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THE PLACE OF AMORTIZATION AMONG COSTS, AS WELL AS EFFECT OF DIFFERENT DEPRECATION CALCULATION METHODS ON MANAGEMENT FROM BUSINESS ECONOMIC AND FINANCIAL VIEW OF POINT

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Abstract: *Due to the accelerated inflation in the past year, the attention focused on the risk of replacement of assets. It is a well-known fact that after the wear and tear of the fixed assets, their replacement is a serious task for the companies. During the functioning, the fixed asset provides resources (financial) on two branches, respectively it will pay off. One direction is the amortization, which reduces the profit as a cost, but does not involve (cash flow) expenses. The other direction of return is the profit, which provides the necessary amount for the development after having payed the taxes. The source of the profit sector increases in value in the event of an increase in inflation, since the source of amortization continuously generated during the period of operation has been devaluing by the end of the functioning period. In our article, we try to present the place of amortization (depreciation) among costs, based on several aspects. After that, we will present the different description methods based on their characteristics, giving priority to what their use means for the entrepreneur. We support this with the help of model calculations. We present what mean the amortization accounting methods assuming that management is without inflation or between inflationary conditions. Based on this, we try to formulate proposals on how state intervention how could help businesses in inflationary economic conditions beyond that it would be more permissive in the choice of description method. Following the business economics approach to the question, we will examine the effect of amortization on tax base and the income, taking into consideration financial and accounting aspects. Considering that the use of the fixed assets and thus the expected return period takes several years, we must attention to the careful planning of the amount of replacement costs. When determining the required capital value, we cannot ignore the time factor, the time value of money. The required value of capital accumulation supplementing amortization per period is determined using the annuity method. In our article, we demonstrate what kind of loss inflation causes and to what extent it is necessary to create a source from the generated profit. Dealing with the topic can be considered relevant for two reasons: on the one hand, it is justified by the high inflation experienced in 2022-2023, and, on the other hand, we are missing taking into consideration the time value of money in the Hungarian accounting and planning system.*

Keywords: *costs, amortization; amortization methods; time value of money*
(JEL Code: G30; M40)

INTRODUCTION

Amortization among company's costs

The depreciation expense (amortization), as its name suggests, is included among the costs of production. Amortization is the gradual transfer of value from the fixed assets to manufactured products in order to accumulate funds their replacement. (LEMISHOVSKA 2017; BOYKO et al., 2019) This means that amortization involves allocating the depreciable value of an asset. (SIRBULESKU et al., 2021)

during its intended useful life Costs can be grouped according to several criteria, and amortization can be classified into several groups accordingly. The simplest case is to examine whether the cost in question causes a cash flow within the enterprise, or not. This way, it can be clearly established that, unlike other costs that generate an actual cash flow, amortization is a cost for which this is not the case, that is, it does not generate a cash flow when it is incurred. In a further classification of costs, if we try to separate them based on the form in which they are presented, amortization is supposedly found among elementary costs for the two groups of non-current assets: intangibles and tangible assets. (However, there is a significant exception among tangible assets, farmland, for which no depreciation is charged, because the land does not depreciate in value but increases in value over time, which, together with the land rent, ensures that investing money in farmland is a good investment. (POSTA. 2022))

At the same time, amortization costs are also included in the composite costs, as amortization is also charged on the cost of auxiliary service, the cost of specific tangible assets and the high value assets included in overheads, which means that amortization is expected to be present in these composite costs.

However, when costs are grouped by accountability, the amortization charge is included in direct costs, if it is the cost of depreciation of an asset that is clearly attributable to a sector or activity. In this case, amortization will therefore be included in the cost of the auxiliary service or specialised tangible asset of the sector, as described above, whereas, if the asset is used for general activity (management of the enterprise), the amortization cost of this asset will be included in the indirect, or general expenses. When costs are grouped according to their relationship with the volume of production, the amortization cost is included in fixed costs, i.e., it is a cost which does not vary up to a certain limit even if the volume of production changes. In fact, the most typical fixed cost in this respect is the cost of depreciation, which is of the same value over a period of 1 year, assuming depreciation on a pro rata temporise basis.

