from project to project and even experienced people would need proper training and development, when they are deployed in the
new projects. The project manager is always focused over the desired results of the projects, which can satisfy the end users and customers. The team building process is normally comprised of the following steps

- **Forming:** The forming stage involves identifying the roles, responsibilities and positions of the human resource and their reporting relationship as well the organizational structures. People from different functional backgrounds and experience are teamed together to perform under the team leader.

- **Storming:** The team members need extensive collaboration and brainstorming to develop the project plan, device various processes and procedure to come up with high performance teams. Socialization of the project team members, their training and development and all other necessary requirements of the project and project teams are identified.

- **Norming:** Once the extensive brainstorming and deliberations are over, the project team in normalized to identify their roles and responsibilities, end-users’ expectations and needs, and performance indicators and ground rules are established to judge the success of the projects.

- **Performing:** The team members are then deployed at their roles. The project managers with the active supports from the functional managers and senior executive managers ensure that all requisite resources are provided to the project staff in timely manner. The project performance is reviewed periodically and compared with the standards already established during the earlier stages. Corrections actions are taken timely to ensure that the objectives of time, cost, quality and scope are achieved to satisfy the end users.

- **Adorning:** After successful performance of projects and their completion, the projects are phase out and the resources of the project are demobilized from the projects. The staff is either laid off or deployed at other projects. The projects are closed.

### 2.4.8 Project Communication Management

The project communication management refers to all processes necessary for collection and dissemination of reliable information about the project to all stakeholders in timely manner, so that they are able to take correct decision. The various processes involved are given as under

**Communication Planning**

It refers to determining the information and communications needs of the stakeholders. A typical communication plan contains the types of communication, its frequency, format and contents. The details that who will produce and receive it as well the technologies required for producing, dissemination and conveying of information etc. The plan also provides techniques and approaches for resolving the conflicts and procedures for updating the communication plans.

**Information distribution**

The communication management aims at providing right information to the right person at the right time. The latest technologies for communication of information to the relevant stakeholders have enhanced the accuracy, speed and reliability of information systems in organizations. The details of various technologies in communications are given in Box 1.3. In face to face communication, body language is very important as it conveys 58% of communication in addition to 35% by words selected and 7% of communication takes place through how these words are spoken.

**Performance Reporting**

The performance reports are used to inform various stakeholders of the project about how different resources are used in the projects to achieve its objectives.
Box 2.1 Alternate Workplace strategies with Emerging Technologies

New ways of working within organizations are explored to combine a system of loosely coupled setting connected by physical movement of people and the electronic movement of information. The flexibility of the system and ICT are making such design more preferred designs.

**Non Territorial Offices** It was first used by researcher Thomas Allen. Employees don’t have permanently allocated spaces, desks, workstations and offices. The spaces are allocated on a “First come first served basis”. Some of this types are

- **Free Address:** Individual doesn’t have personally assigned space-IBM approach
- **Group address:** An area within the building without assigned desks intended for use of the groups. IBM
- **Just In Time (JIT):** Offices may be assigned on temporary basis through a reservation system. Anderson Consulting San Francisco-USA
- **Hoteling** Office are assigned on hotel reservation system. Charges are made on the basis of space allocated to the project. Earnest and Young Chicago, PC Lahore Pakistan
- **Shared assigned:** Two or more employees are assigned to use the same desk but at different times. Cornell University-USA

Hot Desking – Desk Sharing – Red Carpet- Drop in
- **Virtual Office** Workplace-whenever and wherever you desire to work.

**Telework Centre/ Satellite Centre**
- **working remotely from an office**
- Small fully equipped work environment in locations convenient to employee home or customer locations. Bonn-based Empirical estimates the number of teleworkers in Europe has doubled in the past three years to 20 million.

Previous research has shown that telework can make a substantial contribution to the three pillars of sustainable development identified at the Gothenburg summit of 2001 - the economy, society and environment.

**Home based telecommuting**
Here employees work at home for a period of work week utilizing technology for communicating with other members of the organization. A successful telecommuting program requires a management style which is based on results and not on close scrutiny of individual employees.

**Collaborative team environments**
For better communication, coordination and team work, the members are assigned specific areas for work in projects. Here organizations are flatter and less hierarchical and more emphasis is laid on team and group work. Temporary workers making up a larger percentage of office worker population. Technologies are more personal, collaborative and portable. They enable ‘work from anywhere’ business strategies

Chapter Summary

Engineers are dealing most of the time with the projects; hence their knowledge about the basic project management process is very important. In this chapter, the fundamental concepts about the project Management have been explained. The Project Management approach of Project Management Institute USA has been explained with emphasis over the processes and knowledge areas.
Q.2.1 Describe various phases of a construction project life cycle

Q.2.2 Explain the knowledge areas of Project Management according to Project Management Institute (PMI) approach

Q.2.3 Write a critical note on the emerging workplaces.
TIME VALUE OF MONEY

3.1 Meaning of Time Value of Money

If Mr. X burrows US$ 1000 from Mr. Y and returns it after 2 years. Will the two amounts have the same value? Certainly not! Because the amount, which Mr. X possesses today, can be invested into some opportunity available. The concept of Time Value of Money (TVM), thus refers to the fact that a dollar in hand today is worth more than a dollar promised at some time in the future. Students often confuse it with the fact that there might be inflation or depreciation in the currency rates. Even if there is no inflation or depreciation, the dollar in hand is worth more than the dollar, one is supposed to receive in future. This mainly due to the fact, that the money available today can be invested into any opportunity in hand, this can generate some profit. This benefit of the foregone opportunity for investment is also called, opportunity cost.

Money received sooner than later can be used for investment into some available opportunities, like investment in property, bonds, stock or buying some goods and services.

The concept of TVM is very important in making decisions about the investment in Engineering Goods and Services. While investing in various projects, the Engineers need to carefully assess the Time Value of investment, while comparing the expected benefits and costs. Time Value allows us the opportunity to postpone our consumption and earn interests.

Example 3.1

The installed exchange at MeDII University is having 400 lines. The existing capacity of the exchange has been utilized and University is planning to enhance the facility to 1000 lines, as expected for next 10 years.

Option-1
Upgrade the existing Exchange by 200 Lines for the 2 years need, which will have an investment of 2.0 Million.

Option-2
Procure a new exchange of 1000 lines for next 10 years need, which will need an investment of Rs. 5.000 Million. Under this option, the existing old exchange will be traded.

Decisions like the above, would need to investigate the TVM.

3.2 Future Value of present investment (compounding factor)

The Future Value (FV) refer to amount of money, one is supposed to receive from an investment (PV), over certain time at given interest rate.

The Future Value after years n is given as $FV_n$ is given as

$$FV_n = PV_0 (1 + r)^n$$

Here
- Present value of the cash flow (PV)
- Interest/Return rate (r), and
- Time period (n)
Example 3.2: Mr. Ali has invested Rs.22,000 today in an account that pays 6% interest, with interest compounded annually, how much will be in the account at the end of 5 years if there are no withdrawals?

Given
- Present Value at Time 0 = Rs. 22,000
- Return rate; \( r = 6\% \)
- Period in years = \( n = 5 \)

Required
- Future Value \( FV_n \) = ?

\[
FV_5 = PV_0 \times (1 + r)^n = 22000 \times (1+0.06)^5 = Rs. 22000 \times (1.338) = Rs. 29,436
\]

3.3 Equal Payment Series Annuities
While meeting our future liabilities of machinery and equipment or purchase of other durable assets, we often save equal payments after some equal interval of time normally on yearly basis. The payment of equal amount and payment interval is normally fixed in such cases. For example, if we are paying an equal amount \( 'A' \) after each year for \( n \) years as given in Fig 3.2

\[
F = A \frac{(1+i)^n - 1}{i} = A(F/A, i, n) \tag{3.2}
\]

Example 3.2: Mr. Waqar is saving Rs. 100,000, every year and depositing it with interest free banking. He is expecting an annual return of 10% based on the previous performance of the bank. What future amount, he is expected to get after 10 years?

Solution

Given
- \( A = Rs. 100,000 \)
- \( i = % \)
- \( n = 10 \) years
Required $F = \frac{A}{F/A, 10\%, 10}$=

\[
F = A\left(\frac{(1+i)^n - 1}{i}\right) = \frac{A(F/A, i, n)}{100000 (1+0.1)^{10} - 1}
\]

\[
= \frac{100000(2.954) - 1}{0.1} = Rs. 1593742
\]

Hence after a period of 10 years, Mr. Waqar is expected to receive an amount of Rs. 1593742

### 3.3 Equal payment series for recovery of Capital or sinking fund

We often buy automobiles, refrigerators and other home appliances on monthly installments. These installments are paid to recover the investment and profit of the investors. At the same time we plan for retirement and other long terms liabilities of education of our children and their marriages etc. For such future needs, we often save from our regular income and salary. If someone is supposed to buy a house at Rs. 10 Million after 15 years, then he or she needs to save some regular amounts on monthly basis and deposit it in some bank account so that funds are available at the time of purchase of house. For such future value, we can work out the equal payment to be saved and deposited in the bank. How much amount $A$ is required to recover the future value of $F$, if a markup of $i$ is paid for $n$ periods of intervals. This value of 'A' is given as

\[
A = F \frac{\frac{i}{(1+i)^n - 1}} = A(F/A, i, n)
\]

(3.4)

**Example 3.3:** Ms. Sheeba is planning to buy a house at Rs. 15 Million after superannuation at the age of 60 years. Presently she is 40 years. She desires to save certain fixed amount from her salary every year and plan to deposit it in a bank where, a return of 15% is expected. How much amount $A$ needs to save every year to fulfill her plan.

Given

$F = 15,00,000$

$n = 60 - 40 = 20$ years

$i = 15\%$ p.a.

$A = ?$

As explained above, the equal amount series required to recover an amount after $n$ years is given as

\[
A = F \frac{\frac{i}{(1+i)^n - 1}} = A(F/A, i, n) = 15,00,000 \frac{0.15}{(1+0.15)^{20} - 1}
\]

\[
= 150,00,000(0.009761) = Rs. 146422.1
\]

Hence Sheeba has to deposit an amount of Rs. 146422 per year

**Example 3.4:** In the preceding Example, if the payment has to be made on monthly basis, then what must be the monthly amount to be saved?

Solution

Here the payment has to be made on monthly basis. Hence the interval for payment will be one month for 2 years. Here the markup rate will be determined for one month and total period will be given in months.
\[ i = 0.15/12 = 0.0125 \]
\[ n = 20 \text{ years} = 20 \times 12 = 240 \text{ months} \]
\[ A = F \frac{i}{(1+i)^n - 1} = A(A/F, i, n) = 1.50,00,000 \frac{0.0125}{(1 + 0.0125)^{240} - 1} \]
\[ = 150,00,000(0.000668) = Rs.10018.44 \text{ per month} \]
It is obvious that on monthly basis, the yearly payment would be Rs.120221.2 as against Rs.146622

### 3.5 Present Value of Equal Payments made in future

Often we lease our car or mortgage our new house with the bank at the agreed total price and down payments. In such case, we pay equal monthly or yearly amount against the financed amount. The Present worth of such future equal payments is determined for comparison. The cash flow diagram for present value of future equal payments is given in Fig 3.3.

![Graphical of Present Value of Equal Payment Series](image)

The present value \( P \) is given by eq.

\[ P = A \frac{(1+i)^n - 1}{i(1+i)^n} = A(P/A, i, n) \]  \( (3.4) \)

**Example 3.4:** Medli University needs to invest into various option for creating pension payments to its employees for next 10 years. The annual pension liability is Rs. 20 Million, which is 10% of the current revenue of total revenue of the University. The expected long term return of the investment is 12%. How much initial investment is required for meeting the pension liabilities for next 10 years?

**Solution:**

Given

Equal yearly amount to be paid in pension, \( A = 20 \text{ million} \)
\( n = 10 \text{ years} \), \( i = 12\% \)

Required Present Investment \( P=? \)

\[ P = A \frac{(1+i)^n - 1}{i(1+i)^n} = A(P/A, i, n) = 20 \frac{(1+0.12)^{10} - 1}{0.12(1+.012)^{10}} = 20(5.650223) = Rs.113.005 \text{ Million} \]

The University would need to invest Rs. 133 Million to ensure that the pension liabilities for next 10 years are paid at Rs. 20 Million

**Example 4.4:** Mr. Javed is planning to buy a new Toyota car from a bank. The total price of the car is Rs. 20,00,000. He desires to make a down payment of 40% i.e. 800,000 and get financing...
of Rs. 1200,000 from bank. The bank has suggested Rs. 42000 per month for a tenure of 48 months. What is the actual markup rate, Mr. Javed has to pay to the bank. The insurance of the car is not included in the price.

Solution:

Here monthly equal installment is \( A = \text{Rs. 42000} \)
The lease tenure \( n = 48 \) months
The markup rate \( i = ? \)
Financed amount \( P = \text{Rs. 12,00,000} \)

From Eq 3.3, we solve by hit and trial
Assume \( i = 15\% \) for monthly payment \( i = \frac{15}{12}\% = 0.0125 \)

\[
P = A \left( \frac{(1+i)^n-1}{i(1+i)^n} \right) = A(P/A,i,n)
\]

\[
P = 42000 \left( \frac{(1.0125)^{48}-1}{0.0125(1.0125)^{48}} \right) = 42000(35.9315) = 1509182 \neq 1200,000
\]

For
\( i = 28\% \) pa = \( 0.0233 \) per month
\[
P = 42000(26.693) = \text{Rs. 1205091} \approx 120000
\]

Hence the bank is charging a markup rate of \( 28\% \) per annum. Most of the bank, however claim that they are charging only \( 16\% \), which is not the right scenario.

Example 4.5: Mr. Shahid has got a loan from HBL equal to 20 times his current gross salary of Rs. 100,000, under the Advance Scheme for regular employees against their salaries. The tenure of loan is 10 years on yearly installment. The bank markup rate is 15%. What is the yearly equal installment, Mr. Shahid is supposed to pay?

Solution:

Given
Total value of present loan \( P = 20 \times 100,000 = 20,00,000 \)
Markup rate \( i = 15\% \)
Loan tenure= 10 years
Yearly equal installment \( A = ? \)

\[
P = A \left( \frac{(1+i)^n-1}{i(1+i)^n} \right) = A(P/A,i,n)
\]

\[
A = P \left( \frac{i(1+i)^{10}}{(1+i)^{10}-1} \right) = 20,00,000 \left( 0.1992 \right) = \text{Rs. 398504}
\]

Hence Mr. Shahid has to pay Rs. 298504 every year, to pay back the loan of Rs. 20,00,000 got from HBL.

3.6 Importance of TVM in engineering decision making process

Time Value of Money (TVM) is an important consideration for investing into projects and purchase of durable assets. The Engineering decision making is now based on the Life Cycle Costing (LCC), which covers the cost of entire life cycle of projects and products, including their
R&D cost, development cost, construction cost, operation and Maintenance cost and finally its disposal cost. The concept of TVM is very important for such kinds of valuations. Some of the important areas, where TVM is often used are

- Stock valuation while generating capital for investments, firms often issue bonds. The valuation and redemption value of such bonds is determined while using TVM.
- Financial analysis of firms While evaluating the financial soundness of the firm, their investment portfolios, balance sheets, profit and loss statements etc. are evaluated. Such analysis require the concept of TVM.
- The comparison of projects for their selection on the basis of projects benefit and costs are often done with the help of comparing their cash flows and determining their present values with TVM concepts.
- The basic decision of Buy or Lease an equipment or durable asset will also involve the use of TVM.

### Case Study House Purchase Plan at the retirement age

An Engineer who is working at Design and consultancy firm is 35 years and he is planning to retire after 25 years. He has presently some surplus saving of Rs. 500,0000. He is working as part time with design team and can save about 1,50,000 every year. He is expected to receive an amount of Rs. 10 Million at the time of retirement from commutation of his salary. After retirement, he is planning to buy a house with the expected price of Rs. 50 Million. He will sell his plot at the town at an expected price of Rs. 10 Million at the time of retirement. Please check whether he will be able to manage to buy the house or not? If not, then what other options are available with him?

### Chapter Summary

Time Value of Money (TVM) is an important consideration in the decision making process and selection process. In this chapter, the basic concepts of TVM, compounding, discounting, present value and future values have been explained. The concepts of Net Present Value have been explained with the help of solved examples. It has been argued that without assessing the present value of the cash flows, it is not rational to compare the projects for selection.
Q.3.1: **Future Value of a Single Payment** If you have deposited Rs. 10,000 in a bank account at annual markup rate of 10% interest. How much will be in your account after 5 years?

Q3.2: **Number of Periods of a Single Payment** If you deposit Rs. 100,000 at a bank and the guaranteed markup of the bank is 6% annual interest. How long will it take to be 200,000?

Q 3.3: **Number of Periods for an Annuity** You have Rs. 250,000 in your account, and you plan to deposit an additional Rs.50,000 at the end of every future year until your account totals 25,00,000. If the expected return is 12%, how long will you take to receive the target amount?

Q 3.4: **Interest Rate of a Single Payment** Your father is planning to retire after 20 years. He would have some saving of Rs. 10,00,000 from purchase of land. He would like to get Rs. 50,00,000 at the time of retirement. What is markup rate, he would need from bank deposit?

Q3.5: **Future Value Annuity** You are saving Rs. 500,000 at the start of every year for 10 years and deposits at bank with guaranteed markup of 10%. What amount, would you receive at the end of 10 years?

Q3.6: Today your stock is worth Rs.500,000. About 18 years ago, you invested Rs. 50,000 in the stock. What average annual rate of return did you earn on your investment?

Q 3.7: It is now January 1, 2017. You plan to make 5 deposits of 10000 each, one every 6 months, with the first payment from today. If the markup rate is 12% but uses semiannual compounding, how much will be in your account after 10 years?

**Multiple Choice Questions on Time Value of Money (TVM)**

Please tick the correct answer

1. Markup or interest rate of bank is based on the idea
   i. Having money today is worth more than having the same amount a year from now
   ii. The lender compensates the borrower for charging loan fees
   iii. Having money a year from now is worth more than having the same amount today
   iv. Most people would prefer to have money later than sooner

2. An interest period or markup period is
   i. Expressed on a yearly or less-than-a-year basis
   ii. A base unit of time over which an annual interest rate is calculated
   iii. Always expressed on a yearly basis
   iv. Usually expressed on a yearly basis but can be of any duration

3. Compound and simple interest
   i. Are both common methods of computing interest in practice
   ii. Both add the accumulated interest in one period to the principal amount used to calculate interest in the next period
   iii. Make very little difference in the accumulated interest over time
iv. Can make a significant difference in the accumulated interest when a high interest rate is considered over a prolonged time period

4. Which of the following is false about interest
   i. It allows us to evaluate very complicated exchanges of money over time
   ii. It concerns the lending and borrowing of money
   iii. The root source of it is the productive use of money
   iv. It has does not have a physical basis

5. An effective interest rate is
   i. the same as a nominal interest rate if interest is compounded
   ii. usually the stated annual interest rate
   iii. the same as a nominal interest rate if the two rates are expressed in a common compounding period
   iv. the preferred rate to advertise than a nominal interest rate for bank loans and credit companies

6. A nominal interest rate
   i. is generally lower than the effective rate
   ii. is an unconventional way of stating the annual interest rate
   iii. makes it easy to compare interest rates even if the compounding periods are different
   iv. is used when compounding is done is less often than once per year

7. Continuous compounding means that
   i. the interest period is infinitesimally small
   ii. the benefits of a project are invested back into the project at a certain time interval
   iii. the interest period is infinitely large
   iv. the cash flows occur continuously

8. A cash flow diagram
   i. cannot show multiple cash flows occurring at the same time
   ii. shows the magnitude of cash flows horizontally and the timeline vertically
   iii. is useful for summarizing the timing and magnitude of cash flows over time
   iv. differentiates positive and negative cash flows by the size of the arrows

9. In a cash flow diagram
   i. there are never negative time periods
   ii. the end of one period corresponds to the beginning of the next period
   iii. some cash flows may be drawn in the middle of a time period
   iv. time zero is always the present

10. Which of the following statements is false?
    i. Decisional equivalence for one decision maker may not hold for another decision maker
    ii. Mathematical equivalence is captured in a mathematical equation
    iii. Engineering economics assumes that market equivalence holds
    iv. Market equivalence always holds for large companies and individuals
CHAPTER - 4

PROJECT LIFE CYCLE AND PROJECT SELECTION METHODS

4.1 Project Life Cycle Phases
Earlier in Chapter 2, we discussed the project management and various knowledge areas and process of the project management, project life cycle etc. The project is normally comprised of three major set of tasks and activities often described as phases of the project. The combination of these phases together is called Project Life Cycle. These phases are normally divided into three major group namely pre-project stage, project or execution stage and termination or closing stage.

In the pre-project stage, which is sometime called definition stage, all important decisions required for starting of the project are taken. The activities like project selection and definition, requirement analysis, preliminary budgeting and design etc. are decided in this phase. In this phase we define project objectives, scope and approach, mobilise project team. The two important components of this phase is project selection and confirmation. Further details of these major tasks are given as follows:

i.  **Project selection**
   It involves defining project scope, project objectives, approach and methodology to execute the project, develop business case to attract funding for the project and finally selecting the best project for execution.

ii. **Project Confirmation**
    After selection of the project, it is very important to understand the expectations of the stakeholders, project scope definition, project assumption and identify the project risks.

Once the project is selected and confirmed, then we go to the execution phases. Important sub phases of the execution phase include

a.  **Plan the execution**
   The execution plan will include the following major tasks:

   i. Define Project Deliverables in terms of products, processes or services,
   ii. Develop Work Plans: This will include developing the sub projects and work breakdown structure (WBS) for the major project. The work plan will include identification of all the major tasks and activities, developing their logical relation and schedule for their performance. The work plan will make the baseline for the execution of various sub projects.
   iii. Develop Scope: In the definition stage, normally preliminary scope is worked out. But in the execution phase, the detailed projects scope incorporating all the project deliverables is developed.
   iv. Change Control: Though the project scope is defined in quite yet there is always tendency for change in scope due to changing expectation and demands of the project major stakeholders and users. This change in scope must be controlled as frequent change in scope of the projects would bring delays and cost increases. There must be a rigorous process to change the project scope.
   v. Issue Management and Sign-off Processes: At the execution stage, many sign offs like contract approval and awards, project team deployment, releases of funds and other technical sanction for the initiation of the project are necessary.
vi. Develop Risk Mitigation Plan: The project risk management plan is an integral part of the project plan. All possible risks are identified and then selective risks are evaluated for probable adverse outcomes. Their mitigations plans are also developed during the execution stage.

vii. Develop Quality Plan

viii. Project specification and quality is one of the most important contains and outcome for the project acceptability. A proactive project quality plan based on Continuous Quality Improvement (CQI) and Total Quality Management (TQM) is developed as baseline for quality assurance and quality control.

b. Organize resources

This involves organizing the human and nonhuman resources for the project. The following major tasks are involved in this sub phase.

i. Identify Project Team Roles and Responsibilities. The selection of right team is pivotal for the success of the project

ii. Assign Team Members to Work Plan tasks Once the team members are identified, the next step, is to give them authority and power to execute different parts of the work and project.

iii. Communicate responsibilities, target dates, deliverables

iv. Train Team Members

v. Organise physical resources

c. Control the work

During execution of the projects, it is essential to monitor and control the project, to ensure that it is progressing as per plan. The performance measurement towards achieving the objectives of time, cost and quality is very important. Some of the major activities in this sub phase are given below

i. Monitor work progress: The collection of data about the actual performance of the project is called monitoring. The progress monitoring is an important activity. In public sector projects, work plan is normally used to monitor the projects, which will be discussed in the subsequent part of the book

ii. Resolve Issues: During monitoring and controlling of the projects, many decision about the project are made. The issues relating to the triple constraints of the projects are resolved.

iii. Measure performance: Performance measurement involves, comparing the planned and actual performance of the projects and taking corrective actions. There are various tools for performance measurement such Earned Value Management (EVM), Value Engineering etc.

d. Report project status

The various major stakeholders of the project and their reporting requirements vary from department to department and person to person. Hence reliable and time access to information is assured through appropriate project reporting system, which is often termed as “Project Management Information System (PMIS)” in the computerized project management.

