FINANCIAL & ECONOMIC APPRAISAL OF PC-I PROPOSALS

Concept Review of Key Techniques

PRACTICAL GUIDE FOR P&DD OFFICIALS

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PRACTICAL GUIDE

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This brief guide is designed to provide a simplified manual for P&DD Officials that may be used as a frame of reference when conducting financial and economic appraisals of PC-I proposals. The document should serve as a starting point to improve the quality of appraisal and analysis of project proposals.

Disclaimer

This report contains data, tables, figures, analysis and technical notes that are related to the **Subject Report (Practical Guide for Financial & Economic Appraisal of PC-I Proposals - 2020).** The content expressed in this report may reflect the views of the author, reviewers and individual(s) interviewed in pursuance of this report.

Every effort has been made to cross-check and verify the authenticity of the data. All information used is assumed to be correct. This report is prepared by Research & Training Wing, Planning & Development Department – Government of Sindh.

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Preface

The primary motivation for developing this guide for financial and economic appraisal of PC-I proposals is to impart critical knowledge on key techniques that can significantly improve the overall quality of appraisals and can eventually translate into improved 'returns of public sector development investment'.

The guide aims to delve into the review of key concepts pertaining to financial and economic appraisals of project proposals. However, this document should not be taken as an end-to-end guide for all the facets of PC-I proposals that varies across sectors and may also vary across each proposal. The overarching objective is to facilitate a paradigm shift from the focus on scrutinizing the internal consistency of the proposals or the sole emphasis on cost-rationalization to ascertain the 'returns on investment' indicators associated with the proposed projects. The 'returns on investment' can be defined in many ways, but a simple definition can be: quantifiable social, financial, economic, environmental or other benefits that can be yielded with the costs incurred or investments made on the project. For evidence-based planning, it is essential to provide credible evidence to quantify and substantiate the potential impact associated with the proposed project. The quality of appraisal would generate a demand for the executing agencies to justify the need of the proposed project with sufficient and unequivocal evidence on the spectrum of potential benefits.

This practical guide can serve as the starting point to move the public sector development paradigm towards evidence-based planning. Improvements in the quality of appraisal can have significant multiplier effects that may have far-reaching financial, economic, social and environmental benefits. However, the focus must be on building on marginal improvements in the quality of financial and economic analysis of the proposals that would eventually translate into an eco-system of public sector development planning that zooms in on the policy and strategic imperatives of the province. Ultimately, the overarching goal is to work in unison for the collective benefit of the province. Any and every effort must be undertaken with a perspective to benefit the society. Contributing to the analytical rigor and capability of the P&DD officials can have amplified positive impact on the key development indicators of the province. The core competency that should be instilled across the departments is sharpening the fundamentals of effective writing, reading comprehension and critical analysis when preparing or appraising project proposals.

Acronyms

ADP	Annual Development Programme
AI	Artificial Insemination
BCR	Benefit–Cost Ratio
BEV	Break-Even Value
BEQ	Break-Even Quantity
CBA	Cost–Benefit Analysis
CEA	Cost-Effectiveness Analysis
DSS	Decision Support System
EU PFM-SPP	European Union Public Financial Management Support Program for Pakistan
EIA	Environmental Impact Assessment
FV	Future value
GoP	Government of Pakistan
GoS	Government of Sindh
IRR	Internal Rate of Return
NGO	Non-Governmental Organisation
NPV	Net Present Value
OC	Opportunity Cost
O&M	Operation and Maintenance
P&D	Planning and Development
P&DD	Planning and Development Department
PC	Planning Commission
PDWP	Provincial Development Working Party
PKR	Pakistani Rupee
PSDP	Public Sector Development Programme
PV	Present Value
ROI	Returns on Investment
TC	Technical Committee
VFM	Value for Money
WB	World Bank

Glossary of Terms

Benefit–Cost Ratio:	Technique for the cost-benefit analysis to compute overall benefits relative to the costs associated with a project. BCR>1 indicates that the benefits outweigh the costs
Break-Even Point	Calculated by dividing the fixed costs of production by the price per unit minus the variable costs of production. It is the level of production at which the costs of production equal the revenues for a product
Cost Benefit Analysis:	Analyzing comprehensive list of all the costs and benefits associated with the project or decision. Techniques like BCR are part of the analysis.
Cost-Effectiveness Analysis:	Alternative to Cost-Benefit Analysis that is centered on comparing relative costs to the outcomes (cannot be monetized) of two or more projects (e.g., deaths averted due to Project A vs Project B)
Discount Rate	Interest rate used in discounted cash flow (DCF) analysis to determine the present value of future cash flows (determined by the Budget Wing of Finance Division of GoP)
Externality:	Cost or benefit caused by the producer that is not financially incurred or received by the producer (e.g., industrial pollution causing widespread lung diseases in the society)
Financial Sustainability:	The assessment that a project would have sufficient funds to meet all its resources and financial obligations
Future Value	Value of an asset or investment at some point in the future based on assumed growth rate(s)
Internal Rate of Return	Discount rate that makes the net present value of all cash flows in a discounted cash flow analysis equal to zero. IRR is a metric to estimate the profitability of an investment (If IRR>Discount Rate, the project is considered profitable)
Net-Present Value:	Capital budgeting technique that discounts projected cash flows to the present to determine if they are greater than zero or not (NPV>0 means that project is feasible)
Payback Period	Amount of time it takes to recover the cost of an investment. Simply put, the payback period is the length of time an investment reaches a break-even point.
Sustainability:	Meeting present needs without compromising the ability of future generations to meet their needs

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Introduction

When discussing 'returns on investment' (RoI) indicators, one of the queries that may arise is that 'Why would the Government look at RoI indicators, given that its primary aims are grounded in equitable growth and inclusive development?' In other words, the assertion might be that RoI indicators are pertinent to businesses that have a sole profit maximization motive, but not particularly relevant for the Government. The simple answer to that question is that RoI estimations or projections are not reserved for profit-maximizing businesses because many non-governmental and non-profit organizations also incorporate such projections in their proposals to quantify the potential impact. The follow-up question can be: 'Why is computing RoI indicators important for non-profit entities, including the Government?' The answer to this question is also the underlying reason for developing this guide for financial and economic appraisal of project proposals. The confusion often stems from a narrow definition of the term 'returns'. More often than not, returns are assumed to be financial returns on investments/costs incurred. However, the expansive view of 'returns' is grounded in the concept of multiple dimensions of benefits that are yielded against the investments.

To illustrate the point of distinguishing between financial and other kind of returns to investment, let's distinguish the corresponding 'Returns on Investment' indicators between a stylized example of an 'Infrastructure' project & a 'Social Sector' project proposal. For example, a 'farm-to-market road' project has been proposed for Taluka Shah Bandar with an investment of Rs. 100 million that would yield financial benefits of Rs. 150 million within a span of two years. This project would be termed feasible as the financial benefits outweigh the costs by Rs. 50 million.

Now, let's consider a 'social sector' project that proposes rolling out a school deworming program for children under-five years with an investment of Rs. 40 million. The program is projected to avert 400,000 deaths that translate into 10 deaths averted per Rs. 1000 spent by the government. This would be termed as the 'social returns to investment' for the proposed deworming program. From an appraisal perspective, cost-effectiveness analysis can be conducted to quantify relative 'social returns' of the deworming program to those of a door-to-door measles vaccination program that projects 8 deaths averted per Rs. 1000 spent by the government. Cost-effectiveness analysis would tilt the resource-constrained government towards the deworming program (10>8 deaths averted per Rs. 1000 spent).

The aforementioned stylized examples are provided to stress on an important point: Project proposals need to quantify the potential benefits that are envisioned with the investments undertaken today. These 'returns' do not need to be confined to financial returns. If the appraiser has a holistic understanding of the 'returns on investment' indicators, then a better economic and financial appraisal can be undertaken. The systemic demand for projections of financial, economic, social and other benefits would help improve the quality of project proposals and overall quality of public sector investments.

It is worth mentioning that this guide is not a replacement for any facet of the technical appraisal of PC-I proposals. This guide is designed to delve into the economic and financial analysis contours of the appraisal to provide Planning & Development Department Officials with actionable knowledge and tools to effectively undertake financial and economic appraisal of the proposals. By the virtue of their respective functions, the technical sections of P&DD have adequate sectoral knowledge to effectively undertake technical appraisals of PC-I before these are presented to competent provincial forums of Technical Committee and Provincial Development Working Party. Incorporating financial and economic analytical techniques in the appraisal would improve the decision support system and also ensure value-for-money in terms of public sector development investments in the long-run.

Background

This guide has been developed in the contextual background of recently incorporated requirements to include potential impact (social, economic, environmental) of development schemes' proposals for Technical Committee (TC) and Provincial Development Working Party (PDWP). It is imperative to create and transmit meaningful knowledge for officials who appraise PC-I proposals and officials who prepare them on the essentials of key quantifiable impact indicators. The key indicators are now part of the updated working papers & proposals for Technical Committee Meeting and Provincial Development Working Party.

This development necessitates that both the Line Departments and Planning & Development Department (P&DD) officials are well aware of the key concepts to prepare and evaluate the computations on project's estimated returns on public sector development investments.