However, it is very important to note that, even if we cannot influence it for a year on the whole (since the amortization rate clearly determines its level), it is very much possible to influence it specifically, and this possibility lies in the use of available capacities, in increasing utilisation. Accordingly, the least amount of this fixed annual cost per unit of product or service will be obtained if we make the best use of our existing assets and produce as many products and services with them as possible. However, within fixed costs, the amortization cost is also known as a step cost, because if the production exceeds a certain limit, the cost rises by one 'step'. Therefore, for one asset, the annual amortization rate (assuming depreciation on a pro rata basis) is constant, but once we need another asset of the same type, the amortization rate "steps up" and the same happens in each subsequent case the same asset is put into production. Another feature of the amortization cost is the so-called 'cost rigidity' or, in other words, 'remanence', which occurs when assets become surplus due to the reduction or possible cessation of production, while the fixed cost of the asset that becomes surplus (the amortization cost that has not yet been written off or accounted for) remains and continues to be charged to the business.

To avoid this, we have to try to get rid of the asset, but this cannot be easily accomplished, especially in the case of a special asset. In view of the fact that the activity for which the asset was needed no longer generates income for us, the same is very likely to be the case for other businesses, so nobody will want to buy this asset. As can be seen, amortization can be presented in several different ways, depending on how we look at costs. (PFAU and POSTA, 2011)

In addition to the above, it can be stated that the value of tangible and intangible assets is constantly declining due to physical (and moral) wear and tear and technological obsolescence, while the value of assets is gradually being transferred into the value of the produced goods and services. The financial accounting of this process is carried out within the depreciation - amortization - system. The amortization system ensures that the one-off capital investment is accounted for as a continuous cost and that it is recovered. (PFAU and NÁBRÁDI, 2007) Thus, amortization is both a cost to the entrepreneur and a return on their capital, which means that parallel to the wear of the assets, the depreciation system increases the cost of production, while the capital thus depreciated becomes free and available for reuse. This can create the possibility for the entrepreneur to replace the asset in accordance with its original purpose or to use the amount depreciated for other purposes, e.g., to develop other activities or to expand production. Therefore, the basic function is replacement, but depending on the entrepreneur's choice, the amount accounted for (and set aside) can also be used as a resource for other activities. (CHIKÁN 2010) Amortization is thus a means of creating the conditions for simple replacement, creating the basis for buying another asset of the same type years later instead of the asset that has been worn out. However, depending on whether we are operating under inflation conditions or not, amortization may or may not be able to fulfil this function. It also plays an important role in the implementation of technological development. Typically, as regards the source of new purchases, a major part of the investments is financed from the amount accumulated under depreciation.

In the sample calculation, in case of the funds lost due to inflation, we do not calculate with the residual value. We see it as more transparent if the value of the resulting source over the years is the same as the total value of the asset. When calculating the return, we assume that the asset can be sold at a price equal with the residual value. We wish to present the studied problem within this framework, since the purpose of the two calculations is slightly different.

Amortization methods

In fact, the correct development of the amortization system involves two processes - the accounting of one-off capital investment in instalments and the temporal linking of replacement. Impairment of fixed assets due to physical and moral obsolescence (capital depreciation) should be determined and accounted for as depreciation. However, the true extent of wear and tear on an asset is very difficult to determine. The time – e.g., in the case of the physical wear and tear of a machine - depends not only on the technical standard of production, but also on the degree of use over time, its circumstances, the user, etc. Moral obsolescence occurs when there is a more modern, more economically productive newer asset of the same type on the market, and the old asset must be withdrawn from production because it is no longer competitive. It happens often that the moral wear and tear of assets occurs more quickly than their physical wear and tear (most often in the case of machinery). Different amortization systems - depreciation methods - can be used to account for wear and tear in connection with use. First and foremost, a distinction must be made between amortization systems on a time basis and on a performance basis. (CSETE et al 1974)

In the former, the use of an asset is expressed in years and the amortization rate is determined in proportion to this, while in the latter, it is calculated on the basis of service life, e.g., the total number of operating hours, and thus the annual depreciation depends on the extent of use, i.e., the number of operating hours. In the case of pro rata temporis accounting, depreciation is determined according to the period of use, its value is constant for a year and depending on the annual use of the asset, it varies per unit of output. In the case of performance-based depreciation, the amount of depreciation per unit of output is always the same, but its value per year varies according to the utilisation of the asset. Of the two systems, pro-rata depreciation is the sole dominant.

