THE ENTERPRISE THEORY
-
BUSINESS EXPENSES SALES

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SCHOOL OF BUSINESS ADMINISTRATION IN KARVINA

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COST FUNCTION

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

$$E = f(Q)$$

- types of cost functions:
  - short-run cost functions
  - long run cost functions

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

$$E = V + F$$

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, …]

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Assignment: Determine the cost function for the production of 10,000 A piece of candy.

Cost item	The amount of costs [CZK]	Variable costs [CZK]	Fixed costs [CZK]
Material consumption	66,000	60,000	6,000
Wages of pastry chefs	45,000	15,000	30,000
Administrative staff salary	20,000		20,000
Technological energy (production equipment drive)	15,000	15,000	
Non-technological energy	1000		1000
Depreciation of tangible fixed assets	20,000		20,000
TOTAL	167,000	90,000	77,000

$E = (v \times Q) + F$

$V = v \times Q$

$V = V / Q$

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Solution:

Cost item	The amount of costs [CZK]	Variable costs [CZK]	Fixed costs [CZK]
Material consumption	66,000	60,000	6,000
Wages of pastry chefs	45,000	15,000	30,000
Administrative staff salary	20,000		20,000
Technological energy (production equipment drive)	15,000	15,000	
Non-technological energy	1000		1000
Depreciation of tangible fixed assets	20,000		20,000
TOTAL			77,000

$$F = 77\,000 \text{ CZK}$$

$$v = \frac{90\,000}{10\,000} = 9$$

$$E = 9Q + 77\,000$$

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 E_{QMIN} and E_{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

$$E_{Qmax} = (v \times Q_{max}) + F$$
$$E_{Qmin} = (v \times Q_{min}) + F$$

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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

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Solution:

$Q_{MIN} = 8500\text{pc}\ N_{Q_{MIN}} = 135\,000\ .\ \text{CZK}$

$Q_{MAX} = 11000\text{pc}\ N_{Q_{MAX}} = 162\,000.\ \text{CZK}$

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

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

$$27\,000 = v \cdot 2500$$

$$v = 10{,}8\ Kč/unit$$

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

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

Use of cost functions in business practice

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- 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:

$$E1 = 2 \cdot 150Q$$
$$E2 = 2000$$

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

$E_2(3) = 2\,000\text{CZK}$

b) $E_1 = E2$

$$2 \cdot 150 \cdot Q = 2\,000$$

$$Q = \frac{2\,000}{300} = 6{,}67$$

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

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

$$NP = S - E$$

where

VH ... profit

V ... total revenues

N... total cost

Respectively:

$$NP = S - E$$

where

S... total sales

If:

S > E, then NP > 0..... **Gain**

S < E, then NP < 0..... **Loss**

S = E , then NP = 0 ... **Zero gain**

If we substitute

$$\mathrm{S} = p \cdot Q$$
$$\mathrm{E} = \mathrm{V} + F$$
$$\mathrm{E} = v \cdot Q + F$$

to NP

then

$$NP = p \cdot Q - (v \cdot Q + F)$$

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

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?

$$S = p \cdot Q$$

$$E = (v \cdot Q) + F$$

$$NP = p \cdot Q - (v \cdot Q + F)$$