The 'RoI' indicators (not exhaustive) discussed in the guide and a few others are also available in the 'Appraisal Section (Chapter 7) of the Planning Commission's Manual for PSDP (Revised 2019). Incorporating such indicators would add rigor and robustness to project proposals as they would help in making informed and evidence-based decisions about the feasibility of development investments, based on potential quantifiable impact. The widespread adoption of such practices will help move the government(s) towards more fiscally responsible development initiatives that aim to avoid funds leakages/dissipation. Ultimately, evidence-based approaches would facilitate and catalyze amplified impact from the investments undertaken by the government.

Objective

This guide is developed with an overarching objective to equip technical sections with the knowledge and tools for effective project appraisal and analysis

The actualization of 'Evidence-Based Planning' can be ensured by effective Economic and Financial Appraisal Techniques that are aimed to ascertain whether the development investments are undertaken in projects with quantifiable returns and societal benefits. Before delving into the economic and financial appraisal techniques, the salient features of project appraisal are briefly discussed

Salient Features

Project appraisal is intended to:

- help develop and formulate potential projects precisely and concisely
- promote quantifying the effectiveness of projects with evidence of potential impact
- ensure returns on investment in projects with obvious societal benefits
- determine if project components are consistent with the project objectives & sectoral strategy
- assess sources and magnitude of the risks
- determine how to reduce, mitigate and share risks

Theory of Change

A **theory of change** is a diagrammatic delineation and illustration of how the intended change of a program/project would happen in a particular context with the stated assumptions. Theory of change can also be described as the detailed chain of causal links from the program intervention to its impact. It is an ongoing process of reflection on how change happens, and the role we can play:

- locates a programme or project within a wider analysis of how change comes about;
- draws on external learning about development.
- articulates our understanding of change - but also challenges us to explore it further.
- acknowledges the complexity of change: the wider systems and actors that influence it
- often presented in diagrammatic form with an accompanying narrative summary

From a program/project perspective, the theory of change in a three-step process:

- identify the problem that the project aims to address
- diagnose the most pressing underlying cause/binding constraint for the identified problem
- design the appropriate intervention along with the 'theory of change' that unpacks how the proposed intervention leads to desired change along with the underpinning assumptions

From the appraiser's perspective, it is essential to scrutinize the project proposal to ascertain if a clear theory of change is provided with evidence to substantiate how the proposed project would bring about the desired change in terms of the intended impact. A clearly delineated theory of change would help pre-emptively clarify a lot of confusion that may arise with regards to unpacking the causal chain from project intervention(s) to the desired change. Absence of a robust theory of change would mean that there is lack of clarity about what exactly the proposed project wants to achieve and the relevant evidence to back the assertions and assumptions.

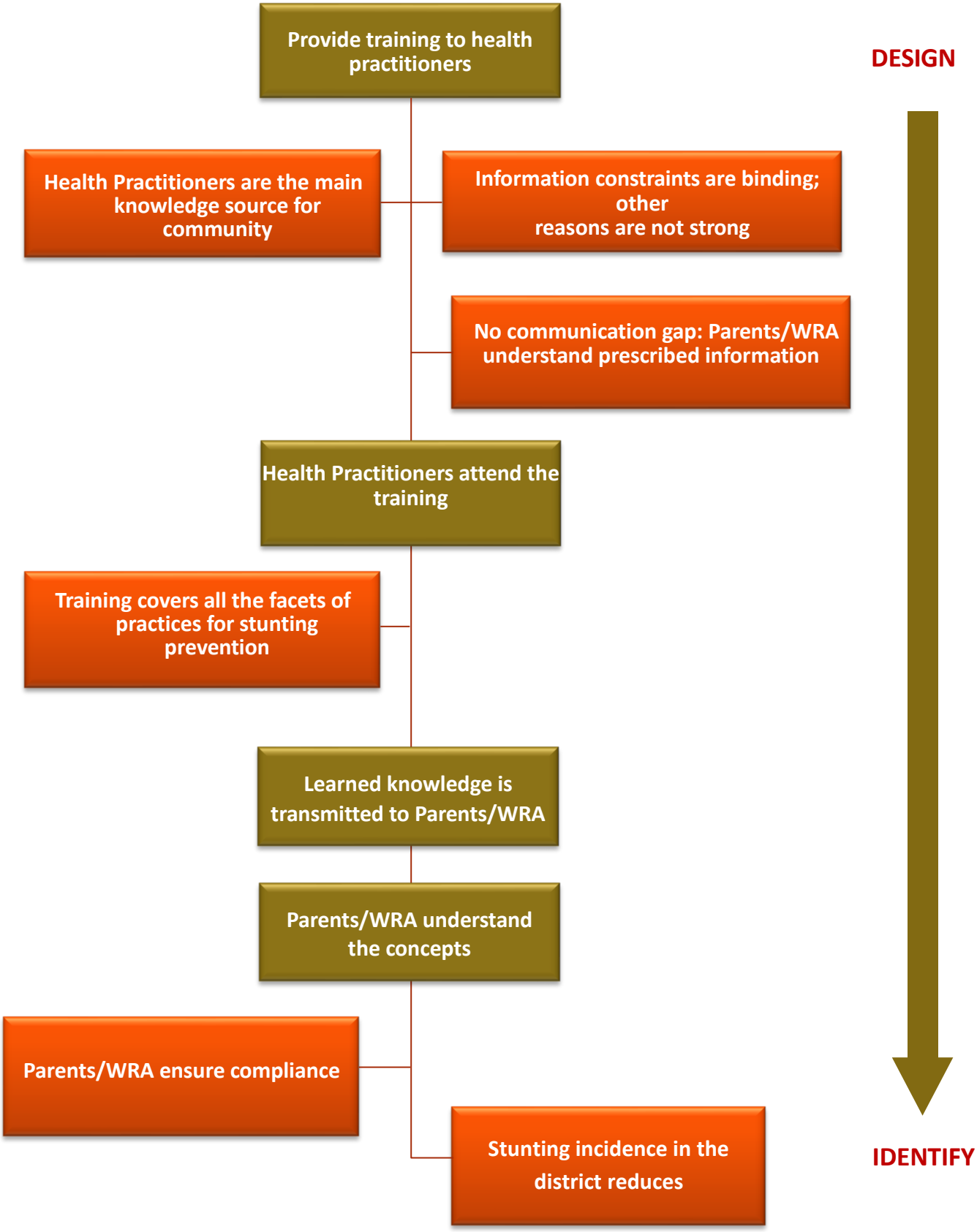
The appraiser can analyze the theory of change through the three-step process highlighted above:

- Does the project proposal clearly identify the problem that it aims to address?
- Has ample evidence been provided to ascertain that the underlying cause of the identified problem the most important one?
- Is the proposed intervention clearly laid out to explain how it would lead to the intended impact or desired change along with implicit and explicit assumptions at every stage?

By analyzing the theory of change, the appraiser will have ample clarity to gauge whether other project indicators (e.g. milestones, deliverables, key performance indicators, etc.) are also aligned with the theory of change. The systemic demand for a well-articulated theory of change can go a long way in significantly improving the quality of proposals and the subsequent implementation of the project. Let's take a simple example to unpack the concept of theory of change pertaining to the problem of stunting in a particular district in Sindh. The first step is the 'identification of the problem' which in this case is the prevalence of stunting at 48% among under-5 years of age children in that district. To 'diagnose the most pressing problem or the binding constraint', the evidence of both demand-side and supply-side causes of stunting are analyzed to prioritize the most significant cause. Let's assume that the 'lack of awareness of health practitioners about stunting' is the most significant cause of the prevalence of stunting in the district as it perpetuates lack of community awareness about the stunting issue. To 'design the intervention', the diagnosis of inadequate information among health practitioners as the underlying cause is used. The proposed intervention would be a 'training program for health practitioners on stunting' in which they will learn about the practices that may reduce the incidence of stunting in the district. A stylized diagram of the theory of change for the aforementioned example is provided below:

Underlying Cause:

High Prevalence & Incidence of Stunting due to inadequate knowledge of health practitioners on appropriate preventive practices



Financial & Economic Appraisal

Before delving into the financial and economic appraisal techniques, it is important to distinguish between the two concepts. Financial appraisal & analysis is primarily is centred on the private benefits and the financial returns on investment. Economic appraisal & analysis focuses on the economic returns on investment from the perspective of the societal benefits. Let's take an example of a 'farm-to-market connectivity road' to reduce the transportation costs and time for the farmers to bring their products to the market. From the financial standpoint, the analysis would focus on computing financial benefits in terms of quantifying the increase in the volume of trade due to the road and compare it to the costs to be incurred for building the road. From the economic appraisal standpoint, the economic costs & benefits of the road would be analysed from societal perspective. The economic costs could include the displacement of population and cutting down trees to build the road in addition to the direct financial costs incurred. The economic benefits could include the access this road would provide to the population to education and health facilities, in addition to the increased commerce and trade activities that are captured in the financial analysis.

In the aforementioned example, the resettlement costs due to the displacement of population and the environmental costs due to cutting down of trees for the road construction can be termed as 'negative externalities'. Similarly, better access to education and health facilities that might result in improved human development outcomes can be termed as 'positive externalities'. Including the societal benefits, costs and externalities would be a part of economic analysis, but not the financial analysis.

