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B.Com Honours | Semester 3 | Calicut University

FINANCIAL STRATEGY FOR START-UPS

Course Code: COM3MN201 • Module II Notes

MODULE II: INVESTMENT DECISIONS FOR ENTREPRENEURS

Capital Allocation & Venture Project Appraisal

Capital investment decisions — commonly designated as **Capital Budgeting** — represent the most crucial strategic choices an entrepreneur confronts. Because start-up resources are strictly finite and initial seed funds cannot be easily replenished, committing capital to long-term technological infrastructure, product development pipelines, manufacturing facilities, or geographic expansions involves irreversible cash outflows with payoffs realized across multi-year future horizons. Faulty investment appraisal leads to cash exhaustion, excessive runway consumption, and enterprise liquidation. Conversely, rigorous capital allocation enables founders to maximize shareholder wealth, select value-accretive projects, and optimize limited venture capital.

1. Principles of Capital Budgeting in Entrepreneurial Ventures

Capital budgeting is the decision-making process through which an entrepreneurial firm evaluates, screens, and selects long-term capital investments. Key features characterizing start-up capital allocation include:

- **Long-Term Horizon:** Cash outflows occur immediately (Time 0), whereas benefits accrue over several succeeding operating periods.
- **Substantial Outlay:** Capital commitments represent a massive proportion of the start-up's total net worth.
- **Irreversibility:** Secondary markets for specialized custom software, AI models, or specialized lab equipment are highly illiquid; abandoning a failed project results in severe capital write-offs.
- **Strategic Impact:** Dictates the venture's operating cost structure, production scale, break-even point, and competitive differentiation.

CLASSIFICATION OF CAPITAL INVESTMENT PROJECTS

Strategic Project Types

1. Independent Projects

Projects whose cash flows are independent of each other. Accepting or rejecting Project A has no direct bearing on the acceptance of Project B. If both have positive NPV and funding exists, both can be accepted.

2. Mutually Exclusive Projects

Projects that perform identical functions or compete for the same scarce resource. Accepting one automatically precludes the acceptance of the other (e.g., choosing between cloud hosting on AWS vs. setting up proprietary physical servers).

3. Contingent / Dependent Projects

Projects whose acceptance is conditional upon the approval of another primary investment (e.g., acquiring an automated assembly line necessitates building a specialized air-conditioned clean room facility).

4. Replacement vs. Expansion Projects

Replacement: Retiring obsolete machinery to reduce operating downtime and maintenance. **Expansion:** Adding capacity to enter new geographic markets or introduce new product lines.

2. Project Cost Calculation: Determining Relevant Cash Flows

A foundational tenet of financial appraisal is that project evaluation must be based strictly on **Incremental Cash Flows**, not accounting net profits. Accounting profits contain non-cash items (such as depreciation) and arbitrary overhead allocations that do not reflect true liquidity.

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THE THREE DISTINCT CHRONOLOGICAL STAGES OF PROJECT CASH FLOWS:
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STAGE 1: INITIAL CASH OUTFLOW (TIME 0 - Net Investment):
   + Purchase Price of New Capital Asset / Technology Platform
   + Freight, Shipping, Insurance, Custom Duties & Import Levies
   + Installation, Commissioning, Site Preparation, Calibration & Trial Run Costs
   + Initial Working Capital Margin Required to Support Operations
   − Net Salvage Value / Resale Proceeds from Old Replaced Asset (if any)
   ± Tax Impact on Sale of Old Asset (Tax saving on capital loss / Tax on gain)
   = NET INITIAL CASH OUTLAY (CF0)

STAGE 2: OPERATING CASH INFLOWS (YEARS 1 TO n - CFAT):
   Revenues Generated by Project
   − Operating Costs (Direct materials, labor, power, maintenance, excluding
depreciation)
   = Earnings Before Depreciation, Interest, and Taxes (EBDIT)
   − Tax Depreciation
   = Earnings Before Interest and Taxes (EBIT / Operating Profit)
   − Corporate Income Tax
   = Net Operating Profit After Tax (NOPAT)
   + Tax Depreciation (Added back as non-cash charge)
   = CASH FLOW AFTER TAX (CFAT)
   * Formula: CFAT = (Sales − Operating Costs) × (1 − T) + (Depreciation × T)

