

PROJECT PLANNING AND MANAGEMENT

FINANCIAL ESTIMATES AND PROJECTIONS

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CHAPTER

6

Chapter Introduction

Financial estimates and projections convert the project's:

- Market assumptions
- Technical requirements
- Implementation plan
- Financing structure
- Operating arrangements

...into an integrated financial model.

The projections show whether the proposed project can generate adequate profit, liquidity and debt-repayment capacity.

Central Financial Question

How much will the project cost, how will it be financed, and will its projected operations generate sufficient profit and cash to remain financially sustainable?

Learning Objectives

By the end of this chapter, students will be able to:

- Estimate the total cost of a project
- Develop a complete means-of-finance plan
- Prepare sales and production estimates
- Estimate the cost of production
- Determine working-capital requirements
- Prepare projected profitability statements
- Prepare projected cash-flow statements
- Prepare projected balance sheets
- Calculate the break-even point
- Assess debt-service capacity
- Develop a consistent financial-assumptions schedule
- Test the internal consistency of financial projections
- Make a preliminary financial-feasibility recommendation

Chapter Roadmap

This chapter covers:

1. Financial-estimation framework
2. Cost of project
3. Means of finance
4. Estimates of sales and production
5. Cost of production
6. Working-capital requirement
7. Projected profitability
8. Projected cash flow
9. Projected balance sheet
10. Break-even point
11. Debt-service capacity
12. Financial assumptions
13. Integrated financial analysis

Opening Reflection

Discussion Question — A project reports a substantial accounting profit but is unable to:

- Pay suppliers
- Repay its loan
- Purchase raw materials
- Pay employees on time

Is the project financially sound? Explain why profitability and liquidity must be assessed separately.

What Are Financial Estimates?

Financial estimates are forward-looking calculations of the project's expected:

- Investment
- Financing
- Revenue
- Operating costs
- Profit
- Cash flows
- Assets
- Liabilities
- Debt obligations

Purpose of Financial Projections

Financial projections help determine:

- Total funding required
- Timing of financing
- Expected profitability
- Liquidity position
- Debt-repayment capacity
- Working-capital needs
- Financial risk
- Sustainability

Main Sources of Financial Data

Financial projections use information from:

- Market and demand analysis
- Technical analysis
- Organizational analysis
- Implementation schedule
- Procurement plan
- Tax regulations
- Financing proposals
- Economic assumptions

Market-Analysis Inputs

Market analysis provides:

- Sales volume
- Selling price
- Market share
- Product mix
- Sales growth
- Customer credit terms
- Seasonality

Technical-Analysis Inputs

Technical analysis provides:

- Land requirements
- Buildings
- Machinery
- Product capacity
- Raw materials
- Utilities
- Labour
- Implementation costs
- Maintenance requirements

Organizational Inputs

Organizational analysis provides estimates for:

- Management salaries
- Technical staff
- Administrative staff
- Governance costs
- Information systems
- Insurance
- Professional services

Implementation-Schedule Inputs

The implementation schedule determines:

- Timing of capital expenditure
- Loan-disbursement needs
- Interest during construction
- Pre-operating expenditure
- Start of production
- Start of sales
- Working-capital timing

Main Financial Statements

A complete financial model normally includes:

1. Cost-of-project statement
2. Means-of-finance statement
3. Sales and production schedule
4. Cost-of-production schedule
5. Working-capital schedule
6. Projected income statement
7. Projected cash-flow statement
8. Projected balance sheet
9. Loan-repayment schedule

Financial-Projection Period

The projection period should reflect:

- Construction period
- Loan maturity
- Asset life
- Market conditions
- Business stabilization
- Evaluation requirements

A five- to ten-year forecast is common for project appraisal.

Construction and Operating Periods

The model should clearly distinguish:

Construction Period

The project is being established and does not normally generate full operating revenue.

Operating Period

Commercial production and sales have commenced.

Nominal and Real Projections

Nominal Projections

Include expected inflation.

Real Projections

Use constant prices and exclude general inflation.

Revenue, costs and discount rates must be treated consistently.

Incremental Financial Analysis

$$\text{Incremental Cash Flow} = \text{Cash Flow with Project} \\ - \text{Cash Flow without Project}$$

Financial appraisal should include only cash flows caused by undertaking the project.

Consistency Principle

All projections must use internally consistent assumptions concerning:

- Production
- Sales
- Prices
- Costs
- Tax
- Financing
- Depreciation
- Working capital
- Timing

What Is the Cost of Project?

The cost of project is the total investment required to:

- Acquire assets
- Construct facilities
- Install equipment
- Complete pre-operating activities
- Provide initial working capital
- Bring the project into commercial operation

Main Project-Cost Categories

The total project cost may include:

1. Land and site development
2. Buildings and civil works
3. Plant and machinery
4. Technical know-how and engineering
5. Miscellaneous fixed assets
6. Preliminary and pre-operative expenses
7. Contingency
8. Margin money for working capital
9. Initial operating losses where applicable

Total Project Cost

Total Project Cost =
Fixed Assets + Pre-Operating Expenses
+ Contingency + Initial Working Capital

Land and Site Development

Land-related costs may include:

- Purchase price
- Lease payment
- Registration
- Legal fees
- Compensation
- Site clearing
- Grading
- Drainage
- Access road
- Fencing

Land-Cost Considerations

The estimate should clarify:

- Whether land is purchased or leased
- Payment schedule
- Legal ownership
- Development requirements
- Taxes and registration fees
- Resettlement costs
- Expansion area

Buildings and Civil Works

Costs may include:

- Production building
- Warehouse
- Office
- Laboratory
- Workshop
- Utility structures
- Internal roads
- Drainage
- Water systems
- Waste-treatment facilities

Building-Cost Estimate

$$\text{Building Cost} = \text{Floor Area} \times \text{Cost per Square Metre}$$

Building-Cost Example

Floor area

3,000 square metres

Cost per square metre

ETB 30,000

BUILDING COST

ETB 90,000,000

Plant and Machinery

Machinery costs may include:

- Basic purchase price
- Freight
- Insurance
- Customs duties
- Inland transport
- Installation
- Testing
- Commissioning
- Initial spare parts

Landed Machinery Cost

Landed Cost =
Purchase Price + Freight + Insurance
+ Customs + Inland Transport + Installation

Machinery-Cost Example

Assume:

Purchase price	ETB 100 million
Freight and insurance	ETB 8 million
Customs and taxes	ETB 15 million
Inland transport	ETB 3 million
Installation	ETB 10 million

TOTAL MACHINERY COST

ETB 136 million

Technical Know-How

Technical know-how expenditure may include:

- Licence fee
- Technology-transfer fee
- Engineering design
- Royalty advance
- Technical assistance
- Documentation
- Specialist training

Miscellaneous Fixed Assets

Examples include:

- Vehicles
- Office furniture
- Computers
- Communication equipment
- Laboratory equipment
- Safety equipment
- Maintenance tools
- Security systems

Preliminary Expenses

Preliminary expenses may include:

- Feasibility study
- Market research
- Legal registration
- Engineering study
- Environmental assessment
- Consultancy
- Financing application fees

Pre-Operative Expenses

Pre-operative expenses arise after project approval but before commercial operations. Examples:

- Project-management salaries
- Office expenses
- Training
- Travel
- Trial production
- Utilities
- Insurance
- Initial promotion

Interest during Construction

Interest incurred during construction may be capitalized when it relates directly to financing project establishment.

Interest-during-Construction Estimate

$$\text{IDC} = \text{Average Outstanding Construction Loan} \\ \times \text{Interest Rate} \times \text{Construction Period}$$

Interest Example

Average construction loan

ETB 100 million

Interest rate

15%

Construction period

1 year

INTEREST DURING CONSTRUCTION

ETB 15 million

Contingency Provision

Contingency covers:

- Quantity changes
- Design modification
- Additional installation
- Price escalation
- Exchange-rate movement
- Unforeseen site conditions

Physical Contingency

$$\text{Physical Contingency} = \text{Eligible Base Cost} \times \text{Physical Contingency Rate}$$

Price Contingency

Price contingency reflects expected increases during project implementation. It may be calculated separately for:

- Local costs
- Imported equipment
- Construction
- Labour
- Transport

Initial Working Capital

Initial working capital finances:

- Raw-material inventory
- Work in progress
- Finished goods
- Receivables
- Minimum cash
- Initial operating expenses

Initial Operating Losses

A new project may incur losses because:

- Capacity utilization is low
- Market penetration is gradual
- Staff productivity is developing
- Reject rates are high
- Fixed costs begin immediately

These losses may need financing.

Project-Cost Statement

Cost Category	ETB
Land and site development	20,000,000
Buildings and civil works	90,000,000
Machinery and equipment	136,000,000
Technical know-how	8,000,000
Miscellaneous fixed assets	12,000,000
Preliminary expenses	4,000,000
Pre-operative expenses	10,000,000
Contingency	20,000,000
Working-capital margin	30,000,000
Total Project Cost	330,000,000

Local and Foreign-Currency Costs

Project costs should be divided into:

Local Currency

- Land
- Local construction
- Local labour
- Domestic transport
- Administration

Foreign Currency

- Imported machinery
- Foreign consultancy
- Software
- Technology licences
- Imported spare parts

Cost-Estimate Sources

Cost estimates may be based on:

- Supplier quotations
- Contractor estimates
- Engineering quantities
- Current market prices
- Similar projects
- Government schedules
- Professional judgment

Common Project-Cost Errors

- Excluding freight and insurance
- Omitting installation
- Ignoring taxes and duties
- Underestimating pre-operating expenses
- Excluding working capital
- Double counting expenses
- Using outdated quotations
- Ignoring implementation delay

What Are Means of Finance?

Means of finance are the sources from which the total project cost will be funded.

Main Sources of Finance

Projects may be financed through:

- Equity capital
- Preference capital
- Retained earnings
- Term loans
- Lease financing
- Grants
- Supplier credit
- Working-capital loans
- Public–private partnerships

Financing Equality

Total Means of Finance = Total Project Cost

A financing gap indicates that the project is not fully funded.

Equity Capital

Equity is capital contributed by project owners or shareholders. It normally:

- Carries ownership rights
- Has no compulsory repayment date
- Bears the greatest risk
- Receives residual profits

Advantages of Equity

- No mandatory principal repayment
- No compulsory interest
- Strengthens financial resilience
- Improves borrowing capacity
- Supports long-term investment

Limitations of Equity

- Dilutes ownership
- May reduce promoter control
- Investors expect high returns
- May be difficult to raise
- Dividends are not tax-deductible

Preference Capital

Preference capital may provide:

- Fixed dividend
- Priority over ordinary shareholders
- Limited voting rights
- Long-term financing

Its exact treatment depends on its legal and contractual features.

Retained Earnings

Existing enterprises may finance projects using accumulated profits. Advantages:

- No new ownership dilution
- No direct borrowing obligation
- Lower transaction cost

Term Loans

Term loans finance long-term project assets and are repaid according to an agreed schedule. Important terms include:

- Interest rate
- Maturity
- Grace period
- Repayment frequency
- Security
- Fees
- Covenants

Grace Period

A grace period postpones principal repayment during:

- Construction
- Installation
- Trial operation
- Initial market development

Interest may still be payable or capitalized.

Loan Maturity

Loan maturity should reflect:

- Project cash-generation pattern
- Asset life
- Construction period
- Market ramp-up
- Debt-service capacity

A short maturity may create excessive repayment pressure.

Lease Financing

Lease financing allows the project to use an asset while making periodic lease payments. It may reduce the initial cash requirement but creates contractual payment obligations.

Supplier Credit

Suppliers may permit delayed payment for:

- Equipment
- Raw materials
- Components
- Installation services

Supplier credit should be assessed for its effective financing cost.