Another key component of economic analysis is the concept of 'shadow price' which is assigning a price to that is not traditionally assigned a monetary value or market price using financial analysis. For example, the value of life is something that is difficult to monetize; however, to compute shadow price of the value of a life, 'willingness to pay' studies are conducted to estimate the value of a statistical life. An example of such a study would be to interview a representative sample of 50,000 people to ask how much they would be willing to pay to avoid or reduce the risk of dying of a disease with 1 per 100,000 mortality risk. If the average comes out to Rs. 1000, then the value of a statistical life is computed by multiplying the average 'willingness to pay' of Rs. 1000 by the inverse of mortality risk i.e. 100,000. This would translate into the value of statistical life for that population to be 100,000 x 1000= Rs. 100 million.

Again, it is worth reiterating that financial and economic appraisal comes after the technical appraisal of PC-I proposals that need to ascertain whether the proposed project meets a pressing need, is part of the sectoral strategy, and is technically sound and coherent. The scrutiny of financial and economic feasibility must follow after the aforementioned and other considerations are rigorously analysed. Key distinctions between financial and economic appraisal are provided below.

Distinctions between Financial and Economic Appraisal

	Financial Appraisal	Economic Appraisal
Purview	Entity or Participants	Society/Country
Prices	Market	Economic (Shadow Prices)
Benefits	Private	Societal
Costs	Private	Societal
Externalities	Not accounted for	Accounted for

Financial Appraisal

The financial appraisal of a project helps determine the financial sustainability of the project and its overall success. It helps the Government to not only ensure the availability of funds to finance the project but also whether the project is financially feasible or not.

The appraisal is done for three primary reasons: 1) Funds Availability, 2) Determining Net Economic Benefits, and 3) Profitability

Financial Appraisal can be broadly categorized into 'discounting' and 'non-discounting techniques'. Simply put, the discount rate is provided to compute the 'time value of money'. A simplified example for time value of money can be that a person earning Rs. 30,000 today would have decreasing purchasing power/real income if he/she keeps earning Rs. 30,000 in the next five years. In other words, the person's purchasing power decreases because the earning was constant, but the inflation kept increasing over time.

Another example can be that if Country A borrows Rs. 100,000 from Country B for undertaking medium-term investment during December, 2020, then paying that money back after 5 years in December 2025 would entail computation of the value of money in that time. Assuming that the discount rate is 12%, Country A would have to payback Rs. 176,234 in December, 2025 using the following computation:

$$176{,}234 = 100{,}000 \times 1.12^5$$

The aforementioned computation was centred on calculating the 'future value' of money. However, when PC-I proposals are submitted, the appraiser's focus should be on computing/scrutinizing the present value of project benefits to ascertain if the proposed project is financially/economically feasible. The real rate of discount is usually computed by subtracting the inflation rate from long-term borrowing rate (or nominal rate); i.e., Real discount rate=Nominal Rate – Inflation Rate. However, there is a slightly more complex relation between the rates as conceptualized by the Fisher Equation below:

$$\text{Real Discount Rate} = \frac{(1 + R_N)}{(1 + R_I)} - 1$$

$$R_N = Nominal\ Rate$$

$$R_I = Inflation\ Rate$$

For financial analysis in Pakistan, the rate of mark-up is fixed by the Budget Wing of the Finance Division which has been fixed at 6.62% for 2017-18, 11.53% for 2018-19, and 12.20% for 2019-20. In theory, discount rate for financial analysis is the actual rate of interest on capital. For economic analysis, the discount rate is defined as the 'opportunity cost' of capital. Pakistan follows World Bank's discount rate of 12% for economic evaluation of the projects. It is worth mentioning that the '12% discount rate' might not be reflective of the opportunity cost of capital, but might be used for rationing of funds.

In essence, all the techniques for financial appraisal are applicable to economic appraisal too, but economic appraisal entails a holistic analysis of societal benefits, costs and externalities that are not captured in financial appraisal. Another key concept in economic analysis is that of 'opportunity cost' which essentially means the valuation of benefits foregone when undertaking a certain project. For example, in a resource-constrained setting, the opportunity cost of investing in a 'smoking cessation campaign project' would be investing the same money in a specialized healthcare institute for chest diseases. If the benefits of undertaking the 'smoking cessation project' outweighs the opportunity cost of foregone benefits of investing in an institute for chest diseases, then the project is deemed economically feasible.

The following table summarizes key 'discounting' and 'non-discounting' techniques for undertaking financial appraisal. As mentioned above, the discounting techniques that incorporate discount rate/time value of money are also applicable to economic appraisal that would incorporate the concepts of societal benefits & costs, externalities and opportunity costs to compute the returns on investment. For example, for the Net Present Value of a proposed 'smoking cessation campaign project', the financial analysis would compute the NPV using 12.20% as discount rate while the economic analysis would use 12% as discount rate and might also include monetized values of societal benefits & costs that are not captured in the financial analysis. Ultimately, the core idea of both financial and economic appraisal is to ascertain whether the quantifiable value of benefits outweighs the costs or not.

Techniques for Financial Appraisal

Discounting Techniques	Non-Discounting Techniques
Net Present Value (NPV) is the sum total of present values of the expected incremental positive and negative net cash flows over a project's proposed life. If NPV > 0, There is a gain on investment and the project is feasible	**Payback Period:** Under this technique, a project is accepted or rejected on the basis of years that a project requires to recover the money invested in it. It is mostly expressed in years. Unlike NPV payback period technique does not take into account the time value of money
Internal Rate of Return (IRR) is that discount rate which sets the NPV of a project to 0. IRR has to be thus compared with the opportunity cost of funds (prevailing discount rate) to find if the project is feasible or not	**Breakeven Analysis** allows you to know how much revenue is required to cover the costs associated with an investment. In effect, it allows one to set prices for products and services
Benefit Cost Ratio (BCR) also sometimes called the profitability index, the benefit-cost ratio, is the ratio of the NPV of the net cash inflows (or economic benefits) to the NPV of the net cash outflows (or economic costs)	

Economic Appraisal

The economic appraisal of a project helps analyse the costs and benefits of a project from the point of view of the entire economy, and takes into account the societal costs and benefits too.

The appraisal is important because the Government does not operate on profit motivation when considering projects. In fact, the impact of an investment is scrutinized from the perspective of the entire society and/or economy. As mentioned in the sections above, all the techniques for financial appraisal can be replicated for economic appraisal with incorporation of additional computations for societal costs & benefits, externalities, and opportunity cost.

One key addition for the economic appraisal is the concept of 'cost-effectiveness analysis' which helps in comparing projects that are geared towards same outcomes. For example, Project A is projected to improve full immunization coverage for under-2 years children by 1% for every Rs. 100,000 spent compared to Project B which estimates improving immunization coverage by 0.5% for every Rs. 100,000 spent. Hence, Project A would be deemed more cost-effective relative to Project B.

One key consideration that must be looked at when considering economic/shadow prices is that of **standard conversion factor (SCF)** which is essentially the ratio of domestic prices of goods to the international prices of these goods. Simply put, if the average domestic prices are 10% more than the world prices, the standard conversion factor would be 1/1.1=0.91. Hence, for all the financial costs and benefits would be multiplied by 0.91 to convert them into economic costs and benefits. SCF is mainly influenced by the trade policy of the government (e.g. tariff regime). It is estimated by the weighted average of import and export tariffs. The formula for computing SCF along with an example is provided below for further explanation of the concept.

$$\textbf{Standard Conversion Factor} = \frac{M + X}{(M + T_m) + (X - T_x)}$$

M= CIF Value of Imports
X= FOB Value of Exports
T_m= Net Value of Taxes on imports
T_x= Net value of Taxes on exports

Cost, Insurance and Freight (**CIF**) **value** is the actual **value** of the goods when they are shipped. The **FOB Value** (free on-board price) of **exports** and imports of goods is the market **value** of the goods at the point of uniform valuation, (the customs frontier of the economy from which they are **exported**).

An example is provided below to further elucidate the concept of SCF

(Million Rs.)

Description	2011-12	2012-13	2013-14	2014-15	2015-16	Average
Total Imports	4009093	4349880	4630521	4644152	4658749	4458479.0
Total Exports	2110605	2366478	2583463	2397513	2166846	2324981.0
Import Duties	219589	242989	244947	308950	410632	254120.7
Sales Tax on Imports	430399	429831	495330	553028	683518	477147.0
Subsidies on Imports	49198	10000	3000	23700	18625	26304.7
Export Duties	5762	6832	6595	6361	5933	6387.5
Export Rebates	8453	10362	8732	9091	11994	9726.4

$$\mathbf{SCF} = \frac{4458479 + 2324981}{(4458479 + 254120.7 + 477147 - 26304.7) + (2324981 - 6387.5 + 9726.4)}$$

$$\text{Standard Conversion Factor} = \frac{6783460}{7491762}$$

$$\text{Standard Conversion Factor} = 0.905$$

The subsequent financial prices would then be converted into economic (shadow) prices by multiplying the financial prices with the aforementioned SCF for economic analysis.

