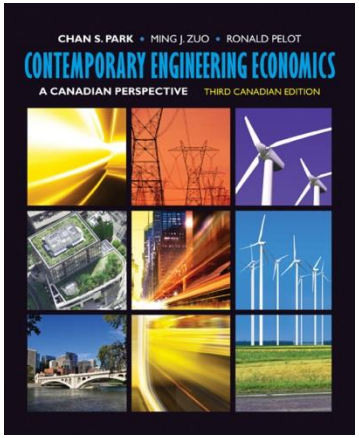
Developing Project Cash Flows



Lecture No. 27
Chapter 10
Contemporary Engineering Economics
Third Canadian Edition

Chapter Opening Story: Imperial Gives Kearl Green Light

- Kearl is an $8 billion oil sands mining and extraction project being developed by Imperial Oil (as operator) and ExxonMobil Canada. The project is located 70 kilometres northeast of Fort McMurray, Alberta. The project's total recoverable bitumen is estimated to be 4.6 billion barrels and at full production is estimated to average 300,000 barrels of bitumen per day. Kearl has an expected 50-year project life.
- A key issue to engineers is how Imperial justified the investment of $8 billion.

Chapter Opening Story: Imperial Gives Kearl Green Light (continued)

- Imperial's first step would be to estimate the magnitude of the revenue stream over the 50-year life of the project. The crude oil price and the production level would be the basis for possible revenue projections.
- Other influential factors include the labour costs, the costs of equipment such as shovels, trucks, crushers, and so on, and the tightening emissions regulations.
- That is, the project's justification depends upon the ability to estimate potential cash flows.

Chapter 10 Objectives

- What constitutes project cash flow elements?
- How do you use the income statement approach in developing project cash flows?
- How do you treat the gains and losses related to the disposal of an asset in the project cash flow statement?
- How do you determine the working capital requirement and its impact on project cash flows?
- How do you incorporate the costs associated with financing a project in developing the project's cash flow statement?

Chapter 10 Objectives (continued)

- How do you develop a generalized cash flow model?
- How do you use the after-tax cash flow diagram approach to develop cash flows?
- How do you perform an analysis of a lease-or-buy decision on an after-tax basis?

Lecture 27 Objectives

- What constitutes project cash flow elements?

Cost–Benefit Estimation for Engineering Projects

- Developing adequate cost and revenue estimates is an extremely important component of engineering projects.
- When discussing cost-estimating techniques, it is useful to present them in the context of simple projects and complex projects.
  - Simple Projects: These projects usually involve a single "off-the-shelf" component or a series of such components that are integrated together in a simple manner.
  - Complex Projects: These projects usually include specialized equipment that is not "off the shelf" and must be fabricated from detailed engineering drawings. Typical phases of a project are: development, conceptual design, preliminary design, and detailed design.

EPC

Incremental Cash Flows

VS.
Corporation level (Entity-based)

- In evaluating a capital investment, the only concern is the cash flows (called differential or incremental cash flows) that represent the change in the firm's total cash flow that occurs as a direct result of this investment.

Incremental

Elements of Incremental Cash Flows: Cash Outflows

1. Purchase of New Equipment: The relevant investment costs are incremental costs such as the cost of the asset, shipping and installation costs, and the costs of training employees to use the new asset.
   - When existing assets are sold, the relevant amount by which the new investment is reduced consists of the proceeds of the sale, adjusted for tax effects.
2. Investments in Working Capital: investment in non-capital assets is often called investment in working capital. In accounting, it means the amount carried in cash, and inventory that is available for the day-to-day operating needs.