Grant Financing

Grants may support projects producing:

- Social benefits
- Public services
- Innovation
- Employment
- Environmental benefits
- Regional development

Working-Capital Finance

Short-term operating needs may be financed through:

- Bank overdraft
- Revolving credit
- Short-term loan
- Supplier credit
- Receivables financing
- Owner's working-capital contribution

Debt-Equity Ratio

$$\text{Debt-Equity Ratio} = \text{Debt} \div \text{Equity}$$

Debt-Equity Example

Debt

ETB 210 million

Equity

ETB 120 million

DEBT-EQUITY RATIO = $210 \div 120$

1.75

Financing-Mix Example

Financing Source	ETB	Percentage
Equity	120m	36.4%
Term loan	180m	54.5%
Grant	20m	6.1%
Supplier credit	10m	3.0%
Total	330m	100%

Financing-Structure Considerations

The financing mix should balance:

- Cost of capital
- Financial risk
- Ownership control
- Liquidity
- Debt-service burden
- Tax consequences
- Availability of funds

Sources-and-Uses Statement

Uses of Funds	ETB	Sources of Funds	ETB
Fixed assets	270m	Equity	120m
Pre-operating costs	30m	Term loan	180m
Working capital	30m	Grant and credit	30m
Total	330m	Total	330m

Financing Gap

$$\text{Financing Gap} = \text{Total Project Cost} - \text{Confirmed Finance}$$

A positive gap must be closed before implementation.

Financing-Maturity Matching

Long-term assets should generally be financed with:

- Equity
- Long-term debt
- Lease finance

Short-term working capital should normally be financed with short-term sources.

Sales and Production Projections

Sales and production estimates translate the market study into operating and financial forecasts.

Production versus Sales

Production and sales may differ because of:

- Inventory accumulation
- Spoilage
- Quality rejection
- Seasonal stocking
- Unsold finished goods

Production Capacity

$$\text{Production} = \text{Installed Capacity} \times \text{Capacity Utilization}$$

Capacity-Utilization Schedule

A new project may assume:

- Year 1: 60%
- Year 2: 70%
- Year 3: 80%
- Year 4: 90%
- Year 5: 95%

Production Example

Installed capacity

20,000 tonnes

Year 1 utilization

60%

YEAR 1 PRODUCTION

12,000 tonnes

Production Schedule

Year	Installed Capacity	Utilization	Production
1	20,000	60%	12,000
2	20,000	70%	14,000
3	20,000	80%	16,000
4	20,000	90%	18,000
5	20,000	95%	19,000

Sales-Volume Estimate

$$\text{Sales Volume} = \text{Opening Finished Goods} \\ + \text{Production} - \text{Closing Finished Goods}$$

Sales-Volume Example

Opening inventory	1,000 units
Production	12,000 units
Closing inventory	1,500 units

SALES

11,500 units

Sales Revenue

$$\text{Sales Revenue} = \text{Sales Quantity} \times \text{Selling Price}$$

Sales-Revenue Example

Sales quantity

12,000 tonnes

Selling price

ETB 40,000 per tonne

SALES REVENUE

ETB 480 million

Multiple-Product Revenue

$$\text{Total Revenue} = \sum (Q_i \times P_i)$$

Multiple-Product Example

Product	Quantity	Price	Revenue
Product A	8,000	40,000	320m
Product B	4,000	45,000	180m
Total			500m

Selling-Price Estimate

Selling price may be based on:

- Market price
- Competitor price
- Production cost
- Customer willingness to pay
- Quality position
- Government regulation
- Distribution margins

Price-Growth Formula

$$P_t = P_o (1 + g)^t$$

P_o = base selling price

g = annual price growth

t = forecast period

Sales-Growth Assumptions

Sales growth may arise from:

- Capacity ramp-up
- Market expansion
- Distribution growth
- Product acceptance
- Price changes
- New product introduction

Credit Sales

When goods are sold on credit, revenue may be recognized before cash is received. This creates:

- Accounts receivable
- Collection risk
- Working-capital requirements
- Cash-flow differences

Sales Returns and Discounts

Revenue projections should consider:

- Sales returns
- Product defects
- Quantity discounts
- Promotional discounts
- Bad debts
- Dealer commissions

Net Sales

$$\text{Net Sales} = \text{Gross Sales} - \text{Returns} - \text{Discounts} - \text{Allowances}$$

Other Operating Income

Other income may include:

- By-product sales
- Scrap sales
- Service charges
- Rental income
- Technical-support income
- Waste-product sales

Sales-Projection Risks

Common risks include:

- Overestimated demand
- Unrealistic market share
- Excessive price growth
- Ignoring competitor response
- Assuming immediate full capacity
- Ignoring customer credit losses

What Is Cost of Production?

Cost of production is the total cost incurred to manufacture products or deliver services during a specified period.

Main Production-Cost Categories

Production costs may include:

- Raw materials
- Direct labour
- Utilities
- Consumables
- Maintenance
- Factory overhead
- Depreciation
- Quality control
- Packaging

Fixed and Variable Costs

Fixed Costs

Remain relatively stable within a relevant operating range.

Variable Costs

Change with production or sales volume.

Total Cost

$$\text{Total Cost} = \text{Fixed Cost} + \text{Variable Cost}$$

Direct Materials

$$\text{Material Cost} = \text{Required Quantity} \times \text{Unit Price}$$

Material-Cost Example

Annual maize requirement

12,000 tonnes

Price

ETB 20,000 per tonne

ANNUAL MAIZE COST

ETB 240 million

Adjusting for Process Loss

$$\text{Gross Material Requirement} = \text{Net Material Requirement} \div (1 - \text{Loss Rate})$$

Direct Labour

Direct-labour cost may include:

- Basic wages
- Overtime
- Allowances
- Employer contributions
- Production incentives
- Employee benefits

Labour-Cost Estimate

$$\text{Annual Labour Cost} = \text{Number of Employees} \times \text{Annual Cost per Employee}$$

Labour-Cost Example

Production employees

40

Average annual cost

ETB 180,000

ANNUAL LABOUR COST

ETB 7,200,000

Utility Costs

Utility costs may include:

- Electricity
- Water
- Fuel
- Steam
- Gas
- Refrigeration
- Internet
- Waste treatment

Utility-Cost Formula

$$\text{Utility Cost} = \text{Utility Consumption} \times \text{Applicable Tariff}$$

Maintenance Cost

Maintenance may be estimated as:

- Percentage of equipment cost
- Supplier recommendation
- Historical expenditure
- Planned maintenance schedule
- Expected spare-parts consumption

Factory Overhead

Factory overhead may include:

- Production supervision
- Indirect labour
- Factory insurance
- Security
- Cleaning
- Repairs
- Factory administration
- Safety expenditure

Depreciation

$$\text{Annual Depreciation} = \frac{(\text{Asset Cost} - \text{Residual Value})}{\text{Useful Life}}$$

Depreciation allocates the depreciable cost of an asset over its estimated useful life.