Once the project is completed substantially, the “Closing phase” of the project is undertaken. The closing or project termination phase is comprised of the following major sub phases.

i. Complete any developmental activities in the form of deliverable.

ii. Any administrative activity required such as contract closure, final acceptance of deliverables, final payments etc. are completed

iii. Obtain sign off of the project deliverables

The sign off or handing taking over from the supplier to the client(s) is an important activity of the project completion process. Normally after taking over the facility, a checklist is served to the contractor, to rectify the defects and shortcomings. The
project is however deemed substantially completed, if it can serve the purpose, for which the project has been developed. An important deliverable of the project closing phase, is "Lesson Learnt" document, which record the unique feature and challenges faced during execution of the project. This document is rarely developed by the public sector project managers, which leaves very little for their successors to learn from such record.

iv. Transition of the project from project team to client or maintenance team.

4.2 Project Selection Methods
Projects are selected keeping in view the organizational long term and short term objectives and goals. The vision and Mission of the organizations are translated into goals and targets. The strategic planning identifies, both short term and long term objectives and needs for new products and services. These needs and subsequent products and services are achieved through new projects.

The targets and goals set by the organizations must be SMART

S Specific and well understood by the project stakeholders.
M Measureable and quantifiable, so that its evaluation with time is possible
R Realistic and base on ground realities and organization resources and capacity. Goals and targets must be challenging but achievable.
T Time bound, which can be measured with time.

Apart from other considerations, three important things for undertaking new projects are need, availability of funds and Organizational will and capacity to deal with the projects. Projects are inevitable for the survival of organizations. Some of the major reasons are given as follows

i. Sacred Cow: The project desired by the senior and executive management of the organization and in most cases by the CEO. Projects executed under Prime Minister or Chief Minister Directives are examples of this kind of projects. In recent years, some of the major projects like Metro Projects, Orange Trains, PM Laptop scheme etc. are examples of such kinds of projects.
ii. Operational Necessity: Sometime new projects become operational necessity of the organization in terms of new infrastructure and new markets. The China Pakistan Economic Corridor (CPEC), involves US$ 46 billion in the development of new infrastructure, energy supply in Pakistan and improvement of Gwadar port. The success of China’s “One Belt One Route (OBOR)” depends on strong infrastructure in the region, which can provide access of the Chinese merchandise to the global market.
iii. Product line extension: To capture new markets and new customers, organizations extend their product lines to different segments both vertically and horizontally. Nestle Pakistan, Unilever Pakistan and Lipton Pakistan are some examples.

There are various qualitative and quantitative techniques for selection of the projects.

4.2.1 Qualitative Project Selection Techniques
Qualitative project selection normally, ranks the projects in terms of the priorities set by the organization. The relevance of the project to the organizational, strategic fit, objectives, image building, profitability, in-house strength, experience etc. are normally considered. Some of the qualitative considerations in the project selection include

i. Delphic Method: Here consensus is tried to reach amongst the external experts on ranking of the projects through an iterative process. Further details can be studied under “Delphi technique”

ii. Balanced Portfolio: Here the project financial and non-financial factors are balanced. The financial factors may include NPV, Payback period, Rate of Return
etc. The non-financial factors may include project strategic importance, image building, risk etc. Normally high returns are associated with high risk projects and vice versa. The balance score card or balance portfolio methods attempts to balance the risk and returns of the projects.

iii. **Weighted Scoring Methods**: This is semi-quantitative method, where weightages are assigned to various important strategic considerations, such as support to key business objectives, internal support, customer support, technology required, project duration and positive NPV etc. In Table 4.1, the comparison of three projects on weighted Scoring Model is given.

### Table 4.1 Weighted Scores of various projects

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weightage</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score out of 100</td>
<td>Weighted Score</td>
<td>Score out of 100</td>
<td>Weighted Score</td>
</tr>
<tr>
<td>Supports Key Business objective</td>
<td>25%</td>
<td>75</td>
<td>18.75</td>
<td>80</td>
</tr>
<tr>
<td>Strong Internal Support exists</td>
<td>15%</td>
<td>80</td>
<td>12</td>
<td>78</td>
</tr>
<tr>
<td>Strong Customer Supports exists</td>
<td>15%</td>
<td>85</td>
<td>12.75</td>
<td>75</td>
</tr>
<tr>
<td>Realistic level of technology exists</td>
<td>10%</td>
<td>60</td>
<td>6</td>
<td>65</td>
</tr>
<tr>
<td>Can be implemented in one year or less.</td>
<td>5%</td>
<td>80</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>Have positive NPV</td>
<td>20%</td>
<td>90</td>
<td>18</td>
<td>85</td>
</tr>
<tr>
<td>Have low risk in cost, quality and scope</td>
<td>10%</td>
<td>5</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>Weighted Score</td>
<td>100%</td>
<td>76.5</td>
<td>77.95</td>
<td>79.3</td>
</tr>
</tbody>
</table>

Based on the weighed score, Project 3 is selected, which has the largest value of 79.3%

### 4.2.2 Quantitative techniques for project selection

Qualitative and quantitative techniques of project selection either move in parallel or the latter is undertaken, once the former is completed and priority of the projects has been established. In quantitative technique, the benefits and costs of the project (s) are portrayed in $ value for their mutual comparison. However such techniques alone don’t guarantee the credibility of the project (s).

The most commonly used quantitative techniques for project selection are discussed as follows

**4.2.2.1 Net Present Value (NPV) of projects** As already discussed, under NPV, all future streams of Project cash flows are discounted at the opportunity cost of investment to determine the NPV of the project and ultimately the project with more “+ve” NPV is selected. The NPV is given by following equation

\[
NPV = \left( \frac{(1+i)^n}{i(1+i)^n} \right) = \sum_{t=0}^{n} \frac{R_t}{C_t} = \frac{R_t - C_t}{(1+i)^t}
\]

(4.1)

Where

- \( R_t \) Total returns over the project period
- \( C_t \) Total Cost over the project period
- \( i \) Discount rate of the money
The following examples can illustrate the use of NPV for project selection (In PKR Million)

<table>
<thead>
<tr>
<th>Project/Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost (Outflow)</td>
<td>10.000</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
<td>2.000</td>
<td>2.500</td>
</tr>
<tr>
<td>Returns (Inflows)</td>
<td>0.00</td>
<td>3.000</td>
<td>5.000</td>
<td>7.000</td>
<td>6.000</td>
<td>8.000</td>
</tr>
<tr>
<td>Net Cash flow</td>
<td>-10.00</td>
<td>1.000</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
<td>5.500</td>
</tr>
<tr>
<td><strong>Project B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost (Outflow)</td>
<td>15.000</td>
<td>3.000</td>
<td>4.000</td>
<td>6.000</td>
<td>3.000</td>
<td>3.500</td>
</tr>
<tr>
<td>Returns (Inflows)</td>
<td>0.000</td>
<td>5.000</td>
<td>7.000</td>
<td>10.000</td>
<td>8.000</td>
<td>11.000</td>
</tr>
<tr>
<td>Net Cash flow</td>
<td>-15.00</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
<td>5.000</td>
<td>7.500</td>
</tr>
</tbody>
</table>

The discount rate of the investment is 10% p.a.

Net Present Value Project 1

\[
NPV_1 = \sum_{t=0}^{n} \left( \frac{R_t}{(1+i)^t} - \frac{C_t}{(1+i)^t} \right) = \frac{R_1 - C_1}{(1+i)^0} + \frac{R_2 - C_2}{(1+i)^1} + \frac{R_3 - C_3}{(1+i)^2} + \frac{R_4 - C_4}{(1+i)^3} + \frac{R_5 - C_5}{(1+i)^4} + \frac{R_6 - C_6}{(1+i)^5}
\]

\[
= -10 + \frac{1.00}{(1+0.1)^0} + \frac{2.00}{(1+0.1)^1} + \frac{3.00}{(1+0.1)^2} + \frac{4.00}{(1+0.1)^3} + \frac{5.50}{(1+0.1)^4} = -10 + 0.909 + 1.65 + 2.25 + 2.73 + 3.41
\]

\[
NPV_1 = -10 + 10.949 = +0.949
\]

Net Present Value Project 2

\[
NPV_2 = \sum_{t=0}^{n} \left( \frac{R_t}{(1+i)^t} - \frac{C_t}{(1+i)^t} \right) = \frac{R_1 - C_1}{(1+i)^0} + \frac{R_2 - C_2}{(1+i)^1} + \frac{R_3 - C_3}{(1+i)^2} + \frac{R_4 - C_4}{(1+i)^3} + \frac{R_5 - C_5}{(1+i)^4} + \frac{R_6 - C_6}{(1+i)^5}
\]

\[
= -15 + \frac{2.00}{(1+0.1)^0} + \frac{3.00}{(1+0.1)^1} + \frac{4.00}{(1+0.1)^2} + \frac{5.00}{(1+0.1)^3} + \frac{7.50}{(1+0.1)^4} = -15 + 1.818 + 2.48 + 3.00 + 3.41 + 4.66
\]

\[
NPV_2 = -15 + 15.368 = +0.368
\]

The comparison of project 1 and project 2 shows that project 1 has more NPV, hence it can be selected based on NPV. The basic rules for project selection on the basis of NPV are

- NPV must be positive
- While comparing two or more projects, higher value of NPV is selected

4.2.2.1 Advantages and Disadvantages of NPV technique for project selection

NPV technique measures the value being added to the firm. At the same time it measures the project income over certain period of time at the expected rate of return. This can also help in developing the firm’s projected cash flows and balance sheet etc.

The major disadvantage is the estimation of the future value, expected from the project returns and discount rate. Both these estimates are really very difficult to ascertain.

4.2.2.1 Pay Back Period (PBP)

The concept of payback period is a crude way to compare the projects on the basis of the period required to realize the actual investment. Theoretically a project with least PBP period is preferred. Payback period can be determined on the basis of undiscounted cash flow or discounted cash flows. In latter case, it will be relatively longer. Since it is used only for comparative analysis, it is argued that undiscounted cash flow analysis is also suitable.
The following example will explain, both the concepts

<table>
<thead>
<tr>
<th>Project/Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project A</td>
<td>-10.00</td>
<td>1.000</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
<td>5.500</td>
</tr>
<tr>
<td>Project B</td>
<td>-15.00</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
<td>5.000</td>
<td>7.500</td>
</tr>
</tbody>
</table>

The discount rate of the investment is 10% p.a.

Case A Payback Period (PBP), based on undiscounted Cash Flows

**Project A Total investment (Cost) = PKR 10.000 Million**

Net Return after Year 1 = -10 +1 = -9.000 Million
After Year 2 = -9 +2 = -7.000 Million
After Year 3 = -7 +3 = -4.000 Million
After Year 4 = -4 +4 = 0

Hence the project investment of PKR 10 Million will be recovered in 4 years.

**Project B Total investment (Cost) = PKR 15.000 Million**

Net Return after Year 1 = -15 +2 = -13000 Million
After Year 2 = -13 +3 = -10.000 Million
After Year 3 = -10 +4 = -6.000 Million
After Year 4 = -6 +5 = -1.000 Million
After Year 5 = -1 +7.5 = 6.500 Million

Hence the positive cash flow (Profit would start in year 5. If it is assumed that the project will earn the PKR of 7.500 Million in year 5 evenly in 12 months. Then the net cash flow loss of PKR 1.000 Million till the end of year 4 will be realized in (12/5)* 1 = 2.4 months

Hence the payback period of project A will be 4 year, 2 months and 12 days

**Based on the least payback period of 4 years. Project A is selected**

Case B Payback Period (PBP), based on undiscounted Cash Flows

<table>
<thead>
<tr>
<th>Project/Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020 Total (net)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project A</td>
<td>Net Cash flow</td>
<td>-10.00</td>
<td>1.000</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
</tr>
<tr>
<td></td>
<td>Discounted Cash flow</td>
<td>-10.00</td>
<td>0.909</td>
<td>1.650</td>
<td>2.250</td>
<td>2.730</td>
</tr>
<tr>
<td>Project B</td>
<td>Net Cash flow</td>
<td>-15.00</td>
<td>2.000</td>
<td>3.000</td>
<td>4.000</td>
<td>5.000</td>
</tr>
<tr>
<td></td>
<td>Discounted Cash flow</td>
<td>-15.00</td>
<td>1.818</td>
<td>2.48</td>
<td>3.00</td>
<td>3.41</td>
</tr>
</tbody>
</table>

Note: The annual discount rate is 10%

**Project A**: Net Cash flow after 4 years -10 + 0.909 + 1.65 + 2.25 + 2.73 = -2.461
On the basis of discounted cash flows, the project will recover its initial investment in 5th year i.e. (12/3) 2.461 = 9.84 month of year 5th. Hence the PBP of project is 4 years 8 months and 25 days, which is slightly more than the undiscounted PBP.
Project B: Net Cash flow after 4 years -15 + 1.818 + 2.48 + 3.00 + 3.41 = -4.292

On the basis of discounted cash flows, the project will recover its initial investment in 5th year i.e. 
\[ (12/4.66) \times 4.292 = 11.05 \text{ month of year 5th} \]. Hence the PBP of project is 4 years 11 months and 2 days, which is slightly more than the undiscounted PBP.

The Payback period of project A, based on discounted cash flows is thus lesser, which is the same decision as in case of undiscounted cash flows. The comparison of PBP for both the undiscounted and discounted cash flows are given in following Table 4.2

<table>
<thead>
<tr>
<th>Project</th>
<th>Pay Back Period</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4 years</td>
<td>4 years 8 months and 25 days</td>
</tr>
<tr>
<td>B</td>
<td>4 years 8 months, 25 days</td>
<td>4 years 11 months and 2 days</td>
</tr>
</tbody>
</table>

4.2.2.2.1 Advantages and disadvantages of Payback period for project selection

The major advantage of the Payback period is its ease of calculation and understanding. Projects with faster returns and lesser PBP is obviously the top priority of the firms.

In general, it neglected the TVM and long term projects, which can yield higher profit at later stage, may be avoided. Hence it seems more appropriate for short term projects.

4.2.2.3 Internal Rate of Return (IRR)

The concept of IRR is close to NPV, except it identifies the threshold of rate of return, at which the project becomes acceptable. In other words, it is not incurring any loss. IRR is defined as the discount rate at which the NPV of the project become zero. Using the equation of NPV

\[ \sum_{t=0}^{n} \frac{R_t}{(1+i)^t} - \frac{C_t}{(1+i)^t} = 0 \]  \hspace{1cm} (4.4)

IRR like NPV also takes, the TVM into consideration, while assessing the financial feasibility of projects. It can be easily used for small projects of equipment purchase or investment. Once the project's IRR, is calculated, project can be selected in cases, where the project's IRR exceeds the estimated cost of Capital.

Example: Shah Associates needs to decide whether to purchase new factory equipment for $300,000 with a service life of 3 years. It will generate $150,000 per year. The salvage value of the equipment is about $10,000

Using IRR, Shah Associates wants to decide in two options, whether the equipment purchases is a better by cash or its other investment options, which should return about 10%.

Solution:

The first step would be determining the IRR. We assume initially with 10% pa.

\[ NPV = \sum_{t=0}^{n} \frac{R_t}{(1+i)^t} - \frac{C_t}{(1+i)^t} = \frac{150,000}{1.1^1} + \frac{150,000}{1.1^2} + \frac{150,000}{1.1^3} - 300,000 = 136363 + 123966 + 112697 - 300000 \]

\[ = 100,026 \]

The NPV is positive, hence we increase i=20%
NPV = 125000 + 104167 + 112697 - 300,000 = 41,864 (+ve)

Try with 25%

NPV = -7200 (Which means that IRR is somewhere between 20% and 25%. We can determine using linear interpolation)

For NPV = 0, the IRR = \(20 + \frac{25 - 20}{41864} \times 41864 = 24.30\%\)

The equipment purchase decision will have a return of 24.30% per annum as against the investment option in the bank which has only 10% returns. Hence the Co must buy the equipment instead of investing the amount in bank.

IRR can also be determined with the help of Excel program as follows

Using Microsoft Excel to determine IRR

1. For the example given, enter initial cash flow into any cell on the spreadsheet, keeping it negative being cost/investment.
2. Then enter the yearly return for the project life in other cells.
3. Type in the function command "=IRR(A1:A4)" into the A5 cell and enter, which will give you the IRR value as given in the following two cases

<table>
<thead>
<tr>
<th>Project Option</th>
<th>Initial Investment</th>
<th>Returns</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-300000</td>
<td>150000</td>
<td>150000</td>
</tr>
<tr>
<td>B</td>
<td>100000</td>
<td>100000</td>
<td>200000</td>
</tr>
</tbody>
</table>

Comparison of NPV and IRR

<table>
<thead>
<tr>
<th>Attributes</th>
<th>NPV</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>The present value of the net project cash flows discounted at the interest rate can be positive, negative and zero</td>
<td>The discount rate, at which the net cash flow of the project would become zero</td>
</tr>
<tr>
<td>Expressed as</td>
<td>Absolute Value</td>
<td>Percent point</td>
</tr>
<tr>
<td>It represents</td>
<td>Project surplus</td>
<td>Point of no profit no loss in the Project</td>
</tr>
<tr>
<td>Help in decision making</td>
<td>Easy to interpret</td>
<td>Difficult to interpret</td>
</tr>
<tr>
<td>Rate for investment of</td>
<td>Cost of Capital rate</td>
<td>Internal Rate of Return</td>
</tr>
<tr>
<td>intermediate cash flows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variation in cash outflow</td>
<td>Will have no effect</td>
<td>Will show negative of multiple IRR</td>
</tr>
<tr>
<td>timing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2.2.4 Break Even Point (BEP)

The concept of Break Even Point is more applicable to manufacturing and services projects, where distinct output as product or service can be identified. The Total Cost (TC), of production is normally expressed as sum of Fixed Cost (FC) and Variable Cost (VC) i.e

\[ TC = FC + VC \]  \hspace{1cm} (4.3)

Fixed cost is defined as the capital cost for developing the facility and all expenses before production and covered in this. Sometimes such expenses are described as Capital Expenditures (Capex).
Variable Cost: The cost incurred during production process. Hence such cost would incur once the production is started. This is also called Operational Expenses (Opex). Variable cost would increase with the increase in production. Once the production is started, the revenue would start. \textit{Break Even Point} is defined as the production level “Q” at which the Total Cost and Total Revenue of the project are equal.

If \( P \) is the sale price then Total Revenue \( R = Q \times p \)

At Break Even Point \( TC = TR \) i.e. \( FC + VC = p \times Q \)

\[
Q = \frac{FC + VC}{p} \tag{4.4}
\]

If Variable cost per unit is expressed as \( v \), then \( VC = Qv \)

\[
FC = TR - VC = Q \times p - Qv
\]

\text{OR}

\[
Q = \frac{FC}{p - v} \tag{4.5}
\]

\textbf{Examples:} The Fixed cost or Capital Expenditure of a Furniture Plant is PKR 10.00 Million. The variable cost per unit is PKR 3000 and sale price is PKR 10000. Determine the Break Event point at which, Total Revenue and Total Cost are equal.

\textit{Given}

\( FC = PKR \; 10,000,000 \)

\( \text{Variable Cost per unit } v = 3000 \)

\( \text{Sales price } p = 10,000 \)

\textit{Break Event Point Quantity } \( Q = ? \)

\textbf{Solution:}

\[
Q_{BEP} = \frac{FC}{p - v} = \frac{10,000,000}{10,000 - 7000} = 1429 \text{ Units}
\]

Hence at least 1429 units will be produced by the furniture firm to recover the Fixed cost and Variable Cost.
4.3 Project Life Cycle Costing (LCC)

For procurement of durable assets, the life cycle cost is taken into account consideration. In this method, the estimated costs of all phases of project life cycle are accounted for. This may include, the cost of R&D, model development, testing etc., execution, operation & maintenance and disposal. In many cases, it has been observed that the initial cost of durable assets are minimum, but when it comes to its operational and maintenance costs, it is very high, making the life cycle on higher side. It is an important economic analysis, which provides sound information for decision making. Some of the major benefits of the LCC are:

i. Help in assessment of future resource requirements for the project by projecting the various components of the project.
ii. Compare the costs of potential acquisition for the projects.
iii. Helps in deciding various sources of supply of goods and services.
iv. Used as source for present or past cost auditing and reporting.
v. Optimize operational and maintenance cost of the projects by better understanding of inputs during various phases.
vi. Understand the economic life of assets and their needs and requirements of changes, updating and improvements over time.
vii. Assists in improvement of system design by better understanding of trends of requirements such as human resource, utilities, machines, supplies etc.
viii. Acquisition costs (or design and development costs).

The following example of procurement of diesel generator (s) will explain the concept.

**Table 4.3: Comparison of Life Cycle Costing of various options of Generators**

<table>
<thead>
<tr>
<th></th>
<th>Generator Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Capital Cost</td>
<td>3.500</td>
<td>3.000</td>
<td>3.200</td>
</tr>
<tr>
<td>02</td>
<td>Design Life (years)</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>03</td>
<td>Operational Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>Average Fuel consumption (Lit/hr)/(Rs/hr)</td>
<td>10/750</td>
<td>12/900</td>
<td>14/1050</td>
</tr>
<tr>
<td>05</td>
<td>Annual Fuel Charges (150 days @ 8 hour/day)</td>
<td>150<em>8</em>750 =0.900</td>
<td>150<em>8</em>900 =1.080</td>
<td>150<em>8</em>1050 =1.260</td>
</tr>
<tr>
<td>06</td>
<td>Total Fuel charges for 10 years</td>
<td>9.000</td>
<td>10.800</td>
<td>12.600</td>
</tr>
<tr>
<td>07</td>
<td>Annual Cost of accessories</td>
<td>1.000</td>
<td>1.100</td>
<td>0.900</td>
</tr>
<tr>
<td>08</td>
<td>Total cost of accessories</td>
<td>10.000</td>
<td>11.000</td>
<td>9.000</td>
</tr>
<tr>
<td>09</td>
<td>Total Operational Cost (07+09)</td>
<td>19.00</td>
<td>20.800</td>
<td>21.600</td>
</tr>
<tr>
<td>10</td>
<td>Maintenance Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Annual Maintenance Charges</td>
<td>0.300</td>
<td>0.35</td>
<td>0.40</td>
</tr>
<tr>
<td>12</td>
<td>Total Maint Cost for 10 Yrs</td>
<td>3.00</td>
<td>3.500</td>
<td>4.00</td>
</tr>
<tr>
<td>13</td>
<td>Major overhaul cost after 2 years</td>
<td>0.500</td>
<td>0.400</td>
<td>0.450</td>
</tr>
<tr>
<td>14</td>
<td>Total overhaul cost ( 4 times)</td>
<td>2.000</td>
<td>1.600</td>
<td>1.800</td>
</tr>
<tr>
<td>15</td>
<td>Total Maintenance Cost (13+15)</td>
<td>5.000</td>
<td>5.100</td>
<td>5.800</td>
</tr>
<tr>
<td>16</td>
<td>Disposal Cost</td>
<td>0.100</td>
<td>0.120</td>
<td>0.130</td>
</tr>
<tr>
<td>17</td>
<td>Salvage cost</td>
<td>0.500</td>
<td>0.300</td>
<td>0.400</td>
</tr>
</tbody>
</table>
The above analysis reveals that the sum of costs all phases of the project life cycle for Generator A is Rs. 27.100 Million, Generator G is Rs. 28.720 Million and Generator C is Rs. 303.330 Million. Hence based on the minimum Life Cycle Cost (LCC), the Generator A is selected.

Chapter Summary

Project Life Cycle like product life cycle, identifies the specific phases in the life of a project and their required inputs and expected deliverables. In this chapter various phases of project life cycle have been explained with examples from real life. The project selection methods, both qualitative and quantitative have been discussed. None of these techniques are sufficient alone for selection of the project. Hence a combination of these methods may be used for project selection.
Q 4.1 Explain various project selection methods in an organization. What particular method is the most suitable for the following types of projects and why?
   i. Construction Projects
   ii. Software Development project
   iii. Social sector projects
   iv. Infrastructure Development project
   v. Human Resource Development project.

Q 4.2 A new plan by Millat Tractor has the following cash flows:
   Initial Investment \( y_0 \) = $10 million.
   Additional annual investment per year up to 3 years = $4 million
   The plant is expected to start production of Tractors after 2 years.
   Annual operating and maintenance cost = $2 million per year
   Revenue of will start at the start of 4th year @ $5 million per year
   Life of the plant is 15 years.

   Determine:
   1. Project Cash flow table for the life of the project
   2. Net Present Value of the project having an annual discount rate of 12%

Q 4.3 A new highway has planned to join Gujranwala and Lahore, at a total construction cost of PKR 2 billion, which will have a life of 20-year. The existing railway would become obsolete with the construction of the railway and about 2000 employee will be redundant as a result. The Government of Punjab will pay an annual salary to these employees PKR 600,000 per year for each employee. The annual maintenance cost of the highway will be PKR 100 Million. The assessed salvage value of the railroad is about PKR 3 billion. An additional revenue of PKR per truck mile will be generated and the total of 400 Million miles of use of the highway is expected during the design life of the highway. The annual tax revenue from highway is expected to increase by Rs. 120 Million per year.

