

# Seminar finances

Break even point, investment evaluation

# Task 10.4 A and B Evaluation of investment options - calculation comparing costs

The static cost method is based on a comparison of operating and one-time costs. It is based on the fact that one variant has higher operating costs, the other higher one-off costs, but they do not differ in their revenues.

Example: We have to decide between two investment variants of the same capacity. Variant A has one-time costs of CZK 250,000 and annual operating costs of CZK 160,000, variant B CZK 300,000 and CZK 140,000. The estimated lifetime of both variants is 4 years.

10.4 A: Compare the benefits of each alternative using absolute lifetime cost values.

10.4 B: assess the profitability of both investment variants by calculating the payback period of additional investment costs  $d_n$ .

# Task 10.4 B Solution

$$\text{payback period } d_n = \frac{N_J(B) - N_J(A)}{N_P(A) - N_P(B)}$$

where: NP is operating costs (think of their difference as "profit" - the difference between costs)

NJ is a one-time cost (think of it as an investment)

A, B - investment options

Calculation:

# Task 10.5

- Example: We have to decide between two investment variants of the same capacity. Variant A has one-time costs of CZK 250,000 and annual operating costs of CZK 160,000, variant B CZK 300,000 and CZK 140,000. The estimated lifetime of both variants is 4 years.
- Compare the profitability of individual investment alternatives by discounting future costs. Based on the above example, the one-time cost was incurred in year 0 and the cost of capital is 14%.
- For the calculation, use the breakdown of the individual variants of the calculation tables:

Year	Costs	Disinheritor (14%)	Discounted costs
<b>0</b>		<b>1.0000</b>	
<b>1</b>		<b>0.8772</b>	
<b>2</b>		<b>0.7695</b>	
...	...	...	...

$$\frac{1}{(1+i)^t}$$

# Task 10.5 Solution

Variant A

Year	Costs	Disinherito r	Discounted costs
0	250,000	1	
1	160,000	0.8772	
2	160,000	0.7695	
3	160,000	0.675	
4	160,000	0.5921	

Option B

Year	Costs	Disinherito r	Discounted costs
0	300,000	1	
1	140,000	0.8772	
2	140,000	0.7695	
3	140,000	0.675	
4	140,000	0.5921	

Option B is again more advantageous (716208 for A versus 707932 for B). This procedure is especially advantageous if operating costs are different in individual years.

# Task 10.6 Evaluation of investment options - financial and mathematical procedures

- Flows of cash expenses and cash income are assessed until the end of the economic life or a certain planning horizon.
- Example: There are two investment options (A and B) for which the same capital expenditure of CZK 1,000,000 is assumed, but a different distribution of annual net cash flows (see table). The cost of capital is 10%, the lifetime for both variants is the same (6 years). Compare the listed variants.

# Task 10.6 A and B

*Distribution of net income of investment options A and B*

Year	Cash flow A	Monetary flow B	Executor (10%)
0	-1000	-1000	1,000
1	300	100	0.909
2	600	200	0.826
3	400	300	0.751
4	300	400	0.683
5	200	500	0.620
6	100	600	0.564

Assignment 10.6 A Compare the listed investment options using a simple cash flow analysis project.

Assignment 10.6 B Compare the listed investment options using discount rate, i.e. the changing time value of money.

# Task 10.6 A Evaluation of investment options – simple cash flow

*Distribution of net income of investment options A and B*

<b>Year</b>	<b>Cash flow A</b>	<b>Cash flow B</b>
<b>0</b>	<b>-1000</b>	<b>-1000</b>
<b>1</b>	<b>300</b>	<b>100</b>
<b>2</b>	<b>600</b>	<b>200</b>
<b>3</b>	<b>400</b>	<b>300</b>
<b>4</b>	<b>300</b>	<b>400</b>
<b>5</b>	<b>200</b>	<b>500</b>
<b>6</b>	<b>100</b>	<b>600</b>



# Task 10.6 B Evaluation of investment options – discounted cash flow

*Distribution of net income of investment options A and B*

$K_A =$

$K_B =$

Year	Cash flow A	Cash flow B
0	-1000	-1000
1	300	100
2	600	200
3	400	300
4	300	400
5	200	500
6	100	600

$$K = \sum_{t=0}^n \frac{(E_t - A_t)}{(1+i)^t}$$

# Task 10.7

The cost function  $TC = 18,000 + 1.4 Q$  is given

Determine the break-even point in pieces if the price of 1 piece is 5 CZK

## Task 10.8

- The cost function  $TC = 18,000 + 1.4 Q$  is given. Sell price is 5 CZK.
- What quantity of products must the company produce in order to make a profit of CZK 43,200

## Task 10.9

The price of the product is CZK 5/pc. The required profit for the period is CZK 36,000. The company is able to produce 15,000 pieces of products during this period.

- What is the limit of fixed costs, if the variable costs per 1 piece are CZK 1.40?

# Task 10.10

The company produces 2 types of products at the same time. More detailed information is given in the following table:

<i>Product</i>	<i>Production volume in tons</i>	<i>Var. cost per 1 ton</i>	<i>Fixed. costs</i>	<i>Price for 1 ton</i>
AND	600	20		50
B	200	40		60
in total	800		11,000	

Determine the break-even point of products A and B when producing both of them simultaneously.

# Task 10.11

- Find out for which production volumes the individual technological procedures listed in the following overview will be suitable. The variants are technologically equivalent, they differ in their cost function.

Technological variant	Fixed costs	Variable cost per 1 piece
1	2000	300
2	10,000	200
3	50,000	100

## Task 10.12

The company BOTAS, as is considering the production and sale of a new type of sports shoes. The estimated annual production volume is 60,000 units at a unit price of CZK 650. Annual fixed costs are budgeted at CZK 18,000,000.

- a) Find out the maximum variable costs for 1 product.
- b) By how many CZK would the unit variable costs have to be reduced if the company requires a pre-tax profit of CZK 1,500,000, taking into account the need to replenish the reserve fund, pay the required dividends for shareholders and resources for investments?

- Thank you for your attention