STAGE 3: TERMINAL CASH INFLOW (AT END OF PROJECT HORIZON - YEAR n):
   + Net Estimated Scrap / Salvage Value of Asset upon Retirement
   ± Tax on Salvage Value (Balancing charge / Terminal allowance)
   + 100% Recovery of Net Working Capital Margin initially invested
   = NET TERMINAL CASH INFLOW (TNCF)
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Golden Rules for Relevant Cash Flow Determination

- **Sunk Costs are Irrelevant:** Money already spent in the past (e.g., prior feasibility studies, market research) cannot be recovered and must be excluded from investment decisions.
- **Opportunity Costs are Relevant:** If an existing building or warehouse owned by the founder is allocated to the project, the forgone rental income is a real economic cash outflow that must be included.
- **Financing Costs are Excluded from Cash Inflows:** Interest payments and dividend outflows must NOT be deducted when calculating CFAT. Financing costs are already incorporated into the discount rate (WACC); deducting interest would double-count financing charges.

3. Capital Investment Evaluation Methods: Traditional vs. DCF

Investment evaluation techniques are divided into two categories based on whether they incorporate the Time Value of Money:

Traditional (Non-Discounted) Techniques

Do not take into account the time value of money or discounting of future cash receipts:

- **Payback Period (PBP) Method:** Measures the exact time required to recover the initial capital investment.
- **Accounting Rate of Return (ARR):** Measures average accounting net profit as a percentage of capital investment.

Discounted Cash Flow (DCF / Modern) Techniques

Explicitly recognize the time value of money by discounting future expected cash streams using the opportunity cost of capital:

- **Net Present Value (NPV) Method:** The gold standard of corporate appraisal.
- **Internal Rate of Return (IRR) Method:** Rate that equates PV of inflows to initial outlay.
- **Profitability Index (PI):** Benefit-Cost ratio.
- **Discounted Payback Period (DPBP):** Payback adjusted for TVM.

4. The Payback Period (PBP) Method

The **Payback Period** is the length of time required for the cumulative cash inflows from an investment project to equal the original initial cash outlay.

Payback Period Formulations

Case A: Even (Constant) Annual Cash Inflows:
Payback Period = Initial Cash Outlay ÷ Constant Annual CFAT

Case B: Uneven (Fluctuating) Annual Cash Inflows:
Computed by calculating cumulative CFAT year by year until initial cost is recovered:
Payback Period = E + [(Initial Outlay − Cumulative Inflows at E) ÷ CFAT in Year (E + 1)]
Where *E* is the completed number of years immediately prior to full recovery.

APPRAISAL OF THE PAYBACK PERIOD METHOD

Critical Evaluation

Advantages (Why Start-Up Founders Use It)

- **Simplicity:** Extremely easy to compute and intuitive for non-financial founders.
- **Liquidity & Survival Focus:** Prioritizes rapid cash recovery, which is critical for cash-strapped start-ups with short runway.
- **Risk Screening:** Projects with shorter payback minimize exposure to distant, uncertain technological and market shifts.

Severe Inherent Theoretical Flaws

- **Ignores Post-Payback Cash Flows:** Completely disregards massive cash inflows earned after the payback period, penalizing high-value long-term infrastructure.
- **Ignores Time Value of Money:** Treats cash received in Year 1 identical to cash received in Year 5 without discounting.
- **Arbitrary Cut-Off:** Setting the target hurdle payback period is purely subjective without theoretical basis.

Discounted Payback Period (DPBP)

To rectify the TVM limitation of traditional payback, the **Discounted Payback Period** first discounts all expected future CFATs to their Present Values at the firm's cost of capital, and then calculates the time taken for cumulative discounted cash inflows to recover the initial capital investment. DPBP is always longer than simple PBP.

5. The Net Present Value (NPV) Method

The **Net Present Value (NPV)** method is universally regarded in modern finance as the theoretically soundest capital budgeting criterion. The NPV of an investment project represents the dollar addition to shareholder wealth generated by the project, net of the initial capital commitment.