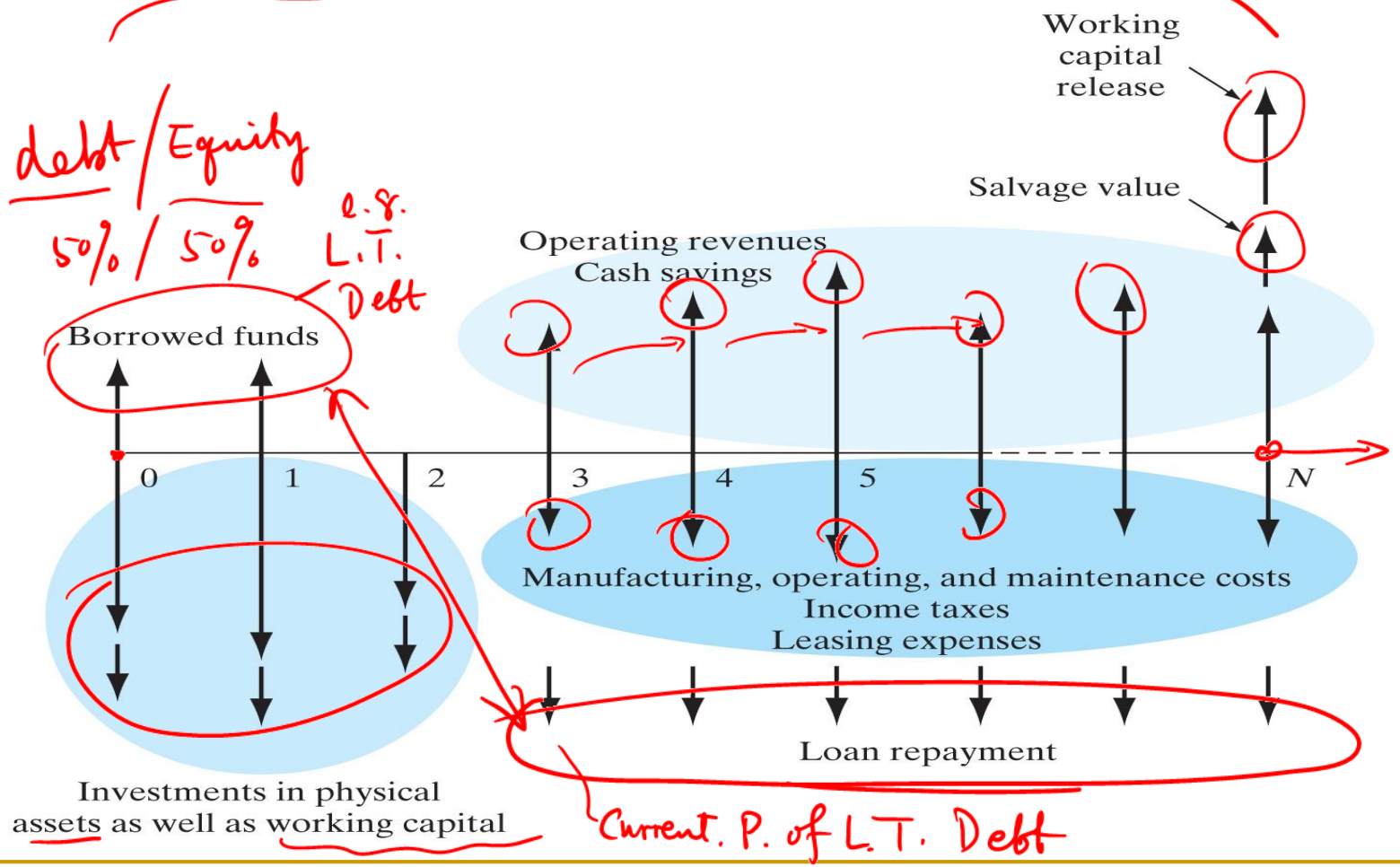
Elements of Incremental Cash Flows: Cash Outflows (continued)

3. Manufacturing, Operating, and Maintenance Costs: The cost associated with manufacturing a new product is estimated. Typical manufacturing costs include labour, materials, and overhead costs.
4. Leasing Expenses: the costs associated with leasing equipment or a building
5. Interest and Repayment of Borrowed Amounts: repayment of debts (principal and interests from loans and bonds)
6. Income Taxes and Tax Credits: any income tax payment following from a profitable operation or investment tax credit

Elements of Incremental Cash Flows: Cash Inflows

1. Borrowed Funds: Proceeds from borrowing are considered cash inflows.
2. Operating Revenues: as a result of the investment
3. Cost Savings (or Cost Reduction): is equivalent to an increase in revenues
4. Salvage Value (or Net Selling Price): of an existing asset is the selling price minus any costs incurred in selling, dismantling, and removing it. This value is subject to taxable gain or loss.
5. Working Capital Release: As a project approaches termination, inventories can be liquidated at their cost. This end-of-project cash flows are approximately equal to the net working capital investment that was made when the project began

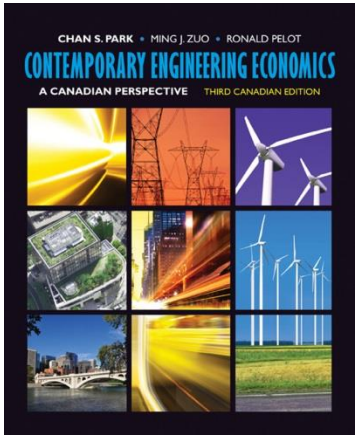
Types of Cash Flow Elements in Project Analysis



Classification of Cash Flow Elements

1. Operating Activities: Cash flows from operations include current sales revenues, cost of goods sold, operating expenses, and income taxes.
2. Investing Activities: Three types of investment flows are associated with buying a piece of equipment, specifically original investment, salvage value at the end of the useful life, and the working capital investment or recovery.
3. Financing Activities: Cash flows related to financing activities include the amount of borrowing and repayment of principal. Interest payments are classified as operating activities.

Summary



Identifying and estimating relevant project cash flows is perhaps the most challenging aspect of engineering economic analysis. All cash flows can be organized into one of the following three categories: i) operating activities, ii) investing activities, and iii) financing activities.