Depreciation Example

Asset cost

ETB 50 million

Residual value

ETB 5 million

Useful life

10 years

ANNUAL DEPRECIATION

ETB 4.5 million

Depreciation and Cash Flow

Depreciation:

- Reduces accounting profit
- Reduces taxable income
- Does not normally require a cash payment in the year recorded

It is therefore added back in cash-flow calculations.

Cost of Goods Manufactured

Cost of Goods Manufactured =
Direct Materials + Direct Labour
+ Manufacturing Overhead
+ Opening Work in Progress
– Closing Work in Progress

Cost of Goods Sold

$$\begin{aligned}\text{Cost of Goods Sold} = & \\ & \text{Opening Finished Goods} \\ & + \text{Cost of Goods Manufactured} \\ & - \text{Closing Finished Goods}\end{aligned}$$

Administrative Expenses

Administrative expenses may include:

- Management salaries
- Office rent
- Communication
- Audit
- Legal services
- Office supplies
- Information systems
- Board and governance costs

Selling and Distribution Expenses

Examples include:

- Sales salaries
- Advertising
- Transport
- Warehousing
- Dealer commission
- Market research
- Promotion
- Customer support

Financial Expenses

Financial expenses may include:

- Loan interest
- Bank charges
- Commitment fees
- Guarantee fees
- Lease interest
- Foreign-exchange losses

Cost Escalation

$$C_t = C_o (1 + i)^t$$

where i is the cost-inflation rate

Unit Cost

$$\text{Unit Production Cost} = \text{Total Production Cost} \div \text{Units Produced}$$

Unit-Cost Example

Total production cost

ETB 360 million

Output

12,000 tonnes

UNIT PRODUCTION COST

ETB 30,000 per tonne

Production-Cost Schedule

Cost Item	Year 1	Year 2	Year 3
Raw materials	300m	350m	400m
Direct labour	8m	9m	10m
Utilities	12m	14m	16m
Maintenance	5m	6m	7m
Factory overhead	15m	17m	19m
Depreciation	10m	10m	10m

What Is Working Capital?

Working capital finances the project's short-term operating cycle. It supports:

- Inventory
- Production
- Credit sales
- Operating expenses
- Minimum cash requirements

Gross Working Capital

Gross working capital is the total investment in current assets.

Net Working Capital

$$\text{Net Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

Current Assets

Current assets may include:

- Raw materials
- Work in progress
- Finished goods
- Accounts receivable
- Cash and bank
- Prepaid expenses

Current Liabilities

Current liabilities may include:

- Supplier credit
- Accrued wages
- Accrued expenses
- Taxes payable
- Short-term operating liabilities

Working-Capital Cycle

Cash → Raw Materials → Work in Progress → Finished
Goods → Credit Sales → Receivables → Cash

Working-Capital Drivers

Working capital depends on:

- Production volume
- Inventory days
- Production cycle
- Credit sales
- Collection period
- Supplier-credit period
- Minimum cash policy

Raw-Material Inventory

$$\text{Raw-Material Inventory} = (\text{Annual Material Cost} \div 365) \times \text{Inventory Days}$$

Raw-Material Example

Annual material cost

ETB 365 million

Inventory period

30 days

RAW-MATERIAL INVENTORY

ETB 30 million

Work in Progress

Work-in-progress investment may include a proportion of:

- Materials
- Labour
- Factory overhead

...depending on the stage of production.

Finished-Goods Inventory

$$\text{Finished-Goods Inventory} = \frac{\text{Annual Cost of Production}}{\text{Days}} \div 365 \times \text{Finished-Goods Days}$$

Accounts Receivable

$$\text{Receivables} = (\text{Annual Credit Sales} \div 365) \times \text{Collection Days}$$

Receivables Example

Annual credit sales

ETB 438 million

Collection period

30 days

RECEIVABLES

ETB 36 million

Accounts Payable

$$\text{Payables} = \frac{(\text{Annual Credit Purchases} \div 365) \times \text{Supplier-Credit Days}}{\text{Days}}$$

Minimum Cash Balance

Minimum cash may be based on:

- Number of operating days
- Monthly cash expenses
- Payment cycle
- Emergency requirements
- Management policy

Working-Capital Estimate

Component	ETB
Raw-material inventory	30m
Work in progress	8m
Finished goods	20m
Receivables	36m
Minimum cash	6m
Total Current Assets	100m
Less: Payables	(25m)
Less: Accrued expenses	(5m)
Net Working Capital	70m

Working-Capital Margin

$$\text{Working-Capital Margin} = \text{Required Working Capital} - \text{Bank Finance}$$

A lender may finance only part of working capital; the owners may need to contribute a margin.

Working-Capital Growth

Working capital usually grows with:

- Sales volume
- Production
- Prices
- Credit periods
- Inventory requirements

Annual increases represent additional cash outflows.

Change in Working Capital

$$\Delta WC_t = WC_t - WC_{t-1}$$

An increase in working capital reduces project cash flow.

Working-Capital Recovery

Working capital may be recovered at the end of the project when:

- Inventory is sold
- Receivables are collected
- Operating liabilities are settled

Working-Capital Risks

- Excess inventory
- Slow collections
- Customer default
- Reduced supplier credit
- Rapid growth
- Inflation
- Seasonal purchasing
- Cash-flow mismatch

What Is Projected Profitability?