Techniques for Economic Appraisal

Cost-Benefit Analysis (CBA)	Cost-Effectiveness Analysis (CEA)
Through Cost-Benefit Analysis (CBA), different approaches to achieving the project's benefits are assessed and compared to determine which approach is the most beneficial. **For different approaches, the stream of economic benefits are identified, quantified and monetized in net present value terms. These are then compared with the respective stream of economic costs (that include the accounting cost and the opportunity cost) in net present values.** **The net benefit is assessed and the option with the highest net benefit is selected as the approach to the project.**	**Cost effectiveness analysis (CEA)** is an analysis of the operational efficiency of a project. It is to determine the least expensive approach to achieving a result, from two or more alternatives. This approach is most commonly used when it is difficult to monetize the economic benefits from a project, e.g. number of lives saved from polio vaccinations.

Estimating Financial & Economic Benefits

When we discuss computing present and future values of costs or benefits, we are actually focusing on the computing the time value of money as we know that Rs. 100 today would be worth much less in the next year, and so on. From an appraiser's perspective, we are essentially looking at whether the net present value of cash inflows (benefits) outweigh the net present value of cash outflows (costs) to ascertain whether the project is feasible or not. For example, if the projected benefits for a Project are shown to be Rs. 120 in five years, but the investment required at present is Rs. 100. This would not mean that the benefits outweigh the costs by Rs. 20 because the benefits would be yielded after five years. The present value of the benefits at 12% discount rate would be 120/(1.12) ^5=Rs. 68.1. This would mean that the project is not financially feasible as the cost outweighs the benefit at present value.

In order to compute future values, compounding of cash flows is required. There are two main ways that interest can be included in future values (FV), **simple interest** and **compound interest.** The definition and formulas are provided below:

Compounding (Calculating Future Values)

	Simple Interest Rate	Compound Interest Rate
Definition	paid only on the principal amount that is invested	paid on both the principal and the interest as it accumulates
Formula	FV = 100*(1 + r)t Where, FV = Future value, r =the interest rate and t = time period	Vt = V0 × (1 + r)t, where, Vt = value in year t, V0 = value in year 0, r =the interest rate and t = time period.

Understanding the Discount Rate

The discount rate is generally determined by the prevailing interest rates in a country and is equal to the opportunity cost of funds.

The higher the discount rate, the lower present value of a future investment. Thus, higher discount rates increase the chances of the rejection of projects on the basis of NPV and IRR analysis and vice versa. The Federal Government uses the following discount rates in specific cases:

Financial appraisal:

For government-funded projects, provisional rate of mark-up is fixed by the Finance division of Pakistan. This was 12.20% for 2019-2020

In case of Foreign 'grants', the discount rate is taken as 0%.

Economic Appraisal:

A discount rate of 12% is taken.

Calculating Present Value

In the example below, at a 10% discount rate the present value of one rupee received after 10 years would be Rs. 0.386. If the discount rate is higher i.e., 15% this value would be Rs. 0.247.

Year	0	1	2	3	10
Discount Factor at 10% rate	$1/1.1^{(0)}$ = 1	$1/1.1^{(1)}$ =0.909	$1/1.1^{(2)}$ = 0.826	$1/1.1^{(3)}$ =0.751	$1/1.1^{(10)}$ = 0. 386
Discount Factor at 15% rate	$1/1.15^{(0)}$ = 1	$1/1.15^{(1)}$ =0.870	$1/1.15^{(2)}$ = 0.756	$1/1.15^{(3)}$ =0.658	$1/1.15^{(10)}$ = 0.247

Net Present Value (NPV)

The net present value (NPV) is the sum total of present values of the expected incremental positive and negative net cash flows over a project's proposed life. Net Present Value is argued to be the best methodology for assessing government projects.

The net present value of a project is dependent upon

a. The timeframe of project
b. The discount rate and
c. The accuracy of the cashflow calculations

If NPV = 0, it means that there is no loss but also no benefit on investment.
If NPV < 0, There is a loss on investment and the project is not feasible
If NPV > 0, There is a gain on investment and the project is feasible

Scenario 1-NPV Method (Example)
The following example is a 'made-up' one to illustrate Net Present Value (NPV) computations:
Note:- In the examples below, Year 1 is synonymous with the initial Year of project which essentially means that discounting would start from Year 2 as 1/(1+r)^1, and so on.

SCENARIO 1:
Artificial Insemination Project (Livestock)
Discount rate = 12%,
Life of Project = 10 years
Capital Cost =Rs.100 billion
O&M cost = Rs. 32 Billion
Revenue = Rs. 320 billion

In the example below, the net present value of the project at 12% discount rate is **Rs. 71.0 billion** which would make the project feasible.

Year	Capital Cost	O&M	Total Cost	Revenue	Net Benefit/Loss	PV of Net benefit/Loss
1	30.00	-	30.00	-	(30.00)	(30.00)
2	30.00	-	30.00	-	(30.00)	(26.80)
3	40.00	4.00	44.00	40.00	(4.00)	(3.20)
4		4.00	4.00	40.00	36.00	25.60
5		4.00	4.00	40.00	36.00	22.90
6		4.00	4.00	40.00	36.00	20.40
7		4.00	4.00	40.00	36.00	18.20
8		4.00	4.00	40.00	36.00	16.30

9		4.00		4.00	40.00	36.00	14.50
10		4.00		4.00	40.00	36.00	13.00
Total	100.00	32.00		132	320.00	188.00	**71.00**

Scenario 2-NPV Method (Example)
The following example is a 'made-up' one to illustrate Net Present Value (NPV) computations with a discount rate of 18% (compared to 12% in the original case):

SCENARIO 2:
Artificial Insemination Project (Livestock)
Discount rate = **increased from 12% to 18%**,
Life of Project = 10 years
Capital Cost =Rs.100 billion
O&M cost = Rs. 32 Billion
Revenue = Rs. 320 billion

Year	Capital Cost	O&M		Total Cost	Revenue	Net Benefit/Loss	PV of Net benefit/Loss
1	30.00	-		30.00	-	(30.00)	(30.00)
2	30.00	-		30.00	-	(30.00)	(25.40)
3	40.00	4.00		44.00	40.00	(4.00)	(2.90)
4		4.00		4.00	40.00	36.00	21.90
5		4.00		4.00	40.00	36.00	18.60
6		4.00		4.00	40.00	36.00	15.70
7		4.00		4.00	40.00	36.00	13.30
8		4.00		4.00	40.00	36.00	11.30
9		4.00		4.00	40.00	36.00	9.60
10		4.00		4.00	40.00	36.00	8.10
Total	100.00	32.00		132.00	320.00	188.00	**40.20**

If we increase the discount rate from 12% to 18%, the NPV of the project decreases, but still remains positive at **Rs. 40.2 billion**

Internal Rate of Return (IRR)

By definition, IRR is that discount rate which sets the NPV of a project to 0. IRR has to be thus compared with the opportunity cost of funds/capital (prevailing discount rate) to find if the project is feasible or not.

For example, if the discount rate is 12% and the IRR is greater than 12% the return on the project is more than the opportunity cost of funds making the project feasible. And IRR of 12% would mean that the project is breakeven and you are no better or worse off. If the IRR is less than the discount rate than the project is not feasible. The following formula denotes the formula for computing IRR which can easily be computed with the in-built function for IRR in Microsoft Excel using net cash flows

$$\text{NPV} = \frac{\sum_0^t C_t}{(1+IRR)^t} - C_0 = 0$$

where:

Ct=Net cash inflow during the period t

Co=Total initial investment costs

IRR=The internal rate of return

t=The number of time period

If IRR = Discount Rate, it means that there is no loss but also no benefit on investment.
If IRR < Discount Rate, there is a loss on investment and the project is not feasible
If IRR > Discount Rate, there is a gain on investment and the project is feasible

Method (Artificial Insemination Project):
In the aforementioned scenario of AI Project, the IRR of 32.16% is greater than the discount rate applied (which is 12 % in this case), the project is feasible.

Year	Capital Cost	O&M	Total Cost	Revenue	Net Benefit/Loss	PV of Net benefit/Loss	PV at IRR
1	30.00	-		30.00	-	-30.00	-30.00
2	30.00	-		30.00	-	-30.00	-22.70
3	40.00	4.00		44.00	40.00	-4.00	-2.30
4		4.00		4.00	40.00	36.00	15.60
5		4.00		4.00	40.00	36.00	11.80
6		4.00		4.00	40.00	36.00	8.90
7		4.00		4.00	40.00	36.00	6.80
8		4.00		4.00	40.00	36.00	5.10
9		4.00		4.00	40.00	36.00	3.90
10		4.00		4.00	40.00	36.00	2.90
Total	100.00	32.00		132.00	320.00	188.00	0.00
						IRR	**32.16%**

Benefit Cost Ratio

Also sometimes called the profitability index, the benefit-cost ratio, is the ratio of the NPV of the net cash inflows (or economic benefits) to the NPV of the net cash outflows (or economic costs):

$$\text{BCR} = \frac{NPV\ of\ Net\ Cash\ Inflows}{NPV\ of\ Net\ Cash\ Outflows}$$

If the ratio is less than one, the project is not feasible
If the ratio is greater than one, the project is feasible
If the ratio is equal to 1, the project would breakeven

Sensitivity Analysis

Sensitivity-Original Case

Multiple scenarios can be tested to see the sensitivity of the project to survive such risks (e.g. cost escalation, decrease in revenue.)