   The initial investment has to be borrowed from Asian Development Bank @ 7% per annum. Determine

   i. Net Present Value (NPV) of the project
   ii. Benefit Cost Ratio (BCR) at the discounted cash flows basis

   .
CHAPTER – 5

DEPRECIATION OF DURABLE ASSETS

5.1 Rationale for depreciation of durable assets
Durable assets like machinery & equipment, tools & plants and furniture & fixtures require intensive capital investment. Such investments are inevitable for operation and service, improvement and enhancement, developing new products and services etc. The capital cost of such durable assets is gradually accounted for during the service life of the asset. Depreciation is a systematic process of retiring and adjusting, the capital cost of the durable assets progressively during the service life of the asset.

Depreciation is based on the fundamental Matching Principles of Accounting, which requires allocating the cost or part thereof of an asset to the period of account when the benefits are received from use of that particular asset. Hence part of the Capital cost of such asset is accounted towards expenses in that particular period, where such benefits from using of the assets have been received.

The value of the assets diminishes with time due to its use and wear & tear and if the organization desires to replace it after its service life, they have to invest for the procurement of the same or enhanced version of the asset. It is not the valuation of the asset as the market price of the asset may be different rather that it is the book value. After completion of the service life, the asset has some salvage value. The book value of the asset at any stage at the end of a year will be simply the

\[ \text{Book Value} = \text{Capital cost} - \text{Depreciation} + \text{Salvage value}. \]

Assets also become obsolete with time as new versions and models of machinery and technologies come into play, hence even if a machine is not worn-out, it may become obsolete due to technological changes or some regulatory changes. In such cases, the cost of assets is also gradually adjusted through depreciation process.

5.1.1 Factors affecting depreciation of durable assets
Depreciation depends on many factors. Some of the major factors are discussed as follows:

- **Capital Cost of the asset:** Actual or capital cost or historical cost means the cost of procurement or acquisition of the asset and includes all incidental expenses which are necessary to bring the asset to its present condition and location.

- **Useful Life of asset:** The estimated useful life of an assets is assessed from historical data, expected changes in the technology and capital expenditure on acquiring the assets. The Computer and IT equipment has the shortest useful life due to astounding changes and advancements in the ICTs. In such cases, the useful life of IT equipment is treated as 2-3 years. For example a laptop procured at Rs. 100,000 as brand new may be available at Rs. 50,000 after couple of months. The durable assets like vehicle have larger useful life like 8-10 years. The furniture and fixture may have even larger useful life of 10-12 years and so on.
- **Salvage Value or Residual Value of the asset**: Depreciation also depends on the salvage value or residual value, when the assets are retired. For heavy machinery and automobiles, the salvage value may be relatively higher as 40-50% of the actual capital cost of the asset. In Case of IT equipment, it may very insignificant and can be neglected.

- **Obsolescence**: One of the major factors for calculating depreciation is obsolescence, even the useful life is still there. In emerging technologies, this kind of problem often tends to reduce the useful life of the machines and equipment. A machine may be able to perform and produce for 15 years, but due to technological or other changes, it may become obsolete and the enterprise may prefer to replace it.

### 5.2 Accounting for Depreciation

Depreciation of an asset is always reflected as expenditure in the relevant year. The major reasons for the depreciation from the accounts point of view are discussed as follows

- For working out profit and loss statement of the firm depreciation is counted towards the business expenses and shown at the debit side of the profit and loss statement. Hence the net income is determined after depreciation. The cost of the assets is gradually recovered and the correct profit and loss situations are reported.
- For Balance Sheet purposes- The depreciation rationales the value of the assets, otherwise it will be reported at higher side than actual. True and fair value of the asset is thus reported.
- Funds availability for replacement of the assets- Capital assets are very expensive in replacement, as require huge investments. The depreciation recovers the cost of the assets to enable the organization to replace such assets after their useful life.
- Reporting accurate cost of production when the depreciation is treated as cost and overheads, the cost of production is increased and rationalized as a result.
- Rationalization of dividends- if there is no depreciation, the profit will be shown on higher side and as result; the dividend to shareholders will also be on higher side. This will reduce the capital of the firm.
- Income tax is normally paid after depreciation, which rationalizes the income tax and overpayment of the income tax is avoided.

### 5.3 Depreciation method and factor affecting the selection of depreciation methods

There are various accounting method used for depreciation of durable assets. Some of the most commonly used depreciation methods are as follows

- Straight line depreciation method
- Declining balance method
- Sum of year method
- Double digit method

The selection of a particular method of depreciation will depend on the following factors

- **Nature of Assets**: The nature of assets, its useful life and the amount required for its repair on annual basis may important considerations. An expensive asset may require more stringent depreciation. However, it may be ignored for cheaper assets. The useful life of assets will guide us for selection of the depreciation method. An asset with relatively larger useful life, may require gradual or secular depreciation and the straight line method may be suitable.

- **Tax Considerations**: Since depreciation leads to reduction in profit and subsequent income tax, therefore the selection of a particular method of depreciation will depend on the income tax, the firm plans to pay on annual basis.
- **Replacement cost of assets:** In case of high inflations in the economy, the cost of replacing an asset after its useful life may be relatively on higher side. In such case depreciation must be based on expected replacement cost rather than historical data.

- **Accounting Conventions and Policy guidelines of Federal Bureau of Revenue (FBR):** While preparing the business accounts and audited reports, some accounting conventions are followed. These conventions are some internationally acceptable and followed. Again the Federal Bureau of Revenue and tax departments also suggest some fundamental principles for developing the depreciation accounts.

- **Obsolescence:** If the assets are vulnerable to technological changes or fashion or taste changes, in such case these may become obsolete soon. In such cases, they may written off the book through expedited depreciation. For example in case of IT equipment, the useful life may be even less than 2 years and the machines may become obsolete at higher rate.

- **Management Policy Organizations:** May select particular method of depreciation as policy for all units. They may consider simplicity or any other factor while devising such policy. For durable assets having longer life of 8-10 years, firms may support straight line method. In case of high burden of IT equipment other method of diminishing balance may be used, where major part of the cost is recovered in the initial years.

### 5.3.1 Straight Line Method of Depreciation
Here fixed sum is charged every year over the life of the equipment to recover the investment. It is assumed that the asset is depreciating at uniform rate during the service life of the asset. In this method, it assumed that there is no inflation. The total depreciation at the end of useful life become sum of all depreciation minus the salvage value of the asset. The book value at the end of any year is the Capital cost less sum of depreciation in the preceding period plus the salvage value.

In straight line method, the formula for depreciation of the asset is given as follows:

\[
D = \frac{P - F}{n}
\]

\[
B_t = B_{t-1} - D_t = P - \frac{P - F}{n}
\]

Where
- \(P\): Initial price/Capital Cost of the asset.
- \(F\): Salvage Value of the asset.
- \(B_t\): Book Value at the end of year \(t\)
- \(B_{t-1}\): Book Value at the end of preceding year.

**Example 6.1:** A company has purchased an equipment whose initial cost is PKR. 1,00,000 with an estimated life of 10 years. The estimated salvage value of the equipment at the end of its lifetime is PKR. 20,000. Determine the depreciation charge and book value at the end of various years using the straight line method of depreciation.

Given
- Initial price \(P = PKR 100,000\)
- Salvage Value \(F = PKR 20,000\)
- Useful life \(n = 10\) years

**Depreciation at the end of Year \(t\) =**

\[
D = \frac{P - F}{n} = \frac{100000 - 20000}{10} = 8000
\]
The book value after year-1 = \( B_1 = P \cdot \frac{P - F}{n} = 100,000 \cdot 8000 = 92000 \)

The values are calculated for all years and presented in following Table 5.1

<table>
<thead>
<tr>
<th>End of year</th>
<th>Depreciation</th>
<th>Cumulative depreciation</th>
<th>Book value ( Bt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>8000</td>
<td>8000</td>
<td>92000</td>
</tr>
<tr>
<td>02</td>
<td>8000</td>
<td>16000</td>
<td>84000</td>
</tr>
<tr>
<td>03</td>
<td>8000</td>
<td>24000</td>
<td>76000</td>
</tr>
<tr>
<td>04</td>
<td>8000</td>
<td>32000</td>
<td>68000</td>
</tr>
<tr>
<td>05</td>
<td>8000</td>
<td>40000</td>
<td>60000</td>
</tr>
<tr>
<td>06</td>
<td>8000</td>
<td>48000</td>
<td>52000</td>
</tr>
<tr>
<td>07</td>
<td>8000</td>
<td>56000</td>
<td>44000</td>
</tr>
<tr>
<td>08</td>
<td>8000</td>
<td>64000</td>
<td>36000</td>
</tr>
<tr>
<td>09</td>
<td>8000</td>
<td>72000</td>
<td>28000</td>
</tr>
<tr>
<td>10</td>
<td>8000</td>
<td>80000</td>
<td>20000</td>
</tr>
</tbody>
</table>

Suitability of the Straight Line method of depreciation

Straight method is more suitable when the useful life of the assets is relatively larger and the wear tear of the asset is uniformly over it with less initial investment. For equipment and assets which does not require large maintenance and repairs in the useful life. It is suitable for furniture and fixtures, buildings, machinery & equipment excluding IT equipment.

5.3.2 Declining Balance Method

For very expensive and high tech equipment, the depreciation is not constant and rather its value change more rapidly in the initial years. For Example, the depreciation of computer and IT equipment is initially very high. In this method a constant percentage of the book value of previous period is charged instead of constant value. It is more realistic for short life span products and assets. Depreciation is determined as follows

\[
D = KB_{t-1} \\
B_t = B_{t-1} - D_t = B_{t-1} - KB_{t-1} = B_{t-1} (1 - K)
\]

For any period \( t \), the depreciation and book value in terms capital cost \( P \) is given as follows

\[
D_t = K(1 - K)^{t-1} \\
B_t = B(1 - K)^t P
\]

Example 5.2: In the previous example, use constant declining factor at 20% (K=0.2), determine the depreciation and book value of the asset, using Declining Balance Method

Given \( P = 100,000 \) \( K = 0.20 \)
\[ D = KB_{t-1} \]
\[ D_t = 0.20 \times 100,000 = 20,000 \]
\[ B_t = B_{t-1} - D_t = 100,000 - 20,000 = 80,000 \]
\[ D_2 = 0.20 \times 80,000 = 16000 \]
\[ B_t = B_{t-1} - D_t = 80,000 - 160000 = 64,000 \]

While using the above formulae, we can determine the year wise depreciation and book value as given in the Table 5.2.

**Table 5.2 Depreciation values, book values of asset using declining balance method**

<table>
<thead>
<tr>
<th>End of year</th>
<th>Depreciation</th>
<th>Cumulative depreciation</th>
<th>Book Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>20000</td>
<td>20000</td>
<td>80000</td>
</tr>
<tr>
<td>02</td>
<td>16000</td>
<td>36000</td>
<td>64000</td>
</tr>
<tr>
<td>03</td>
<td>12800</td>
<td>48800</td>
<td>51200</td>
</tr>
<tr>
<td>04</td>
<td>10240</td>
<td>59040</td>
<td>40960</td>
</tr>
<tr>
<td>05</td>
<td>8192</td>
<td>67232</td>
<td>32768</td>
</tr>
<tr>
<td>06</td>
<td>6553</td>
<td>73785</td>
<td>26214</td>
</tr>
<tr>
<td>07</td>
<td>5242</td>
<td>79027</td>
<td>20971</td>
</tr>
<tr>
<td>08</td>
<td>4194</td>
<td>83221</td>
<td>16777</td>
</tr>
<tr>
<td>09</td>
<td>3355</td>
<td>86576</td>
<td>13421</td>
</tr>
<tr>
<td>10</td>
<td>2684</td>
<td>89260</td>
<td>10769</td>
</tr>
</tbody>
</table>

Salient features of the Declining Balance Method and its suitability as evident from the Table 6.2, the depreciation in the initial years is higher with the declining balance method. This can be suitable for high capital assets and having less salvage value. For IT equipment and other machines which are affected very quickly by modern technologies may be depreciated with this method.

**5.3.3 Sum-of-the-Years-Digits Method of Depreciation**

This method is also for capital intensive assets with low or no salvage and less useful life. Here the book value of the asset is assumed to reduce at the decreasing rate. The depreciation at the initial year is highest and then it is gradually reduced till the end of the asset’s life. For an asset having useful life of 8 years, the sum of year’s digits is determined as

\[ n = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36 \]
\[ = n(n+1)/2 = 8(8+1)/2 = 36 \]

The depreciation and book value at the end of period \( t \) is given by

\[ D_t = \frac{n-t+1}{n(n+1)/2} (P-F) \]
\[ B_t = (P-F) \cdot \frac{n-t}{n} \cdot \frac{n-t+1}{n+1} + F \]

**Example 6.3:** Consider Example 6.1 and demonstrate the calculations of the sum-of-the-years-digits method of depreciation, using useful life of 8 years.

**Solution:**
P = Rs. 1,00,000, F = Rs. 20,000, n = 8 years
Sum = \( n(n + 1)/2 \) = \( 8 (9)/2 \) = 36

The rates for years 1–8, are respectively 8/36, 7/36, 6/36, 5/36, 4/36, 3/36, 2/36 and 1/36.

The calculations of \( D_t \), and \( B_t \) for different values of \( t \) are summarized using the following formulae

\[
D_t = \text{Rate} \times (P - F)
\]

\[
B_t = B_{t-1} - D_t
\]

**Table 5.3 Depreciation and Book Value at the end of year using sum of digit method.**

<table>
<thead>
<tr>
<th>End of year</th>
<th>Depreciation</th>
<th>Book Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>17777.777</td>
<td>100000</td>
</tr>
<tr>
<td>02</td>
<td>15555.55</td>
<td>82222.23</td>
</tr>
<tr>
<td>03</td>
<td>13333.333</td>
<td>66666.67</td>
</tr>
<tr>
<td>04</td>
<td>11111.11</td>
<td>42222.24</td>
</tr>
<tr>
<td>05</td>
<td>88888.88</td>
<td>333333.33</td>
</tr>
<tr>
<td>06</td>
<td>6666.67</td>
<td>26666.70</td>
</tr>
<tr>
<td>07</td>
<td>4444.44</td>
<td>22222.23</td>
</tr>
<tr>
<td>08</td>
<td>22222.22</td>
<td>20000.04</td>
</tr>
</tbody>
</table>

We can directly determine the depreciation and book value at year 5\(^{th} \), while using the related expressions

\[
D_5 = \frac{n - t + 1}{n(n + 1)/2} (P - F) \Rightarrow D_5 = \frac{8 - 5 + 1}{8(8 + 1)/2} (100000 - 20000) = 8888.888
\]

\[
B_5 = (P - F) \times \frac{n - t}{n} \times \frac{n - t + 1}{n + 1} + F \Rightarrow B_5 = (100000 + 20000) \times \frac{8 - 5}{8 + 1} \times \frac{8 - 5 + 1}{5 + 1} + 20000 = 33333.333
\]

The sum of digit number of year’s depreciation method is more suited for expensive assets with less useful life, like IT and fashion products. Hence maximum cost of the asset can be recovered in the initial years.

### 5.3.4 Sinking Fund Method of Depreciation

Sinking fund method of asset depreciation attempts to generate funds for the replacing of an asset, after its useful life. For this purpose, sinking funds requires high depreciation cost. The loss of asset value \( (P-F) \) is then recovered through an equal depreciation amount \( A \) on annual basis for the useful life of the asset. For calculation of \( A \), the equation for annuity is used as follows

\[
A = (P - F) \times (A / F, i, n)
\]

For each subsequent year, the value of \( A \) will be further discounted and accumulated. The general expression for depreciation \( D_t \) and book value \( B_t \) will be determined as

\[
D_t = (P - F) \times (A / F, i, n) \times (F / P, i, t - 1)
\]

\[
B_t = P - (P - F)(A / F, i, n)9F / A, i, t)
\]

This approach takes into account, the Time Value of Money and the recovered annual amount of depreciation is adjusted to the present value, through discounting rate \( i \). Hence the amount of annual depreciation cost has to increase with time till the useful life of the asset.
**Example**: An equipment has been purchased at PKR 100,000 with an expected life of 8 years and salvage value of PKR 20,000. If the annual discount rate is 12%, then determine the annual depreciation cost of the asset, using Sinking Fund method.

**Solution**:

Given that

- \( P = PKR \, 100,000 \)
- \( F = PKR \, 20,000 \)
- \( n = 8 \) years
- \( i = 12\% \) p.a

Annual amount of depreciation by using Sinking Fund method is given by

\[
A = (P - F) \times \left( \frac{A}{F}, i, n \right) = (P - F) \frac{i}{(1 + i)^n - 1} = 100,000 - 20,000(0.0813) = PKR \, 6500
\]

Hence the annual equal value to be recovered is PKR 6500

- The depreciation of year 1, \( D_1 = PKR \, 6500 \)
- Depreciation after year 2, \( D_2 = 6504 + 6504(0.12) = 7284 \)
- Depreciation after year 3, \( D_3 = 6504 + (6504 + 7284)(0.12) = 8158 \)

Depreciation at the end of year 8, \( D_8 = PKR \, 14328 \). The values of \( D_t \) and \( B_t \) are given in the following Table.

**Table 5.4 Depreciation cost and book values of the given example by sinking fund method**

<table>
<thead>
<tr>
<th>End of year ( t )</th>
<th>Fixed Depreciation cost (PKR)</th>
<th>Net Depreciation (Dt) (PKR)</th>
<th>Cumulative Depreciation ( \sum D_t )</th>
<th>Book Value ( (B_t) = B_{t-1} - D_t ) (PKR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6504</td>
<td>0</td>
<td>0</td>
<td>100000</td>
</tr>
<tr>
<td>1</td>
<td>6504</td>
<td>6504</td>
<td>6504</td>
<td>93496</td>
</tr>
<tr>
<td>2</td>
<td>6504</td>
<td>7284</td>
<td>13788</td>
<td>86212</td>
</tr>
<tr>
<td>3</td>
<td>6504</td>
<td>8158</td>
<td>21946</td>
<td>78054</td>
</tr>
<tr>
<td>4</td>
<td>6504</td>
<td>9137</td>
<td>21946</td>
<td>78054</td>
</tr>
<tr>
<td>5</td>
<td>6504</td>
<td>10234</td>
<td>27529</td>
<td>72471</td>
</tr>
<tr>
<td>6</td>
<td>6504</td>
<td>11462</td>
<td>41317</td>
<td>58683</td>
</tr>
<tr>
<td>7</td>
<td>6504</td>
<td>12837</td>
<td>65616</td>
<td>34384</td>
</tr>
<tr>
<td>8</td>
<td>6504</td>
<td>14378</td>
<td>79994</td>
<td>20006</td>
</tr>
</tbody>
</table>

**5.4 Depreciation based on Service output**

Though yearly depreciation is very common in accounting, yet in many cases, depreciation would also depend on the service use of the assets. It has been observed that most of the new machines and equipment are utilized heavily in the initial years and later its service output is progressively reduced. Hence in such case, the depreciation can be matched with the level of output or use. Apparently, this seems to be more realistic, but the other methods are relatively easier for application and accounting and don’t require exhaustive documentation. In this method the total net value of the asset is recovered on yearly basis in ratio of the outcome in that particular year to the total expected outcome.

For example, if the total expected outputs of a machine during service life is \( X \) and the output in particular year is \( x \), then the depreciation for that year will be simply

\[
D_t = (P - F) \frac{x}{X}
\]
**Example:** A brick manufacturing machine will cost about one PKR Million and in its service life of ten years and salvage value is 0.100 Million. It is expected to produce 2.5 Million bricks. If the total brick in 2\textsuperscript{nd} year is 0.500 Million, what will be the depreciation cost of the machine, at that year?

**Solution:**
Given \( P = \text{PKR 1.000 Million} \)
\( F = \text{PKR 0.100 Million} \)
Net Value of the asset = \( P - F = 0.900 \) Million
The total output of the machine during service life \( X = 2.500 \) Million
No. of bricks produced in year 2 = 0.500 Million
Required Depreciation of year 2 (\( D_2 \)) = ?
\[
D_2 = \frac{(P-F) \times X}{X} = 0.90 \times \frac{0.50}{2.5} = \text{PKR 0.180 Million}
\]

**Chapter Summary**
Depreciation is an important consideration in economics and accounting, where the value of the asset is progressively reduced during its service life. Various techniques are used for accounting of depreciation, which have been explained in details with examples. These methods must be carefully used to assess the depreciation of different types of assets, depending on the historical data and application by the firm.
Q 5.1 Explain the rationale of depreciation of durable assets for a business concern.

Q 5.2 Describe various depreciation methods with their relative advantages and disadvantages.

Q 5.3 What method of depreciation will you select for the following assets and why?

i. Building facility
ii. Machinery and Equipment
iii. Furniture items
iv. Computer and electronic equipment

Q 5.4 A material testing Lab has just purchased a testing machine for Rs. 20,00,000. The plant engineer estimates that the machine has a useful life of 10 years and a salvage value of Rs. 100,000 at the end of its useful life. Compute the depreciation schedule for the machine by each of the following depreciation methods:

i. Straight line method of depreciation
ii. Sum-of-the-years digits method of depreciation
iii. Double declining balance method of depreciation

Q 5.5 A company has purchased a device for Rs. 10,00,000. The device can be used for 10 years. The salvage value at the end of the life of the device is 5 % of the purchase value. Find the following using the double declining balance method of depreciation:

i. Depreciation at the end of the 5th year
ii. Depreciation at the end of the 7th year
iii. Book value at the end of the 8th year
CAPITAL FINANCING AND BUDGETING IN PUBLIC SECTOR PROJECTS

Capital Budgeting and Project Portfolio Management
The selection of appropriate projects is challenge both in private and public sector. In private sector, the projects are mostly aimed at value to the firm’s business. Hence in most of the cases, the earning of profit in terms of new assets, increase in the stakeholder’s share etc. are the major objectives. In public sector, the projects are mostly conceived and executed for socioeconomic development of the society and general public, hence the quantification of both costs and benefits are always a major challenge.

Capital budgeting is the process of allocating funds to the perspective projects with an aim to increase the firm profitability within an acceptable level of risk. Generally the projects, having high risks are toed with high returns and vice versa, but the firm cannot rely either on high risk projects or low return projects. Hence a mix of projects is developed which can ultimately to more returns at reasonable risk. This is called project portfolio. Project Portfolio Management (PPM) is a process designed to help an organization identify new project opportunities, acquire information about these opportunities, and rank and prioritize them against a specified set of criteria such as strategic fit, cost, risk, expected return etc.

6.1 Capital Budgeting Process
The Capital budgeting process is comprised of the following steps:

i. Identification of Potential Investment Opportunities: Exploring the investment opportunities for a business can be one of the major challenges. These investment opportunities can come from various external environmental factors. These opportunities can be created by economic forces, technological trends, social trends and political & regulatory trends. To exploit such investment opportunities, a careful assessment of the firm’s corporate strategy and internal & external environment is required. SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is normally undertaken for this purpose. The in house committee of experts reviews all such internal and external factors before deciding for an investment. Suggestions from various stakeholders including senior management, employees and shareholders are also obtained. The various techniques adopted for generating the ideas for investment may include brainstorming, focus group discussion and research based techniques. Normally a project approval committee or capital budgeting is constituted at the corporate level.
ii. **Documenting and reviewing new investment proposal:** Many Project proposal are received from different departments in an organization. Such proposals are initially reviewed by the department committee, to check that it is in line with the corporate policy, goals and objectives. These proposals are categorized under different heads such as new product development, expansion of existing project, Replacement of equipment etc. This helps the committee members to take quick decision, budgeting and project monitoring & controlling at later stage.

iii. **Decision Making:** The decision is normally taken at the senior and executive management levels. Once the project is approved, commitment for capital budgeting is assured. Both in public and private sectors, the financial limits for the capital budgeting are given to various committees and forums. For larger projects, the proposals are submitted for approval at the Board of Directors.

iv. **Preparation of Capital Budget and Appropriations:** Once the overall project portfolio is decided, the next step in the capital budgeting process is to classify the investment outlays into the smaller value and the higher value. The smaller value budgets are allocated by lower level management and for higher level; the budgets are appropriated after approval at the senior level.

v. **Implementation:** During implementation of the projects, many problems and challenges are faced by the project teams. Detailed feasibility analysis and formulation of the project is done beforehand.

vi. **Performance Review:** Regular monitoring and evaluation of the projects after implementation, is required to ensure that the targets planned are achieved in true spirit. A good monitoring and review system of the project will ensure timely completion of the projects.