Projected profitability estimates the expected accounting performance of the project over the forecast period.

Projected Income Statement

The projected income statement presents:

- Revenue
- Cost of sales
- Gross profit
- Operating expenses
- Depreciation
- Interest
- Tax
- Net profit

Income-Statement Structure

Revenue

– Cost of Goods Sold

= Gross Profit

– Operating Expenses

= EBITDA

– Depreciation

= EBIT

– Interest

= Profit Before Tax

– Tax

= Net Profit

Gross Profit

$$\text{Gross Profit} = \text{Net Sales} - \text{Cost of Goods Sold}$$

Gross-Profit Margin

$$\text{Gross-Profit Margin} = (\text{Gross Profit} \div \text{Net Sales}) \times 100$$

EBITDA

EBITDA means: Earnings Before Interest, Tax, Depreciation and Amortization.

It provides a measure of operating performance before financing, tax and noncash depreciation.

EBIT

$$\text{EBIT} = \text{EBITDA} - \text{Depreciation} - \text{Amortization}$$

Profit Before Tax

$$\text{Profit Before Tax} = \text{EBIT} - \text{Interest Expense}$$

Taxable Income

Taxable income may differ from accounting profit because of:

- Tax depreciation
- Disallowed expenses
- Tax incentives
- Loss carryforward
- Capital allowances

Net Profit

$$\text{Net Profit} = \text{Profit Before Tax} - \text{Income Tax}$$

Projected Income Statement Example

Item	ETB
Net sales	500m
Cost of goods sold	(350m)
Gross profit	150m
Administrative and selling costs	(50m)
EBITDA	100m
Depreciation	(20m)
EBIT	80m
Interest	(25m)
Profit before tax	55m
Tax	(16.5m)
Net profit	38.5m

Net-Profit Margin

$$\text{Net-Profit Margin} = (\text{Net Profit} \div \text{Net Sales}) \times 100$$

For the example: $38.5 \div 500 \times 100 = 7.7\%$

Return on Assets

$$\text{ROA} = (\text{Net Profit} \div \text{Average Total Assets}) \times 100$$

Return on Equity

$$\text{ROE} = (\text{Net Profit} \div \text{Average Equity}) \times 100$$

Retained Earnings

$$\text{Retained Earnings} = \text{Net Profit} - \text{Dividends}$$

Retained earnings increase project equity.

Profitability Schedule

Item	Year 1	Year 2	Year 3
Sales	500m	600m	700m
Gross profit	150m	190m	230m
EBITDA	100m	135m	165m
EBIT	80m	115m	145m
Profit before tax	55m	94m	128m
Net profit	38.5m	65.8m	89.6m

Profitability Interpretation

Assess:

- Whether profits are positive
- How quickly profitability improves
- Whether margins are adequate
- Whether profits support dividends
- Whether profits strengthen equity
- Whether assumptions are realistic

Accounting Profit Is Not Cash

A profitable project may still face cash shortages because:

- Sales are on credit
- Inventory is increasing
- Capital expenditure is high
- Loan principal is being repaid
- Taxes are paid in cash

What Is Projected Cash Flow?

A projected cash-flow statement estimates expected cash inflows, cash outflows and closing cash balances.

Why Cash-Flow Forecasting Matters

It helps determine whether the project can:

- Pay operating expenses
- Purchase inputs
- Repay debt
- Pay taxes
- Finance expansion
- Avoid liquidity failure

Cash-Flow Categories

Cash flows are normally classified as:

1. Operating activities
2. Investing activities
3. Financing activities

Operating Cash Inflows

Examples:

- Cash sales
- Receivable collections
- Service revenue
- Other operating receipts

Operating Cash Outflows

Examples:

- Supplier payments
- Employee payments
- Utility payments
- Taxes
- Marketing expenditure
- Administrative expenditure

Investing Cash Flows

Examples:

- Land purchase
- Building expenditure
- Machinery purchase
- Replacement assets
- Asset-sale proceeds
- Residual value

Financing Cash Flows

Examples:

- Equity contributions
- Loan proceeds
- Loan repayments
- Interest payments
- Lease payments
- Dividends

Direct Cash-Flow Format

$$\text{Closing Cash} = \text{Opening Cash} + \text{Cash Inflows} - \text{Cash Outflows}$$

Operating Cash Flow from Profit

$$\begin{aligned}\text{Operating Cash Flow} = & \\ & \text{Net Profit} + \text{Noncash Expenses} \\ & - \Delta \text{ Working Capital}\end{aligned}$$

A simplified indirect calculation.

Operating-Cash-Flow Example

Net profit	ETB 38.5 million
Depreciation	ETB 20 million
Increase in working capital	ETB 10 million

OPERATING CASH FLOW

ETB 48.5 million

Project Cash-Flow Table

Item	Year 0	Year 1	Year 2
Operating cash flow	—	48.5m	75m
Capital expenditure	(300m)	(5m)	(8m)
Working-capital change	(30m)	(10m)	(8m)
Loan proceeds	180m	—	—
Equity contribution	120m	—	—
Debt service	—	(35m)	(40m)
Net cash flow	(30m)	(1.5m)	19m

Cash Deficit

A projected cash deficit may require:

- Additional equity
- Working-capital borrowing
- Delayed capital expenditure
- Reduced dividends
- Improved collections
- Cost reduction

Cumulative Cash Balance

The cash-flow projection should track the cumulative cash balance to identify the maximum financing requirement.

Free Cash Flow to the Project

$$\text{FCFF} = \text{EBIT} (1 - T) + \text{Depreciation} \\ - \text{Capital Expenditure} - \Delta \text{WC}$$

A simplified project cash flow.

Free Cash Flow to Equity

Cash flow to equity reflects cash available to owners after:

- Operating costs
- Taxes
- Capital expenditure
- Working-capital changes
- Debt servicing
- New borrowing

Terminal Cash Flow

Terminal cash flow may include:

- Salvage value
- Working-capital recovery
- Asset-disposal tax
- Closure cost
- Environmental restoration

Cash-Flow Forecasting Risks

- Customers pay late
- Inventory is higher than planned
- Production begins late
- Costs are paid earlier than expected
- Loan disbursement is delayed
- Taxes are underestimated

What Is a Projected Balance Sheet?