There are also several forms of the pro rata temporise amortization systems. These include linear, degressive and progressive amortization. When the linear method of amortization is used, the annual depreciation is determined based on the depreciable value of the assets and the useful life of the assets. (ERTSEY and NÁBRÁDI 2003) Using this method, the same amount of depreciation is charged for each year of use, that is, the same value of the assets is recovered. The rate of depreciation is expressed as a percentage, which is a constant for linear depreciation. The basis of depreciation is typically the gross value of the asset (or the gross value minus the residual value). The amount to be amortised or depreciated is then obtained by deducing the residual value (if any) of the asset from the cost of the asset (the gross value) and multiplying the gross value that can be depreciated by the annual depreciation rate. (MAGDA et al. 1998) The aforementioned linear depreciation system is therefore a very simple method that is easy to use, to keep records of, to review and to plan. It is the most widely used and practically the sole dominant depreciation method in current practice. However, one of its disadvantages is the fact that its constant annual amount does not take into account the real time use of the assets. Within pro rata temporise depreciation, the use of the degressive amortization method as opposed to the linear method means that a higher value is recognised in the initial period of the use of the assets - accelerating the depreciation - while the amount of depreciation becomes less and less as the period of use progresses. There are several options for degressive depreciation. The simplest degressive method is to apply decreasing depreciation rates to the basic characteristics of the assets in use.

Another method is when the net value of the assets (gross value - amortization = net value) is used as the basis for depreciation. (Using the same amortization rate on the basis the of decreasing net value, the annual amount of amortization becomes smaller over time.) The third method is the aggregation of years method, which is also a degressive method. The essence of this method is to add up the years of projected use for the asset (determining the number of units) and then divide the value to be amortized by the number of units to determine the amount of amortization per unit. As the last step, the amortization per unit multiplied by the number of units is charged for each year of use in reverse order. (For example, if we want to use the asset for seven years, we will have 7+6+5+4+3+2+1=28 units, which divided by the depreciable value of the asset gives us the amortization per unit. Finally, for the first year, 7 units, for the second year 6 units, for the third year 5 units, for the fourth year 4 units, for the fifth year 3 units, for the sixth year 2 units and for the seventh year only 1 unit of amortization are calculated.) All the variations of the degressive amortization methods are characterised by the fact that the return on capital employed is concentrated in the first half of the useful life of the asset. Although the higher value increases costs at the beginning, this part of the capital is returned to the entrepreneur sooner. If economic policy aims at a rapid growth in production and a rapid spread of newer technology, this form of depreciation method can be a good public policy regulator. On the whole, the degressive method of depreciation can be an incentive for technological development, and it is clear that it is in the interests of the entrepreneur (or the enterprise) to use this method of depreciation.

Staying still with the pro rata temporise method, when using the progressive amortization method – which slows down depreciation – the amount of depreciation charged is initially lower and then increases over time. Once it has been established that the degressive method of depreciation is in the interest of the entrepreneur and serves technological improvement, it can be clearly concluded that the progressive method of depreciation is not justified. However, there are some cases, e.g., fruit or grape cultures where the yields are more modest in the first years of production, or at the beginning of the production of a new product when other costs of production are higher. Therefore, in these cases it may be justified to initially set the amortization cost at a more modest rate and then increase it. (NÁBRÁDI, PUPOS and TAKÁCSNÉ GYÖRGY 2008) (Since amortization also appears as a cost, it does make a difference when and against what level of production the higher costs are accounted. For the plantation crops mentioned above, yields are not yet realized or are very low at the beginning of production, compared to later periods. It is therefore not justifiable to increase costs with amortization very much at the beginning of production, since there is nothing to offset them against. However, when production ramps up, the increased costs have a significant income-reducing effect, which has a significant impact on tax liability as well. The subsequent higher accounting of costs thus results in tax savings for the entrepreneur in these cases.)