Original case - Discount rate of 12%								
Year	**Capital Cost**	**O&M**	**Total Cost**	**PV of Total cost**	**Revenues**	**PV of Total Revenues**	**Net Benefit/ Cost**	**PV of Net Benefit/cost**
1	30		30	30		-	(30)	(30)
2		4	4	3.6		-	(4)	(3.6)
3		4	4	3.2	40	31.9	36	28.7
4		4	4	2.8	40	28.5	36	25.6
	30	**12**	**42**	**39.6**	**80**	**60.4**	**38**	**20.8**
							NPV	**20.8**
							IRR	**37.47%**
							BCR	**1.52**

Sensitivity-Cost-Over Run Case

A different scenario with a 20% increase in cost

Cost Over-run (20% increase) - Discount rate of 12%								
Year	**Capital Cost**	**O&M**	**Total Cost**	**PV of Total cost**	**Revenues**	**PV of Total Revenues**	**Net Benefit/ Cost**	**PV of Net Benefit/cost**
1	36		36	36		-	(36)	(36)
2		4.8	4.8	4.3		-	(4.8)	(4.3)
3		4.8	4.8	3.8	40	31.9	35.2	28.1
4		4.8	4.8	3.4	40	28.5	35.2	25.1
	36	**14.4**	**50.4**	**47.5**	**80**	**60.4**	**29.6**	**12.8**
							NPV	**12.8**
							IRR	**25.94%**
							BCR	**1.27**

Sensitivity-Revenue-Decrease Case

A different scenario with a revenue decreases of 20%.

Revenue Decrease of 20% - Discount rate of 12%								
Year	**Capital Cost**	**O&M**	**Total Cost**	**PV of Total cost**	**Revenues**	**PV of Total Revenues**	**Net Benefit/ Cost**	**PV of Net Benefit/cost**
1	30		30	30		-	(30)	(30)
2		4	4	3.6		-	(4)	(3.6)
3		4	4	3.2	32	25.5	28	22.3
4		4	4	2.8	32	22.8	28	19.9
	30	**12**	**42**	**39.6**	**64**	**48.3**	**22**	**8.7**
							NPV	**8.7**
							IRR	**21.91%**
							BCR	**1.22**

Sensitivity-Discount Rate Increase Case:

A different scenario with a discount rate increases from 12% to 15%

Discount rate increase from 12% to 15%								
Year	**Capital Cost**	**O&M**	**Total Cost**	**PV of Total cost**	**Revenues**	**PV of Total Revenues**	**Net Benefit/ Cost**	**PV of Net Benefit/cost**
1	30		30	30		-	(30)	(30)
2		4	4	3.5		-	(4)	(3.5)
3		4	4	3.0	40	30.2	36	27.2
4		4	4	2.6	40	26.3	36	23.7
	30	**12**	**42**	**39.1**	**80**	**56.5**	**38**	**17.4**
							NPV	**17.4**
							IRR	**37.47%**
							BCR	**1.44**

Sensitivity Analysis-Different Scenarios

Comparing different scenarios for sensitivity analysis for risk estimations.

	Original	20% Cost Increase	20% Revenue Decrease	Discount rate of 15%
NPV	20.80	12.80	8.70	17.40
IRR	37.47%	25.94%	21.91%	37.47%
BCR	1.58	1.27	1.22	1.44

As can be seen from the different scenarios constructed for sensitivity analysis, the NPV decreases relative to the original case for all 3 scenarios, but remains positive (i.e. 20% Cost Increase, 20% Revenue Decrease and Discount rate increasing to 15%). IRR also decreases for the 2 scenarios, but remains more than the 12% discount rate (i.e. 20% cost increase and 20% revenue decrease). However, IRR doesn't change when discount rate increases to 15% because IRR doesn't depend on the discount rate (it is a discount rate itself that makes NPV=0). BCR also decreases, relative to the original case, for the aforementioned scenarios, but remains more than 1 throughout.

In short, the anticipated risks might decrease the profitability of the project, but the project remains feasible across all scenarios (i.e. NPV>0, IRR>Discount Rate, BCR>1). The appraiser should take into account such risks, their implications and mitigation strategies when conducting/scrutinizing sensitivity analysis.

Payback Period

Under this technique, a project is accepted or rejected on the basis of years that a project requires to recover the money invested in it. It is mostly expressed in years. Unlike NPV payback period technique does not take into account the time value of money.

As per this technique the quicker the recovery of initial investment the more desirable a project. The formula of the Payback period is as follows

$$\textbf{Payback Period} = \frac{\boldsymbol{Investment\ Required}}{\boldsymbol{Net\ Annual\ Cash\ Flow}}$$

Example: The Government of Sindh is planning build a farm-to-market road. The road would cost Rs 400 million and would have a useful life of 10 years. The expected annual net cash inflow from the road through the toll payments is Rs. 80 million per year.

The payback period would be calculated as follows:

$$\textbf{Payback Period} = \frac{Rs.400M}{Rs.80M} = 5\ Years$$

Thus, the road would cover its cost in 5 years.

Breakeven Analysis

Breakeven analysis allows you to know how much revenue is required to cover the costs associated with an investment. In effect, it allows one to set prices for products and services.

$$\text{BEV} = \frac{Fixed\ Costs}{Revenue\ per\ Unit - Variable\ Cost\ per\ Unit} = \frac{Fixed\ Costs}{Unit\ Margin}$$

Example: The Government of Sindh is planning build a financially sustainable Reverse Osmosis Plant with a revenue generating stream by selling six-litres water bottles. The fixed cost for the project is estimated at Rs. 1 million, the variable cost per water bottle would be Rs. 10. The water bottle is proposed to be sold at Rs. 20. Therefore, given the fixed cost, variable cost and selling price, the project would need to sell 100,000 bottles to breakeven.

The breakeven quantity would be calculated as follows:

$$\text{Breakeven Quantity} = \frac{Rs.1{,}000{,}000}{Rs.20 - Rs.10} = 100{,}000\ Bottles$$

Return on Investment

Return on Investment Ratio is another profitability ratio that computes net gains from a project compared to the net cost. In simple words, ROI computes how much the project will get back compared to the investments.

Usually, ROI between 5% and 12% is considered good while ROI above 12% is considered excellent. A negative ROI entails that the project is not worth considering.

$$\text{ROI} = \frac{Net\ Present\ Value}{Present\ Value\ of\ Cumulative\ Cash\ Outflows}$$

Example: The Government of Sindh is planning to invest in a technical skills program for the youth to generate employment and income opportunities. The net present value of the project is estimated at Rs. 250,000. The cumulative present value of cash outflows (costs) is estimated to be Rs. 1.5 million. Therefore, the ROI of the project is 16.7% which essentially means that the **net gain** on Rs. 1.5 million investment is 16.7%.

The return on investment (ROI) would be calculated as follows:

$$\text{ROI} = \frac{Rs.250{,}000}{Rs.1{,}500{,}000} \times 100 = 16.7\%$$

Cost-Benefit Analysis & Cost-Effective Analysis

Economic Appraisal: The Government does not operate on profit motivation when considering projects. In fact, it wants to determine the effect of an investment proposal on the entire nation. Economic appraisal helps analyze the costs and benefits of a project from the point of view of the entire economy.

There are three main differences due to which economic analysis may give different results from financial analysis. These differences include

(a) Social benefit vs private benefit

(b) Social cost vs private cost and

(c) Market distortions

There are two basic techniques for economic appraisal i.e., **Cost Benefit Analysis (CBA)** and **Cost Effectiveness Analysis (CEA)**

Cost-Benefit Analysis

Through Cost-Benefit Analysis (CBA), different approaches to achieving the project's benefits are assessed and compared to determine which approach is the most beneficial

For different approaches, **the stream of economic benefits are identified, quantified and monetized in net present value terms**. **These are then compared with the respective stream of economic costs** (that include the accounting cost and the opportunity cost) **in net present values**. The net benefit is assessed and the option with the highest net benefit is selected as the approach to the project

Examples of Monetized Economic Benefits	Examples of Economic Costs
Current and future income generated	Actual financial costs of the project
Revenue collections	Foregone financial income from child labour, as a result of education projects
Value of increased economic activity, from a cash transfer programme	Foregone income of business along the existing roads, from a new road project
Higher life expectancy and therefore higher future incomes from a health project	Foregone tourism and cultural heritage, from infrastructure projects that impact heritage and nature sights.
Future income of students, from a technical education programme	
Low future financial outlays on floods cleanup, from a disaster risk management project	

Example: The Government of Sindh is planning to build a farm to market road. Two Proposals are received.

BCR for Proposal 1=1.5;
BCR for Proposal 2=1.8.

Financial CBA would dictate that the Government opts for Proposal 2

What if Proposal 2 has a negative 'externality' that displaces population and businesses along the route that would increase the cost to the society? Suppose **BCR for Proposal 2 now equals 1.2 (instead of 1.8).**

Economic CBA incorporates the societal cost which makes Proposal 1 the more feasible option now (i.e., 1.5>1.2)

Cost-Effectiveness Analysis

Cost effectiveness analysis is an analysis of the operational efficiency of a project. It is to determine the least expensive approach to achieving a result, from two or more alternatives. This approach is most commonly used when it is difficult to monetize the economic benefits from a project, e.g. number of lives saved from polio vaccinations.