Mathematical Formula for Net Present Value

NPV = Σ [CFATt ÷ (1 + k)^t] − Initial Outlay (CF0) = Total PV of Cash Inflows − Total PV of Cash Outflows

Where: *CFATt* = Cash flow after tax in year *t*; *k* = Cost of capital (discount rate / hurdle rate); *t* = Time period (from 1 to n); *CF0* = Initial cash investment at Time 0.

STATUTORY DECISION RULES FOR NPV — Accept / Reject Criteria

NPV > 0 (Positive)	NPV = 0 (Zero)	NPV < 0 (Negative)
ACCEPT THE PROJECT. The investment generates cash flows at a rate exceeding the cost of capital, expanding the net market value of the venture and augmenting shareholder wealth.	**INDIFFERENT.** The project earns exactly the cost of capital. Project may be accepted if strategic or non-financial benefits exist.	**REJECT THE PROJECT.** The project earns less than the minimum required hurdle rate, depleting existing capital reserves and destroying equity wealth.

6. The Internal Rate of Return (IRR) Method

The **Internal Rate of Return (IRR)** is the annualized effective compounded rate of return earned on the invested capital of a project. Statistically, it is that unique discount rate at which the **Net Present Value of the project equals zero** (i.e., Total PV of Cash Inflows = Initial Cash Outlay).

Mathematical Formulation of IRR

Σ [CFATt ÷ (1 + IRR)^t] − CF0 = 0

Because the polynomial equation cannot be solved directly for uneven cash flows, IRR is solved through trial and error using two trial discount rates (L = Lower rate giving positive NPV; H = Higher rate giving negative NPV) and applying **Linear Interpolation**:

IRR = L + [NPVL ÷ (NPVL − NPVH)] × (H − L)

IRR Decision Criteria

- **If IRR > Cost of Capital (k / Hurdle Rate): ACCEPT.** The venture generates higher returns than the cost of funding.
- **If IRR < Cost of Capital (k): REJECT.** The venture yields less than the cost of capital.
- **If IRR = Cost of Capital (k): INDIFFERENT.** Project breaks even on capital costs.

7. Comprehensive Comparative Analysis: NPV vs. IRR

For independent single projects with conventional cash flows (initial negative outflow followed by positive inflows), NPV and IRR always yield identical accept/reject decisions. However, when evaluating **Mutually Exclusive Projects**, NPV and IRR frequently produce conflicting rankings due to:

Dimension	Net Present Value (NPV)	Internal Rate of Return (IRR)
Measurement Basis	Absolute monetary value (Rupees / Dollars). Directly measures wealth addition.	Relative percentage rate. Does not indicate total quantum of wealth generated.
Reinvestment Rate Assumption	Assumes interim cash inflows are reinvested at the **firm's Cost of Capital (k)** — realistic and commercially valid.	Assumes interim cash flows are reinvested at the **project's own IRR** — highly unrealistic for projects with exceptionally high IRRs (e.g., 60%).
Scale / Size Disparity	Prefers a large project generating INR 50 Lakhs NPV, even if percentage return is 18%.	May favor a tiny project with an IRR of 40% generating merely INR 2 Lakhs NPV.
Multiple Rates of Return	Always gives a unique, unambiguous single value for any cash flow pattern.	Non-conventional cash flows (alternating signs − + − +) can yield **multiple IRRs** or imaginary numbers.
Theoretical Superiority	**Universally preferred** in finance theory as it directly fulfills wealth maximization.	Popular among executives and VCs because percentages are easy to benchmark against interest rates.

8. Capital Rationing and Project Selection Under Resource Constraints

In textbook finance, it is assumed that a firm can raise infinite capital at its WACC to fund every positive NPV project. In the real entrepreneurial world, ventures face **Capital Rationing** — a fixed ceiling on the total capital available for investment during a budget period.

FORMS OF CAPITAL RATIONING

Capital Restraints

1. Hard Capital Rationing (External Constraints)

Imposed by external financial markets, commercial banks, or venture capitalists. Outside capital suppliers refuse to provide additional funding due to the start-up's lack of credit history, collateral deficits, high existing debt gearing, or macroeconomic credit squeezes.