A projected balance sheet presents the expected financial position of the project at a specific future date.

Accounting Equation

$$\text{Assets} = \text{Liabilities} + \text{Equity}$$

The projected balance sheet must balance in every period.

Current Assets

Current assets may include:

- Cash
- Receivables
- Raw-material inventory
- Work in progress
- Finished goods
- Prepayments

Noncurrent Assets

Noncurrent assets may include:

- Land
- Buildings
- Machinery
- Vehicles
- Furniture
- Intangible assets
- Less accumulated depreciation

Current Liabilities

Current liabilities may include:

- Accounts payable
- Accrued expenses
- Short-term loans
- Current portion of long-term debt
- Taxes payable

Long-Term Liabilities

Examples include:

- Term loans
- Lease obligations
- Deferred liabilities
- Long-term provisions

Equity

Equity may include:

- Paid-up capital
- Share premium
- Reserves
- Retained earnings
- Current-year profit

Projected Balance Sheet Example

Assets	ETB	Liabilities and Equity	ETB
Cash	20m	Payables	30m
Receivables	36m	Short-term debt	20m
Inventory	58m	Long-term debt	150m
Net fixed assets	260m	Equity	120m
Other assets	6m	Retained earnings	60m
Total	380m	Total	380m

Fixed-Asset Schedule

A fixed-asset schedule should show:

- Opening asset balance
- New additions
- Asset disposals
- Depreciation
- Closing net book value

Loan-Balance Schedule

A loan schedule should show:

- Opening balance
- New disbursement
- Principal repayment
- Closing balance
- Interest expense

Retained-Earnings Schedule

Closing Retained Earnings =
Opening Retained Earnings + Net Profit – Dividends

Balance-Sheet Consistency Checks

Verify that:

- Cash matches the cash-flow statement
- Debt matches the loan schedule
- Retained earnings match accumulated profits
- Fixed assets match the depreciation schedule
- Working capital matches operating assumptions

Current Ratio

$$\text{Current Ratio} = \text{Current Assets} \div \text{Current Liabilities}$$

It measures short-term liquidity.

Quick Ratio

$$\text{Quick Ratio} = (\text{Cash} + \text{Receivables}) \div \text{Current Liabilities}$$

It excludes inventory from liquid assets.

Debt Ratio

$$\text{Debt Ratio} = \text{Total Debt} \div \text{Total Assets}$$

Balance-Sheet Warning Signs

- Negative cash balance
- Excessive receivables
- Obsolete inventory
- Increasing short-term debt
- Weak equity
- Rapidly declining asset base
- Liabilities exceeding assets

What Is the Break-Even Point?

$$\begin{aligned}\text{Total Revenue} &= \text{Total Cost} \\ \text{Profit} &= 0\end{aligned}$$

The break-even point is the sales level at which total revenue equals total cost.

Contribution Margin

$$\text{Unit Contribution} = \text{Unit Selling Price} - \text{Unit Variable Cost}$$

Break-Even Quantity

$$Q(\text{BE}) = \frac{\text{Annual Fixed Cost}}{\text{Unit Selling Price} - \text{Unit Variable Cost}}$$

Break-Even Example

Fixed cost

ETB 60 million

Unit selling price

ETB 40,000

Unit variable cost

ETB 30,000

$$Q(\text{BE}) = 60,000,000 \div 10,000$$

6,000 tonnes

Contribution-Margin Ratio

$$\text{Contribution-Margin Ratio} = (\text{Sales} - \text{Variable Cost}) \div \text{Sales}$$

Break-Even Sales Revenue

$$\text{Break-Even Revenue} = \text{Fixed Costs} \div \text{Contribution-Margin Ratio}$$

Break-Even Capacity Utilization

$$\text{Break-Even Capacity} = (\text{Break-Even Output} \div \text{Installed Capacity}) \times 100$$

Break-Even Capacity Example

Break-even output

6,000 tonnes

Installed capacity

20,000 tonnes

BREAK-EVEN CAPACITY

30%

Margin of Safety

$$\text{Margin of Safety} = \text{Expected Sales} - \text{Break-Even Sales}$$

Margin-of-Safety Percentage

$$\text{Margin-of-Safety \%} = \frac{((\text{Expected Sales} - \text{Break-Even Sales}) \div \text{Expected Sales}) \times 100}$$

Margin-of-Safety Example

Expected sales	12,000 tonnes
Break-even sales	6,000 tonnes

MARGIN OF SAFETY

50%

Break-Even Assumptions

Basic break-even analysis assumes:

- Constant selling price
- Constant unit variable cost
- Stable fixed costs
- Production equals sales
- Constant product mix
- Relevant operating range

Multiple-Product Break-Even

For multiple products, break-even analysis requires a stable weighted-average contribution margin based on the expected sales mix.

Cash Break-Even Point

$$\text{Cash Break-Even} = \text{Cash Fixed Costs} \div \text{Unit Contribution}$$

Cash break-even excludes noncash fixed expenses such as depreciation.

Accounting versus Cash Break-Even

Accounting Break-Even

Covers all accounting costs, including depreciation.

Cash Break-Even

Covers only cash operating costs.

What Is Debt Service?

Debt service consists of the contractual payments required on borrowed funds. It normally includes:

- Principal
- Interest
- Loan fees where applicable

Why Debt-Service Analysis Matters

A project may be profitable but unable to repay debt because:

- Cash receipts are delayed
- Principal installments are high
- Grace period is inadequate
- Working-capital requirements are large
- Revenue grows slowly

Loan-Repayment Schedule

Year	Opening Balance	Interest	Principal	Total Debt Service	Closing Balance
1	—	—	—	—	—
2	—	—	—	—	—
3	—	—	—	—	—
4	—	—	—	—	—
5	—	—	—	—	—

Template for annual debt-service scheduling.