### 6.2 Assessment of Public Sector projects

Public sector Projects are more focused on the social welfare and uplift of common man. As general principle, the benefits of the public sector projects must be either equal or more than costs of the project. The benefits costs ratio of the project, when quantified must be equal or more than 1. However the real challenge is the quantification of the benefits and costs of such projects.

**The Benefit Cost ratio for public sector projects = Equivalent Benefits/Equivalent Costs**

Some of the major attributes of the public sector projects as compared to the private sector projects are given as follows

i. Public sector projects are relatively complex and involve a number of stakeholders. Almost everyone having direct or indirect relation with the project can influence the projects. Hence the biggest challenge is the stakeholder management in such projects.

ii. Public sector projects are difficult to be justified on the basis of cash flows only as the cash flows from the project will be insufficient to justify the investment. There are a number of indirect benefits which can’t be easily quantified. For example for a highway, a large portion of the direct benefits will be in the form of reduced travel time or increased travel volumes.

iii. Public sector projects are more related to the social development and hence, their impacts on development and employment may be major goals of the project rather than direct benefits.

iv. Decision makers for the public sector projects are elected representatives at various levels, who respond directly to public concerns such as externalities Equity, aesthetics, etc., which are important public concerns.
There are a number of mutually competing public sector projects in various sectors like transportation, housing, education, defense, and other public concerns, hence the competition is much broader than in a private company.

The compassion of public and private sector projects is given in following Table

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding Source</td>
<td>Debts &amp; Equity Markets</td>
<td>Taxes, Govt. loan, Tax fee bonds</td>
</tr>
<tr>
<td>Multi-purpose</td>
<td>Few of the projects</td>
<td>Most of the projects</td>
</tr>
<tr>
<td>Project Life</td>
<td>Shorter</td>
<td>Longer</td>
</tr>
<tr>
<td>Benefits</td>
<td>Financial</td>
<td>Mix of Financial, Social, Economic, Aesthetic</td>
</tr>
<tr>
<td>Conflicts</td>
<td>Low to Moderate</td>
<td>Common and High</td>
</tr>
<tr>
<td>Politics</td>
<td>Low to Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Measure of Efficiency</td>
<td>NPV, IRR, ROI, BCR</td>
<td>Very difficult and multiple</td>
</tr>
</tbody>
</table>

### 6.3 Case Study of Water Resources Projects

Some of the major benefits of the water resource dam project are given as follows

i. **Assists in flood control:** The surface runoff after rainfall ultimately goes to canals and rivers, which floods in the downstream areas. Construction of dams, restrict the flooding in such areas.

ii. **Irrigation of the cultivable area:** The water stored in the dams, is used for irrigation of the command area, which leads to agricultural growth. The irrigated land of Pakistan is about

iii. **Hydroelectric generation:** The stored water in the dam, is used for generation of electricity. The details of hydroelectric dams of Pakistan are given in the Table

iv. **Recreational facilities:** Dams are recreational places, where people come for fishing, family outing, yachting and excursions.

v. **Source of drinking water:** The stored water is used for drinking purpose. For example the Simly Dam is providing water supply to Islamabad.

### Disadvantages of the Dam projects

i. **Loss of farmland:** The construction of large dams, occupies big tracts of farmlands and creating shortage of the cultivable lands.

ii. **Loss of wild life (Flora and Fauna):** With the construction of reservoirs, the natural habitat, animals and plants (Flora and Fauna) are also affected. The endangered species are further threatened of extinction.
iii. *Loss of fertile sediments on lower farmlands*: The sediments and nutrients on the downstream areas of the dams are eroded under the flow of water.

iv. *Environmental and Social impacts of the dams*: The large dams create multiple social issues like displacement and resettlements of the affected, impact on the livelihood of people of the adjoining areas. Other environmental issues may include visual, climatic and biotic impacts.

One of the major challenges in assessing the viability of the projects in public sector is quantification of benefits and costs. The social benefits and cost analysis is the major obstruction in this context. As a rule of thumb, the benefits must exceed the costs, but the quantification of non-financial benefits can be measure with certainty.

### 6.4 Project Preparation in Public Sector

The various documents covering the project life cycle of a public sector projects have been discussed in quiet details. In this section, the major components of public sector projects appraisals are discussed. This part of the book has been derived from the Project Management Manual of the Planning Commission of Pakistan.

#### 6.4.1 Linking Projects resources

The Planning Commission normally communicates the expected available funds under each sector well before preparation of the PSDP, but in most of the cases, the Ministries and Divisions prepare their demands in excess of the available resources, which delay the projects. The sectoral properties must be clearly defined and adhered to as frequent changes of priorities can distort both the ongoing and new projects. In political Governments, the changes in the priorities are quite often in case of change of the Governments. The sponsoring departments have to carefully check the availability of funds at the approval of the new projects. The projects are approved on the basis of available rough cost estimates and a cushion of 15% is given for variation during detailed analysis and design & execution. The National Economic Council (NEC), in their meeting dated 4th July, 1988, has made it mandatory to complete the detailed design of the projects within 6 months of its approval, but this is very rarely practiced. Furthermore for projects more than Rs. 500 Million, it has been must be supported with feasibility study/PC-1

#### 6.4.2 Location, Area and Population Coverage

The place and administrative district is given here with the location map. The selection of the location of the project is very important decision. In most of the cases the location of the project is selected on political grounds without real need and coverage of the maximum population. Hence the public money is underutilized as the benefits of the projects are spread over larger population. An important factor in the location of the new projects, is availability of land and other resources & utilities. A number of public sector projects are suffering from inappropriate location and non-availability of the land.

#### 6.4.3 Project Description

Project description or project statement, provides a brief summary of the project rationale, technical and social justification, with reference to the Governments priorities, vision and development plan.

#### 6.4.4 Project Objectives and Targets

The project objectives and targets have to be aligned with the vision and development plans of the Government, including 5 year plans, Medium Terms Development
Framework and Vision 2030 of Pakistan. The information from various departments and published data can help to define and refine the objectives and targets.

6.4.5 Project Scope

As already described in the earlier chapter, that the project scope defines the boundaries of the project and explains, the deliverables covered by the project. Information about the following aspects of the project scope may be provided:

i. Demand for output, with its basis the demand and supply status of the deliverables and outputs of the project. For example, if a new college has to be established the demand and supply of students completing 10th grade education, will be provided.

ii. Existing position regarding capacity and actual supply of output. The demand and supply gap has to be identified through primary or secondary data.

iii. The details about the part of gap to be filled by the proposed project have to be provided in the project proposal.

The project scope is its spirit and must be strictly followed both in terms of physical and financial terms. No change beyond 15% of the approved scope must be allowed unless the PC-1 of the project is revised with detailed justification and approved by the same forum, which accorded approval to the original project.

6.4.2 Project Cost Estimates

Unrealistic cost estimates are one of the major causes of the project delays in public and private sectors both. The sector specific guidelines for the project estimates must be followed. Some of the generic guidelines are given as follows:

i. Foreign Versus Local Cost
   The Local and foreign cost components of the projects have to be quoted separately. The cost of imported items, available in the local market must be quoted in local currency.

ii. The breakdown of the total cost has to be given in total land and development cost, machinery & equipment, civil works, supplies, consultancies, project staff, interest cost during project execution.

iii. For preparation of cost estimates, the unit cost of the building or other deliverables are given separately according to the given format.

iv. In case of revision of the approved cost, the reason for increase in the original cost have to be recorded.

v. The revised cost has to be prepared with due care and diligence, as further revision of the project may not be possible.

vi. The increase of 15% cost shall not apply to the foreign aided projects and hence such increase shall not be allowed.

vii. The price escalation shall be provided at 6.5% for the second year, 13% for the third year and 20% for the fourth year. No escalation is provided in project of one year or lesser durations.

viii. The cost estimates must be based on the current market prices, with relevant details.

6.4.3 Financial Plans and phasing

The project proposal (PC-1) must provide the financial plans and phasing of the project, during the project life cycle. The source and amount of funding must be clearly indicated in the relevant columns, such as Government Sources (Grant, Loan or Equity), Sponsoring Agency’s Own Fund, Private Investment, Local Body Services, if any Non-Government Borrowing, if any) and other Sources (e.g., recoveries).

6.4.4 Physical Scheduling
The physical scheduling of the project includes the various components of the projects and its expected completion time. For example, the design, access roads, Structure, water supply etc. This part is very important for later monitoring of the projects.

6.4.5 **Period of Project Implementation**

The project implementation period has to be calculated carefully. For this purpose some important considerations are project allocation made in the 5 year plan, expected allocation in the subsequent years, time required for the completion of the project, availability of human and non-human resources. For developing a realistic project schedule, detailed time analysis incorporating all the project activities, is carried out. For this purpose the modern project scheduling techniques including Critical Path Method (CPM), Project Evaluation and Review Technique (PERT) and Project Bar charts can be used.

6.4.6 **Appointment of Consultants for project preparation**

For appointment of consultants for the preparation of PC-1/design, preference should be given to the local consultants. For appointment of consultants, the PEC approved bidding documents and PPRA approved methods must be used. The Terms of Reference (ToR) for the project must be carefully developed to avoid any problem at later stage.

6.4.7 **Economic benefits**

The economic benefits of the project can be assessed by linking the project outcomes backward and forward, in terms of employment generation, cost reduction with more mechanization. In social sector projects, the social benefits can be worked out, which may include better income distribution, national integration, national defense, better life of rural population etc.

6.4.8 **Inter-Agency Coordination**

Close coordination with other project implementation agencies and national building department is required to get the appropriate data and avoid duplication. The availability of necessary utilities such as water supply, gases, education and housing facilities can also be ensured through such coordination.

6.5 **Identification of Project Costs and Benefits in Public Sector projects**

The costs and benefits of the public sector projects are difficult to quantify. One of the basic approach is to compare the two scenarios of “without Project” and “With project”, to assess the expected benefits and costs. Some of the important considerations for identifying the costs and benefits of the public sector projects are given as follows

i. **Direct Transfer Payments** These payments are directly made through transfer from one account to the other. The payments of taxes, subsidies, credit transactions, and interests are not treated as the costs of the projects as it merely transfer from one account to the other account.

ii. **Depreciation** is not included in the project cost to avoid double counting. The depreciation is basically return on capital investment.

iii. **Sunk Cost** The cost of project incurred in the past is not included in the cost analysis. Many times projects become unfeasible due to changes in market conditions, environmental conditions or other ground realities. In such cases it is not advisable to continue with the project. The project may be either terminated or closed at the premature conclusion.

iv. **Contingencies** The project risks are mainly of two types “Known Unknowns” which very common to all projects, such changes in design, specifications, inflation etc. and “Unknown Unknowns” which are not very easy to identify. Such conditions are sometimes called “Uncertainty”. Project Contingency Allowance is made in the projects to meet such risks and uncertainties.
v. **Inflation Changes**. In inflation rates during the project life cycle cannot be predicted easily. Again Governments also don’t provide accurate data of inflation.

vi. **Changes in the Relative prices of the projects** The project costs are based on the available market prices. The changes in the relative prices have direct impact on the project objectives. For projects with longer completion period, the project changes in relative prices have more impacts as compared to smaller projects.

vii. **Working Capital** The short term investments for an year or lesser period, during the project life cycle, the working capital is treated as project cost.

viii. **Replacement Costs** In large time span projects like sugar refinery, cement factory etc., some of the project components may be replaced during the current of the projects, like boilers etc.; hence their replacement costs have to be recovered during the project and shall be included in the project costs.

ix. **Residual/salvage Value** The salvage value of the assets used in the project during its currency is treated as benefits to the project, when the project ends. This may have very small impact on the project total cost.

**Case Study:**

**Table 6.2 Financial Analysis of the Industrial Project Shoe Manufacturing Unit**

(In Rs. Million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Capital Cost</th>
<th>O&amp;M Cost</th>
<th>Total Cost</th>
<th>Benefits</th>
<th>Net Benefits</th>
<th>NPV at 20%</th>
<th>NPV at 25%</th>
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<td>0</td>
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<td>-14.12</td>
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</tr>
</tbody>
</table>

**Present Worth of Costs and Benefits**

20% discount Rate
Present Worth of Cost (PWC) at 20% = 607.73
Present Worth of Benefits at 20% = 687.102
Benefits Cost Ratio at 20% = 687.102/607.73 = 1.13 > 1.0, hence the project is feasible at 20%

At 25% discount Rate
Present Worth of Cost (PWC) at 25% = 511.89
Present Worth of Benefits at 25% = 497.77
Benefits Cost Ratio at 25% = 511.89/497.77 = 0.97 < 1.0, hence the project is not feasible at 25%

**Net Present Value (NPV) of the Project**
NPV at 20% discount rate = 79.372  
NPV at 25% discount rate = -14.12

Hence the Internal Rate of Return at which the NPV is zero, falls between 20% and 25%. We can use interpolation technique to determine the discount rate at which the NPV=0

\[
IRR = 20 + \frac{79.32}{79.372 + 14.12} = 24.24\%
\]

6.6 Guidelines for the discount rate of public sector projects
The selection of appropriate discount rate for the public sector projects is one of the major challenges. Some of the possible discount rate for such projects can be

i. Actual interest rate for funds borrowed for a specific project from the funding agency. In the foreign aided projects, the funds are borrowed from the International donors at soft terms but the domestic borrowing is made by the Government at very high rates and hence its justification must be made, before investment.

ii. Opportunity cost of investment to government there are large number of the new candidate projects for the public sector funding, but due to shortage of available resources, all the projects can’t be approved and started. Hence a good number of projects are dropped. The opportunity cost is basically the benefits of the candidate project which was dropped.

iii. Possibly return required for risk-free investments. This is the guaranteed minimum return on investment provided by the financial institutes.

iv. Opportunity cost of capital to tax-payers. This can be decided by the Government.

6.7 Guidelines for quantification of Costs and Benefits of the public Sector projects
- Quantification of the public sector projects benefits and costs is always a challenge. Yet attempt must be made to quantify these as much as possible.
- Involve expert from various fields for better understanding of the nature and value of the expected benefits and costs of the projects.
- Fair and reliable data must be presented before the political leadership to select the projects on merit.
- Generally a range of benefits and costs are specified by the Economics division or planning commission for quantification of costs and benefits.

6.8 Example of Public Project of Highways-Expressway
A typical expressway or highway projects normally can be developed in the following manner

- Justification of the project:
  - Current demand of the traffic and transportation and supply in terms of available services. The items like traffic flows, congestions, trips time, reliability of the traffic and existing services, costs, equipment and revenues etc.
  - The analysis and comparison of with project and without project scenarios, Changes expected with the new projects, improvement in the highways networks etc.
  - Some of the standard techniques to analyze the benefits may include
    - Savings in travel times of the existing users. The different users’ groups have different level of benefits and these are mostly in high proportion to their income.
    - Diverted and attracted new users of the road due to enhanced service level.
    - The Rule of Half, is normally applied for the new traffic, which means that half of the traffic which was using other routes, would be attracted to the new highway.

- Analysis of the project benefits
  - The direct and indirect benefits of the projects are considered and analyzed.
  - The multiplier effect of the new highway in terms of socio economic development of the region, including creation of new jobs and business opportunities, income increase of the people etc.
- Improvement of safety environment and reduction in accidents rates.
  - Project Risk Assessment
    - Both positive and negative risks are considered and analyzed.
    - The negative externalities may include disruption to the traffic flow
    - Environmental hazards such as short and long terms effects on land use, pollution, water contamination, deforestation and noise etc.
    - Environmental improvements can be treated as positive risk or opportunity as after the completion of the projects, in terms of improved air quality, saving in the CO\textsubscript{2} emissions and reduction in Green House Gases and subsequent Global Warming, reduced travel time etc.

6.9 Public Private Partnership Projects
Public sector projects require huge investments and for Governments in both the developing and developed countries, it is not always possible to finance all the developmental projects. One of the options is to explore funding from the private sector through public private partnership (PPP) mode. In order to encourage investments in the public sector projects, in the early 1990s, Pakistan established a policy and regulatory framework for Public Private Partnership (PPP) in the telecom and power sectors. Public Private Partnerships (PPP) involve the financing, development, operation and maintenance of infrastructure by the private-sector which would otherwise have been provided by the public sector. The apparent benefits of the PPP are given as follows:

- Development of the required infrastructures for the social development on time and within budget.
- Encouraging the private sector investment in the innovative design, modern technology and financing structures, thereby creating more investment in Capital assets in the country
- Sharing Risk sharing by the Government with private partners, in mega projects, where high level of capital investment is involved.
- Improving and ensuring good quality public services and their wider availability to the general public.
- Real financial benefits, and a better utilization and allocation of public funds for the welfare of the general public.
- Through economic growth more opportunities for employment and income generations are created.
- By engaging the private sector in the mega projects, the governance, operation and reliability of the services and projects are improved.

Some of the major sectors where PPP is more recommended by the Government include
- Transport and logistics
- Mass Urban Public Transport
- Local Government
- Energy Projects
- Tourism projects
- Industrial projects
- Irrigation projects
- Power generation
- Social infrastructure

The various phases involved in the PPP projects are given as follows
i. Project Needs Options Analysis.
ii. Initial Viability Analysis.
iii. Technical, legal, environmental and financial due diligence.
iv. Risk, Affordability and Value for Money test.
v. Market Sounding.
vi. Tendering/Bidding.
vii. Approval of Viability Gap funding (if required)
viii. Signing of Agreement and Financial Close between the Institution, and the winning private partner.

ix. Project Monitoring by Institution (Construction and Operational Periods).

One of the major challenges in PPP projects is to safeguard the interests of the consumers and general public, as the monitoring of prices, service levels, employees’ rights. The Government has to ensure the rights of the consumers, through the following ways:

- Safeguard to users in local communities, particularly those falling in the vulnerable, groups, particularly the Oil and Gas companies.
- Ensuring public health, safety, social safeguards and protection of environment.
- Providing adequate protection of users’ rights to privacy;
- Providing information to the public about the obligations of the private sector and the government relating to PPP projects;
- Setting affordable user charges and tariff structures.

Some of the major projects under PPP, are listed as follows:

- Faisalabad Solid Waste Management Project;
- Lahore Southern Bypass from Motorway to Ferozepur Road of LDA;
- PIMS projects Institute of Dentistry and Centre for Liver Diseases;
- Flyover/Railway Overhead Bridge at Habib Abad of the National Highway (N-5);
- Hostel facility at COMSATS, Islamabad;
- Operating cargo and oil trains on Pakistan Railways track;
- CAA projects Commercial Hub and Fuel Farm / Fuel Hydrant System;
- Faisalabad Slaughter House Project of CDGF;
- Islamabad Solid Waste Management Project;
- IT Park Project of National University of Science and Technology; and
- Light Commercial Vehicles Project of Sindh Engineering.

6.10 Result Based Monitoring in Public Sector Projects

The generic monitoring cycle in public sector of Pakistan is shown below.

Project Evaluation can be at different levels of the projects during, its currency and after its completion. Some of the important levels of project evaluation are given as Fig 6.1

i. On-going/Mid-term Evaluation: This type of project evaluation is normally conducted during the execution of the project. The main purpose of an on-going/mid-project evaluation is to assist the project management to make appropriate adjustments with changes in the project environment, funding, scope etc.

ii. Post-Completion Evaluation: Once the project is completed, this type of evaluation becomes necessary to assess, whether the project has been completed as per the approved scope, time and cost. The purpose of an ex-post evaluation is to discover the actual, as opposed to the projected, results of implementing a project.

iii. Feedback for the Future: The most important part of the evaluation is the feedback, which is a systematic and integrated approach.
Fig 6.1  Project monitoring process in public sector of Pakistan

The RBM, is based on four important pillars as shown in the following Figure 6.2

- **Impact**
  The benefits of the projects at the relatively long term. The higher-order objective to which a development intervention is intended to contribute. For example, the benefits of impact of developing new highways for the community can be in the form of better life of people, employment, better health of the people due to reduced pollution and reduced accidents as well saving of travel times.

- **Outcome**
  The benefits likely to be achieved short-term and medium-term effects of an intervention's outputs. For example the immediate outcome of the highway projects can reduce travel time, lesser accident and fatigue of the commuters.

- **Output**
  The tangible and intangible deliverables of the project in the form of products, capital goods and services which result from a development intervention. These may also include resulting from the intervention which is relevant to the achievement of outcomes.

- **Input/Activity**
  Actions taken or work performed through which inputs such as funds, technical assistance and other types of resources are mobilized to produce specific outputs.
The RBM is comprised of the following ten steps

1. **Conducting a readiness assessment**
   An analytical framework to assess a department’s ability to monitor and evaluate its development goals. This assessment normally checks the projects in the perspective of Governments/political, institutional, personal and economic aspects. The barriers like Lack of fiscal resources, lack of political consensus, lack of project champions, lack of previous expertise of the project team, poor strategy and knowledge.

2. **Choose and agree on performance outcomes to monitor and evaluate**
   These are very important for both the execution and monitoring teams of the projects. The outcomes must be translated from the concerns of the project major stakeholders to the expected short and medium terms outcomes of the project. Some of the concerns and outcomes of the proposed projects are given in the following diagram/Table

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Project</th>
<th>Concern of the stakeholders</th>
<th>Outcome of the projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Farm to Market Roads Projects</td>
<td>Rural Crops are spoiling before getting to the market, hence connecting farms to the market can enhance the profits of the produces.</td>
<td>Improve Farmers Access to Markets</td>
</tr>
<tr>
<td>02</td>
<td>Improvement of the students enrolment in Primary Education</td>
<td>Children are dropping out of School</td>
<td>Creating incentives for families to keep their children intact in the education</td>
</tr>
<tr>
<td>03</td>
<td>Enhancing the Security of the City</td>
<td>No Longer safe to go out after dark</td>
<td>Improve crime prevention</td>
</tr>
</tbody>
</table>

The outcomes have to be well defined. For example, the outcomes for the pre-education projects have to be clearly defined with the indictors, baseline and targets.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Indicators</th>
<th>Baselines</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nation’s children have Improved access to pre-school programs</td>
<td>At the end of the project 80% of the out of school projects will join the schools after 5 years.</td>
<td>Presently almost 40% of the enrolled students leave school after grade 5</td>
<td>After 2 years, the 40% of the out of school will be enrolled. After 4 years, the cumulative enrolment will be 60% After 4 years, the cumulative enrolment will be 80%</td>
</tr>
<tr>
<td>Primary school learning outcomes for children are improved.</td>
<td>At the end of the project 75% of the enrolled students will have the four major learning outcomes.</td>
<td>The present baseline is 40% students having the four skills</td>
<td>Year-2 50% level Year-3 60% level Year-4 70% level. Year-5 75% level</td>
</tr>
</tbody>
</table>

1. Selecting and Developing key indicators to monitor outcomes.
Without tangible performance indicators, it is usually difficult to assess the outcomes of the projects. The outcomes are translated into numerical indicators, so that it can be easily monitored. For the selection of the indicators, the term CREAM must be remembered
C Clear and precise indicators must be identified.
R Relevant and appropriate
E Economic and available at affordable cost
A Adequate to provide sufficient and conclusive performance data
M Monitorable with reasonable monitoring tools available with the monitoring department.

Some of the indicators for the Farm to Market Road projects can be
Indicators - Outcome or not?
   i. % change in annual revenue of farmers, after completion of the project
   ii. % change or reduction in amount of spoiled crops, which couldn't transport previously
   iii. % change in crop pricing due to competition, with the increased supply of crops to the market.
   iv. % change in agricultural employment, due to better revenue of the famers
   v. % change in rural to urban migration, after completion of the better communication facilities.
   vi. % change in types of crops being cultivated, after easy access to the market and better response to the market demands.

For some projects financed by the international donors, they have well defined indicators such as
- Millennium Development Goals (MDGs)
- UNDP – Sustainable Human Development
- IMF – Macroeconomic indicators

2. Planning for improvements – setting realistic targets this would require setting targets for improvement. Some of the targets for the developmental projects can be as follows

   Goal Socioeconomic Development Well-Being project
   Outcome target to reduce the poverty level to 30% by year 2020, to the proportion of people presently living in extreme poverty in year 2017.

   Goal Social Development project
   Primary Education Sector Outcome target to improve the Primary Education enrollment rates by 30% in Pakistan by 2025 against the baseline of year 2017.

   For health sector development projects Outcome target to reduce incidence of hepatitis rates in the infants upto 20% by 2020 against the baseline in 2017.