For such projects, different approaches are evaluated by comparing the cost-effectiveness ratio:

$$\text{CE Ratio} = \frac{Effectiveness\ of\ the\ Option}{Cost\ of\ the\ Option}$$

The option with the highest CE ratio is the preferred option.

(Note: -sometimes, the formula is reversed in which case lowest CE ratio is the preferred option)

Example: The Government of Sindh is planning to invest in a project to reduce under-5 child mortality. Two Proposals are received.

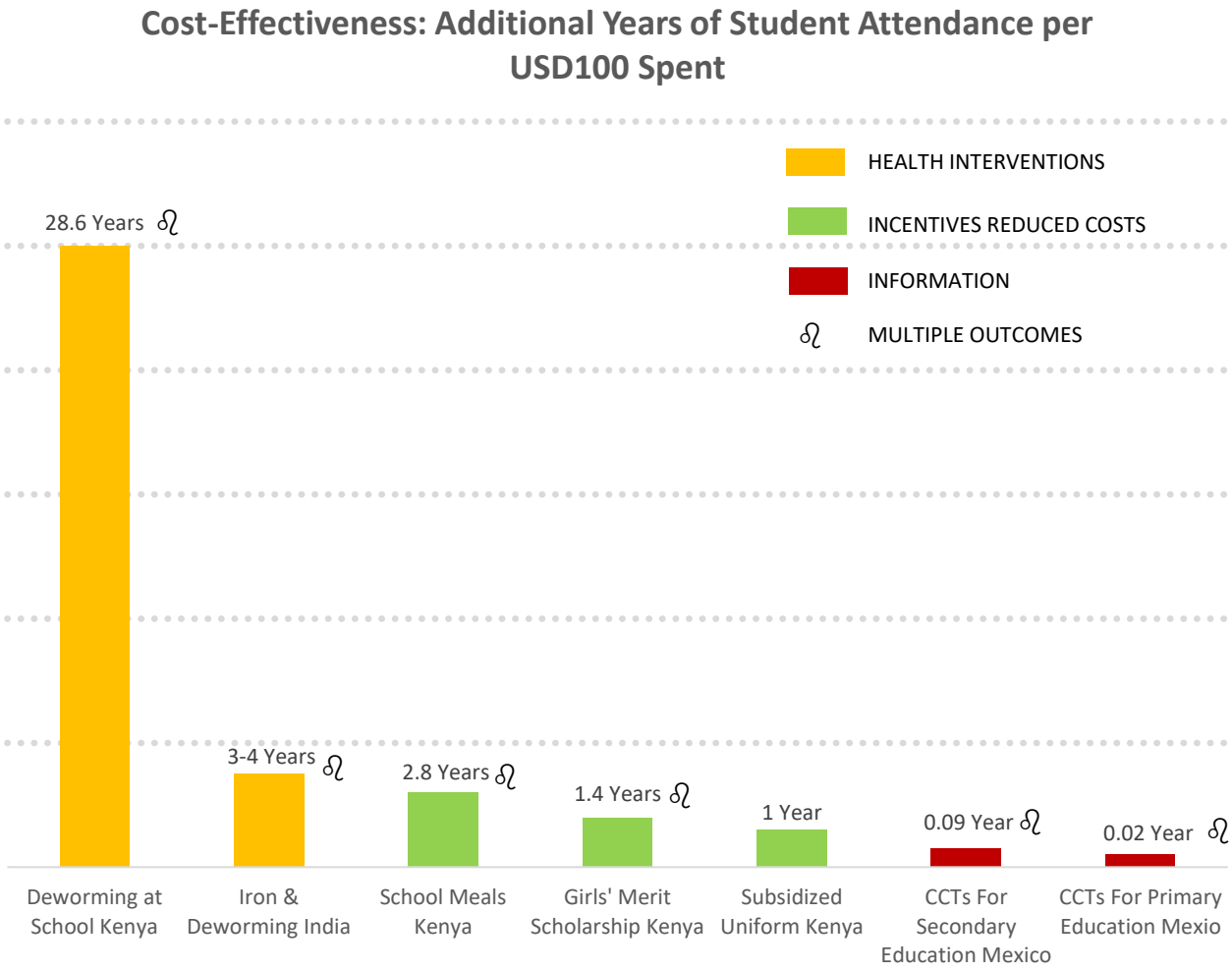
CE ratio for Proposal 1= 2 deaths averted/Rs. 100 invested;

CE ratio for Proposal 2= 1 death averted/Rs. 100 invested.

CE analysis would dictate that the Government opts for Proposal 1

What if Proposal 2 has a positive 'externality'/ 'spill-over' effect that results in deaths averted in proximate households (e.g. herd immunity)? Suppose CE Ratio for Proposal 2 now equals 3 deaths averted/Rs. 100 invested (instead of 1).

Incorporating the positive spill-over effects makes Proposal 2 the more feasible option now (i.e. 3>2 deaths averted per Rs. 100 invested)



Source: J-PAL, MIT <www.povertyactionlab.org>

The concept of cost-effectiveness can be further crystallized by looking at multi-country studies undertaken by Massachusetts Institute of Technology's (MIT) Abdul Latif Jameel's Poverty Action Lab (J-PAL). The studies looked at the effect of various school-based interventions (e.g. deworming, school meals, merit scholarships, subsidized uniforms and conditional cash transfers) to gauge their impact on a common outcome, i.e. additional years of student attendance per USD 100 spent.

The figure below shows the relative cost-effectiveness of the interventions on the same outcome. This helps resource-constrained countries in making an evidence-based decision about which intervention to finance to achieve the highest value-for-money in terms of impact of spending.

Technical Appraisal

Technical appraisal helps in assessing the technical feasibility of a Project. Technical Appraisal provides a comprehensive review of all technical aspects of the project such as rendering judgment on merits of technical proposals and operating costs.

Technical appraisal may comprise of the following (not an exhaustive list):

- Confirmation of the source of the project proposal, including feasibility studies undertaken before the proposal, and the nature of decisions taken by all relevant authorities involved
- Has the problem to be resolved by the project been clearly stated? (Well-defined objectives)
- Has the project been clearly spelled out with the correct technical design details (such as size, location, timing, and technology)?
- Is there is a sound rationale for the selected technical design or approach?
- Has the proposed technology been proven or tested or has been in practice elsewhere? Can the technology be applied in the current context and conditions?
- Are the costs of the project clearly established, expected product prices projected, and payment modalities and schedules agreed to?

In addition to the aforementioned considerations, the overarching objectives of the project should be effectively scrutinized to ascertain whether the proposed project falls under the purview of the sectoral strategy. For example, a project proposed for health sector must contribute to the Sindh Health Sector Strategy 2012-20. However, there can be exceptions when a project might not be a part of the sectoral strategy per se, but there should be an effort to focus on the alignment of any proposed project with the provincial, national or global strategy/policy/goal. Similarly, a demand-supply analysis should be undertaken for every project proposal.

For example, if a project proposes to build a primary school in Taluka Shah Bandar of District Sujawal, then the demand should be ascertained by doing a survey of the area and the catchment population to gauge how many school-going children are present in the vicinity. From the supply side, the project should present the quantum of human, physical, technical and financial resources that would be expended to cater to the computed demand. Existing projects and initiatives in the area must also be surveyed to ensure that there is no duplication of efforts.

Another demand-and-supply analysis from a technical appraisal perspective can be a water supply project for Sindh with a water pricing component via water-meters for revenue generation and financial sustainability. The obvious question that the appraiser should ask is about the demand and supply of the project. The demand of the project must be ascertained by a geo-spatial analysis of the water consumption patterns in the province. Similarly, 'willingness-to-pay' studies must be conducted to ascertain the water price that can be paid by the catchment population. Additionally, such studies would help gauge peak demand period that may put additional burden on the water supply system. The studies can translate into a 'differential tariff strategy' such that the prices increase during the peak period and decrease during the off-peak period to balance production and consumption. The supply side of the project must be centered on the physical, human, technical and financial resources that would be needed to effectively cater to the demand of the catchment population.

Creating an evidence-base with pertinent studies can help make informed decisions when analyzing and appraising proposals. Asking basic relevant questions can go a long way in effective appraisal of project proposals. This is true irrespective of how complex or intricate the project proposal is.

Social Appraisal

A social appraisal reviews the project design and the process of project identification through to implementation and monitoring, from a social perspective. Social Appraisal allows adjustments to the project goals so that they have more meaning for both the project population and the implementing agencies.

Social analysis focuses on four areas indicated below:

- The demographic and social-cultural characteristics of the project beneficiaries – its size and social structure, including ethnic, tribal and class composition
- How the project beneficiaries are organized to carry out productive activities, including the structure of households and families, availability of labor, ownership of land, and access to and control of resources.
- The project's beneficiary's cultural acceptability; i.e. its capacity both for adapting to and for bringing about desirable changes in stakeholders' behaviour and in how they perceive their needs
- The strategy necessary to elicit commitment from the project beneficiaries and to ensure their sustained participation from design through to successful implementation, operation and maintenance.

