

INNOVATION OF COSTING SYSTEM IN METALLURGICAL COMPANIES

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Innovation means creating and implementing new ideas in theory and practice. Generally speaking, companies in the Czech Republic that don't have a foreign owner behave very conservatively as far as the used costing system is concerned. This also applies to metallurgical companies and foundries. The decision on method of costing calculations should be included in the sphere of strategic decision-making. The strategy must also define how to use method so as to obtain new orders which, as a result, should lead to an increase in production volume, and thereby to higher capacity utilization and also to higher overall sales. The article discusses the innovation of costing system in metallurgical companies.

Key words: metallurgical production, costing system, innovation, production capacity

INTRODUCTION

Innovation means creating and implementing new ideas in theory and practice. Innovations can affect any human activities and areas. Generally speaking, companies in the Czech Republic that don't have a foreign owner behave very conservatively as far as the used costing system is concerned. This also applies to metallurgical companies and foundries.

INNOVATION OF COSTING SYSTEM

Unfortunately, the so-called standard costing model with paradox division of costing items into direct and overhead is still commonly used in the metallurgical companies and foundries. This fact remains unchanged despite the well known so-called dynamic costing model, which primarily divides the costing items into variable and fixed and which can be considered as an innovation of the costing system. The benefit of dynamic costing model is the possibility of using costing for quick conversions (modelling) of economic conditions with changing volume and output composition.

The Activity Based Costing method, in which the overhead costs are much more precisely allocated in the individual costing units, finds little use in practice. This method is based on the idea that the vast majority of overhead costs is invoked by activities (activities and processes [1]) that are consumed in production of the individual products (costing units). The allocation of costs resulting from these activities takes advantage of

the so-called cost drivers that show a causal link between the consumption of these activities and the produced costing units [2].

Another previously performed innovation of the costing system is the use of costing expenditures, especially the costing depreciations. The costing calculation using costing expenditures is particularly important for price calculations and for target costing calculations. The use of costing depreciations is related to the use of the so-called "fixed assets". In cases where the used tax or book depreciations don't match the real acquisition value and the real usage time of the given fixed assets, these costs are reduced in costing calculations. Metallurgical production is demanding in terms of investments into production facilities, i.e. into fixed assets. In case of enterprises built or modernized more than 20 years ago, a large part or the majority of their fixed assets have already been written off as far as the tax or accounting are concerned. In addition to that, the value of assets depreciated in this way is often well below their current acquisition price, especially in post-communist countries. This condition applies to most metallurgical companies, not only in the Czech Republic.

In these cases, the price calculations or the target costing calculations should make use of costing depreciations that are based on the real purchase value of the used fixed assets and on their real length of service.

The above presented innovations of the costing system are important, but they don't solve the problem of incorrect costing distortions intended for price negotiations caused by the registered low capacity utilization in these costing calculations.

The price calculations or target calculations in companies are based on production volume, which corresponds to real utilization of their own production ca-

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capacities in the given company [3]. If the company doesn't utilize its own capacity to full extend, i.e. it doesn't have continuous production throughout the week or at least during 5 days of the week, the above presented method of costing calculation is, if not entirely wrong, certainly problematic.

More precisely, there is a problem when the costing calculations of a company reflect (for pricing purposes) its capacity utilization, which is significantly lower than that achieved by its competitors in the given market sector, or which is normal in this sector. This method leads to the calculation of a higher proportion of absolutely fixed costs per unit of production compared to the competitors or normal level. Absolutely fixed costs are defined as part of fixed costs that doesn't change (for example by the so-called jump) during any change in production volume (depreciations, part of administrative overhead expenses, part of labour costs, lease, etc.) [4]. In the case of partial calculations, the absolute value of contribution margin calculation of all products compared to normal state is lower.

EXPERIMENTAL PART AND RESULTS

To calculate the impact of lower utilization of production capacity than usual, you can define the required formulas:

Usual utilization of production capacity:

Conventional formula for the coefficient of production capacity utilization k_c [5]:

$$k_c = Q_s / Q_p \quad (1)$$

Q_s actual production capacity (tonnes)

Q_p production capacity (tonnes)

The formula presented above and the resulting subsequent formulas should be modified for the purpose of calculation of the impact of lower production capacity utilization than normal in the given market sector as follows:

The formula for the coefficient of usual production capacity utilization k_{co} :

$$k_{co} = Q_s / Q_p \quad (2)$$

The formula for the coefficient of utilization of usual production capacity k_o :

$$k_o = Q_s / Q_o \quad (3)$$

Q_s actual production capacity (tonnes)

Q_o usual production capacity (tonnes)

Unutilized usual capacity Q_r :

$$Q_r = Q_o - Q_s \quad (4)$$

Q_o usual production capacity (tonnes)

Q_r capacity reserve (tonnes)

The above presented formulas make it possible to derive the formula for the coefficient of unutilization of usual production capacity k_{no} :

$$k_{no} = Q_r / Q_o \quad (5)$$

it is fact that:

$$k_o + k_{no} = 1 \quad (6)$$

Similar way can be used to derive the formula for the coefficient of relation between unutilized usual capacity and real production capacity k_{vo} :

$$k_{vo} = Q_r / Q_s \quad (7)$$

it is fact that:

$$k_{vo} = (1 - k_o) / k_o \quad (8)$$

The calculation of the impact of lower utilization of production capacity than usual on the level of total costs per unit of production can be calculated from the following formulas:

The actual amount of total absolutely fixed costs per unit of production FN_{sj} :

$$FN_{sj} = FN / Q_s \quad (9)$$

FN total absolutely fixed costs (€)

Q_s actual production capacity (tonnes)

The usual amount of total absolutely fixed costs per unit of production FN_{oj} :

$$FN_{oj} = FN / Q_o \quad (10)$$

The above presented formulas make it possible to calculate the coefficient of utilization of absolutely fixed costs per unit of production k_{FN} :

$$k_{FN} = FN_{oj} / FN_{sj} = k_o \quad (1)$$

The defined formulas clearly show that the value of the coefficient of utilization of absolutely fixed costs per unit of production is the same as the value of the coefficient of utilization of usual capacity. Practically, this means that absolutely fixed costs per unit of production are inversely proportional to the coefficient of utilization of usual production capacity (k_o) and directly proportional to the coefficient of unutilization of usual production capacity (k_{no}).

The change of the total cost per unit of production due to the utilization of absolutely fixed costs per unit of production is influenced by the coefficient of share of absolutely fixed costs on total costs $k_{FN/CN}$:

$$k_{FN/CN} = FN / CN \quad (12)$$

FN total absolutely fixed costs (€)

CN total costs (€)

The percentage change of the total costs per unit of production ($\% \Delta CN_j$) due to unutilization of usual production capacity is calculated from the formula:

$$\% \Delta CN_j = k_{FN/CN} * k_{no} * k_{no} * 100 \quad (13)$$

The level of impact of lower capacity utilization than usual with various shares of absolutely fixed costs (FN) on the total costs (CN) is shown in the Table 1.

Table 1 **Impact lower capacity utilization compared to normal level on the growth of total costs per unit of production / in %**

Share of FN on CN / %	Percentage of unutilization of usual production capacity						
	10	20	30	40	50	60	70
10	1,0	2,0	3,0	4,0	5,0	6,0	7,0
11	1,1	2,2	3,3	4,4	5,5	6,6	7,7
12	1,2	2,4	3,6	4,8	6,0	7,2	8,4
13	1,3	2,6	3,9	5,2	6,5	7,8	9,1
14	1,4	2,8	4,2	5,6	7,0	8,4	9,8
15	1,5	3,0	4,5	6,0	7,5	9,0	10,5
16	1,6	3,2	4,8	6,4	8,0	9,6	11,2
17	1,7	3,4	5,1	6,8	8,5	10,2	11,9
18	1,8	3,6	5,4	7,2	9,0	10,8	12,6
19	1,9	3,8	5,7	7,6	9,5	11,4	13,3
20	2,0	4,0	6,0	8,0	10,0	12,0	14,0
21	2,1	4,2	6,3	8,4	10,5	12,6	14,7
22	2,2	4,4	6,6	8,8	11,0	13,2	15,4
23	2,3	4,6	6,9	9,2	11,5	13,8	16,1
24	2,4	4,8	7,2	9,6	12,0	14,4	16,8
25	2,5	5,0	7,5	10,0	12,5	15,0	17,5

DISCUSSION

The advantage of one-quarter up to one-third wages in enterprises in the Czech Republic in comparison with businesses in Germany is often fully negated by using only one extra shift. As a result, a number of Czech companies with low utilization of their production capacities finds it problematic to compete with German manufacturers with higher utilization of their production capacities in terms of costs and, as a result of that, price.

In the event that companies in the Czech Republic work only in morning shift system during 5 days of the week and companies (e.g. in Germany) work in continuous operation five days a week, then Czech companies have only one-third capacity utilization compared to German ones. It equals to approximately 67 % lower utilization (unutilization) of capacities of Czech companies compared to German ones ($k_{no} = 0,67$), thus resulting in 67 % higher absolutely fixed costs per unit of production. With 25 % share of absolutely fixed costs on the total costs ($k_{FN/CN} = 0,25$) in Czech enterprises, this this means that Czech companies have their total costs higher by 16,75 % than German ones ($0,67 \times 0,25 \times 100$).

CONCLUSION

In cases where the actual use of production capacities is lower than usual, it is very important for the price calculations and the target costing calculations to allocate the absolute fixed costs not according to the production volume, which is based on the actual level of capacity utilization of the given company, but the fixed

costs must be allocated to production volume that corresponds to the usual level of capacity utilization in the market sector in question. Under these conditions, the fixed costs per unit of production calculated using this method and the total costs per unit of production will be lower than if the costing were calculated from lower actual capacity utilizations.

The decision on this method of costing calculations should be included in the sphere of strategic decision-making. The strategy must also define how to use this method so as to obtain new orders which, as a result, should lead to an increase in production volume, and thereby to higher capacity utilization and also to higher overall sales. This method should be used primarily for gradual acquisition of new orders. The use of this method must avoid situations where a company using this pricing policy would compete with itself, i.e. this method must not cause an immediate pressure to decrease the prices of existing orders. At least, this shouldn't be the case until the company starts using their capacities in the usual amount. An essential condition of this method is that it must lead to an increase in the absolute value of contribution margin which equals the difference between the value of total sales and the value of total variable costs. Otherwise, the use of costing calculated this way doesn't make any sense.

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