   Goal Environmental Sustainability and Environmental Protection Outcome target implement a national strategy for sustainable management in all developmental projects by 2025

While developing the baseline for improvements, the following major points may be kept in mind
- Only one target is desirable for each indicator, so that it can specifically focused
- If the indicator is new and not previously used, then it must be used carefully by setting a firm targets, instead of exact value.
- Targets are sent for certain period. Most targets are set and monitored yearly, but some could be set quarterly; others set for longer periods.
- Improvements are not generally visible in short time and the results can take some time, hence these must be realistic and achievable.
An example of developing target for preschool education is given in the Table below

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Indicators</th>
<th>Baselines</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nation’s children have improved access to pre-school programs</td>
<td>% of eligible urban children enrolled in pre-school education</td>
<td>75% urban children ages 3-5 in 2025</td>
<td>85% urban children ages 3-5 by 2030</td>
</tr>
<tr>
<td></td>
<td>% of eligible rural children enrolled in pre-school education</td>
<td>40% rural children ages 3-5 in 2020</td>
<td>60% rural children ages 3-5 by 2025</td>
</tr>
<tr>
<td>Primary school learning outcomes for children are improved</td>
<td>% of Grade 6 students scoring 70% or better on standardized math and science tests</td>
<td>75% in 2020 scored 70% or better in math. 61% in 2020 scored 70% or better in science</td>
<td>80% scoring 70% or better in math by 2025. 67% scoring 70% or better in science by 2025</td>
</tr>
</tbody>
</table>

3. Monitoring of Results and building a monitoring system

A results-based monitoring system is a form of Continuous Quality Improvement process, which tracks both implementation in terms of inputs, activities, outputs and results in terms of outcomes and goals.

There is always a monitoring system in the implementation of the projects and project teams are involved in its monitoring and evaluation process but it is different than the monitoring of the results. For instance the overall goals of reduced children morality in the rural areas of Pakistan, can be judged from the outcome of reduced children morality in the hospitals on annual basis. For this purpose an annual target of 20% reduction in the fatal infant diseases can be set. At the activity level, three major diseases can be targeted like polio, tetanus, and whooping cough.

To develop a proactive and responsive monitoring system, is the heart of RBM. This system must to establish clear responsibility at each level such as:

- What data are collected and what will be its source?
- When data are collected timing and frequency of data collection?
- How data are collected: tools and data collection methodology
- Who collects the data: The human resource for data collection/
- Who analyzes the data: The data analysts and experts
- For whom the data are collected: The audience and sample for data collection.
- Who reports the data: The data reporting model and organization?

For each outcome of the project, indicators, baseline, targets, data collection strategy, data analysis and reporting plan has to be identified.

4. Implementation monitoring is supported through the use of management tools – budget, staffing plans, and activity planning.

Good evaluation has to be unbiased, useful, involves major stakeholders, having good value for the money spent, technically sound and appropriately disseminated. There are eight types of evaluation questions, which are normally tried to be answered

- **Descriptive** Describe the content of the information campaign in Pakistan for polio prevention.
- **Normative/compliance** How many days during the year, where national drinking water standards met? For how many days of the year, the load shedding has been reduced in the year?
- **Correlational** What is the relation between the new interventions and the results? The relation between the literacy rate and number of trained teachers in a province of
district, shows the link between two situations, or conditions, but does not specify causality or cause and effect relationship. Correlation without causation can be misleading sometime.

- **Cause and Effect**: This type of analysis or monitoring also explores the causes for the results for instance, has the introduction of a new hybrid seed caused increased crop yield? Instead of mere relationship, it also establish the logic behind such relationship.

- **Program Logic** Is the sequence/strategy of planned activities likely to increase the number of years girls stay in school? This gives the correct causal relationship of the intervention.

- **Implementation/process** This is analysis of the entire process by using the standard process analysis method. Was a project, program or policy to improve the quality of water supplies in an urban area implemented as intended?

- **Performance** The planned outcomes and impacts from a policy or an intervention, is reflected in its performance. Hence performance establishes links between inputs, activities, outputs, outcomes and impacts.

- **Appropriate use of policy tools**: The appropriate tool and its implementation is the basic ingredient of a good monitoring system. Has the government made use of the right policy tool in providing subsidies to indigenous villagers who need to be resettled due to the construction of Neelum Jhelum Power project? This evaluation establishes whether government selected appropriate instrument to achieve its aims.

5. Analyzing and reporting findings

The evaluation of the major findings is an art and heart of the whole process. An incorrect evaluation of the results can mislead the whole process. There are six types of evaluation types

i. **Performance Logic or Chain Assessment**: In such kind of evaluation, questions about the basic causal logic of the project, program, or policy are addressed mainly.
   a. The rationale for the sequence of activities of the project, program, or policy is explained.
   b. The likelihood of achieving intended effects based on research and prior experience.

ii. **Pre-Implementation** It deal with the preliminary evaluation of a project, program, or policy's implementation strategy that assures that three standards are met
   a. Objectives are well defined. Sometime we describe such objectives as SMART i.e. Specific, Measureable, Achievable, Realistic and Time bound,
   b. Implementation plans are plausible and there is maximum possibility of its timely implementation and achievement.
   c. Intended uses of human and noon human resources are well defined and appropriate to achievement of objectives.

iii. **Process Implementation Evaluation**: This type of evaluation mainly evaluates the implementation process based on the Total Quality Management philosophy. Some of the basic questions needed to be addressed in this evaluation are
   a. Provides detailed information on whether the program is operating as planned.
   b. Provides detailed information on program functioning to those interested in replication or scaling up a pilot, in case the detailed project has been implemented based on the pilot study.
   c. Provides continuous feedback loops to assist managers and other major stakeholders of the projects.

iv. **Case Study based Evaluation**: This is a narrowed and focuses type of evaluation, where, a complex situation and is based on a comprehensive understanding of that situation.
v. **Meta Evaluation:** This is mainly based on the literature review and existing knowledge about the problems and projects. It pulls together known studies on a topic to gain greater confidence in findings and generalizability. This more like a research type of evaluation. It also addresses where there are credible supportable evaluation findings on a topic, which can further strengthen the findings of the study. It also compares different studies with disparate findings about a topic against a common set of criteria and ultimately draw a conclusion.

vi. **Impact Evaluation:** This type of evaluation is more focused on the results and outcomes and provides information on how and why intended (and un-intended) project, program, or policy outcomes and impacts were achieved or not achieved.

6. Collecting and providing evaluative information
   In reporting the findings of evaluation, it is important to report the results in a desirable way, which can help in taking the decisions. For a business project evaluation, the important parameters of report may include the following important aspects

   - Expenditure/income
   - Organizational units
   - Raw numbers
   - Geographical locations
   - Percentages
   - Demographics
   - Statistical tests
   - Client satisfaction scales (high, medium, low)

Important data, which can help in making appropriate decision, must be presented. Unnecessary data dumps must be avoided. The presentation skills for reporting writing must be strong enough to convince the decision makers. Use an appendix or a separate report to convey detailed data, where required. Strong visual presentations such charts, graphs, maps must be used to highlight key points. It is more appropriate to compare the targeted and actual performance and outcome in Tabular form as it is relatively easier to understand such information, as shown in Table below.

**Table 6.1 Comparison of targeted and actual outcomes of the health sector projects**

<table>
<thead>
<tr>
<th>Outcome Indicator</th>
<th>Baseline (%)</th>
<th>Current (%)</th>
<th>Target (%)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates of hepatitis (N=6000)</td>
<td>30</td>
<td>25</td>
<td>20</td>
<td>-5</td>
</tr>
<tr>
<td>Percentage of children with improved overall health status (N=9000)</td>
<td>20</td>
<td>20</td>
<td>24</td>
<td>-4</td>
</tr>
<tr>
<td>Percentage of children who show 4 out of 5 positive scores on physical exams (N=3500)</td>
<td>50</td>
<td>65</td>
<td>65</td>
<td>0</td>
</tr>
<tr>
<td>Percentage of children with improved nutritional status (N = 14,000)</td>
<td>80</td>
<td>85</td>
<td>83</td>
<td>+2</td>
</tr>
</tbody>
</table>

7. Using the findings so that it can reach the appropriate audience.
   This is the most important part of evaluation process. The whole evolution process will result into some findings which shared with the relevant stakeholders. Ten major uses of the findings are discussed as follows:
i. Responds to elected officials’ and the public’s demands for accountability in case of public sector projects.
ii. Helps formulate and justify budget requests by the concerned ministry and departments.
iii. Helps in making operational resource allocation decisions by the various forums of the project approvals.
iv. Triggers in-depth examinations of what performance problems can exist and what corrections are needed during the projects and future such projects.
v. Helps motivate personnel to continue making program improvements and adjustments with time and budgets.
vi. Monitors the performance of contractors, suppliers and other stakeholders.
vii. Provides data for special, in-depth program evaluations for research purpose and further investigations where required.
viii. Helps provide services more efficiently.
ix. Supports strategic and other long-term planning efforts by providing baseline information and later tracking progress of the projects and programs.
x. Communicates better with the public to build public trust and their involvement in the projects.

8. Sustaining the monitoring and evaluation system within government/organization

The last step in evaluation process is to ensure its sustainability. In many cases it has been observed that a very stringent monitoring and evaluation process has been developed by the governments but it has not been adopted on sustainable basis. This is certainly results into the wastage of resources.

Critical components for sustaining the monitoring and evaluation system are:
- Demand and need of the M&E system in the department
- Clear role and responsibilities of the people and stakeholders involved
- Trustworthiness and credibility of the information provided
- Accountability on the basis of information provided
- Capacity of the organization and human resource to deal with the information and the results
- Incentives and privileges for developing, implementing and sustaining M&E system.

Chapter Summary

Capital Budgeting is the process of allocating the scare resources to the project, based on their priority and importance to achieve the corporate objectives and goals. In public sector project, quantification of benefits and cost is an uphill task. In this chapter, the basic concepts of Capital Budgeting have been explained. Public Private Partnership, can be an important arrangement to attract foreign of local private investment for public sector projects. However in Pakistan, the Public Private Partnership based projects are rarely executed due to multiple level of compilations. An important concept of Result based Monitoring (RBM), has been explained with example, which relies on the quantifiable results in the form of outputs and outcomes against the established benchmark and targets.
Q 6.1 The Provincial Government has planned to construct a Provincial Expressway to connect, the capital city with the northern part of the country. A feasibility study is required to assess the benefits and costs of the project. Please identify the direct and indirect benefits and cost of the project.

Q 6.2 Public Private Partnership (PPP) projects are aimed at attracting private resources for the public projects. This model has been practiced successfully in the developing countries, but in Pakistan, it has been rarely applied. Critically evaluate the challenges in PPP projects in Pakistan and suggest measures for attracting Foreign Direct Investment (FDI) for PPP projects.

Q 6.3 The Chinese philosophy of One Belt One Route (OBOR) is aimed at, connecting Chinese markets with the rest of the world to enhance the global trade. China Pakistan Economic Corridor (CPEC) is an important part of this vision. Conduct SWOT analysis of CPEC.

Q 6.4 Result Based Monitoring (RBM) is more objective technique to quantify the outputs and outcomes of the projects against a baseline. Develop a RBM plan for the construction of Hydel Power Generation project in your area.

Q 6.5 Online Project Monitoring can provide a reliable and cost effective project management system for the public sector project. Please suggest some mechanism for the online project monitoring of social sector projects.
FORMS OF BUSINESS AND BANKING SERVICES

7.1 Forms of Business
The success of businesses and enterprises depend on many factors including nature of business, equity of partners or shareholders, nature of their relationships etc. The form of business explains the relationship of the business with the owners. These various legal forms are given in following Figure

<table>
<thead>
<tr>
<th>Legal Forms of Business</th>
<th>Partnerships</th>
<th>Corporations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole Proprietorships</td>
<td>General Partnership</td>
<td>Regular Corporation</td>
</tr>
<tr>
<td></td>
<td>Limited Partnership</td>
<td>Subchapter S Corporation (S-Corporation)</td>
</tr>
<tr>
<td></td>
<td>Master Limited Partnership</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7.1: Various forms of business
7.1.1 Sole Proprietorship

Under this form of business, it is owned and operated by one person. It is the simplest form of business ownership and most popular form of business organization in the world and in Pakistan and almost 75% of the businesses are owned by individuals.

Such forms of business are more common in retailing, service, and agriculture.

Advantages and disadvantages of the Sole Proprietorship
- **Ease of Startup:** The establishment of sole proprietorship is relatively easy, as it doesn’t require consensus from many partners or stakeholders.
- **Little legal documentation:** The legal documentation for this type of business is almost negligible.
- **No co-owners are required:** As the sole owner is at liberty to establish it.
- **Least expensive to start:** As it can be initiated with small investment.
- **Pride of Ownership:** The sole owner always has the pride of owning the right and title of business.
- **Retention of profits:** The profits and losses are owned by the sole owner and hence the profits are retained by a particular person.
- **Flexibility:** The sole proprietorship is flexible in nature and can add any new products and service.
- **No Business Income Tax:** is normally involved.

Some of the major disadvantages of the sole proprietorship are given as follows

- **Unlimited Liability:** The liability of the owner of the sole proprietorship has to bear unlimited liability in case of loss and default.
- **Limited Life of business:** As in case the owner leaves the business, it ends.
- **Limited Access to Start-up Capital:** The sole proprietorship has limited option for loan and credits for startup capital of the business from banks and financial institutions.
- **Limited Management Expertise:** The one man owner has limited expertise to deal with the challenges of business.
- **Difficulty in Hiring Employees:** The limited capacity of the business can’t employ the workers and employees.
- **Proprietor is not considered an employee:** and the credit of his service are normally not considered in the account.

7.1.2 Partnership or Association of Persons (AOP)

To deal with the challenges of the sole proprietorship, two or more persons may join to run a business in the form of partnership or sometimes called Association of Persons (AoP).

**Partnership is defined as:**

“An association of two or more persons engaged in a business enterprise in which the profits and losses are shared proportionally. The legal definition of a partnership is generally stated as “an association of two or more persons to carry on as co-owners a business for profit”.

About 5-10% of the global businesses are owned by the partnerships. The partnership is normally formed under agreement by the partners. The partnership deed may be registered or not. The registered partnership deed has more legal strength as it can be protected against any forgery and tampering.

**Advantages and Disadvantages of Partnership**
Some of disadvantages of proprietorship are covered with the partnership as discussed below:

- Greater Access to Capital: The partnership can have more access to the capital and funds by mobilizing their resources and funds.
- Greater Access to Credit: The banks and financial institutions prefer the partnership firms for credits and business loans as their risks of default are minimized.
- Retention of Profits: The profits earned by the partnership are retained by the partners and part or whole of the profit is used for further investment into the business.
- More Management Expertise: The collective wisdom of the partners can lead to better decision making and management expertise.
- No Business Income Tax: The business income tax is normally not applied to the partnership, rather the income tax from the partners’ incomes.

Some of the major disadvantages of the partnership are given as follows:

- Shared Profits: The profit of the business is shared amongst the partners as per the agreed share of the partnership deed. This certainly reduces the individual share of the partners.
- Unlimited Liability: The general partners have unlimited liability and in case of default of the partnership, the liability may extend their share and their personal assets may also be used for payment of such liability.
- Each partner has “Agency” power and his/her conduct in business is honored and owned by the partnership as well. Hence the choice of partners is the most difficult decision in partnership business.
- Limited Life: The partnership unlike company has limited life and at the withdrawal or death of one of the partners, it may cease.
- Management of Disagreements: In case of many partners, the consensus on major decisions becomes difficulty and they may miss some very good investment opportunity.
- Frozen Investment: The partnership investment is generally lying unused, which restricts its meaningful investment and returns.

**Partnership Deed**  
A document, which that defines the rights and obligations of partners for the carrying out as specified business. In general the deed may covers important aspects of business like names of partners, address and occupation of partners, it lays down the duration of partnership, nature of business, profit sharing ratio, right to interest, salary, commission, liability and other important parameters.

**Major Types of Partnerships**  
There are many types of partners having specific and general roles in the partnership. Some of the major types are given below:

- Active partners: Taking active role and actions for the business.
- Sleeping partner: Not mainly part of the active business and decision making.
- Nominal partner: Has interests in the firm but not legally partner of the firm.
- Partner in profits only: Only partner in profit and in case of loss, other partners are liable.
- Senior partner: Partner having all the powers and privileges more or equal than other senior partners.
- Junior partner: Having less important role than senior partner, but becomes senior partner with time.
- Secret partner: The name of such partner is not given in the deed or business rather the other partners have secret understanding with him/her.
- Minor partner: Less than 18 and having no major role in decision making.

**Rights and duties of partners**

- Rights to take part in management.
- Rights to inspect books of account.
- Rights to be consulted in case of making major decision.
- Rights to share profit as per agreed ratio in the partnership deed.
**Obligations of the partners**
- All partners have to work for common advantage of the partnership firm.
- To be faithful to the business and its interests and keep business secret confidential.
- Render true account before other partners
- Indemnify all other partners for fraud and misconduct.
- Partners generally don’t claim remuneration unless expressly stated in the deed.
- To share profits and losses as per agreed terms of the partnership deed.
- To act within authorities and roles given in the deed.

The liabilities of partners are generally unlimited and in case, the liabilities of the business can’t be met from partners’ shares, their personal assets may be used to recover such liability.

In case of Limited Liability Partnership, the liability of a partner is restricted to the extent of his personal conduct only and not to the wrongful acts of other partners.

**7.1.3 Joint Stock Companies**
The limitations of the partnership are normally covered in the third form of business called Company or joint stock Company. The two major limitations of the other types are limited funds and unlimited liability. Company of Joint Stock Company is defined as ”A voluntary association of many individuals for profit having limited liability and contribute money or money’s worth to a common stock”. The first joint stock company was started at Italy in 13th century. Later the Joint Stock Companies were formed in England under the Royal Charter during 17th and 18th Centuries.

**Characteristics of Joint Stock Co.**
- **Association of persons** - The persons joining hand, have common motive and objectives. It may be Private Company where min of two and maximum of 50 persons can form it, or it may be public limited company, where a minimum of 7 person can for it.
- **Independent Legal Entity**: A company is an independent legal entity having its perpetual existence and takes part in business, independent of its members and not responsible for the conduct of its members.
- **Limited Liability**: The liability of the shareholders of the Company is limited to the extent of their share, they have acquired.
- **Common Seal**: A company acts like a business person but cannot put its signature, rather it has a seal and get its name engraved on it. The seal of the company is affixed on all important documents and contracts as a token of signature.
- **Transferability of shares**: The Company can transfer its shares from one person to other person as per the Article of Association of the Company.
- **Separation of ownership from Management**: The Shareholders of the company are widely scattered and they invest money though buying the shares. The Company is managed by Board of Directors (BoD) of the Company as per the terms of Article of Association.
- **Perpetual Entity**: A Company exists on perpetual grounds. The issues like death of shareholders, lunacy or insolvency does not affect it.
- **Creating Financing through shares**: The funds for company are generated by selling the shares to the general public and large number of persons invest in the company, thereby generating large volumes of funds.
- **Centralised and delegated Management**: The board of directors is elected by the shareholders in general body meeting and the policies and decisions are made by the majority vote in a democratic way.
- **Publication of Accounts**: The annual statements of accounts are submitted to Registrar of Companies by the secretary of Company.

**7.2 Types of Companies**
Based on the mode of incorporation and formation, the Companies are often divided into three types. The companies may be divided into three categories according to incorporation.

- **Chartered Companies**: The Companies incorporate by the Royal Charter or head of State. Such companies are granted exclusive rights and privileges and can violate the rules. East India Company was established by the British Government to carryout business in United India.

- **Statutory Companies**: formed under Act of Parliament or of a State legislature. The word Ltd is not usually used by these companies. For example State Bank of Pakistan, State Trading Corporation of Pakistan.

- **Registered Companies**: formed and registered under the provisions of the Companies Act 1956. These companies may be limited by shares, limited by guarantee or unlimited companies. In case of limited by share, the liability of the shareholders is restricted to the share. In case of guarantee, the shareholders may also guarantee some level of liability beyond their shares and in case of unlimited Company, the liability may not be restricted.

Based on the transferability of the share in the company, these are sometime classified as:

- **Private Company**: Normally formed by at least three and maximum 50 people. The articles of the private company may restrict some its functions like, A) the right of members to transfer its shares, b) limits the number of its members to fifty, and c) prohibits any invitation to the public to subscribe to is shares and debentures. A private Company is not required to submit prospectus with the Registrar of Companies. A private company is not required to convene annual meeting or submit annual report.

- **Public Companies**: Here the ownership goes to public at large. A minimum of seven members are required to constitute a public company and to get it registered with no restriction on the maximum numbers. The funds in the public companies are normally raised through public subscription.

### 7.3 Franchising

The firms may have not the necessary resources to extend their business to all parts of the region. In such cases, the franchising model is more feasible. Franchising is “License to operate an individually owned business as though it were part of a chain of outlets or stores or the business itself”. This mode of business is more common in the services sector like Telecom, Hotel and Food, Car rental etc. The role of franchiser and franchisee are discussed as follows

**Franchiser**
- Provides a known & advertised business name like Pepsi, Coca cola, Pizza hut etc.
- Supplies management skills in opening of the franchise services. This may include visits to the proposed facility and providing various services like accounting, procurement, and design etc. to the franchisee.
- Supplies training & materials for new products and services.
- Supplies method of doing business including business norms and ethics, completion in the market etc.

**Franchisee**: The franchisee receives well developed products and service for starting new business without much resources and expertise. They provide labor and capital for establishing the business.

Some of the world major Franchises are MacDonald, KFC, Berger King, Subway, Marriot International, Carrefour etc.

**Case Study: Franchising in Asia**
- **Malaysia**
  Presently more than 50 Malaysian products are traded in the 52 countries of international market. The number of Malaysian franchises is growing exponentially both domestically and internationally. The biggest share of 34% goes to food and beverages, followed by clothing, services & maintenance etc. A Malaysian Conglomerate, Berjaya Corporation, has acquired 8 foreign franchises i.e. 7-Eleven; McDonald's; Kenny Rogers Roasters Tutti Frutti; Starbucks Coffee Company; Roadhouse Grill; Wendy’s; Singer;

- **India**
  India has recorded enormous growth in the franchises mostly in food and wellness and education. Currently the number of franchises in India is around 200,000 with about a million employees working directly or indirectly in them. The Indian franchise market has touched USD 30 billion in 2015.

- **Pakistan**
  Telecom Services in Pakistan has seen an unprecedented growth in the last one decade. The number of telecom subscribers has surged, to 100 Million, which has also created tough competition amongst the telecom service operators. The direct and indirect employment provided by the cellular phones is about 1.40 Million. Pakistan Telecom Authority was constitute in 1996 and later the Telecom deregulation policy was framed in 2003. The Mobile Cellular policy was announced in 2004. The franchise in education, food services and fashion design are becoming more popular.

**BANKING AND SPECIAL FINANCIAL INSTITUTIONS**

Banks play vital role in the economic development of the country. The concept of banking can be traced back to 2000BC, when the traders and farmers used to carry out goods between cities in Assyria and Babylonia. In Europe, many banks were reported in the cities of Venice and Florence during 14th Century. The modern banking was redeveloping with the advent of computing and telecommunication in the second half of the 20th century, which gave great impetus to the banking operations and their developments. During the economic recession of 2007-08, many banks were closed.

**7.4 Types of banks:** Banks are often classified on the basis of various criterions. The most common basis of classification of banks are

- On the basis of ownership
- On the basis of domicile or place of incorporation
- On the basis of Function

On the basis of ownership, banks may be further divided into public sector banks and private sector banks. The public sector banks are owned and controlled by the Government like National Bank of Pakistan, Khyber bank, First Women Bank etc. The major share of the public banks is owned by the Government. Private bank on the other hand is owned by the corporations or shareholders. For example, Habib Bank Ltd; Alfalah Bank Ltd; Allied Bank Ltd etc.

Based on the incorporation of the banks, it may be divided into domestic banks and foreign banks. Domestic banks are those banks which have been incorporated in a country whereas the foreign bank is incorporated at an international country. Domestic banks include Punjab Bank Alfalah Bank, MCB Bank etc. Some of the foreign banks operating in Pakistan include Citibank Standard Chartered Bank Alberta Bank.

Similarly the banks also classified on the basis of their functions. For example Central Bank, commercial bank, exchange bank, Saving Bank, agriculture Bank, Industrial Bank, Cooperative Bank, mortgage Bank, investment bank, export-import Bank School bank and Labor bank etc.