As shown, the accounting of depreciation has a significant impact on the technical and technological development of the business. The use of the linear amortization system is mainly justified where the technical obsolescence and moral wear and tear of assets is low, e.g., in the case of buildings. Where the tools and machinery rapidly evolve technologically and old technology becomes obsolete quickly, the increase in the development of production requires a more rapid depreciation of assets, and it is therefore reasonable to depreciate the assets put into production in the initial phase of their use. Although this means that production costs increase at the expense of income - thus the state's income from taxes is lower -, it does result in an overall increase in production. If most of the value of the old assets is depreciated in the initial period of their use, the lower depreciation costs that remain in the second part of the period of use will encourage the entrepreneur to discard the economically obsolete assets and put newer, technically more valuable, more modern assets into production. Overall, the application of the degressive method of depreciation may accelerate technical development, while in other cases a given technology may become conserved in production to a greater or lesser extent, which is not desirable.

It is a very big problem for businesses that under inflationary conditions, when the depreciation rate does not follow inflation, public regulation practice leads to a situation where the amortization value over time does not cover either the necessary capital reallocation rate or the corresponding increase in the cost of production, thus generating a tax-free resource. As a result, the real value of the previously accumulated capital is reduced and, if the value of depreciation becomes lower and the profits correspondingly higher, the entrepreneur will yet again pay tax on profits that derive from profits already taxed. This shortcoming can be remedied by revaluing assets from time to time in line with the inflation rate and increasing the amortization value accordingly. In this way, the profit reflects the real situation and does not include inflationary elements. However, the accounting system is regulated by the State. Unfortunately, this practice is very rarely used by public bodies and ex post corrections are made only occasionally. In an economic situation where the inflation rate is significant, solving this problem is a much more important issue than in countries where inflation is only 1-3% per year. Depreciation, as a cost factor, varies according to the need for fixed tangible assets in production. In line with the above, in comparison with the real situation, the accountable amortization is generally modest and lower. The amortization system also has a tax policy function, which manifests in the fact that amortization is opposed to income.

The higher amortization compared to the value of the asset is, the sooner and to a greater extent the entrepreneur can recover the capital – for which tax has already been paid – tax-free and reinvest it. Deductible amortization is a factor that reduces income and the tax base, thus the amortization rate has a major impact on the tax revenue of the State, which is why every country has a law regulating the order, time and years of amortization deduction. It is evident that in the long run it is in the interest of every country to increase the level of additional investment through its tax policies, and therefore they allow for a faster depreciation than the rate of wear and tear. Accordingly, in our country, depreciation is also faster than the actual rate of wear and tear: in the case of machinery and equipment it is 4-8 years, while the amortization period for buildings and structures is no longer than 15-25 years. However, excessively high depreciation rates - and consequently a significant increase in annual amortization costs - are not characteristic of regulation, as this would lead to a significant reduction in state revenue (taxes), which is not the state's aim. However, the typical method is linear depreciation, which, as we have seen, is not really conducive to businesses and to the rapid modernisation of technology.

MATERIALS AND METHODS

After presenting the location and role of amortization among costs, we dealt with the creating of the amortization system and the calculation methods of amortization. Then, with the help of model calculations, we examined what the linear, degressive, progressive depreciation method means for the entrepreneur in the case of an asset worth 10 million HUF in relation to 10 years and 5 years. In addition, we also try to shed light on what kind of capital loss is caused with inflation for this same asset compared to the case without inflation. We will also show with examples that the loss due to inflation makes it necessary to supplement the funds. For this, we use the role of the time value of money. We present how much more money must be provided from the profit in order to have the amount needed to replace the asset available after 10 years.

