# Financial Profitability Models for Agriculture and Agroindustry

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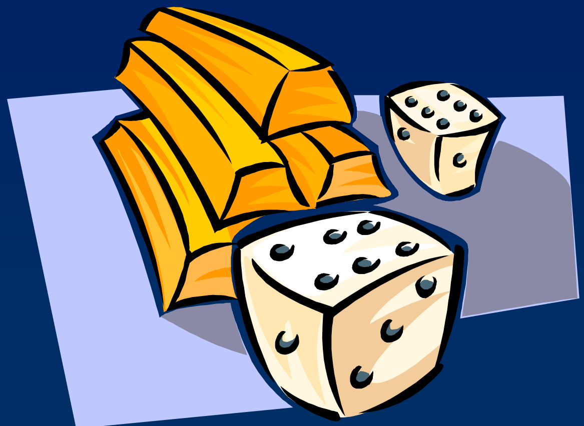
# What is a Financial Profitability Model (FPM)?



A FPM is a projection of investments, incomes and expenses for a given enterprise or project that is organized in an electronic worksheet.

# Why are Financial Profitability Models (FPMs) developed?

- FPMs are used to forecast financial profitability levels and other financial parameters of interest.
- They are also used to understand how profitability is affected by changes in volume, prices and costs (sensitivity analyses).
- The most widely used financial profitability parameters are the Internal Rate of Return (IRR) and the Net Present Value (NPV).

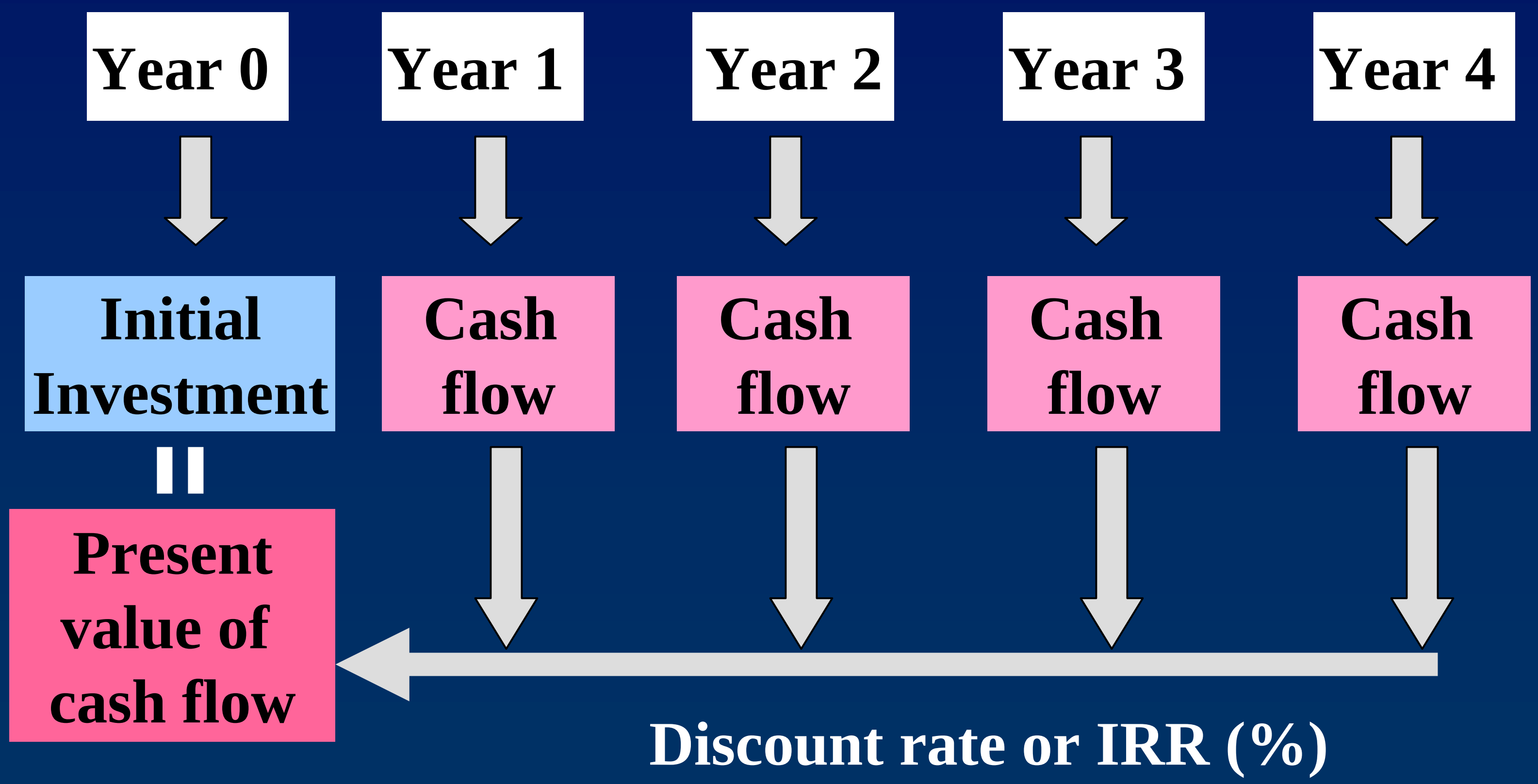
# Why do we want to calculate Financial Profitability?