**7.5 Role of Central Bank**

It is "Bank of the banks” in a country and mainly regulates the monetary policy of the country. For example State Bank of Pakistan acts as a Central Bank of the country. Similarly the Bank of England is a Central Bank of the United Kingdom.
Some of the functions include
- Issue the notes or currency for the country
- Acting as an agent or advisor to the government
- Banker to the banks
- Control credit in the country
- Acts as Clearing Agent
- Lender of the Last Resort
- Custodian of foreign exchange reserves and regulates its rate
- Plays the development and more functions to develop the economy of the country.

7.6 Developmental Financial Institutes (DFIs)

Developmental Financial Institutes (DFIs) occupy an important role in the development of the private sector by providing them, credits and other financial services. These are Government controlled institutions established with an aim to foster economic development in the private sector.

The FDIs in Pakistan have been established mainly during 1950s and 1960s. The developmental funds were routed through these institutions to the private sector for the socio-economic development of the country. FDIs play an important role in the development of society in Pakistan; FDIs have been actively involved in the development of economy through private sector investment in the initial years but later, they faced severe economic problems mainly due to the interference from the Governments. They also assisted entrepreneur for establishing International businesses and acquiring funding and expertise to do the business.

In Pakistan, DFIs mostly started in the 1950 and 60s with the seed money from the government International Financial Institutions like World Bank and IMF. Some of the most prominent DFIs in Pakistan are as follows

Industrial Development Bank of Pakistan (IDBP) IDBP was established in 1961 to provide medium term in long term loans and credit facilities to the industrial units of Pakistan mainly for the replacement and renovations of existing all units and procurement of capital equipment for the existing industrial units. IDBP was initially very successfully in fostering the industrial development in the country but unfortunately towards the 80s and 90s it became highly politicized and with the undue interference from the political governments, its financial strength was fractured and ultimately it was turn into bankrupt liquidated.

Next important DFI, in Pakistan was Pakistan Industrial Credit and Investment Corporation (PICIC), which was established in 1957 with the help of World Bank and Pakistan however like IDBP, it also ended with high losses

National Development Finance Corporation (NDFC), was established for the promotion and expansion of industrial sector and provide financial assistance to the industrial sector including Railways, Shipping Airlines sports Steel Mills and other major industries of the country. The industrial development due to FDIs contributed significantly towards the development of industrial sector of economy towards in 1970s. NDFC, also ended with the same results due to political interference and lack of leadership in these organizations.

Another important development in the financial history of Pakistan was the establishment of Investment Corporation of Pakistan (NIP), which was established in 1966. The major objective of the Investment Corporation of Pakistan was to develop the capital market of the country. In this way, they floated about 25 mutual funds to offer investment opportunities to the investors in the private sector in general. The performance of National Investment Corporation remained highly successful.

Similarly National Investment Trust (NIT), was established in 1963 as a mutual fund to mobilize the small savings from the lower middle and poor class people of the country.
In the same manner, Equity Participation Fund was established in 1970 with the major objective to foster the medium and small size Enterprises with special reference to the units established in the underdeveloped or less developed areas another important development was the Industrial Development Bank of Pakistan which was established 1952 with an aim to foster agriculture in the country.

The Global role of DFIs, in the economic development of the developing countries shows tremendous results. Some of the major roles of DFIs, in the economic development are given as follows:

- Private sector investment in the developing countries has shown substantial growth in last many decades. Small and Medium Enterprises (SMEs), in the developing world has contributed substantially to the social economic development of the country.
- 15 European Development Financial Institutes (EFDIs), which have contributed approximately 18.5 million euros across the low in middle income countries of the world which is roughly 6% of the official development assistance provided by the government European FDI target the private sector mainly due to their financially viable projects and seriousness, on their part towards achieving the desired financial goals. These Investments into the private sector by DFIs, have shown substantial growth rate and major contributions towards achievement of Millennium Development Goals.
- DFIs, contribute to the improvement of private sector in number of ways such as creating more visibility of the private sector, engagement in the public policy dialogues and debates, Strengthening the public private sector financing, reviewing and upgrading the policies and regulatory practices for the private sector and growing the capital base by generating more funds for the development of private sector in developing countries.

7.7 International Development Financial Institutes

International Finance Institutions (IFCs) have been established in more than one country and are regulated by International Laws. Most famous IFCs are World Bank Group (WBG), International Monetary Fund (IMF) and Multilateral Development Bank (MDB).

World Bank Group (WBG) group is comprised the following major Financial Institutions:
- International Bank for Reconstruction and Development (IBRD)
- International Development Association IDA
- International Finance Corporation IFC
- Multilateral Investment Guarantee Agency
- Mega International Centre for settlement of Investment Disputes ICSD

The other IFI include, International Monetary Fund (IMF) and Regional Development Banks such as, Asian Development Bank (ADB) African Development Bank AFDB etc.

The common objectives of the International Financial institutes include poverty reduction, improvement of the quality of life of the member countries. They also support the economic social and sustainable development in the region. At the same time, these organizations try to promote the regional Development, Cooperation and integration.

The World Bank group is mostly focused on the developing countries in the areas of human resource development, agriculture, rural development and Environment protection as well as infrastructure and good governance. It was formed in 1945 after World War II and it is today represented by almost 187 countries of the world. One of the major organs of the World Bank Group is International Bank for reconstruction and development (IBRD). Its mission was initially, to finance the reconstruction of nation devastated by world war-II but later it expanded its role to help the war affected countries of the world in the efforts for reconstruction of their infrastructure.

International Development Association (IDA), was established in 1916 within an aim, to help the poorest countries of the world and providing them long term and medium term interest free loans.
The main focus of this organization is at the least developing countries of the world which are mostly located in Africa and South Asia.

International Finance Corporation (IFC) was established in 1956 to promote the private sector investment in the developing countries. International Centre for the Settlement of Investment disputes was established in 1966 to facilitate reconciliation and dispute resolution in the member States.

Similarly International Monetary Fund (IMF) was established 1944 within an aim to stabilize exchange rates in international payment systems. The funds have provided cooperation in stabilizing the foreign exchange and promote stable economic growth in the member countries. It also provides financial assistance to the member Nations in promoting the sustained growth and solving the balance payment problems in these countries.

Another important International finance institution is European Bank for Reconstruction and Development, which mainly finances industries and businesses in the European continent. It was founded in 1991 to mainly invest in the private and public sectors of EU.

Asian Development Bank ADB is a Regional Development Bank, which was established in 1966, to promote the economic growth, reducing the poverty, developing human resource and protecting the environment in the developing countries mostly of the Asia. Asian Development provided loans, technical assistance and help in promoting investment opportunities and assisting the member countries of the Asian continent in developing their policies in and plans for development.

Chapter Summary
Engineering entrepreneurs require good understanding of various forms of business, their legal requirements and the banking & financial system of the country. In this chapter, various forms of business, their relative advantages and disadvantages, their legal requirements have been explained. The role of commercial and Central Bank of the country in the national development has been explained.
Q 7.1 Compare the advantages and disadvantages of the Sole Proprietorship and Partnership.

Q 7.2 What are different types of Companies and their salient features?

Q 7.3 Explain the registration process of a private limited Company.

Q 7.4 Describe the major functions of banks in the national economic development.

Q 7.5 Central Bank plays pivotal role in the monetary control and polices of a Government. Explain the role of State Bank of Pakistan in controlling inflation.

Q 7.6 Study the latest Economic Survey of Pakistan released by State Bank of Pakistan and explain its salient features.
8.1 Project Monitoring and Evaluation Cycle

All projects, small or large needs rigorous monitoring and evaluation process.

Monitoring is the process collecting recording and reporting information about the project actual performance, whereas controlling is the process of using the collected data to check whether the project is pursuing according to the planned targets of performance or not?

Evaluation is the process of comparing the actual performance with the standards already established and ultimately take corrective actions to bring back the project to the track.

Monitoring and Evaluation or Monitoring Evaluation and Controlling are used synonymously in the project management.

A typical project control cycle is shown in Fig 8.1 below.

![Project Monitoring Controlling and Evaluation Cycle](image)

**Figure 8.1: Project Monitoring Controlling and Evaluation Cycle**

The project monitoring and controlling process, encompasses four generic steps

First step of the monitoring and control cycle is to establish the performance standards. These may be part of the project requirements, specifications or standards given in the project document.

The next very important step is the monitoring which includes collection of the data about the actual performance of the project. In projects, we are using different tools for the data collection
about the performance of the project including IT and Network based tools, which are used to collect the real time online actual performance data of the project. The project information is also stored in the archives of the project. Various data sheets are used to compile the data about the performance of the projects.

After data collection, the actual and standard performance of the project is compared to see whether the project is moving in the right direction or not? In case of any deviation from the standard plan, corrective action may be required and the project team make appropriate resolution.

The data collected in the monitoring and evaluation process may be one of the following forms

- Frequency counts
- Raw numbers
- Subjective numeric ratings
- Indicators and surrogates
- Verbal characterizations

8.2 Project Reports

Project reporting is a routine process, where the status of various aspects of the project is communicated to the relevant stakeholders in a timely manner. The project report are categorized under three major types:

- **Routine project reports**
  - Project status report: Such reports may be required after at specific timeline
  - Project progress report: These are more commonly used to report the periodic progress of the projects’ performance in terms of time, budget, scope and technical performance. Good progress must address the following questions about the project
    o How much work has been accomplished since the last report?
    o Is the project on schedule (within time), budget and at the desired level of performance?
    o If not, what went wrong? How the problem has will be corrected?
    o How long will it take to get back on schedule and actually planned track?
    o Are there any unexpected problems (other than schedule problems)?
    o When do you anticipate completion and at what cost?
  - Forecast reports: To predict the performance of the projects at a future timeline. This is an important report used by the senior and executive management of the projects, to take corrective and timely decisions.

- **Exception Reports**
  - A report used for special decisions or unexpected project situations where affected team members need to be made aware, and the change itself documented. The substantial change in the scope, cost and time. Change in the project basic scope and policies etc.

- **Special analysis**
  - The results of a special study which documents a particular opportunity or problem within the project itself such as project site accidents, damage to the project etc.

Various templates have been used in various private and public projects. One such project status report is shown in Table 8.1
Table 8.1: Template for Project Performance Evaluation Report

<table>
<thead>
<tr>
<th>Project Performance Evaluation Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
</tr>
<tr>
<td>Project Code</td>
</tr>
<tr>
<td>Project Performance Evaluation overview</td>
</tr>
<tr>
<td>Reasons for Evaluation</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Type of Evaluation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Evaluation Team members and signature with dates</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Performance Evaluation-Project Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance indicators</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Project Planning Efforts</td>
</tr>
<tr>
<td>Project Scope Management and Scope change control.</td>
</tr>
<tr>
<td>Project Progress/Variance Management</td>
</tr>
<tr>
<td>Commitment to project objectives</td>
</tr>
<tr>
<td>Commitment to project budget</td>
</tr>
<tr>
<td>Commitment to project schedule</td>
</tr>
<tr>
<td>Commitment to project resource utilization</td>
</tr>
<tr>
<td>Timelines to project communication</td>
</tr>
<tr>
<td>Timelines to project deliverables</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Performance Evaluation; Key and Notable Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Contact</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Performance Evaluation General Comments and Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Project Performance comments based on the evaluation above</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action/Review-Responsibility</th>
<th>Start</th>
<th>Finish</th>
<th>Activity Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attachments</th>
<th>Prepared by</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.3 Project Progress Reports in Public Sector
The progress of PSDP projects are reported through PC-III A for monthly progress review and PC-III B for quarterly reports. The basic principles for the progress review in the public sector are the same and the actual achievements of the projects are compared with the targets envisaged in the PC-1 and yearly project profile. In case of any deviation, the reasons are recorded and follow up actions are proposed. The templates of PC-III A and B are given in the Annexures.

10.3.1 Monthly Monitoring and Progress Review Reports (PC-III A)- The monthly targets as given in the approved PC-1 and project annual plan (Project profile) are reviewed and compared with the actual performance. The deviations are recorded and communicated to planning commission of Pakistan.

10.3.2 Quarterly Progress Report (PC-III B) -In quarterly progress report, the actual physical and financial progresses of the projects are reviewed against the targets set for each quarter of the year. The bottlenecks in the implementation of the projects are also identified.

8.4 Monitoring and Progress Review Meetings
Many progress review and project related problems are discussed and decisions are accordingly taken. These meetings may be informal and formal. Informal meetings can take place during lunch at the dining tables, off the cuff get together. In formal meetings, presentation and agenda are discussed. Some of the guidelines for the effective management of the meetings are given as follows

- Agenda of the meeting must be circulated well before the meeting so that participants can prepare for the meeting and the relevant decisions are taken.
- The meetings must be held in making decisions rather than discussing only the progress of the meetings.
- The discussion in the meeting must be restricted to the agenda and item under discussion. The convener or chair of the meeting has the responsibility to control and guide the meeting so that irrelevant and unnecessary discussions are avoided.
- The proceedings of the meeting must be recorded in the form of Minutes of the meeting.

8.5 Project Controlling
Project Control involves reducing differences between the planned targets and actual projects performance with respect to three major constraints of projects i.e. Time, Cost, Quality (Scope). If timely corrective actions are not taken, the project deviates significantly from the plan and at times, becomes difficult to bring it back to the track. Part of the control process dealing with the human side of the projects, is rarely difficult to control.

There are many approaches to project controls such as

i. Process Reviews: The review of the processes leading to the achievement of the project objectives is most commonly employed in the projects. Sometimes, the Cause and effect analysis is carried out to identify the root cause of the problems and its effects.

ii. Personnel Assignment Based on the past productivity of individuals, control is also assigned to them.

iii. Resource allocation: As general principle, more resources are allocated to the high productivity teams, units and important tasks.

A typical control system has the following five components

i. Sensors: Its major role is to measure the particular aspect of control. In projects, it may cost, quality, time or scope. In traffic management system, it may be traffic density, vehicle speed etc. The sensors are the major gadgets for measurement of the control attributes.

ii. Standards: The standards of items and deliverables, is necessary to be established for control system.
iii. Comparator: Compares the actual performance reported by the sensors with the standards.
iv. Decision Maker: To make the decision about correcting the deviation from the standards, if it is too large.
v. Effectors: The actions required to reduce the deviation in actual and standards.

8.6 Types of control systems
There are various generic control systems. Some of these are discussed as follows

- Cybernetic Control System: A control system using the above cited 5 components in its system.
- Go/No-go System Under this control system, the next step can be taken only when the previous step has been taken according to standards. For example, the paint work cannot be started unless the plaster work is completed as per standards.
- Post Control (Post Performance Review): Here the project performance review is normally done after its completion. Post Project Evaluation is normally done to document the lessons learnt and study effectiveness of various project processes.

Chapter Summary
Project management in the public sector requires specific knowledge. Majority of the Engineers are supposed to join the national building department, hence it is imperative to understand the various project reporting documents and project monitoring mechanisms. In this chapter the basic project documents followed by the Government of Pakistan and Planning Commission of Pakistan such as PC-1, PC-II, PC-III, PC-IV and PC-V have been explained.
Q 8.1 For mega projects, incorporating high risk, Planning Commission of Pakistan recommends to undertake feasibility study (PC-II) of the project, before developing the PC-I. What can be its benefits?

Q 8.2 Explain salient features of the Project Proposal (PC-I) for a software development/IT park in Islamabad. What are the important elements of costs and benefits of the project?

Q 8.3 Visit the Planning Commission of Pakistan website at www.pc.gov.pk, and describe various processes for project reporting in the Public Sector projects.

Q 8.4 Explain important parts of the Project Completion Report (PC-IV) for a newly completed hospital project in your city.

Q 8.5 Project impact assessment through PC-V is important to assess, whether project has achieved its short terms objectives and goals. In Public sector, the preparation of PC-V is rarely emphasized by the Planning Commission of Pakistan. What are the impediments in the preparation of PC-V?
CHAPTER – 9

PROJECT APPROVAL BODIES AND ROLE OF PLANNING COMMISSION OF PAKISTAN

9.1 Working and Functioning of Planning Commission, Ministry of Planning Development and Reforms

9.1.1 History of Development Organization in Pakistan

i. To plan and monitor the developmental projects in Pakistan, Development Board Pakistan was established in 1948 and the first 6 year development plan of Pakistan was envisioned in 1950. It was later made part of the Colombo Plan for Cooperative Economic Development in South and South East Asia.

ii. The Planning Board was constituted on July 18th, 1953 with the objective to develop the resources of Pakistan in a rapid manner, to promote social welfare of the people including their access to free education, health, justice and ensure equitable distribution of resources. The Prime Minister was designated as Chairman of the Board.

iii. The President of Pakistan re-designated National Planning Board as Planning Commission. The President of Pakistan was

iv. In 1982, Planning Commission was reconstituted with Minister of Finance as its Chairman. In 2006, it was revamped and Prime Minister was designated as Chairman of the commission. Its role was further expanded in 2013 with more responsibilities.

9.1.2 Major functions of Planning Commission of Pakistan
The main aim of the Planning Commission has been developing the short term, medium term and long term plans and strategies for the country. Its functions can be further elaborated as follows:

i. Developing Strategic Plans and their implementation & monitoring
- Developing and preparing national and strategic development plans, including preparation of national vision
- Coordinate national economic policies on the basis of economic analysis of the country
- Assessment of resources both human and non-human for the implementing of the various proposal and projects and developing plans to augment such resources.
- Monitoring and evaluation of the programs and projects during implementation stage.
- Promoting the role of the private sector as partner in the national growth.
- Reforms in the Governments in consultation with provinces and respective departments.
9.2 Project Development and Reporting Formats
Planning Commission of Pakistan has devised, different types of project documents for various phases of projects in public sector. The sequence of various activities of the developmental projects, are given in the following Table 9.1
Table 9.1: Sequence of activities in project development Life Cycle in Public Sector

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Activity Title</th>
<th>Predecessor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-feasibility</td>
<td>A</td>
<td>NIL</td>
</tr>
<tr>
<td>2. Concept clearance (where necessary)</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>3. Negotiation for foreign aid/loan (where necessary)</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>4. Preparation of PC-II</td>
<td>D</td>
<td>C</td>
</tr>
<tr>
<td>5. Feasibility</td>
<td>E</td>
<td>D</td>
</tr>
<tr>
<td>6. Project formulation/preparation of PC-I</td>
<td>F</td>
<td>E</td>
</tr>
<tr>
<td>7. Processing/Scrutiny of the Project</td>
<td>G</td>
<td>F</td>
</tr>
<tr>
<td>8. Approval of the project by competent authority.</td>
<td>H</td>
<td>G</td>
</tr>
<tr>
<td>9. Project documents (work plan/ PERT/CPM)</td>
<td>I</td>
<td>H</td>
</tr>
<tr>
<td>10. Signing of foreign loan/aid agreement+</td>
<td>J</td>
<td>B</td>
</tr>
<tr>
<td>11. Administrative approval</td>
<td>K</td>
<td>H</td>
</tr>
<tr>
<td>12. Allocation of funds/ADP (PLA)</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>13. Release of funds*M</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>- Appoint of Project Director N</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>- Land Acquisition O- Simultaneous</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>- Creation of Posts and appointment of staff</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>- Appoint of consultant O</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>- Detailed design preparation R</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>14. Tendering</td>
<td>T</td>
<td>R</td>
</tr>
<tr>
<td>15. Evaluation of Tender</td>
<td>U</td>
<td>S</td>
</tr>
<tr>
<td>16. Award of Contract</td>
<td>V</td>
<td>T</td>
</tr>
<tr>
<td>17. Construction of Civil Works</td>
<td>W</td>
<td>U</td>
</tr>
<tr>
<td>18. Procurement of Machinery / other inputs</td>
<td>X</td>
<td>K/L/V</td>
</tr>
<tr>
<td>19. Installation of machinery / equipment</td>
<td>YV</td>
<td>W</td>
</tr>
<tr>
<td>20. Commissioning / Completion</td>
<td>S</td>
<td>X</td>
</tr>
</tbody>
</table>

These various documents are briefly discussed as follows

Figure 9.2: Projects Life Cycle and various documents used in Public Sector (Adopted from Planning Commission of Pakistan)
ii. **Project Proposal- PC-1**
The basic project document used for developing the project proposal in public sector. Even a small project is not exempted. The public sector projects are divided into four major sectors
- **Social Sector**
- **Infrastructure Sector**
- **Production Sector**

Some of the basic information which is covered in the PC-1 is described in the following sections
- Project Title, Location, Client, Sponsoring agency, Maintenance agency etc.
- Project objectives, justification, technical parameters.
- Project Capital Cost, Operating Cost, Financial Plan & Phasing, Demand & Supply analysis.
- Project Benefit Analysis
  i. Financial
  ii. Social benefits with indicators
  iii. Employment generation (direct and indirect)
  iv. Environmental impact
  v. Impact of delays on project cost and viability
- Implementation Schedule
- Result Based Monitoring (RBM) Indicators
- Management and Human Resource Structure
- Additional project requirements
- Certificates by the preparing and certifying officers etc.

iii. **Feasibility Study (PC-II)***
For large projects, involving high level of risk, innovative technologies and high capital investment, feasibility study is recommended. In mega projects, where extensive studies and analysis is required, the PC-1 may require a lot of data and studies and in case, the project is not feasible, the entire study may be wasted. In large mega projects, covering larger areas and extent, sometime small pilot study is required, which is covered under PC-II. For example for a dam project, enormous studies covering hydrological, climatological. Hydrographic, Seismology, rock mechanics, earthquake engineering, project management etc. are involved. Before submitting PC-1, it is recommended to submit PC-2 for such mega projects.
The important components of PC-2 are given as follows
- Name of client, sponsors, details of survey feasibility etc.
- Components of feasibility;
  - General description and justification of the survey and feasibility analysis.
  - Implementation period of the project
  - Year wise estimated cost of the proposed project
  - Manpower requirements of the proposed project
  - Financial plan of the project
- Expected outcome of the survey/feasibility study and details of projects likely to be submitted after the survey.
The PC-II is followed by PC-I.

iv. **PC-III (Project Monitoring Report)**
The project monitoring report is furnished during currency of the project both on monthly and quarterly basis (PC-III A and PC-III B). The monthly report PC-III A, is normally furnished by 5th of every month and quarterly report PC-III B, is furnished by 20th of closing of each quarter. The PC-III covers, the following information
v. **PC-IV, Completion Report**

The completion report of the project is required to be submitted soon after completion of the project on the prescribed PC-IV form. The completion report is a comparative analysis of the plan (PC-1) and actual performance.

The following information is provided:
- Project Name, location, sponsoring agency, execution agency and Maintenance agency.
- Data of Completion actual and planned
- Date of approval and forum
- Implementation period planned and actual.
- Capital Cost approved and Revised cost as per actual
- Financial Phasing as per PC-1 and
- Physical targets of the project and achievements
- Recurring Cost after Completion of the project.
- Project objectives and achievements
- Results Based Monitoring Indicators (RBM) and their performance
- Impacts after completion in terms of Financial, Economic, Technological, Social (Education, Health, Employment, area Development, etc.) & Environmental impacts.
- Model for sustainability of the project
- Financial and Economic analysis of the project.
- Issued faced in the implementation of the project and lessons learned. The issue may include such as Organizational Management, Capacity of the department concerned, and decision making process.
- The lessons learned may include the important issues in various phases of the project, Project identification, Project preparation, Project approval, Project financing and Project implementation.

vi. **Post Completion Annual Impact Evaluation Report for 5 years (PC-V):**

After completion of the project and submittal of completion report/PC-IV, the project review report on yearly basis is submitted at 5th of July for 5 years. The PC-V is not very seriously followed by neither the Planning Commission nor the Government departments. PC-V mainly quantifies the impacts of the projects in short time, preferably within 5 years. The actual outcomes and benefits are compared with the planned objective of the projects. The contribution of the project to economic and social development is also measured.

9.3 Public Sector Development Strategy and Public Sector Development Program (PSDP)

Social and economic development is one of the main agenda of the Federal and provincial Governments. The public sector development strategy is focused on the socio economic development through infrastructure development, human resource development, growth enablers like communications networks, airports, sea ports and balanced regional development and uplift. These objectives are reflected in the Public Sector Development Programs of the Government of Pakistan.

The Public Sector Development Programme reflects the Government investment and priorities. Some of the major objectives of the PSDP are given as follows:
- The long term strategic plans and objectives and strategies of the country are achieved progressively through PSDP.
- To develop physical and social infrastructure needed for the improvement and growth of society.
- It provides venues for employment generation and poverty alleviation in the country.
- Investments under PSDP lead to GDP growth in the country.