RESULT AND DISCUSTIONS

Comparison of amortization methods

In support of what has been said so far, in the following we will use model calculations to examine what the linear, the degressive and the progressive depreciation methods mean for the entrepreneur for an asset worth HUF 10 million over 10 years and 5 years. In addition, we will also try to find out how much the capital loss is for the same asset with or without inflation. Table 1 shows that since we assume a case without inflation, the entrepreneur obtains their money without loss for all three pro-rata temporise depreciation methods. It is also obvious that for the entrepreneur the degressive case is the most favourable, since they have 85% of the capital value available halfway through the accounting period (10 years), so they can reinvest it in production relatively quickly, and modernise with the use of a possible new technology. In comparison, the linear depreciation method is slightly worse: the entrepreneur realises 50% of the capital halfway through the accounting period. Yet, the worst – quite understandably - is the progressive depreciation method, where only 15% is realised within 5 years, which is very unlikely to be enough to generate a return on capital.

Now we regard to an average 10% inflation to calculate of amortization. Then, in all three cases, a much less favourable situation is created.

Even with the previously most favourable degressive depreciation method, there is a capital loss of 25.2%, which is 38.6% with linear depreciation, while the "result" of progressive depreciation causes the entrepreneur to lose 51% of the total invested capital value.

If we examine where the return on capital is at the halfway point of the term, it can be concluded that even in this situation the values have got worse, since in the case of degressive description, only 67.3% of the capital has now been returned, while looking at linear and progressive accounting, these the values show 37.9 and 10.7%, respectively. Especially the latter value is very deplorable, however - considering that the occurrence of inflation is not rare and the value of 10% cannot be considered very outlier, it is thought-provoking for entrepreneurs. It is not too motivating to buy an asset worth 10 million so that after 5 years only about a third or a tenth of the invested capital is returned. In such cases, the entrepreneur most likely does not want to invest capital in the assets, only if they are absolutely necessary for production, but even then ones will definitely look for the possibility of minimizing the magnitude of the capital loss. The calculations were also performed for a shorter useful life of 5 years which are shown in Tables 3 and 4. Of course, without inflation (table 3), we are not talking about capital loss here either, but because the amortization period has been shortened, the entrepreneur will obviously get capital invested in tangible asset back sooner compared to the 10-year period.

Then, in the case of the most favourable degressive depreciation method, the return on capital will be 75% in the middle of the term, in the linear case it will be 50%, while in the case of progressive depreciation it will be 25%. The point, however, is that the entrepreneur will definitely get access to capital faster and, accordingly, they can manage their new investments sooner, which is considered as desirable. If the previous calculation is made under inflationary conditions and it is compared with the 10-year period, it can be seen

1. Table: Effect of 10-year linear, degressive, progressive amortization on asset with a gross value of 10 million HUF, without inflation

Year	1	2	3	4	5	6	7	8	9	10	Total
Name	Linear depreciation										
amortization %	10	10	10	10	10	10	10	10	10	10	100
amortization HUF K	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	10000
amortization present value, HUF K	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	10000
accumulated description, HUF K	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	-
Loss from inflation	0	0	0	0	0	0	0	0	0	0	0
Name	Degressive depreciation										
amortization %	25	22	15	13	10	5	4	3	2	1	100
amortization HUF K	2500	2200	1500	1300	1000	500	400	300	200	100	10000
amortization present value, HUF K	2500	2200	1500	1300	1000	500	400	300	200	100	10000
accumulated description, HUF K	2500	4700	6200	7500	8500	9000	9400	9700	9900	10000	-
Loss from inflation	0	0	0	0	0	0	0	0	0	0	0
Name	Progressive description										
amortization %	1	2	3	4	5	10	13	15	22	25	100
amortization HUF K	100	200	300	400	500	1000	1300	1500	2200	2500	10000
amortization present value, HUF K	100	200	300	400	500	1000	1300	1500	2200	2500	10000
accumulated description, HUF K	100	300	600	1000	1500	2500	3800	5300	7500	10000	-
Loss from inflation	0	0	0	0	0	0	0	0	0	0	0

Source: own calculation

that the loss of capital is reduced in all three cases. (Table 4) The least is 18.4% for degressive depreciation (which is still significant), 24.2% for linear depreciation, while 29.9% of the capital for the progressive depreciation method is the value that is simply lost to the entrepreneur due to inflation. At the half of 5-year useful life, in the case of degressive depreciation 64.1% of the capital is returned, 42.2% with linear depreciation, and 20.3% with progressive depreciation. It is compared to the 10-year period, at the degressive method is reduced by a few per cent but the case of linear and progressive descriptions improved by 5 and 10%.