Interest Calculation

$$\text{Interest} = \text{Opening Loan Balance} \times \text{Interest Rate}$$

Equal-Principal Repayment

$$\text{Annual Principal} = \text{Original Loan} \div \text{Number of Repayment Periods}$$

Interest declines as the outstanding loan balance falls.

Debt-Service Coverage Ratio

$$\text{DSCR} = \text{Cash Available for Debt Service} \div (\text{Principal} + \text{Interest})$$

Cash Available for Debt Service

$$\text{CADS} = \text{Net Profit} + \text{Depreciation} + \text{Interest}$$

More detailed models may adjust for taxes, working capital and essential capital expenditure.

DSCR Example

Cash available for debt service	ETB 60 million
Principal	ETB 25 million
Interest	ETB 15 million

$$\text{DSCR} = 60 \div 40$$

1.50

DSCR Interpretation

DSCR above 1.00

Available cash exceeds required debt service.

DSCR equal to 1.00

Cash exactly covers debt service.

DSCR below 1.00

The project cannot fully meet debt obligations from available cash.

Minimum Acceptable DSCR

Lenders may require a minimum DSCR such as:

- 1.20
- 1.25
- 1.30
- Higher for riskier projects

The exact requirement depends on the lender and project risk.

Annual, Minimum and Average DSCR

Debt analysis should report:

- Annual DSCR
- Minimum DSCR
- Average DSCR

A strong average does not compensate for a year of insufficient coverage.

Interest-Coverage Ratio

$$\text{Interest Coverage} = \text{EBIT} \div \text{Interest Expense}$$

Debt-Repayment Period

The repayment period should be aligned with:

- Cash-flow generation
- Asset life
- Market ramp-up
- Working-capital needs
- Project risk

Loan-Life Coverage Ratio

A lender may also compare the present value of cash available for debt service with outstanding debt over the remaining loan life.

Debt-Service Warning Signs

- DSCR below lender requirement
- Negative cash balance
- Debt repayment before stable operations
- High balloon payment
- Excessive short-term borrowing
- Interest-rate exposure
- Foreign-currency mismatch

Improving Debt-Service Capacity

Possible measures include:

- Increase equity
- Extend loan maturity
- Increase grace period
- Reduce capital cost
- Phase the project
- Improve collections
- Reduce dividends
- Increase operating efficiency

What Are Financial Assumptions?

Financial assumptions are the estimated variables used to construct the project's financial projections.

Why Document Assumptions?

Documented assumptions make the model:

- Transparent
- Reviewable
- Consistent
- Testable
- Easier to update
- More credible

Main Assumption Categories

Assumptions may cover:

- Project life
- Construction period
- Capacity utilization
- Selling prices
- Sales growth
- Input prices
- Inflation
- Tax
- Interest
- Exchange rates
- Credit periods

Production Assumptions

Specify:

- Installed capacity
- Working days
- Daily shifts
- Operating hours
- Capacity utilization
- Process losses
- Product mix

Sales Assumptions

Specify:

- Sales volume
- Market share
- Selling price
- Price growth
- Credit-sales percentage
- Customer discounts
- Sales returns
- Bad-debt rate

Cost Assumptions

Specify:

- Material consumption
- Material prices
- Labour levels
- Salary growth
- Utility rates
- Maintenance rate
- Administrative costs
- Marketing expenses

Working-Capital Assumptions

Specify:

- Raw-material days
- Work-in-progress days
- Finished-goods days
- Receivable days
- Payable days
- Minimum cash balance

Financing Assumptions

Specify:

- Equity contribution
- Loan amount
- Interest rate
- Grace period
- Repayment method
- Loan maturity
- Fees
- Working-capital financing

Tax Assumptions

Specify:

- Corporate tax rate
- Tax holiday
- Customs duties
- Value-added tax treatment
- Withholding tax
- Loss carryforward
- Depreciation allowances

Depreciation Assumptions

Specify:

- Asset categories
- Cost base
- Useful life
- Residual value
- Depreciation method
- Start date
- Tax depreciation differences

Inflation Assumptions

Inflation may differ for:

- Selling prices
- Raw materials
- Salaries
- Utilities
- Construction
- Imported equipment

A single general inflation rate may not be appropriate.

Exchange-Rate Assumptions

Exchange rates affect:

- Imported equipment
- Imported raw materials
- Foreign-currency loans
- Export revenue
- Foreign consultancy
- Spare parts

Financial-Assumptions Table

Assumption	Base Value	Source	Sensitivity Range
Capacity utilization Year 1	60%	Technical study	50–70%
Selling-price growth	5%	Market study	0–8%
Material-cost inflation	7%	Supplier data	5–12%
Interest rate	15%	Bank offer	15–18%
Corporate tax	30%	Tax regulation	Fixed

Assumption Sources

Assumptions should be supported by:

- Market research
- Supplier quotations
- Engineering studies
- Loan offers
- Government regulations
- Industry benchmarks
- Historical experience
- Professional analysis

Base, Optimistic and Pessimistic Assumptions

Each major variable may be expressed under:

Optimistic case

Favourable variable values.

Base case

Most likely variable values.

Pessimistic case

Adverse variable values.

This supports scenario and sensitivity analysis.

Avoiding Circular Assumptions

The model should avoid assumptions that depend on outputs that themselves depend on the same assumption.

Example: Borrowing depends on cash shortage, while interest depends on borrowing.

This requires structured model logic.

Integration of the Financial Model

A well-structured financial model links:



Model-Linkage Example

An increase in sales volume affects:

- Revenue
- Production
- Material cost
- Labour and utilities
- Inventory
- Receivables
- Tax
- Profit
- Cash flow

Three-Statement Integration

The financial model must link:

Income Statement

Measures profitability.

Cash-Flow Statement

Measures liquidity.

Balance Sheet

Measures financial position.

Sources-and-Uses Check

$$\text{Sources of Finance} - \text{Uses of Finance} = 0$$

Any difference indicates a financing-model error.