- We may want to know if investing in a given business will provide us with a higher return than leaving our funds where they are.
- We may wish to compare the return of two or more investment alternatives.

# What does Internal Rate of Return (IRR) mean?

- The IRR is an interest rate that discounts a series of annual cash flows in such a way that the present value (in Year 0) of the series is equal to the initial investment.
- The IRR should be greater than the opportunity cost of capital plus a risk factor.
- Opportunity cost of capital is the average interest rate that can be obtained for savings; f. ex., in banks.

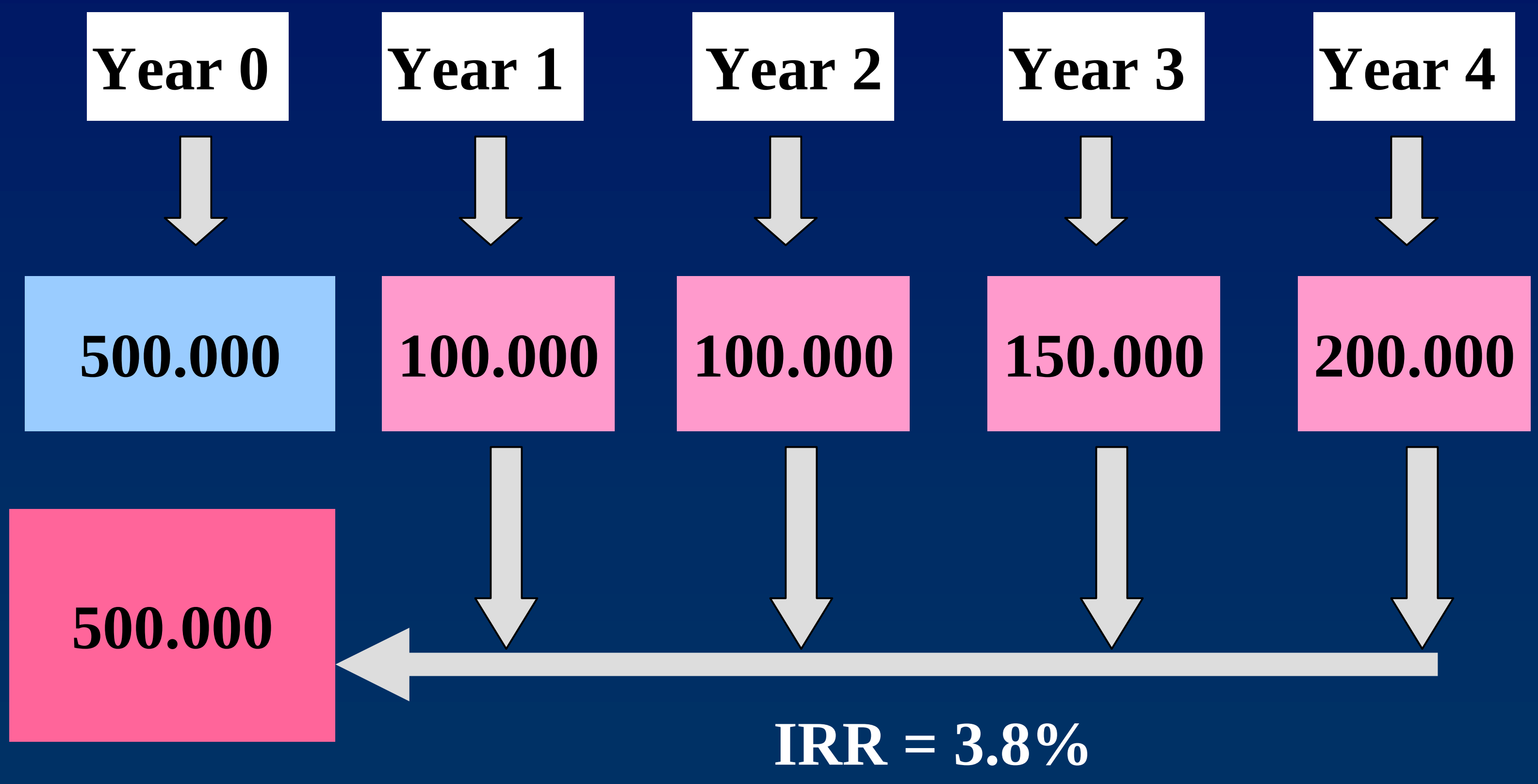
# Graphic interpretation of the IRR



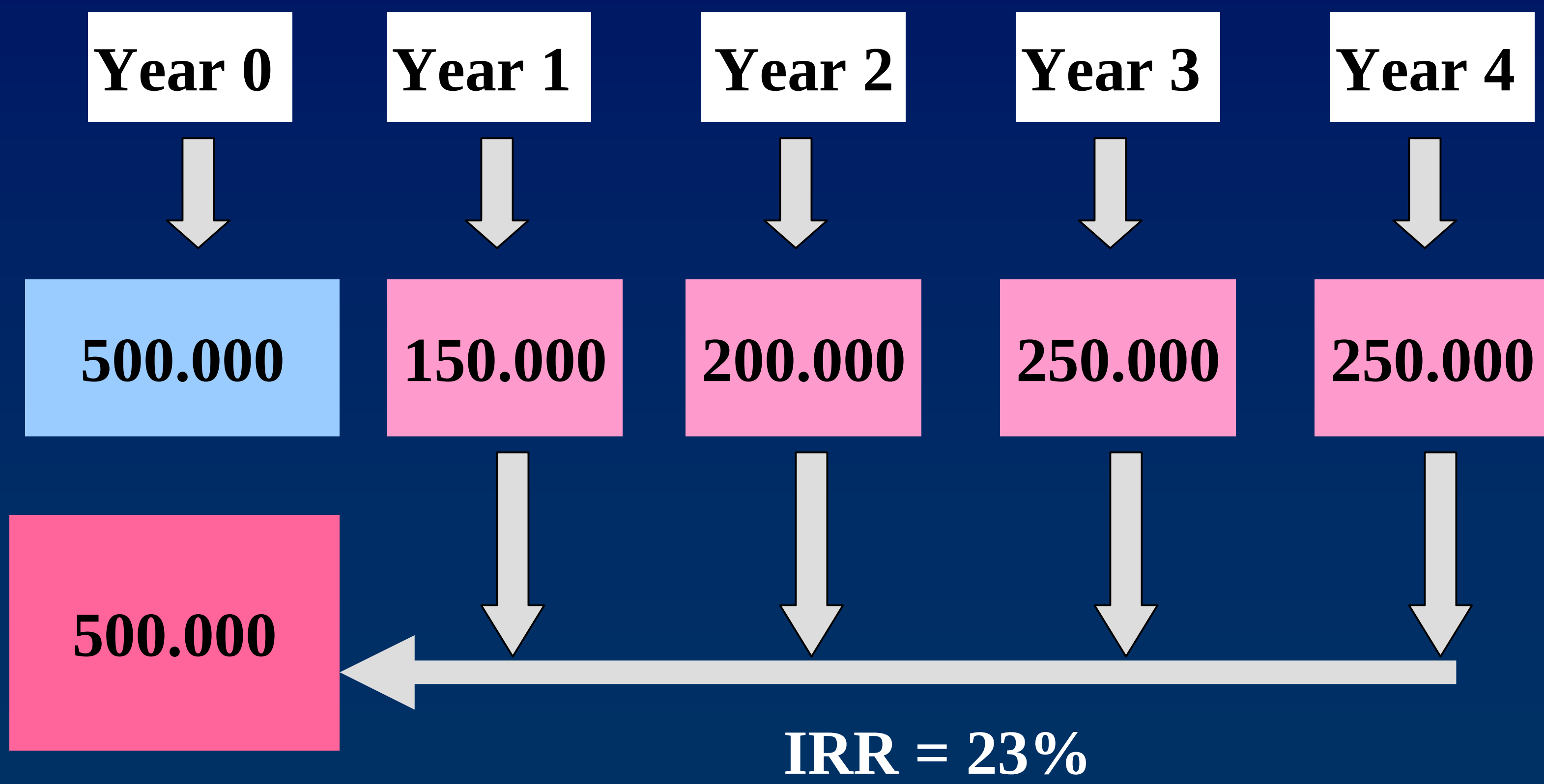
# Calculating IRR

- some annual cash flows can be negative
- the value of money decreases over time
- to compare the sum of annual cash flows with initial investment, we have to discount them to Year 0
- or else, we cannot compare apples with oranges
- the IRR is like the interest rate we obtain from a given investment

