PAY BACK METHOD

Delta Company is planning to purchase a machine known as machine X. Machine X would cost $25,000 and would have a useful life of 10 years with zero salvage value. The expected annual cash inflow of the machine is $10,000.

**Required:** Compute payback period of machine X and conclude whether or not the machine would be purchased if the maximum desired payback period of Delta company is 3 years.

**Solution:**

Since the annual cash inflow is even in this project, we can simply divide the initial investment by the annual cash inflow to compute the payback period. It is shown below:

Payback period = $25,000/$10,000
= 2.5 years

According to payback period analysis, the purchase of machine X is desirable because its payback period is 2.5 years which is shorter than the maximum payback period of the company.

## Example 2:

Due to increased demand, the management of Rani Beverage Company is considering to purchase a new equipment to increase the production and revenues. The useful life of the equipment is 10 years and the company's maximum desired payback period is 4 years. The inflow and outflow of cash associated with the new equipment is given below:

Initial cost of equipment: $37,500

**Annual cash inflows:**

Sales: $75,000

**Annual cash Outflows:**

Cost of ingredients: $45,000
Salaries expenses: $13,500
Maintenance expenses: $1,500

**Non cash expenses:**

Depreciation expense: $5,000

**Required:** Should Rani Beverage Company purchase the new equipment? Use payback method for your answer.

**Solution:**

**Step 1:** In order to compute the payback period of the equipment, we need to work out the net annual cash inflow by deducting the total of cash outflow from the total of cash inflow associated with the equipment.

*Computation of net annual cash inflow:*

$$\$75,000 – (\$45,000 + \$13,500 + \$1,500)$$
$$= \$15,000$$

**Step 2:** Now, the amount of investment required to purchase the equipment would be divided by the amount of net annual cash inflow (computed in step 1) to find the payback period of the equipment.

$$= \$37,500/\$15,000$$
$$=2.5 \text{ years}$$

***Depreciation is a non-cash expense and therefore has been ignored while calculating the payback period of the project.***

According to payback method, the equipment should be purchased because the payback period of the equipment is 2.5 years which is shorter than the maximum desired payback period of 4 years.

## ARR – Example 1

XYZ Company is looking to invest in some new machinery to replace its current malfunctioning one. The new machine, which costs $420,000, would increase annual revenue by $200,000 and annual expenses by $50,000. The machine is estimated to have a useful life of 12 years and zero salvage value.

| | |
|---|---|
| **Step 1: Calculate Average Annual Profit** | |
| Inflows, Years 1-12 | |
| (200,000*12) | $2,400,000 |
| Less: Annual Expenses | |
| (50,000*12) | -$600,000 |
| Less: Depreciation | -$420,000 |
| Total Profit | $1,380,000 |
| **Average Annual Profit** | |
| (1,380,000/12) | **$115,000** |
| **Step 2: Calculate Average Investment** | |
| Average Investment | |
| ($420,000 + $0)/2 = **$210,000** | |

| |
|---|
| **Step 3: Use ARR Formula** |
| ARR = $115,000/$210,000 = **54.76%** |

Therefore, this means that for every dollar invested, the investment will return a profit of about 54.76 cents.

## ARR – Example 2

XYZ Company is considering investing in a project that requires an initial investment of $100,000 for some machinery. There will be net inflows of $20,000 for the first two years, $10,000 in years three and four, and $30,000 in year five. Finally, the machine has a salvage value of $25,000.

| | |
|---|---|
| **Step 1: Calculate Average Annual Profit** | |
| Inflows, Years 1 & 2 | |
| (20,000*2) | $40,000 |
| Inflows, Years 3 & 4 | |
| (10,000*2) | $20,000 |
| Inflow, Year 5 | $30,000 |
| Less: Depreciation | |
| (100,000-25,000) | -$75,000 |
| Total Profit | $15,000 |
| **Average Annual Profit** | |
| (15,000/5) | **$3,000** |
| **Step 2: Calculate Average Investment** | |
| Average Investment | |
| ($100,000 + $25,000) / 2 = **$62,500** | |
| **Step 3: Use ARR Formula** | |
| ARR = $3,000/$62,500 = **4.8%** | |

## Examples of Net Present Value

**NPV = Initial Investment + (Annual Cash Flow / Discount Rate) * (1+Inflation Rate)^Years**

To illustrate the concept of NPV, consider the following examples.

Example 1: You invest $2,000 in a project and expect to receive $3,000 in cash flows over the next five years.

Using the formula above, you would calculate the NPV as follows:

NPV = $2,000 + ($3,000 / 0.04) = $8,250

In this example, the NPV is $8,250, meaning the project is expected to generate a positive return of $6,250.

Example 2: You invest $2,000 in a project and expect to receive $3,000 in cash flows over the next five years with an inflation rate of 2%.
Using the formula above, you would calculate the NPV as follows:
NPV = $2,000 + ($3,000 0.04) * (1+0.02)^5 = $8,805
In this example, the NPV is $8,805, which means the project is expected to generate a positive return of $6,805.
If the expected cash flows in either example had been negative, the NPV would have been negative, indicating that the project would likely yield a negative return investment.
You can also use NPV to compare two different investments. For example, if you had two projects with the same expected cash flows but various initial investments and discount rates, the higher NPV would be the more profitable option.