The hierarchy for formulation of the PSDP is given as follows:

i. Indication of overall size by Finance Division: The Finance division in consultation with the concerned ministries and cabinets core team, indicate the volume of PSDP before the annual budget is prepared.

ii. Indicative Budget Ceilings (for Ministries/ Divisions): Based on the overall size of the PSDP, the budget ceilings of the ministries and divisions are decided.

iii. Budget Call Circular: The Federal Ministries issue budget circular to all attached departments to formulate their annual budgets of the developmental projects.

iv. Priorities Committee: The priority committee decides the importance and priority of the projects.

v. Annual Plan Coordination Committee (APCC): After setting priorities of the projects by the concerned forum, the annual plan coordination committee, coordinate with the concerned ministries and departments,

vi. National Economic Council (NEC): The PSDP is then placed before the NEC for final approval.

vii. Approval of PSDP & Annual Plan by Cabinet, based on the final recommendation and approval of NEC.

viii. Passage by Parliament with Budget, before start of the financial year.

The PSDP allocations have been increased at an average of 17% per annum from PKR 1010 Billion to Bn 1810. The details are given as under:

<table>
<thead>
<tr>
<th>Year</th>
<th>Allocation (Rs. Bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-14</td>
<td>1,040</td>
</tr>
<tr>
<td>2014-15</td>
<td>1,175</td>
</tr>
<tr>
<td>2015-16</td>
<td>1,414</td>
</tr>
<tr>
<td>2016-17</td>
<td>1,580</td>
</tr>
<tr>
<td>2017-18</td>
<td>1,810</td>
</tr>
<tr>
<td>Total</td>
<td>7,019</td>
</tr>
</tbody>
</table>

Source Planning Commission of Pakistan (PSDP allocations 2013-2018)
The sector wise details of PSDP 20187-18 are given in Table 9.2

Table 9.2: Sector wise distribution of PSDP 2017-18 (PKR Billion)

<table>
<thead>
<tr>
<th>SNO</th>
<th>Sector</th>
<th>PKR ( Billion)</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Infrastructure</td>
<td>3374</td>
<td>48</td>
</tr>
<tr>
<td>I</td>
<td>Energy</td>
<td>1128</td>
<td>16</td>
</tr>
<tr>
<td>ii</td>
<td>Transport and Communication</td>
<td>1581</td>
<td>238</td>
</tr>
<tr>
<td>iii</td>
<td>Water Resource Development</td>
<td>592</td>
<td>8</td>
</tr>
<tr>
<td>Iv</td>
<td>Physical Planning and Housing (Federal)</td>
<td>65</td>
<td>1</td>
</tr>
<tr>
<td>V</td>
<td>Fuel</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>Social</td>
<td>2475</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Education and Higher Education</td>
<td>637</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td>427</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Physical Planning and Housing (provincial)</td>
<td>478</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Other Sectors ( Districts and local programs)</td>
<td>933</td>
<td>13</td>
</tr>
<tr>
<td>C</td>
<td>Governance</td>
<td>265</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>Science and Information Technology</td>
<td>86</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>Balanced Regional Development (Federal)</td>
<td>447</td>
<td>6</td>
</tr>
<tr>
<td>F</td>
<td>Productivity Enhancement</td>
<td>254</td>
<td>4</td>
</tr>
<tr>
<td>G</td>
<td>Misc</td>
<td>118</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7019</td>
<td>100</td>
</tr>
</tbody>
</table>

Source Planning Commission of Pakistan (2017)

9.4 National Project Approving Forums

The public sector development projects in Pakistan are approved by various forums according to their monetary value and significance. These forums are represented by various Government departments and functionaries based on their relevance and expertise to the projects. The various forums for approval of the projects are discussed as follows

9.4.1 Bodies for Lone term, medium term and long term plans

i. National Economic Council (NEC): The Council is chaired by the Prime Minister of Pakistan and represented by all the Chief Ministers of the provinces. NEC takes up important issues and projects of national significance and strategic importance. The projects like China Pakistan Economic Corridor (CPEC), Gawadar Port, Saindak project etc. are decided by such forum.

ii. Economic Coordination Council (ECC): This is chaired by the Finance Minister of Pakistan and represented by the Finance Ministers of all the provinces. The council discuss and approve projects of immediate short term nature.

9.4.2 Bodies for approving projects

For approval of the Public Projects of the Sector Development Program, the following forums are used, depending on the monetary value and location of the project

i. Executive Committee of the National Economic Council (ECNEC) This forum is chaired by the Federal Finance Minister and represented by nominees from provinces. This is the highest forum for approval of the developmental projects and takes up projects having value more than PKR 3 billion.

ii. Central Development Working Party (CDWP): The deputy Chairman Planning Commission is the chair of the forum and is represented by various important
ministries including Finance etc. They can approve the projects up to the value of PKR 3 billion.

iii. **Provincial Development Working Party (PDWP):** This forum is represented by Planning & development party of province and chaired by additional chief secretary of the province. The forum can take up projects up to a value of PKR 10 billion.

iv. **Departmental Development Working Party (DDWP):** This forum is chaired by the department secretary and represented by various concerned departments. It can take up projects up to PKR 60 million.

The funds are released to the concerned ministries by Finance Division on the recommendations of the Planning Commission, based on the project performance and phase of project lifecycle. In general, during 1st and 2nd quarters 20% each are released, whereas in 3rd and 4th quarter, 30% each are released. Ministries and Division submit, their quarterly utilization reports, to the planning commission, which are reviewed by the monitoring wing and funds release authorization is given to the Finance Division and AGPR. Based on the releases, ministries issue sanction letter for the projects to the concerned division and executing agencies.

9.4.3 **Re-appropriation and Quarterly Review of developmental projects**

In case the funds utilization is not as per plan and there are unutilized funds in the project, the concerned ministry is authorized to transfer funds to the project(s), where funds utilization is good. This is called Re-appropriation of funds. Such re-appropriation statements are prepared by the concerned executing agency and submitted to the secretary of Principal Accounting Officer (PAO) for approval. Once approved, the funds are transferred from one project to the other projects.

The performance of the project execution is regularly monitored by the Planning Commission (Monitoring section) on quarterly basis. The quarterly progress report on PC-III B is prepared by the executing agency and submitted to the concerned ministry on 20th of the next month after the quarter. These reviews are held to assess the project performance and progress. The first quarter review of FY 2016-17 is held from Nov 1 to Nov 8, 2016 and the second quarter from Jan 24 to Jan 31, 2017. The Monitoring and Evaluation section of the project wing of the planning commission rigorously monitor the developmental projects and submit it to the Prime Minister of Pakistan.

9.5 **Revision of Developmental projects:**
The projects are often revised due to multiple reasons. Some of the major causes of project revisions are given as follows

- **Change in scope of the project:** The approval of a particular project is normally accorded for a specific well defined scope or boundaries of the project. It is mandatory for the project directors and executing agency to adhere to the approved scope of the project. But in many cases, the scope of the project is deemed changed due change in the clients’ priorities, change in Government, change in expectations or some other legislative requirements.

- **Increase in the project cost:** Delays are commonly done in the project due to many reasons in the public sector projects. In most cases, the project releases are not matched with the approved financial phasing of the project. In other cases, the capacity of the executing agency is not well enough to deal with the complexity of the project. Change in political Governments also leads to change the priorities of the projects, as every new Government prefers to bring new projects in their tenure. Due to these multiple reasons, the projects are delayed and consequently the project costs are increased. If an increase in the project is within 15% of the approved cost, there is no need for revision of such
projects and additional funds are allocated, provided that such requests are submitted well in time before the closing of the project.

- Unrealistic project estimates: The preliminary project estimates are based on rough cost data, not supported with detailed Engineering studies. In such case the project’s cost is increased during the execution and detailed design stages. Hence the cost estimates rare required to be revised, even if there is no change in the scope.

- Price adjustments in the input prices: In developmental projects of more than 6 months duration or 50 million value, there is always a provision of adjustment in prices of major inputs’ prices, based on market changes. When inflation is very high, there is enormous increase in the project cost, particularly when the released are also delayed than planned in PC-1. In some case, this increase may be as high as 25%, even if there is no change in scope.

- Lack of capacity of executing agency: Projects are very difficult to execute in departments, where the role of functional managers are very strong and the project managers are given due importance. In such cases, the decision are delayed at various functional levels. Leading to delays in the projects. The poor understanding of the project staff about the project management also hampers the projects.

- Litigation and Contract disputes: Contract Management is a specific area, where both the parties to the contractors are supposed to deal with their obligations in an equitable manner. However, if the contract is not dealt with carefully, then disputes are created, which often lead to litigation and arbitrations. In such cases, the projects are delayed and the cost is also increased as a result. The project managers have to be very carefully in manage the projects, so that such disputes and litigations are avoided.

In such case, when the project revision is deemed necessary, the revised project proposal (Revised PC-I) is drafted by the executing agency on the prescribed format and submitted by the executing agency to the forum, which has approved the original project. It is very important t submit the revised project (PC-I), before the project is closed, so that necessary funding is ensured in the subsequent Annual Development Plans (ADPs). It has been observed in many cases, that the executing agency, change the scope and cost of the project without the consent of the consent of the concerned ministry and planning commission and the revised PC-I is submitted at very late stage which is not approved and the project becomes sick as no funds can be guaranteed for such projects.

Case Study of Project Revision (Revised PC-1 of 100 Beds District Headquarter Hospital Multan)²

² The information of the project has been retrieved from internet. Some of the explanation and changes have been incorporated in the text to save space. The readers can read the entire document at http://www.pndpunjab.gov.pk/system/files/2nd%20Revised%20PC-I%20for%20Shahbaz%20Sharif%20General%20Hospital%20Multan.doc.
The following PC-1 form illustrates a typical health sector project proposal.

**PLANNING COMMISSION**

**PC-1 FORM**

**REVISED 2005**

<table>
<thead>
<tr>
<th>1. NAME OF PROJECT</th>
<th>Construction of 100 Bedded General Hospital, Multan. (Phase-I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. LOCATION</td>
<td>District Multan</td>
</tr>
<tr>
<td>3. AUTHORITIES RESPONSIBLE FOR</td>
<td></td>
</tr>
<tr>
<td>i. Sponsoring.</td>
<td>i. Provincial Government.</td>
</tr>
<tr>
<td>ii. Execution.</td>
<td>ii. Provincial Building Department.</td>
</tr>
<tr>
<td>iii. Operation &amp; Maintenance.</td>
<td>iii. Health Department, City District Government Multan</td>
</tr>
<tr>
<td>4. (a) Plan Provision.</td>
<td>Through Provincial ADP 2014-15 with allocation of Rs.63.607 Million (Capital Rs.23.477 + Revenue Rs.40.130)</td>
</tr>
<tr>
<td>Total Block Provision</td>
<td>Amount Already Committed.</td>
</tr>
<tr>
<td></td>
<td>Capital Rs.212.021</td>
</tr>
<tr>
<td></td>
<td>Revenue Rs.127.178</td>
</tr>
<tr>
<td></td>
<td>O&amp;M Rs.38.931</td>
</tr>
<tr>
<td></td>
<td>Total Rs.378.130</td>
</tr>
<tr>
<td></td>
<td>Revise A.A</td>
</tr>
<tr>
<td></td>
<td>Capital Rs.212.021</td>
</tr>
<tr>
<td></td>
<td>Revenue Rs.198.865</td>
</tr>
<tr>
<td></td>
<td>O&amp;M Rs. Nil</td>
</tr>
<tr>
<td></td>
<td>Total Rs.410.886</td>
</tr>
<tr>
<td></td>
<td>Amount proposed for this Project.</td>
</tr>
<tr>
<td></td>
<td>Capital Rs.216.670</td>
</tr>
<tr>
<td></td>
<td>Revenue Rs.198.865</td>
</tr>
<tr>
<td></td>
<td>O&amp;M Rs. Nil</td>
</tr>
<tr>
<td></td>
<td>Total Rs.415.535</td>
</tr>
<tr>
<td></td>
<td>Excess</td>
</tr>
<tr>
<td></td>
<td>Capital (+)Rs.4.649</td>
</tr>
<tr>
<td></td>
<td>Revenue (+)Rs. Nil</td>
</tr>
<tr>
<td></td>
<td>O&amp;M Rs. Nil</td>
</tr>
<tr>
<td></td>
<td>(-)Total Rs.4.649</td>
</tr>
<tr>
<td>(b) Provision in the Current year PSDP/ADP</td>
<td></td>
</tr>
<tr>
<td>2011-12</td>
<td>30,000</td>
</tr>
<tr>
<td>2012-13</td>
<td>105,000</td>
</tr>
<tr>
<td>2013-14</td>
<td>70,918</td>
</tr>
<tr>
<td>2014-15</td>
<td>23,477</td>
</tr>
<tr>
<td>5. Project objectives and its relationship with Sectoral objectives.</td>
<td>The specific objectives of the project are -</td>
</tr>
<tr>
<td></td>
<td>* Here the objectives of the original project are given</td>
</tr>
<tr>
<td>Relationship with Sectoral objectives</td>
<td>Here the linkage of the project with the objectives of health sector, social welfare &amp; human empowerment, labour and manpower, Education Department, District Government and Law Department are given.</td>
</tr>
</tbody>
</table>
**Justification for Revision**
Here the major reason for the project revision is given. In instant case, the major reasons are
i. Price variation in Civil work component
ii. Change in prices & quantity of equipment (on the basis of Financial bids opened)

**6. Description, justification and Technical parameters.**

**Project Description**
Justification of the project to augment the existing health services in the district are given here.
The Government of the Punjab, Health Department letter No. The scheme envisages the construction in two phases

**Project rationality**
- Shortage of Health Facilities
- Overcrowding in Hospitals
- Deteriorating level of Medical Services
- Food shortage and Mal nutrition
- Congestion in living space
- Environmental Health problems

**Technical Parameters**
The details of various technical aspects of the project covering various essential components of the project are given here. The covered areas of various facilities and layout of the physical facilities are discussed here.

**7. Capital cost estimates.**

<table>
<thead>
<tr>
<th>COMPONENT WISE, YEAR WISE PHYSICAL ACTIVITIES.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-------</td>
</tr>
<tr>
<td>A.</td>
</tr>
<tr>
<td>B.</td>
</tr>
</tbody>
</table>

- a. Cost of Building portion. Rs.216.670 (Million)
- b. Cost of furniture/ fixture Rs.18.576 (Million)
  Cost Of Medical Equipment Rs.93.976 (Million)
  Cost Of Other Misc. Items Rs.1.933 (Million)
  Cost Of Plant & Machinery Rs.72.574 (Million)
  Cost Of Transport Rs.11.390 (Million)
  Cost Of It Equipment Rs.0.416 (Million)

**Total.** Rs.415.535 Million.

*Detail of cost of civil work, equipment’s, instruments, Furniture & bedding/clothing is attached.*
<table>
<thead>
<tr>
<th>YEAR</th>
<th>CIVIL WORKS</th>
<th>INSTRUMENTS &amp; OTHER EQUIPMENTS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR-I 2011-12</td>
<td>LOCAL 30,000</td>
<td>-</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>FEC -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL 30,000</td>
<td>-</td>
<td>30,000</td>
</tr>
<tr>
<td>YEAR-II 2012-13</td>
<td>LOCAL 105,000</td>
<td>-</td>
<td>105,000</td>
</tr>
<tr>
<td></td>
<td>FEC -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL 105,000</td>
<td>-</td>
<td>105,000</td>
</tr>
<tr>
<td>YEAR-III 2013-14</td>
<td>LOCAL 70,918</td>
<td>119,910</td>
<td>190,828</td>
</tr>
<tr>
<td></td>
<td>FEC -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL 70,918</td>
<td>119,910</td>
<td>190,828</td>
</tr>
<tr>
<td>YEAR-IV 2014-15</td>
<td>LOCAL 23,477</td>
<td>40,130</td>
<td>63,607</td>
</tr>
<tr>
<td></td>
<td>FEC -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL 23,477</td>
<td>40,130</td>
<td>63,607</td>
</tr>
<tr>
<td>YEAR-IV 2013-14</td>
<td>LOCAL -</td>
<td>38,558</td>
<td>38,558</td>
</tr>
<tr>
<td></td>
<td>FEC -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL -</td>
<td>38,558</td>
<td>38,558</td>
</tr>
<tr>
<td>TOTAL</td>
<td>LOCAL 229,395</td>
<td>198,598</td>
<td>427,993</td>
</tr>
<tr>
<td></td>
<td>FEC -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL 229,395</td>
<td>198,598</td>
<td>427,993</td>
</tr>
</tbody>
</table>

8. Annual operating and Maintenance cost after Completion of the project. Recurring cost after completion of the project will Rs.52.653 Million (attached)

9. Demand and Supply Analysis
No modern health facilities scientific diagnostic and adequate health care facility is presently available within walled City of Multan.
This hospital will cover all sorts, departments and components of health care including Medical Surgical Psychiatric Cardiac ENT. Ophthalmic and Pediatrician components, more over special attention about women health i.e. Guyanese and obstetric will be emphasized.
In emergency calamities and natural disaster valuable lives will be saved through this facility.

10. Financial Plan & mode of financing
The project will be executed on cost sharing basis Government of Punjab. In respect of building and structure equipment and other allied requirements like recurring operating expense including medicines and surgical disposables are over Government of the Punjab. Health Department will also take up establishment portion of the project through regular budgetary grant while annual budget. Since the project aimed to providing special services to the paying clients a substantial revenue generation is anticipated through private room. Coupled with
<table>
<thead>
<tr>
<th>11. Project Benefits and Analysis</th>
<th>FINANCIAL BENEFITS &amp; ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Financial</td>
<td>There is direct need of financial / budget for requirements of entire staff. There is no Hospital in the area of Mian Muhammad Shahbaz Sharif General Hospital Multan financial expenditure for infrastructure equipment and recurring charges is required. The yardstick of staff is in accordance with international level &amp; as reflected by Health Department Tremendous public will be benefited from this institution specially.</td>
</tr>
<tr>
<td></td>
<td>1. Mortality rate will be decreased.</td>
</tr>
<tr>
<td></td>
<td>2. Health standard of public will enhance.</td>
</tr>
<tr>
<td></td>
<td>3. Better Health Facilities to mother and child.</td>
</tr>
<tr>
<td></td>
<td>4. Prompt and scientific facility for operations.</td>
</tr>
<tr>
<td></td>
<td>5. Rehabilitation of disabled and injured.</td>
</tr>
<tr>
<td></td>
<td>6. Blindness in this area will be decreased and controlled.</td>
</tr>
<tr>
<td></td>
<td>7. Better social and mental health to addicts.</td>
</tr>
<tr>
<td></td>
<td>8. Provision of better health facilities at doorsteps.</td>
</tr>
<tr>
<td></td>
<td>10. Survival of heart failure patients.</td>
</tr>
<tr>
<td>ii. Social benefits with indicators</td>
<td>This all will decreased load of patients on teaching Hospital &amp; specialized institution by promoting physical and mental health and adopting preventive and Hygienic principal the number of patients and diseases will decrease resultantly budget lowed of Government for treatment and saving will be utilized for development programmes.</td>
</tr>
<tr>
<td></td>
<td>It is expected that more than five Lacks patients will visit outpatient department about 35000 patients will get admission more than 15000 procedure and about 10000 major operations will be carried in newly established Mian Muhammad Shahbaz Sharif General Hospital Multan in a year. This project will also provide M.C.H care facilities to more than one Lac Patients. The family planning services trainings of Doctors and paramedics shall also be provided.</td>
</tr>
</tbody>
</table>

**REVENUE GENERATION.**

Revenue will be generated from
1. Outdoor patients
| iii. Employment generation (direct and indirect) | 2. Laboratory fees.  
3. Diagnostic facility fees.  
5. From other fees prescribed by Government.  
6. From private rooms.  
The Targets of MDGs will be achieved.  

**SOCIAL BENEFITS WITH INDICATORS.**

Social economic burden will be decreased due to availability of better medical services in the district. Time and money of community will be saved which were expended in other cities like Lahore, Islamabad etc. on treatment of patient and for boarding and logging of attendance. The social status of community will up rise.

Establishment of Mian Muhammad Shahbaz Sharif General Hospital Multan will lead to generation of employment in the highly skilled professional fields to staff of lower scale of unskilled nature leading to reduction of unemployment and to the job satisfaction to the skilled and needy members of the society. A large number of employments opportunity raised from the establishment of the project. The Medical doctors and paramedics who are trained in this discipline or intended to specialize in this field can make maximum use of training. 46 Gazetted & 119 Non Gazetted post will be available for employment.

It will have no hazardous effect on the environment. On the other hand addition of green belts to the area will provide healthy environment and relaxation / comfort to the general public. Establishment of proposed project will enable a very positive impact on the society by relieving their diseases and making them useful member of the society. This will also lessen load of dependent individual beggars and criminal. This facility will help to provide sign of relief in different segments of society who have been demanding the same for comprehensive care of specialties cases. The impact of this facility will be everlasting to improvise stability through technical assistance of experts.

Delay in the implementation of the project will lead to increase in cost and increase financial burden on the government and general population of this area will continue to suffer for longer period of time incoming. Since the project

| v. Impact of delays on project cost and viability |  
|  

|  

is one of the major needs and has been a long awaited desire of the community therefore government of the Punjab contemplated plan for early execution of District Headquarter Hospital. The delay will not only deprived the victims of the state of the art facility but also distort the public image. In case of delay the price hike in coming years in one of the major threats in its completions Being a specialized health care facility. The capital as well recurring cost will be increase alarmingly with even delay of months. The project is an on-going facility which vibrant mechanism in place for its sustainability.

12. Implementation schedule

If approved project will be completed within (5) financial years. Building will be completed within (3) and purchase of equipment and recruitment of manpower will take two years.

13. Management Structure and Manpower Requirements

(i) Administrative Arrangements

**MANAGEMENT STRUCTURE**

Institution will be run under the administrative control of Medical Superintendent, who will control this with the collaboration and cooperation of Additional Medical Superintendent & Deputy Medical Superintendent. Each medical and surgical unit will be further controlled by head of concerned department. While the account section will be headed by accounts officer. Similarly budget and finance sorts will be controlled by Budget & Finance Officer Official record will be kept up to date under the supervision concerned Office Superintendent.

(ii) Manpower during Execution and Operation of the Project.

Detail of manpower for operation is attached.

(iii) Job Description, Qualification, Experience, age & Salary of each job.

Detail attached.

14. Additional projects / decisions required to maximize socio-economic benefits from the proposed project.

Following additional services in this 70 bedded state of the Mian Muhammad Shahbaz Sharif General Hospital Multan (Phase-I) will increase the utility / benefits of the project and maximize socio-economic benefits.
7. Increase of beds upto 100 Beds
8. Provision of Rehabilitation Centre.
9. Provision of Burn Unit.
13. Training Facility of Doctors, Paramedics, & Nurses etc. by provision of District Health Development Centre.

15. Certified that the project proposal has been prepared on the basis of instructions provided by the Planning Commission for the preparation of PC-1 for Social Sector projects.

Chapter Summary

Public Sector Projects are approved by the Planning Commission for the Federal PSDP projects and provincial Planning and Development departments. In this chapter the role of Planning Commission of Pakistan, various project approving bodies, their constitution has been discussed. With the help of an example of revised PC-1, of a Hospital project, the revision of PC-1 has been explained. Various documents are project phases of the public sector projects have been also discussed in the chapter.
Q 9.1  Explain the chronology of planning history of Pakistan

Q 9.2  Describe major functions and organs of the Ministry of Planning and Development and Reforms, Government of Pakistan

Q 9.3  Explain the role and constitution of various project approval bodies of Pakistan

Q 9.4  What is meant by the term PSDP? Explain important parts of the PSDP 2017-18 for the current financial year (2017-18)


Hartley, J. R., and Okamoto, S.,(1997),Concurrent engineering Shortening lead times, raising quality, and lowering costs, Productivity Press, Shelton, Conn.


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Templates of the Project Documents used by Government of Pakistan

Appendix-1

PC-1 FORM
GOVERNMENT OF PAKISTAN
PLANNING COMMISSION

PROFORMA FOR DEVELOPMENT PROJECTS
(SOCIAL SECTORS)

- Education, Training and Manpower
- Health, Nutrition, Family Planning & Social Welfare
- Science & Technology
- Water Supply & Sewerage
- Culture, Sports, Tourism & Youth
- Mass Media
- Governance
- Research
GOVERNMENT OF PAKISTAN
PLANNING COMMISSION
PC-1 FORM
(SOCIAL SECTORS)

1. Name of the Project
2. Location
3. Authority responsible for
   i. Sponsoring
   ii. Execution
   iii. Operation and maintenance
   iv. Concerned federal ministry
4. Plan Provision
5. Project objectives and its relationship with Sectoral objectives
6. Description, justification and technical parameters
7. Capital cost estimates
8. Annual operating and maintenance cost after completion of the Project
9. Demand and supply analysis
10. Financial Plan and mode of financing
11. Project benefits and analysis
    i. Financial
    ii. Social benefits with indicators
    iii. Employment generation (direct and indirect)
    iv. Environmental impact
    v. Impact of delays on project cost and viability
12. a) Implementation schedule
    b) Result Based Monitoring (RBM) Indicators.
13. Management structure and manpower requirements including
    Specialized skills during execution and operational phases
14. Additional projects/decisions required to maximize socio-economic
    Benefits from the proposed project
15. Certified that the project proposal has been prepared on the basis of
    Instructions provided by the Planning Commission for the preparation of
    PC-I for Social Sector projects.