# Example of IRR Calculation - 1



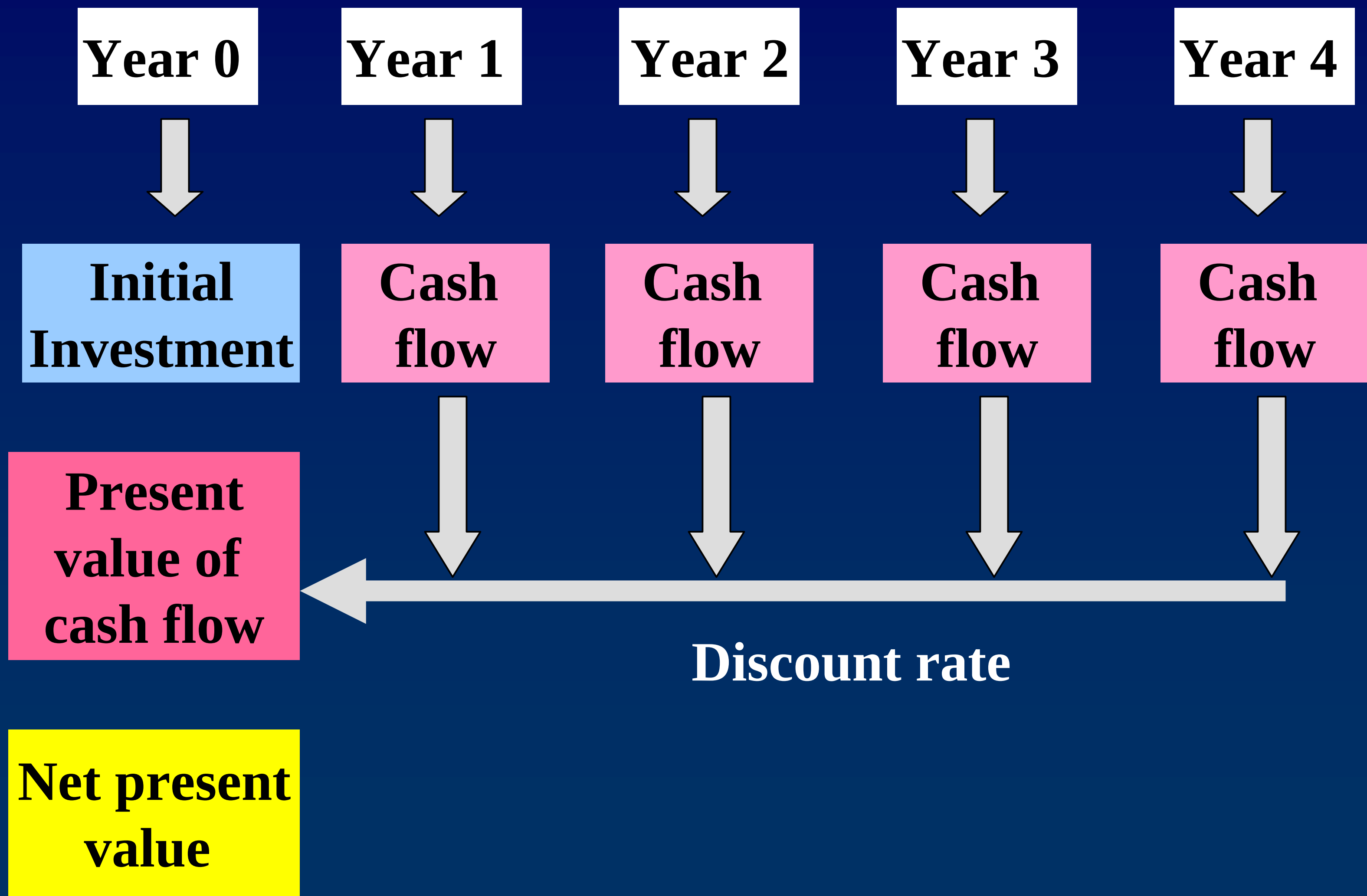
# Example of IRR