## Internal Rate of Return (IRR): Formula and Examples

### The Formula for IRR

The formula used to determine IRR is as follows:

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

**where:**
$C_t$ = Net cash inflow during the period t
$C_0$ = Total initial investment costs
$IRR$ = The internal rate of return
$t$ = The number of time periods

### IRR Example

Assume a company is reviewing two projects. Management must decide whether to move forward with one, both, or neither. Its cost of capital is 10%. The cash flow patterns for each are as follows:

**Project A**

- Initial Outlay = $5,000
- Year one = $1,700
- Year two = $1,900
- Year three = $1,600
- Year four = $1,500
- Year five = $700

**Project B**

- Initial Outlay = $2,000
- Year one = $400
- Year two = $700
- Year three = $500
- Year four = $400

- Year five = $300

The company must calculate the IRR for each project. The initial outlay (period = 0) will be negative. Solving for IRR is an iterative process using the following equation:

*$0 = Σ CFt ÷ (1 + IRR)t*

where:

- CF = net cash flow
- IRR = internal rate of return
- t = period (from 0 to last period)

-or-

*$0 = (initial outlay * −1) + CF1 ÷ (1 + IRR)1 + CF2 ÷ (1 + IRR)2 + ... + CFX ÷ (1 + IRR)X*

Using the above examples, the company can calculate IRR for each project as:

**IRR Project A**

$0 = (−$5,000) + $1,700 ÷ (1 + IRR)1 + $1,900 ÷ (1 + IRR)2 + $1,600 ÷ (1 + IRR)3 + $1,500 ÷ (1 + IRR)4 + $700 ÷ (1 + IRR)5

IRR Project A = **16.61 %**

**IRR Project B**

$0 = (−$2,000) + $400 ÷ (1 + IRR)1 + $700 ÷ (1 + IRR)2 + $500 ÷ (1 + IRR)3 + $400 ÷ (1 + IRR)4 + $300 ÷ (1 + IRR)5

IRR Project B = **5.23 %**

Given that the company's cost of capital is 10%, management should proceed with Project A and reject Project B.

Case study in final accounts

# Case Study: Final Accounts Preparation for XYZ Ltd

**Background:** XYZ Ltd is a small retail business selling sports equipment. The financial year ended on December 31, 2023. Prepare the final accounts for the year ended December 31, 2023.

**Trial Balance as at December 31, 2023:**

| Particulars | Debit ($) | Credit ($) |
|---|---|---|
| Sales | 200,000 | |
| Sales Returns | 5,000 | |
| Purchases | | 120,000 |
| Carriage Inwards | 3,000 | |
| Wages | 30,000 | |
| Rent Expense | 15,000 | |
| Rates and Taxes | 5,000 | |
| Insurance | 2,000 | |
| Electricity | 3,500 | |
| Advertising | 8,000 | |
| Discount Allowed | 2,500 | |
| Discount Received | | 1,500 |
| Bad Debts | 1,200 | |
| Debtors | 40,000 | |
| Creditors | | 28,000 |
| Bank Overdraft | | 7,000 |
| Cash in Hand | 1,500 | |
| Cash at Bank | 10,000 | |
| Fixtures and Fittings | 25,000 | |
| Motor Vehicles | 15,000 | |
| Loan | 20,000 | |
| Capital | | 90,000 |

**Adjustments:**

1. Depreciation on Fixtures and Fittings at 10% p.a.
2. Depreciation on Motor Vehicles at 20% p.a.
3. Provide for Bad Debts at 5% of Debtors.
4. Accrued Wages $2,000.
5. Prepaid Insurance $500.
6. Outstanding Rates and Taxes $1,000.
7. Stock on December 31, 2023, $30,000.

**Solution:**

## Trading Account for the Year Ended December 31, 2023

| Particulars | Amount ($) |
|---|---|
| Sales | 200,000 |
| Less: Sales Returns | (5,000) |
| | ---------- |
| Net Sales | 195,000 |
| Cost of Goods Sold: | |
| Opening Stock | 0 |
| Add: Purchases | 120,000 |
| Add: Carriage Inwards | 3,000 |
| Less: Closing Stock | (30,000) |
| | ---------- |
| Cost of Goods Sold | 93,000 |
| Gross Profit | 102,000 |

## Profit and Loss Account for the Year Ended December 31, 2023

| Particulars | Amount ($) |
|---|---|
| Gross Profit | 102,000 |
| Operating Expenses: | |
| Wages | 32,000 |
| Rent Expense | 15,000 |
| Rates and Taxes | 4,000 |
| Insurance | 1,500 |
| Electricity | 3,500 |
| Advertising | 8,000 |
| Discount Allowed | 2,500 |
| Depreciation - Fixtures | 2,500 |
| Depreciation - Vehicles | 3,000 |
| Bad Debts Provision | 2,000 |
| | ---------- |
| Total Operating Expenses | 74,000 |
| Net Profit | 28,000 |

## Balance Sheet as at December 31, 2023

| Particulars | Amount ($) |
|---|---|
| Assets: | |
| Cash in Hand | 1,500 |
| Cash at Bank | 10,000 |
| Debtors | 40,000 |
| Less: Provision for Bad Debts | (2,000) |
| Stock | 30,000 |
| Fixtures and Fittings | 22,500 |

| Particulars | Amount ($) |
|---|---|
| Less: Depreciation | (2,500) |
| Motor Vehicles | 12,000 |
| Less: Depreciation | (3,000) |
| Prepaid Insurance | 500 |
| | ---------- |
| Total Assets | 111,500 |
| Liabilities: | |
| Creditors | 28,000 |
| Accrued Wages | 2,000 |
| Bank Overdraft | 7,000 |
| Outstanding Rates and Taxes | 1,000 |
| Loan | 20,000 |
| Capital | 90,000 |
| | ---------- |
| Total Liabilities and Capital | 148,000 |

This case study demonstrates how to prepare final accounts including the Trading Account, Profit and Loss Account, and Balance Sheet for a small business like XYZ Ltd.