Stakeholder Analysis

Stakeholder analysis as well as thorough poverty mapping are two good tools for analysing the above. A robust stakeholder analysis can help in answering the above and provide detail on

- What are the different stakeholders?
- What are their interests?
- How will proposed project affect them?
- What are the project priorities between the different groups?
- What is their capacity to participate in the project?

Poverty Mapping

Similarly, a poverty mapping exercise can shed light on

- Who the poor are (at community, household and individual level)?
- What are the characteristics of their poverty (in terms of access to and control of resources and benefits, vulnerability and exclusion)?
- How can the issues of poverty be addressed in the project?

Environmental Appraisal

For Projects that have an adverse impact on the environment/climate, it is imperative that at the time of planning of these projects a proper environmental/climate change appraisal is carried out to compare costs and benefits. For projects pertaining to Sindh, Sindh Environmental Quality Standards (as formulated by Sindh Environment Protection Agency) are to be adhered to.

The commonly used tools for environmental/climate change appraisals are Environmental Impact Assessment (EIA) or Climate Change Impact Assessment.

Environmental Impact Assessment (EIA) was developed as many development projects in the past failed to take into consideration their adverse impacts on the environment. EIA has many definitions the simplest of which has been given by the United Nations and defines it as "an assessment of impacts of a planned activity on the environment" (United Nations)

Goals

The overall goal of an EIA is to achieve better developmental interventions through protecting the environment. EIA aims:

- to provide accurate and balanced information for analysis of the impact on environment so that informed decisions can be made by decision makers;
- to present unquantifiable effects that are not addressed by cost-benefit analysis or technical assessments;
- to provide information to the public;
- to present alternatives so that the least environmentally harmful one can be chosen;
- to help develop mitigation and avoidance measures for protecting the environment

Components

EIA can be thought of as a data management process with three components.

- Firstly, the appropriate information necessary for a particular decision must be identified and collated.

- Secondly, changes in environmental parameters resulting from the proposed project must be forecast and compared with the situation without the proposal.

- Finally, the actual change must be accessed and communicated to the decision makers.

From an appraiser's perspective, the proposal must be reviewed with a close consideration for environmental risk(s) that the project poses, quantification of the potential impact and risk mitigation strategies. Adherence of the project to SEPA's Environmental Quality Standards must also be ensured.

Risk Assessment and Management Planning

Risk assessment and management planning involves the following:

a. **Methodology**: How will risk management be performed on the project? What tools and data sources are available and applicable?
b. **Roles and Responsibilities**: Who are the individuals responsible for implementing specific tasks and providing deliverables related to risk management?
c. **Budget and Schedule**: What are the estimated costs and schedules for performing risk-related activities?
d. **Risk Categories**: What are the main categories of risks that should be addressed on the project? Is there a risk breakdown structure for the project?
e. **Risk Probability and Impact**: How will the probabilities and impacts of risk items be assessed? What scoring and interpretation methods will be used for the qualitative and quantitative analysis of risks?
f. **Risk Documentation**: What reporting formats and processes that will be used for risk management activities?

'Risk Assessment' is focused on anticipating risks associated along the time horizon of a project. A comprehensive risk analysis would help ascertain potential risks along with mitigation strategies to address the identified risks. It might be the case that a certain cost is associated with the risk and 'internalization' of the said cost by executing department would have financial implications. These implications must also be reflected in PC-I proposals to ensure the capacity to evaluate and mitigate potential risks without significant cost over-runs. Ideally, such risks should be clearly computed under the sensitivity analysis for different scenarios like cost-escalation or decrease in expected revenue.

Apart from looking at 'risks' from a financial lens vis-à-vis sensitivity analysis, overall spectrum of potential risks must be effectively assessed and categorized. The underlying sources of risk(s) must also be analyzed for pre-emptive mitigation and corrective strategies. It is worth mentioning that there might be 'exogenous' sources of risks associated with a project that may not be anticipated, but potential sources of risks need to be thoroughly scrutinized to minimize the probability of project facing any major problems that may significantly hamper its progress.

For example, while conceptualizing a 'cooperative farming' project in Shikarpur District, Government of Sindh might anticipate the risk that the surplus production might not be sold at competitive prices because the cooperative farmers have limited market connectivity. The transportation cost and time might make the endeavor financially unviable. In the short-run, the Government can guarantee buying the surplus produce to mitigate the risks for cooperative farmers. Medium-term mitigation strategies might include developing storage facilities for perishable products. Long-term mitigation strategies would include developing farm-to-market roads, creating value-chain linkages with urban centers, promoting private sector investment and an eco-system of agro-based entrepreneurship to generate income and employment multipliers.

While risks can be categorized along several dimensions, usually the severity and likelihood of risks associated with a project can be characterized by developing 5x5 Risk Matrix

SEVERITY →

LIKELIHOOD ↓

LIKELIHOOD	1	2	3	4	5
1	LOW 1	LOW 2	LOW 3	MEDIUM 4	MEDIUM 5
2	LOW 2	MEDIUM 4	MEDIUM 6	HIGH 8	HIGH 10
3	LOW 3	MEDIUM 6	HIGH 9	HIGH 12	EXTREME 15
4	MEDIUM 4	HIGH 8	HIGH 12	HIGH 16	EXTREME 20
5	MEDIUM 5	HIGH 10	EXTREME 15	EXTREME 20	EXTREME 25

Risk categorization must translate into corresponding potential risk mitigation strategies with higher priority assigned to most severe and most likely risks.

Mitigation strategies can help risk management from the onset to avoid any major problems at a later stage. If the mitigation strategies are not undertaken from the onset, the fail-safe option is to develop 'contingency actions' to minimize the risk when the project is underway. Risk prioritization can be done by looking at the likelihood and severity of the specific risk. Some risk models postulate that the product of likelihood and (potential) impact of the risk determine severity which translates into categorization of risk as having low, medium or high severity. Risk prioritization and mitigation strategizing is then done according to the level of severity assigned to the risk. Following is a stylized example of risk categorization for a project proposal that can be followed as a template:

S. No.	Risk Description	Likelihood	Impact	Severity	Responsibility	Mitigation Action
1	Project Purpose and Need is not well-defined	Medium	High	High	Executing Agency	Develop a clearly delineated theory of change along with evidence-based needs assessment
2	Project Design and Deliverables are not aligned with each other	Medium	High	High	Executing Agency	Formulate deliverables that are compatible with the overall project objectives and design
3	Unrealistic timelines are provided for deliverables	Medium	Medium	Medium	Executing Agency	Revise timelines to avoid the over-run issues
4	Scarce resources are available to earmark for allocation	High	High	High	Planning & Development	Explore funding opportunities beyond the ADP resource envelope.
5	No contingency plan is in place for severe exogenous shocks	Low	Medium	Medium	Executing Agency	Develop a contingency plan with sensitivity analysis for shocks that may cause time over-run, cost escalation & other issues
6	Mapping of SDGs Goals/Indicators is missing	Low	Low	Low	Executing Agency	Map project's overarching goal with the relevant SDG(s) and project indicators with corresponding SDG indicators/sub-indicators
Overall Risk Severity of the Project is High **Revise the project proposal to incorporate the proposed risk mitigation strategies to ensure that project is not susceptible or vulnerable to manageable factors (i.e. factors that are not part of extenuating circumstances which are outside of one's control)**						

Project Appraisal Checklist

The checklist below can be used as a guiding tool for effective appraisal of project proposals

CHECKLIST OF APPRAISING PROJECT PROPOSALS (CAN BE CUSTOMIZED AS PER NEED)			
Scrutinizing 'Theory of Change'			
S No.	**Criteria**	**Yes/No**	**Comments**
1.	Project outcomes are aligned with corresponding sectoral strategy/provincial development framework/national development vision		
2.	Theory of Change is clear with Inputs, Outputs, Outcomes and Impact connected with a logical causal chain		
3.	Inputs/Resources are commensurate with the intended outputs (not over-/under-estimated)		
4.	All the underlying assumptions and primary & secondary objectives are valid and justified		
Overall Quality Check			
S No.	**Criteria**	**Yes/No**	**Comments**
5.	Information/Data is valid, reliable and consistent		
6.	Project Proposal adheres to the guidelines and the information is populated according to the PC-I format		
7.	If it is required, feasibility study conducted		
Technical Appraisal			
S No.	**Criteria**	**Yes/No**	**Comments**
8.	Cogent rationale for the selected technical design or approach with sufficient information on sound justification		
9.	Proposed design/approach/methodology is in conformity to provincial/national standards (international standards, if no local standards available)		
10.	Proposed design/approach/methodology is the best option to address the identified needs (comparative analysis with alternatives)		
11.	Proposed intervention has already been tested for efficacy/effectiveness		
12.	Proposed design is in consonance with the local context (i.e., existing institutional, legal, development landscape, etc.)		
13.	List of Equipment, machinery, etc. is properly quantified with demand-supply analysis		
14.	All costs and specifications are attached with updated valuations and requisite information		
15.	Standards of Equipment/Machinery are adequate and in line with provincial/national/international standards		
Financial and Economic Appraisal			
S No.	**Criteria**	**Yes/No**	**Comments**
16.	**Financial Appraisal**		
	Financial returns to investment are quantified		
	Financial costs and benefits are realistic		
	Sensitivity Analysis has been conducted		
	Financial Analysis has been comprehensively computed		
17.	**Economic Appraisal**		
	Economic returns to investment are quantified		