Balance-Sheet Check

$$\text{Total Assets} - (\text{Total Liabilities} + \text{Equity}) = 0$$

Cash-Flow Check

Closing cash from the cash-flow statement must equal cash reported in the projected balance sheet.

Debt Check

Closing debt in the loan schedule must equal debt shown in the projected balance sheet.

Retained-Earnings Check

Retained Earnings =
Previous Retained Earnings + Net Profit -
Dividends

Depreciation Check

Accumulated depreciation should equal the total depreciation charged since the assets entered service, adjusted for disposals.

Reasonableness Testing

Compare projected results with:

- Industry margins
- Similar projects
- Historical performance
- Market capacity
- Technical efficiency
- Financing conditions

Ratio Analysis

Useful projected ratios include:

- Gross-profit margin
- Net-profit margin
- Current ratio
- Debt–equity ratio
- Return on assets
- Return on equity
- Interest coverage
- DSCR

Sensitivity Variables

The projections should be tested for changes in:

- Selling price
- Sales volume
- Capacity utilization
- Raw-material cost
- Investment cost
- Implementation delay
- Interest rate
- Exchange rate

Scenario Analysis

Optimistic

- Higher sales
- Lower costs
- Faster implementation

Base Case

- Most realistic assumptions

Pessimistic

- Lower sales
- Higher costs
- Delayed operations

Financial-Projection Warning Signs

- Positive profit but negative cash
- Persistent financing gaps
- Unrealistic receivable collection
- Increasing inventory
- Debt-service failure
- Balance sheet does not balance
- Full capacity assumed immediately
- Working capital omitted

Common Financial-Projection Mistakes

- Omitting working capital
- Treating production as sales
- Assuming immediate full capacity
- Using inconsistent price and cost inflation
- Ignoring credit sales
- Treating depreciation as a cash payment
- Omitting loan principal from cash flow
- Including loan proceeds as income
- Failing to balance the balance sheet
- Ignoring debt-service capacity

Financial-Projections Checklist

Confirm that:

- Project cost is complete
- Means of finance equal total cost
- Production reflects capacity
- Sales reflect market conditions
- Costs are comprehensively estimated
- Working capital is included
- Income statements are internally consistent
- Cash balances remain realistic
- Balance sheets balance
- Break-even is acceptable
- DSCR meets lender requirements
- Assumptions are documented
- Sensitivity analysis is completed

Knowledge Check

1. What is included in the total cost of a project?
2. What are the main means of finance?
3. Why may production differ from sales?
4. How is sales revenue calculated?
5. What are the main production-cost categories?
6. What is net working capital?
7. How does profit differ from cash flow?
8. What does a projected balance sheet show?
9. How is the break-even quantity calculated?
10. What does DSCR measure?
11. Why should financial assumptions be documented?
12. How are the three projected financial statements linked?

Knowledge Check Answers

1. Fixed assets, pre-operating costs, contingency and initial working capital
2. Equity, loans, retained earnings, grants, leases and supplier credit
3. Because of inventory changes, losses and unsold goods
4. Sales quantity multiplied by selling price
5. Materials, labour, utilities, overhead, maintenance and depreciation
6. Current assets minus current liabilities
7. Profit uses accrual accounting; cash flow measures actual cash movement
8. Expected assets, liabilities and equity at a future date
9. Fixed costs divided by unit contribution margin
10. Ability of project cash flow to cover principal and interest
11. To make projections transparent, consistent and testable
12. Profit affects equity, cash flow determines cash, and both affect the balance sheet

Individual Assignment

Select one proposed project and prepare:

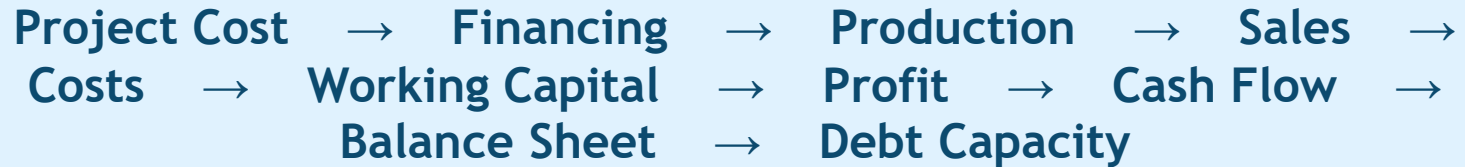
- Complete project-cost statement
- Means-of-finance statement
- Financing-gap analysis
- Five-year production forecast
- Five-year sales forecast
- Cost-of-production schedule
- Working-capital calculation
- Projected income statements
- Projected cash-flow statements
- Projected balance sheets
- Fixed-asset and depreciation schedule
- Loan-repayment schedule
- Break-even analysis
- Debt-service analysis
- Financial-assumptions schedule
- Sensitivity analysis
- Final financial recommendation

Chapter Summary

- Financial estimates translate market and technical information into monetary projections.
- Total project cost includes fixed assets, pre-operating costs, contingency and working capital.
- Sources of finance must equal total project cost.
- Sales projections should reflect market demand and realistic capacity utilization.
- Production costs should include materials, labour, utilities, overhead and depreciation.
- Working capital finances inventory, receivables and daily operations.
- Projected profitability measures expected accounting performance.
- Projected cash flow measures liquidity and financing requirements.
- The projected balance sheet shows the expected financial position.
- Break-even analysis determines the minimum viable sales level.
- Debt-service analysis assesses repayment capacity.
- Financial assumptions should be explicit, evidence-based and internally consistent.
- The income statement, cash flow and balance sheet must be fully integrated.

Key Message

Financial projections are credible only when every number can be traced to a realistic market, technical, operating or financing assumption.



Next Chapter: Project Cash Flows and Investment Criteria

The next chapter will cover:

- Basic principles of cash-flow estimation
- Project cash flows
- Incremental cash flows
- Time value of money
- Payback period
- Accounting rate of return
- Net Present Value
- Internal Rate of Return
- Profitability Index
- Mutually exclusive projects
- Capital rationing
- Investment decision rules

THANK YOU

Questions and Discussion

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