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# THE ENTERPRISE THEORY

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COST FUNCTION  
SALES  
NET PROFIT

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## COST FUNCTION

- expresses the dependence of the amount of costs  $C$  on production volume  $Q$ :
  - production volume - independent variable (explanatory, exogenous)
  - costs - dependent variable (explained, endogenous)

$$C = f(Q)$$



$$C = f(Q) = (v \times Q) + F$$

$$C = V + F$$

where

$F$  ... total fixed costs [CZK]

$v$  ... unit variable costs [CZK/piece, CZK/kg, CZK/l, ...]

$V$  ... total variable costs

$Q$  ... volume of production [pcs, kg, l, ...]



## Use of cost functions in business practice

- how the amount of costs changes depending on the volume of production
- which part of the costs is dependent on the volume of production and which is not
- the starting point for a more qualified decision in a number of areas:
  - determine the amount of costs corresponding to different volumes of production
  - competently determine the economic result
  - determine what volume of production ensures the desired profit



**Example:** Lovers of theatrical performances of the children's theater can purchase a year-long season ticket for 2 children. The price of this season ticket is CZK 2,000. The entrance fee for one performance for one child in a popular line in the theater is 150 CZK.

- a) What are the costs associated with visiting three shows with/without a season ticket if two children go to the theater?
- b) How many times does a pair of children have to visit the theater to make the purchase of a season ticket worth it?

**Solution:**

$$E_1 = 2 \cdot 150Q$$

$$E_2 = 2000$$

a)  $E_1(3) = 2 \cdot 150 \cdot 3 = 900\text{CZK}$

$$E_2(3) = 2000\text{CZK}$$

b)  $E_1 = E_2$

$$2 \cdot 150 \cdot Q = 2000$$

$$Q = \frac{2000}{300} = 6,67$$

up to 6 visits to the theater per season, it is worthwhile not to buy a season ticket, from 7 visits by pairs of children, a season ticket is more advantageous





## The two-period method

- it only works with data on two periods - with the maximum production volume  $Q_{MAX}$  and with a minimum production volume  $Q_{MIN}$  and their corresponding costs  $C_{QMIN}$  and  $C_{QMAX}$
- we insert the data into the general form of the cost function and then solve the resulting system of two linear equations
- it should not be a period however extraordinary

$$C_{Q_{max}} = (v \times Q_{max}) + F$$

$$C_{Q_{min}} = (v \times Q_{min}) + F$$



**Example:** The following table shows data on production volumes and total costs in individual months of last year of the company XYZ, s.r.o. Use the two-period method to determine the cost function.

	Production volume [pcs]	Costs [CZK]
January	10,500	165,000
February	9,500	148,000
March	9,000	145,000
April	10,600	151,000
May	10,400	163,000
June	9,200	148,000
July	8,500	135,000
August	9,600	145,000
September	10,000	167,000
October	10,800	158,000
November	11,000	162,000
December	10,900	161,000





**Solution:**

$$Q_{MIN} = 8500pc$$

$$Q_{MAX} = 11000pc$$

$$C_{Q_{MIN}} = 135\,000\text{ CZK}$$

$$C_{Q_{MAX}} = 162\,000\text{ CZK}$$

$$162\,000 = v \cdot 11\,000 + F$$

$$\underline{135\,000 = v \cdot 8\,500 + F}$$

$$27\,000 = v \cdot 2\,500$$

$$v = 10,8\text{ Kč/unit}$$

$$F = 135\,000 - 10,8 \cdot 8\,500 = 43\,200$$

$$E = 10,8Q + 43\,200$$

# SALES



$$S = (p \times Q)$$

where

$p$  ... selling price per piece [CZK/piece]

$Q$  ... volume of production [pcs, kg, l, ...]



## NET PROFIT

- the evaluation of the economic activity of business entities is based on a comparison of revenues (in the form of sales) and total costs

$$NP = S - C$$

where

*NP* ... profit

*S* ... total revenues

*C* ... total cost



Respectively:

$$NP = S - C$$

where

$S$ ... total sales

If:

$S > C$ , then  $NP > 0$ ..... **Gain**

$S < C$ , then  $NP < 0$ ..... **Loss**

$S = C$ , then  $NP = 0$  ... **Zero gain**



If we substitute

$$S = p \cdot Q$$

$$C = V + F$$

$$C = v \cdot Q + F$$

to  $NP$

then

$$NP = (p * Q) - (v * Q + F)$$



**Příklad: V podniku MONTENA s. r. o. evidují fixní náklady  $F$  ve výši 200 tis. Kč. Podnik vyrábí 20 tis. ks součástek. V hodnoceném období je jediným variabilním nákladem materiál v ceně 20 Kč/ks. Prodejní cena jedné součástky je 35 Kč/ks.**

**a) Jaký je výsledek hospodaření v daném období?**



# BREAK EVEN POINT

- the volume of production  $Q_{BP}$  at which the amount of sales is the same amount as the total costs

$$NP = 0$$

$$0 = (p \times Q_{BZ}) - (v \times Q_{BZ} + F)$$

or

$$Q_{BZ} = \frac{F}{p - v}$$



**Example:** In the company MONTENA s.r.o. they record fixed costs  $F$  in the amount of 200 thousand CZK. In the evaluated period, the only variable cost is material at a price of CZK 20/piece. The selling price of one component is 35 CZK/pc.

- a) What quantity of parts must be produced and sold to break even?