Calculation - 2



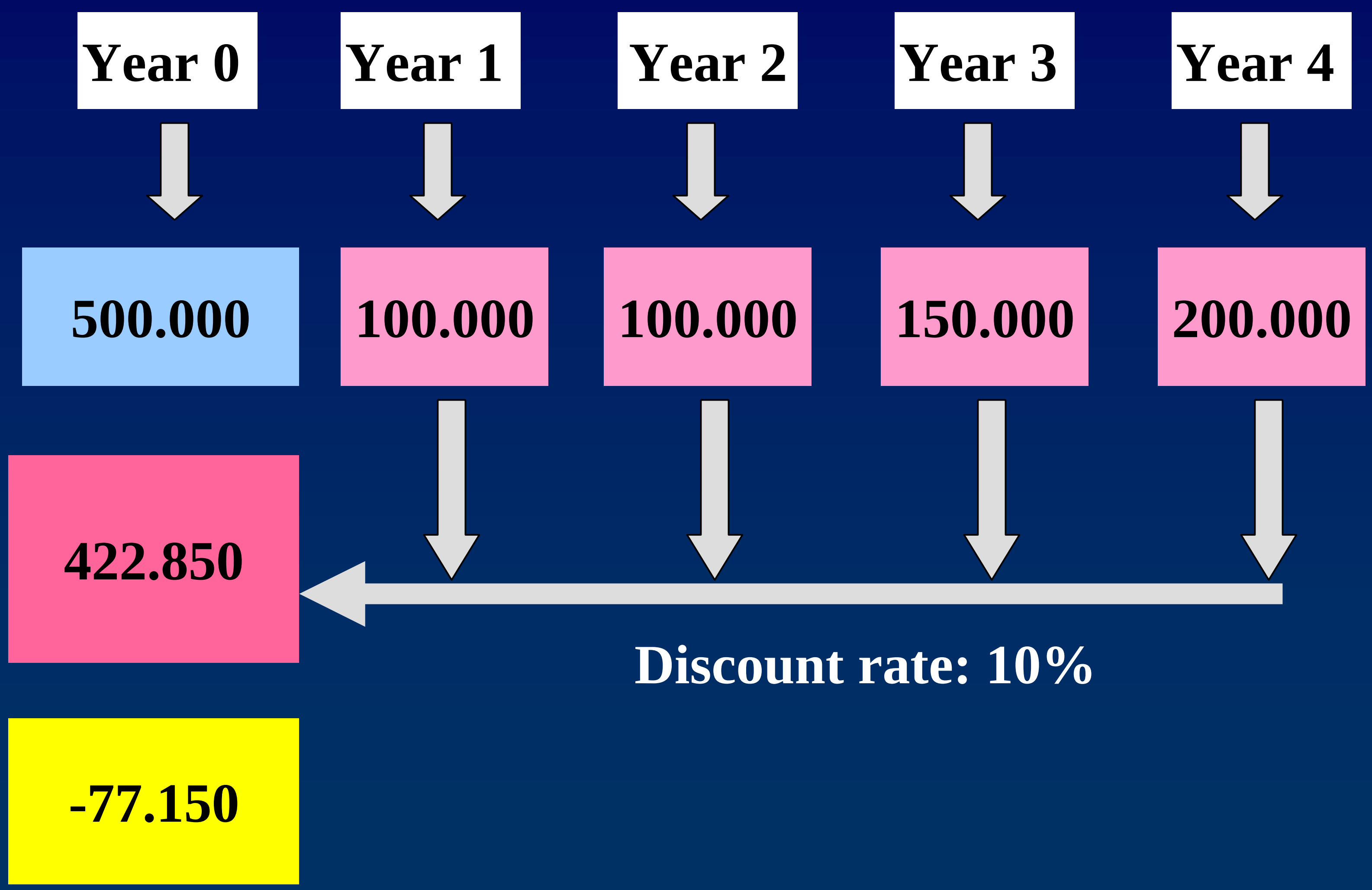
# What is Net Present Value (NPV)?