Prepared by _________________________
Name, Designation & Phone#

Checked by _________________________
Name, Designation & Phone#

Approved by _________________________
Name, Designation & Phone#
Instructions to Fill-in PC-I Proforma (Social Sectors)

1. **Name of the Project**
   Indicate name of the project.

2. **Location**
   - Provide name of District/Province.
   - Attach a map of the area, clearly indicating the project location.

3. **Authorities responsible for**
   Indicate name of the agency responsible for sponsoring, execution, operation and maintenance. For provincial projects, name of the concerned federal ministry be provided.

4. **Plan provision**
   - If the project is included in the medium term/five year plan, specify actual allocation.
   - If not included in the current plan, what warrants its inclusion and how is it now proposed to be accommodated.
   - If the project is proposed to be financed out of block provision, indicate

<table>
<thead>
<tr>
<th>Total block provision</th>
<th>Amount already committed</th>
<th>Amount proposed for this project</th>
<th>Balance available</th>
</tr>
</thead>
</table>

   (b) Provision in the current year PSDP/ADP

5. **Project objectives**
   - The objectives of the sector/sub sector as indicated in the medium term/five year plan be reproduced. Indicate objectives of the project and develop a linkage between the proposed project and sectoral objectives.
   - In case of revised Projects, indicate objectives of the project, if different from original PC-I.

6. **Description and justification of project**
   - Describe the project and indicate existing facilities in the area and justify the establishment of the Project.
   - Provide technical parameters and discuss technology aspect of the Project.
   - Provide details of civil works, equipment, machinery and other physical facilities required for the project.
   - Indicate governance issues of the sector relevant to the project and strategy to resolve them.

   **In addition to above, the following sector specific information be provided**
Education, training and manpower

- Give student-teacher ratio for the project and the national average for the proposed level of education.
- Year-wise proposed enrolment of the institution for 5 years.
- For scholarship projects, indicate number of scholarships to be awarded each year along with selection criteria.
- Provide faculty strength in relevant discipline, in case of expansion of facilities.
- Indicate the extent of library and laboratory facilities available in case of secondary, college and university education.
- Provide details of technical staff required for operation & maintenance of laboratories.

Health, nutrition, family planning and social welfare

a) Health projects
   - Indicate whether the proposed facilities are preventive or curative.
   - Bifurcate the facilities between indoor, outdoor and department-wise.

b) Nutrition
   - Indicate the infrastructure and mechanism required for the project.
   - Measures taken for involvement and participation of the community.
   - Net improvement in the nutritional status of target groups in quantitative terms.

c) Family planning
   - Provide information relating to motivation and distribution sub-system.
   - Give benchmark data and targets relating to number of couples to be approached and number of contraceptives and other devices to be distributed.
   - Mode/mechanism of advocacy and awareness

Water supply & sewerage

- Present and projected population and water availability/demand.
- Indicate source and water availability (mgd) during next 5, 10, 20 years.
- For waste water/sewerage, provide present and future disposal requirements, gaps if any and proposed treatment methods and capacity.
- Indicate present and proposed per capita water supply in the project area, comparison be made with water supply in similar localities.
- Indicate whether the proposed project is a part of the master plan. If so, provide details.

Culture, sports, tourism & youth

- Existing and projected flow of tourists in the country/project area.
- Capacity of existing departments to maintain archaeological sites/museums.
- Relationship of archaeological projects with internal and foreign tourism.
Mass media

- Indicate area and population to be covered with proposed project.

Research

- Indicate benefits of the research to the economy.
- Mention number of studies/papers to be produced.
- Indicate whether these studies would result in commercial application of the process developed (if applicable).

7. Capital cost estimates

- Indicate date of estimation of Project cost.
- Basis of determining the capital cost be provided. It includes market survey, schedule rates, estimation on the basis of previous work done etc.
- Provide year-wise estimates of Physical activities by main components as per following.

<table>
<thead>
<tr>
<th>Component-wise, year-wise physical activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>A.</td>
</tr>
<tr>
<td>B.</td>
</tr>
<tr>
<td>C.</td>
</tr>
</tbody>
</table>

- Phasing of Capital cost be worked out on the basis of each item of work as stated above and provide information as per following.

<table>
<thead>
<tr>
<th>Year-wise/component-wise financial phasing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Million Rs)</td>
</tr>
<tr>
<td>Item</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>A.</td>
</tr>
<tr>
<td>B.</td>
</tr>
<tr>
<td>C.</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

In case of revised Projects, Provide

- Projects approval history, year wise PSDP allocations, releases and expenditure.
- Item-wise, year-wise actual expenditure and Physical progress.
- Justification for revision of PC-I and variation in scope of the project if applicable.
- Item-wise comparison of revised cost with the approved cost and give reasons for variation.
- Indicate exchange rate used to work out FEC in the original and revised PC-I.
8. **Annual operating cost**
   - Item-wise annual operating cost for 5 years and sources of financing.

9. **Demand supply analysis (excluding science & technology, research, Governance & culture, sports & tourism sectors)**
   - Existing capacity of services and its supply
   - Projected demand for ten years
   - Capacity of projects being implemented both in the public & private sector
   - Supply – demand gap
   - Designed capacity & output of the proposed project

10. **Financial plan**
    
    **Sources of financing**
    
    (a) **Equity**
    
    Indicate the amount of equity to be financed from each source
    - Sponsors own resources
    - Federal government
    - Provincial government
    - DFI's/banks
    - General public
    - Foreign equity (indicate partner agency)
    - NGO’s/beneficiaries
    - Others

    (b) **Debt**
    
    Indicate the local & foreign debt, interest rate, grace period and repayment period for each loan separately. The loan repayment schedule be also annexed.

    (c) Grants along with sources

    (d) Weighted cost of capital

11. (a) **Project benefits and analysis**
    
    - Financial Income to the project along with assumptions.
    - Social Quantify benefit to the target group
    - Environmental Environmental impact assessment negative/positive.

    (b) **Project analysis**
    
    - Quantifiable output of the project
    - Unit cost analysis
    - Employment generation (direct and indirect)
    - Impact of delays on project cost and viability
12. a) **Implementation of the project**

- Indicate starting and completion date of the project
- Item-wise/year-wise implementation schedule in line chart co-related with the phasing of physical activities.

b) **Result Based Monitoring (RBM) Indicators**

- Indicate Result Based Monitoring (RBM) framework indicators in quantifiable terms in the following table.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Input</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Baseline Indicator</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
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<td>3</td>
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</tbody>
</table>

13. **Management structure and manpower requirements**

- Administrative arrangements for implementation of the project.
- Manpower requirements during execution and operation of the project be provided by skills/profession.
- Job description, qualification, experience, age and salary of each job be provided.

14. **Additional projects/decisions required**

- Indicate additional projects/decisions required to optimize the investment being undertaken on the project.

15. **Certificate**

- The name, designation and phone # of the officer responsible for preparing and checking be provided. It may also be confirmed that PC-I has been prepared as per instructions for the preparation of PC-I for social sector projects.
- The PC-I along with certificate must be signed by the Principal Accounting Officer to ensure its ownership.
1) Name by which survey/feasibility will be identified

2) Administrative authorities responsible for
   i) Sponsoring
   ii) Execution

3) Details of survey/feasibility study
   i. General description and justification
   ii. Implementation period
   iii. Year wise estimated cost
   iv. Manpower requirements
   v. Financial plan

4) Expected outcome of the survey feasibility study and details of projects likely to be submitted after the survey.

Prepared by _______________________
Name, Designation & Phone #

Checked by _______________________
Name, Designation & Phone #

Approved by _______________________
Name, Designation & Phone #
1. **Name of the Project**

   Please indicate the name by which survey/feasibility study will be undertaken.

2. **Administrative authority**

   Indicate name of the agency responsible for sponsoring and execution of the project.

3. **Details of survey/feasibility study**

   - Provide a general description of the aims, objectives and coverage of the survey/feasibility Study.
   - Provide justification for undertaking the survey/feasibility Study. Indicate whether previous studies in the field have been undertaken. If so, provide details.
   - Indicate duration of study and proposed months of commencement and completion of the study.
   - Provide item-wise/year-wise capital cost estimate of the study broken down between local and foreign exchange.
   - Indicate date on which cost estimates were prepared and the basis of these estimates.
   - Sources of financing the capital cost be provided.
   - Indicate requirements separately for local and foreign personnel i.e. Professional, technical, administrative, clerical, skilled, unskilled, others along with their terms of reference.
   - Indicate the period of contract of both the local and foreign consultants along with qualifications, experience and the terms of their appointment.

4. **Expected outcome**

   - Indicate the expected outcome of the survey/feasibility study in quantifiable terms. It may also be indicated whether any project will be prepared after the survey.
Appendix-3 PC-III FORM

Revised 2005

GOVERNMENT OF PAKISTAN
PLANNING COMMISSION

PROFORMA FOR DEVELOPMENT PROJECTS
(ANNUAL TARGETS AND PROGRESS REPORTING)

PC-III (a) Form (Revised – 2005)

Government of Pakistan
Planning Commission
Implementation of Development Projects
(Physical Targets based on PSDP allocation)
To be furnished by 1st July of each year

1. Name of the Project

   
   
   (Million Rs)

2. Approved Capital Cost

   
   

3. Expenditure up to the end of last Financial Year

<table>
<thead>
<tr>
<th>Actual</th>
<th>Accrued</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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</table>

   (Million Rs)

4. PSDP allocations for the Current year

<table>
<thead>
<tr>
<th>Total</th>
<th>Local</th>
<th>FEC</th>
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<tbody>
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</table>

   (Million Rs)

5. Annual Work Plan

<table>
<thead>
<tr>
<th>As per PC-I</th>
<th>Achievements upto the end of last year</th>
<th>Target for current year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Unit</td>
<td>Quantities</td>
</tr>
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</tbody>
</table>
6. **Quarterly work plan based on annual work plan**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>1st Quarter</th>
<th>2nd Quarter</th>
<th>3rd Quarter</th>
<th>4th Quarter</th>
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</table>

7. **Cash Plan**

<table>
<thead>
<tr>
<th></th>
<th>1st Quarter</th>
<th>2nd Quarter</th>
<th>3rd Quarter</th>
<th>4th Quarter</th>
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</table>

(Rs Millions)

8. **Output indicators**

   To be determined by project director on the basis of indicators given in the PC-I.
1. **Name of the Project**  
   Indicate name of the project.

2. **Approved capital cost**  
   Provide approved capital cost by the competent forum.

3. **Expenditure upto the end of last financial year**  
   Provide the actual and accrued expenditure up to end of last financial year.

4. **PSDP allocations for the current year**  
   Provide allocations for the project as shown in the PSDP/ADP.

5. **Annual Work Plan**  
   - Provide scope of work as indicated in the PC-I by major items of work.  
   - Actual physical achievements up to the end of last financial year against the scope of work indicated in PC-I.  
   - Physical targets for the year be determined on the basis of activity chart/work plan to be prepared each year on the basis of PSDP allocations. (Blank Activity chart/work plan for major items of works enclosed).

6. **Quarterly Work Plan**  
   The quarterly work plan be prepared on the basis of annual work plan.

7. **Cash Plan**  
   Indicate the finances required to achieve the quarterly work plan targets as indicated at 6 above.

8. **Output indicators**  
   A number of projects start yielding results during its implementation. In such projects the recurring cost is capitalized and the project start yielding results during its implementation. Indicate quantifiable outcome of the projects for the current year.
Government of Pakistan
Planning Commission

PC-III (B) Form
(Revised - 2005)

Implementation of Development Projects
(To be furnished by 5th day of each month)

1 Name of the Project

2 Financial Status
   i) PSDP allocations for the current year
   ii) Current quarter requirements as per cash plan
   iii) Releases during the month
   iv) Expenditure during the month

3 Physical Status
   Physical achievements during the month under report

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Unit</th>
<th>Items</th>
<th>Quantities</th>
</tr>
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<tbody>
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</tbody>
</table>
4 Output Indicators

5 Problem/Bottlenecks in Projects Implementation
Ban on Recruitment
Delay in Consultants Appointments
Lack of coordination between Fed/Prov. Govt.
Land Acquisition
Turn over PD/Staff
Concept & Design Problems
Delay in Release of Fund
Law & Order Situation Management Capacity Non Existence of PMUs
Intra-Departmental Problems
Procurement problems
Contractor's Problem
Others
### Project Completion Report

**PROFORMA FOR DEVELOPMENT PROJECTS**

**PCR – 01**
(Revised-2010)

---

**GOVERNMENT OF PAKISTAN**

**PLANNING COMMISSION**

**PROJECT COMPLETION REPORT**

**(PC – IV PROFORMA)**

To be furnished immediately after completion of the project regardless the project accounts have been closed or not.

---

<table>
<thead>
<tr>
<th></th>
<th><strong>Name of the Project/Program/Study</strong></th>
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<tbody>
<tr>
<td></td>
<td><strong>Location</strong></td>
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<thead>
<tr>
<th></th>
<th><strong>Sector</strong></th>
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<tr>
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<td><strong>Sub-Sector</strong></td>
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<thead>
<tr>
<th></th>
<th><strong>Sponsoring Ministry/Agency</strong></th>
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<th></th>
<th><strong>Executing Agency (s)</strong></th>
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<tr>
<th></th>
<th><strong>Agency for Operation &amp; Maintenance after Completion</strong></th>
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<thead>
<tr>
<th></th>
<th><strong>Date of Approval &amp; Approving Forum (DDWP/CDWP/ECNEC/PDWP/Other)</strong></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Original</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>Revised</strong></td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th></th>
<th><strong>a) Implementation Period</strong></th>
<th><strong>Date of Commencement</strong></th>
<th><strong>Date of Completion</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>As per PC-I</strong></td>
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<td></td>
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<tr>
<td></td>
<td><strong>Actual</strong></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>b) Extension(s) in the Implementation Period (if any)</strong></th>
<th><strong>Date</strong></th>
<th><strong>Period</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>(Months/Days)</td>
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</tbody>
</table>

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129
8. **Capital Cost**

<table>
<thead>
<tr>
<th></th>
<th>PC-I Cost (approved)</th>
<th>Actual Expenditure</th>
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<tbody>
<tr>
<td></td>
<td>Local</td>
<td>FE/Loan/Grant</td>
</tr>
<tr>
<td></td>
<td>Local</td>
<td>FE/Loan/Grant</td>
</tr>
<tr>
<td>• Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Revised</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Clearly specify the source and mention exchange rate

<table>
<thead>
<tr>
<th></th>
<th>(Rs. Million)</th>
</tr>
</thead>
</table>

9. **Financing of the Project**

<table>
<thead>
<tr>
<th></th>
<th>Local</th>
<th>FE/Loan/Grant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Federal Share</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provincial Share</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Donors/Others</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total**

* Mention the Rupee exchange rate, if applicable

10. **Project Accounts**

<table>
<thead>
<tr>
<th>Nature of Account</th>
<th>Type</th>
<th>Date of Opening</th>
<th>Lapsable/Non-lapsable</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLA</td>
<td>Assignment Account</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current Account</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Saving Account</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) **Status of Account**

- If closed, mention the date
- If not closed, mention reasons thereof & tentative closure date

11. **Financial Phasing as per PC-I and Expenditure**

<table>
<thead>
<tr>
<th>Year</th>
<th>PC-I Phasing</th>
<th>PSDP Allocation</th>
<th>Releases</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>FE/Loan/Grant</td>
<td>Total</td>
<td>FE/Loan/Grant</td>
</tr>
<tr>
<td></td>
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<td>1</td>
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<td>4</td>
<td>5</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>FE/Loan/Grant</td>
<td>Total</td>
<td>FE/Loan/Grant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Clearly specify the source
12. Physical Targets and Achievements

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Items (as per PC-I)</th>
<th>Unit</th>
<th>Quantity</th>
<th>Actual * Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

* Attach/Annex detailed information for each item separately

13. Item-wise Planned & Actual Expenditure (Rs. Million)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Items (As per PC-I)</th>
<th>PC-I Estimates</th>
<th>Actual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

14. Recurring Cost after Completion of the Project (Rs. Million)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Components</th>
<th>PC-I Estimates*</th>
<th>Actual Expenditure*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Total

* Mention source and agency responsible for financing the recurring cost after completion of the project

15. Achievement of Objectives

<table>
<thead>
<tr>
<th>S. No.</th>
<th>As Contained in the PC-I</th>
<th>Actual Achievement*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>

* Attach/Annex detailed information for each objective separately. In case of not achieving the objectives fully/partially, indicate reasons thereof

16. Year-wise Income from Services/Revenue Generation (Rs. Million)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>As Estimated in the PC-I</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17. **RBM Indicators as given in the PC-I**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Input</th>
<th>Output</th>
<th>Outcome</th>
<th>Baseline Indicator</th>
<th>Targets after Completion of Project</th>
<th>Targeted Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

18. **List of Project Directors (PDs) till Completion**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name &amp; Designation</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

19. **Responsibility/Ownership of Assets (Procured/Acquired/Developed) after Completion of the Project**
   
   - Indicate Agency
   - List of Assets (Moveable/Immoveable)
20. **Impact after Completion of the Project**

   a) Financial  
   b) Economic  
   c) Technological  
   d) Social (Education, Health, Employment, area Development, etc.)  
   e) Environmental  
   f) Any other

21. **Mechanism for Sustainability of Activities after Completion**

   Indicate mechanism how the project activities will be continued on sustainable basis

22. **Financial/Economic Analysis**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Components</th>
<th>As Per PC-I</th>
<th>After Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Financial</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net Present Value (NPV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Benefit Cost Ratio (BCR)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Internal Financial Rate of Return (IFRR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unit Cost Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Economic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net Present Value (NPV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Benefit Cost Ratio (BCR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal Economic Rate of Return (IERR)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23. **Issues Faced during Implementation**

   - Organizational Management
   - Capacity of the department concerned
   - Decision making process
   - Any other

24. **Lessons learned**

   a) Project identification  
   b) Project preparation  
   c) Project approval  
   d) Project financing  
   e) Project implementation

25. **Suggestions for Future Planning & Implementation of Similar Projects**

Submitted by

Signature

Name & Designation

Telephone No.

E-mail Address

Date
Instructions to fill in the PC-IV Proforma

1. **Name of the project**
   Indicate the same name of the project as appeared on PC-I and also mentioned locations of the project.

2. **Sector/Sub-Sector**
   Indicate Sector & Sub-Sector in which the project falls and as indicated in the PC-I.

3. **Sponsoring Ministry/Agency**
   Indicate the full name of the Ministry/Department/Agency with address.

4. **Executing Agency**
   Indicate the name and address of the Organization responsible for implementation of the project.

5. **Agency for Operation & Maintenance after Completion**
   Indicate the name and address of the Agency/Organization.

6. **Date of Approval**
   Mention date of approval of the competent forum like DDWP, CDWP, ECNEC, etc. and enclose copy of the decision/s.

7. **Implementation period**
   Indicate planned, actual commencement & completion date and total duration (in months). Provide details of extension granted in the implementation period with dates and the notification indicating the name of authority.

8. **Capital cost**
   Provide capital cost of the project as approved by the competent forum and actual expenditure incurred on the project till preparation of PC-IV with expected/actual completion cost.
9-10. **Financing the project**
Provide financing/funding requirement and agency (indicating exchange rate in case of foreign component provided in the PC-I).

11. **Financial Phasing as per PC-I and Expenditure**
- Provide PC-I phasing as per approved PC-I.
- PSDP allocations as reflected in annual PSDP/ADP.
- Year-wise releases made to the project.
- Year-wise actual expenditure incurred on the project.

12. **Item-wise physical targets and achievements**
- Provide item-wise quantifiable physical targets as given in the approved PC-I.
- Actual physical achievements against physical targets be provided.

13. **Item-wise planned and actual expenditure**
- Provide item-wise allocations as per approved PC-I.
- Item-wise actual expenditure incurred on the project be provided.

14. **Recurring Cost after Completion of the Project**
Indicate Source and Agency Responsible for Financing the Recurring Cost after completion of the project.

15. **Achievements of Objectives**
Indicate actual achievements against objectives envisaged in the PC-I.

16. **Year-wise income from services rendered/income generation**
Indicate the details and type of services rendered to other agency(s), private agencies and amount of income generated.

17. **Indicate Result Based Monitoring & Evaluation (RBM&E) indicators as envisaged in the Column 12(b) of the PC-I**

18. **List of Project Directors (PDs) Since Inception**
Give details of the PDs of the projects with full details of working periods.
19. **Responsibility/ownership of assets (procured/developed) after Completion of the project**

Indicate to whom assets of the project (developed/procured) will be transferred after completion of project. Details of assets may also be provided.

20. **Impact after Completion of the Project**

Provide impact of the project on the target group/area, etc.

21. **Mechanism for sustainability of project/activities**

Indicate the mechanism by which project activities will be continued in a sustainable manner.

22. **Financial/Economic results based on actual cost**

- Undertake financial, unit cost and economic analysis based on actual capital and recurring cost. The benefits of the project may also be calculated on prevailing prices and output.
- In case of social sector projects, unit cost analysis may only be provided.

23. **Project implementation**

- Indicate whether project has been implemented as per approved cost, scope and time. In case of variation, reasons be provided.

24. **Lessons learned**

- Provide lesson’s learned during identification, preparation, approval, financing and implementation of the project.

25. **Suggestions**

- Suggestions for planning & implementation of similar nature of projects, keeping in view the lessons learned during the implementation of this project.
Appendix-5 PC-V FORM

The Proforma along with activity chart/work plan has to be furnished by 1st July of each financial year.

GOVERNMENT OF PAKISTAN
PLANNING COMMISSION

PROFORMA FOR DEVELOPMENT PROJECTS
(ANNUAL PERFORMANCE REPORT AFTER COMPLETION OF PROJECT)

From PC-V
Revised 2005

Government of Pakistan
Planning Commission

To be furnished by 31st July of each years for 5 years after completion of Project indicating Projects operational results during the last financial year.

1. Name of the Project
2. Objectives & scope of project as per approved PC-I and state as to what extent the objectives have been met
3. Planned and actual recurring cost of the project, with details
4. Planned & actual manpower employed
5. Planned and actual physical output of the project
6. Planned and actual income of the project
7. Planned and actual benefits to the economy
8. Planned and actual social benefits
9. Planned and actual cost per unit produced/sold
10. Marketing mechanism
11. Arrangement for maintenance of building & equipment.
12. Whether output targets as envisaged in the PC-I have been achieved. If not, provide reasons
13. Lessons learned during the year in
14. Any change in project management during the year

15. Suggestions to improve projects performance
<table>
<thead>
<tr>
<th>Question</th>
<th>Correct Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>i</td>
<td>Having money today is worth more than having the same amount a year from now</td>
</tr>
<tr>
<td>2</td>
<td>ii</td>
<td>Usually expressed on a yearly basis but can be of any duration</td>
</tr>
<tr>
<td>3</td>
<td>i</td>
<td>Can make a significant difference in the accumulated interest when a high interest rate is considered over a prolonged time period</td>
</tr>
<tr>
<td>4</td>
<td>iv</td>
<td>It has does not have a physical basis</td>
</tr>
<tr>
<td>5</td>
<td>iii</td>
<td>the same as a nominal interest rate if the two rates are expressed in a common compounding period</td>
</tr>
<tr>
<td>6</td>
<td>i,</td>
<td>is generally lower than the effective rate</td>
</tr>
<tr>
<td>7</td>
<td>ii</td>
<td>the interest period is infinitesimally small</td>
</tr>
<tr>
<td>8</td>
<td>iii</td>
<td>is useful for summarizing the timing and magnitude of cash flows over time</td>
</tr>
<tr>
<td>9</td>
<td>iii</td>
<td>the end of one period corresponds to the beginning of the next period</td>
</tr>
<tr>
<td>10</td>
<td>iv</td>
<td>Market equivalence always holds for large companies and individuals</td>
</tr>
</tbody>
</table>