2. Soft Capital Rationing (Internal Constraints)

Imposed internally by the board of directors, founders, or corporate management. Arises from conservative policies to prevent overexpansion, preserve founder voting control, or limit growth to match managerial execution capacity.

Project Selection Mechanism: The Profitability Index (PI)

Under capital rationing, simply ranking projects by absolute NPV fails because large projects consume all available funds while excluding multiple smaller, highly efficient projects. The firm must maximize **NPV per rupee of capital spent** using the **Profitability Index (PI / Benefit-Cost Ratio)**:

Profitability Index Formula & Selection Protocol

Profitability Index (PI) = Present Value of Future Cash Inflows ÷ Initial Cash Outlay

Net Profitability Index (NPI): NPI = NPV ÷ Initial Cash Outlay = PI − 1.

Selection Criteria:

• **Divisible Projects:** Projects can be accepted in fractions. Rank all projects in descending order of PI and allocate the capital budget until funds are fully exhausted.

• **Indivisible Projects:** Projects must be accepted 100% or rejected. Form feasible trial combinations of projects within the budget limit and select the combination that yields the **highest aggregate NPV**.

9. Comprehensive Practical Problem on Capital Budgeting & Project Selection

PRACTICAL PROJECT APPRAISAL & CAPITAL RATIONING CASE

Comprehensive Examination Model

Fact Situation: Zenith Tech Labs has a maximum capital budget of **INR 50,00,000** for the fiscal year 2026-27. The venture's cost of capital is **10%**. Five independent capital projects are under consideration (all projects are divisible):

Project	Initial Outlay (INR)	Annual CFAT (INR)	Life (Years)	PVIFA (10%, n) Factor
Project A	INR 20,00,000	INR 6,00,000	5 Years	3.791
Project B	INR 15,00,000	INR 4,50,000	6 Years	4.355
Project C	INR 10,00,000	INR 3,20,000	5 Years	3.791
Project D	INR 18,00,000	INR 5,20,000	5 Years	3.791
Project E	INR 12,00,000	INR 3,50,000	4 Years	3.170

STEP-BY-STEP PROJECT EVALUATION & OPTIMAL ALLOCATION:

STEP 1: COMPUTE PV OF CASH INFLOWS, NPV, AND PROFITABILITY INDEX (PI):

Proj	Initial Cost (INR)	Annual CFAT	Life	PV Inflows (CFAT × Factor)	NPV	PI (PV / Outlay)	Rank
A	20,00,000	6,00,000	5 yr	6,00,000 × 3.791 = 22,74,600	+2,74,600	1.1373	4
B	15,00,000	4,50,000	6 yr	4,50,000 × 4.355 = 19,59,750	+4,59,750	1.3065	1
C	10,00,000	3,20,000	5 yr	3,20,000 × 3.791 = 12,13,120	+2,13,120	1.2131	2
D	18,00,000	5,20,000	5 yr	5,20,000 × 3.791 = 19,71,320	+1,71,320	1.0952	5
E	12,00,000	3,50,000	4 yr	3,50,000 × 3.170 = 11,09,500	−90,500	0.9246	REJECT

* Project E is immediately REJECTED because NPV is negative (PI < 1.0).

STEP 2: OPTIMAL ALLOCATION UNDER CAPITAL RATIONING (Budget = INR 50,00,000):

Rank	Project	Outlay Required	Cumulative Outlay	Fraction Accepted	NPV Generated (INR)
1	B	INR 15,00,000	INR 15,00,000	100% (Full)	4,59,750
2	C	INR 10,00,000	INR 25,00,000	100% (Full)	2,13,120
3	A	INR 20,00,000	INR 45,00,000	100% (Full)	2,74,600
4	D	INR 18,00,000	INR 50,00,000	27.78% (5L / 18L)	47,589
TOTAL ALLOCATION:		**INR 50,00,000**			**INR 9,95,059**

Optimal Decision: Fully accept Projects B, C, and A, and take a 27.78% fractional interest in Project D.
This combination exhausts the budget of INR 50,00,000 while yielding the maximum aggregate NPV of INR 9,95,059.