- The NPV is the value in Year 0 of a series of annual cash flows generated by a business if discounted using an interest rate equal to the opportunity cost of capital.
- Opportunity cost of capital is the average interest rate that can be obtained for savings.
- For example, the average amount of interest paid by financial institutions such as banks.
- The NPV should be greater than 0, plus the risk factor.

# Graphic interpretation of the NPV



# Example of NPV calculation - 1



# Example of NPV calculation - 2

# How do we develop Financial Profitability Models?

Preliminary decisions include:

- project life: be realistic
- production capacity: start small;depends on investment capacity also
- capacity utilization: usually increases over time
- inflation rate: consider or not; either way, results will have to be interpreted accordingly

# How do we develop Financial Profitability Models?

- Determine investment requirements, including working capital
- Buy new? Buy second-hand? Lease? Rent?
- Working capital requirements are a function of volume, costs, inflation and terms of payment
- Working capital leaves and returns to the enterprise, with the production and selling cycles
- Define the residual value of assets; be conservative

# How do we develop Financial Profitability Models?

- We have to estimate sales volume; be conservative
- We have to determine the business cost structure
- In general, rural farmers and producers lack this information
- Variable costs: how much does it cost to produce a unit of output?
- Assign costs to everything: include opportunity cost of family labor
- Fixed costs and taxes if pertinent

# How do we develop Financial Profitability Models?

- Organize information as follows:
- Unit cost and price matrix (investment, variable or production costs, sales prices)
- Quantity matrix (investment, variable or production costs, yield)
- Income and cost matrix (multiply first two matrices)
- Incorporates fixed costs and taxes; similar to income statement
- Cash flow series without financing
- Cash flow series with financing

# How do we develop Financial Profitability Models?

Unit and cost matrix X Quantity matrix = Income and cost matrix

Cash flow series

IRR or NPV

# How do we develop Financial Profitability Models?

- The Income and cost matrix
  - Investment
  - Residual value if pertinent
  - Net sales income
  - minus variable costs, production costs (includes transportation)
  - minus marketing costs
  - minus fixed costs (includes maintenance)

# How do we develop Financial Profitability Models?

- The Income and cost matrix
  - Do not include depreciation; it’s not a cash flow
  - Depreciation is only an accounting figure
  - When calculating ‘pure profitability’, do not include financing
  - Separate investment decision from financing one

# Comparing agricultural and agroindustrial models

- make sure you know the costs of agricultural production
- agroindustrial models may imply some kind of processing
- raw materials are purchased, not produced
- the use of conversion factors (raw material to final product and to by-products) is key in the profitability model
- include income from main product and by-products
- working capital very important