	Economic costs and benefits are realistic		
	Externalities have been considered		
	Cost-Benefit Analysis/Cost-Effectiveness Analysis has been conducted		
	Economic Analysis has been comprehensively computed		
Social and Environmental Appraisal			
S No.	**Criteria**	**Yes/No**	**Comments**
18.	Environmental Standards are in line with SEQS/NEQS or any international standards (if applicable)		
19.	Public health, environmental safety and other relevant risks are considered along with potential mitigation strategies (if applicable)		
20.	In case of involuntary resettlement/displacement of population, compensation mechanisms/alternative arrangements are mentioned		
21.	Distributional access to project benefits are well-delineated with special considerations for marginalized and impoverished segments		
22.	Conservation of natural resources is considered and planned		
23.	Rights of Indigenous people are accounted for		
24.	Local community and stakeholders have been consulted		
25.	Effective targeting and delivery mechanism is clearly laid-out		
26.	Local traditions, values, culture and heritage has been considered		
27.	Gender Inclusivity and Equity implications have been incorporated		
Organizational/Managerial Appraisal			
S No.	**Criteria**	**Yes/No**	**Comments**
28.	Sufficient human, technical resources are available or are provisioned for in the proposal		
	Adequate experience of executing agency for executing and managing projects of similar nature		
29.	For specialized functions, provision for external support has been incorporated		

Conclusion

This guide is not meant to be an end-to-end instruction manual for PC-I appraisal as the Federal Government's Planning Manual for Development Projects is already available with most recent version revised in 2019. However, this guide aims to provide an in-depth step-by-step review of key techniques that are essential for conducting effective financial and economic appraisal of PC-I proposals. Technical sections/Appraisers can gain useful insights by perusing the tools and techniques.

Multiple facets of appraisal and the associated gaps require some introspection:

i. **Cost-Benefit Analysis:** How to construct a sector-wise portfolio?

ii. **Evidence-Base**: PC-I comprises of projections, but what about the actual impact evaluation of completed ADP schemes (PC-V)?

iii. **Data Gap**: Reliance on national and provincial surveys for overall provincial/district socio-economic indicators, but what about the data on the effectiveness of public sector development investments?

iv. **Institutional Gap**: Bureau of Statistics may be involved in province-wide survey (e.g. MICS), but what about alignment with the ADP portfolio in terms of capturing and managing data?

v. **Data Analysis**: Are there adequate analytical skills to gauge worthwhile project investments along with the respective effectiveness?

vi. **Utilization**: Is the data utilized to foster systemic demand for relevant evidence?

Questions that need to be asked and answered by the appraisers of project proposals:

i. **Overall Quality**: Is the current level of appraisal satisfactory?

ii. **Analytical Capacity**: Is the analytical capacity for effective project appraisal adequate?

iii. **Sectoral Knowledge**: Is the sectoral knowledge sufficient for comprehensive technical appraisal of project proposals?

iv. **Risk Insights**: Is the holistic understanding up-to-the-mark to identify, categorize and potentially mitigate anticipated and unanticipated risks

v. **Spectrum of Considerations**: If sufficient evidence is not provided, can the appraiser identify the gaps in project proposal? Can the appraiser suggest exact evidence to the executing agency to fill the information gap?

vi. **Vision**: Can the appraiser gauge whether the proposed project is line with the broader national and provincial policy imperatives? Is the proposed project duplicating efforts of another existing project? Are the projected benefits and costs realistic? Is the project timeline pragmatic? etc.

Regardless of the sectoral knowledge, the key to comprehending strengths, weaknesses, opportunities and risks associated with a project is to engage deeply with the PC-I proposal from both micro-level perspective (i.e. specific project components) and holistic perspective (i.e. where does the project fill in sectoral strategy/provincial policy/national development vision).

Note: To reiterate the major concepts covered in this guide, a review question based on an actual approved PC-I has provided in Annexure-I with the corresponding Answer Key (without computations) in Annexure-II to hone the analytical skills of P&DD Officials. A couple of additional questions on 'made-up' scenarios are also included for review of the concepts covered in the guide.

Annexure-I

Review Questions

Question 1. You are tasked to **compute the Net Present Value, Benefits-Costs Ratio & Internal Rate of Return** for a 'Four-Lane Road on Indus Highway N-55' Project, with an initial investment of Rs. 339.5 Million (Note: No need to discount the initial investment at Year 0). Is the project feasible and worth investing in? The discount rate is 12%.

After computing NPV, BCR & IRR for the base case (i.e. 12% discount rate); conduct a sensitivity analysis for the following:

- Discount Rate increases from 12% to 18%
- All Economic Costs increase by 10%
- All Benefits decrease by 10%

Does the project remain feasible for the aforementioned three scenarios too?

Following details are provided on cash inflows (benefits) and cash outflows (costs):

Year	Project Economic Costs	Project Economic Benefits
0	33339.53	0
1	11133.18	2310.19
2	22.27	3356.07
3	44.53	4401.95
4	44.53	5447.83
5	44.53	6493.71
6	44.53	7539.6
7	44.53	8309.05
8	44.53	9078.51
9	44.53	9847.96
10	4231.82	10617.42
11	44.53	11386.87
12	44.53	12386.96
13	44.53	13387.05
14	44.53	14387.13
15	44.53	15387.22
16	44.53	16387.3
17	44.53	16891.01
18	44.53	17394.72
19	44.53	17898.43
20	4231.82	29535.32

Question 2. You are tasked to **compute the Net Present Value, Benefits-Costs Ratio, Internal Rate of Return & Return On Investment** for a Preventive Healthcare Project that would run for Five years, with an initial investment of Rs. 425,000 (No need to discount the initial investment at Year 0). The discount rate is 12%. Following details are provided on cash inflows (economic benefits) and cash outflows (economic costs):

(In Million Rs.)

Cash Inflows	**Year**	**0**	**1**	**2**	**3**	**4**	**5**
HH Health Expenditures Saved			45,000	45,000	45,000	45,000	45,000
Public Health Expenditures Saved			25,000	25,000	25,000	25,000	25,000
Labor Productivity Increased			75,000	75,000	75,000	75,000	75,000
Savings from higher disposal income			100,000	100,000	100,000	100,000	100,000
Returns to Investment from higher savings			250,000	250,000	250,000	250,000	250,000
Cash Inflow							
PV of Cash Inflow							
Cumulative Cash Inflow							

(In Million Rs.)

Cash Outflows	**Year**	**0**	**1**	**2**	**3**	**4**	**5**
Initial Investment		425,000					
Software Maintenance			50,000	50,000	50,000	50,000	50,000
Data Storage			10,000	10,000	10,000	10,000	10,000
Human Resources			200,000	200,000	200,000	200,000	200,000
Opportunity Cost			50,000	50,000	50,000	50,000	50,000
Cash Outflow							
PV of Cash Outflow							
Cumulative Cash Outflow							

Question 3.

A) As an appraiser, you are provided with five different projects along with their corresponding costs and benefits. However, resource-constraints mean that you may only choose one. Which one would you choose and why?

Project	Benefits (Rs.)	Costs (Rs.)
A	1,784,364	1,542,481
B	1,600,000	1,550,000
C	1,800,000	1,600,000
D	2,000,000	1,800,000
E	1,400,000	1,600,000

B) As an appraiser, you are provided with five different projects along with their corresponding costs and non-monetized benefits. However, resource-constraints mean that you may only choose one. Which one would you choose and why?

Project	Deaths Averted	Total Cost (Rs.)
A	100,000	3,000,000
B	150,000	1,000,000
C	200,000	500,000
D	300,000	3,500,000
E	250,000	1,500,000

Annexure-II

Answer Key

Question 1.

Base Case (Discount Rate= 12%):
NPV= Rs. 15,629.4 Million
IRR=15.75%
BCR=1.34
Project is Feasible as NPV>0, IRR>Discount Rate, BCR>1

Scenario 1 (Discount Rate increases to 18%):
NPV= Rs. -6,517.2 Million
IRR=15.75%
BCR=0.85
Project is not Feasible as NPV<0, IRR<Discount Rate, BCR<1

Scenario 2 (Cost Escalation of 10%):
NPV= Rs. 11,087.9 Million
IRR=14.49%
BCR=1.22
Project is Feasible as NPV>0, IRR>Discount Rate, BCR>1

Scenario 3 (Revenue Decrease of 10%):
NPV= Rs. 9,525.0 Million
IRR=14.36%
BCR=1.21
Project is Feasible as NPV>0, IRR>Discount Rate, BCR>1

Question 2.

NPV= Rs. 241,884

IRR=33.11%

ROI=15.68%

BCR=1.16

Project is Feasible as NPV>0, IRR>Discount Rate, ROI>0, BCR>1

Question 3.

a) **Project A because highest BCR of 1.16**
b) **Project C because most cost-effective with 400 deaths averted for every Rs. 1000 spent**

FINANCIAL & ECONOMIC APPRAISAL OF PC-I PROPOSALS

Concept Review of Key Techniques

RESEARCH & TRAINING WING, PLANNING & DEVELOPMENT DEPARTMENT, GOVERNMENT OF SINDH

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