Based on the tables, what can be suggested regarding the amortization period and the future development of the amortization percent if we want to keep the interests of the entrepreneur in mind? In any case, it would be advisable to reduce the amortization period, since the sooner the entrepreneur gets the value of the invested capital, the sooner they can modernize their assets.

It is even more important, however, that the amount of capital loss should be minimized when accounting for amortization under rising inflationary conditions. Moreover, its entire value should be disappeared, since it cannot be con-

2. Table: Effect of 10-year linear, degressive, progressive amortization on asset with a gross value of 10 million HUF, with 10% inflation

Year	1	2	3	4	5	6	7	8	9	10	Total
Name	Linear depreciation										
amortization %	10	10	10	10	10	10	10	10	10	10	100
amortization HUF K	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	10000
amortization present value, HUF K	909,1	826,4	751,3	683,0	620,9	564,5	513,2	466,5	424,1	385,5	6144,5
accumulated description, HUF K	909,1	1735,5	2486,8	3169,8	3790,7	4355,2	4868,4	5334,9	5759,0	6144,5	-
Loss from inflation HUF K	90,9	173,6	248,7	317,0	379,1	435,5	486,8	533,5	575,9	614,5	3855,5
Name	Degressive depreciation										
amortization %	25	22	15	13	10	5	4	3	2	1	100
amortization HUF K	2500	2200	1500	1300	1000	500	400	300	200	100	10000
amortization present value, HUF K	2272,8	1818,1	1127,0	887,9	620,9	282,3	205,3	140,0	84,8	38,6	7477,7
accumulated description, HUF K	2272,8	4090,9	5217,9	6105,8	6726,7	7009,0	7214,3	7354,3	7439,1	7477,7	-
Loss from inflation HUF K	227,2	381,9	373,0	412,1	379,1	217,7	194,7	160,0	115,2	61,4	2522,3
Name	Progressive description										
amortization %	1	2	3	4	5	10	13	15	22	25	100
amortization HUF K	100	200	300	400	500	1000	1300	1500	2200	2500	10000
amortization present value, HUF K	90,9	165,3	225,4	273,2	310,5	564,5	667,2	699,8	933,0	963,8	4893,6
accumulated description, HUF K	90,9	256,2	481,6	754,8	1065,3	1629,8	2297,0	2996,8	3929,8	4893,6	-
Loss from inflation HUF K	9,1	34,7	74,6	126,8	189,5	435,5	632,8	800,2	1267,0	1536,2	5106,4

Source: own calculation

sidered a normal case if the present value of the amortized capital does not reach the present value of the invested capital at the end of the amortization period. It can be seen that in the 10-year amortization period, even in the most favourable case, 25.2% of the value of the invested capital was lost for the entrepreneur (and the extreme 51% occurred at the progressive method). Although at the 5-year depreciation period, the capital loss was reduced to 18% in the best case, but even then it could reach a value of around 30% (which is still considered very unfavourable compared to the desirable 0%).

3. Table: Effect of 5-year linear, degressive, progressive amortization on asset with a gross value of 10 million HUF, without inflation

Year	1	2	3	4	5	Total
Name	Linear depreciation					
amortization %	20	20	20	20	20	100
amortization HUF K	2000	2000	2000	2000	2000	10000
amortization present value, HUF K	2000	2000	2000	2000	2000	10000
accumulated description, HUF K	2000	4000	6000	8000	10000	-
Loss from inflation HUF K	0	0	0	0	0	0
Name	Degressive depreciation					
amortization %	35	30	20	10	5	100
amortization HUF K	3500	3000	2000	1000	500	10000
amortization present value, HUF K	3500	3000	2000	1000	500	10000
accumulated description, HUF K	3500	6500	8500	9500	10000	-
Loss from inflation HUF K	0	0	0	0	0	0
Name	Progressive description					
amortization %	5	10	20	30	35	100
amortization HUF K	500	1000	2000	3000	3500	10000
amortization present value, HUF K	500	1000	2000	3000	3500	10000
accumulated description, HUF K	500	1500	3500	6500	10000	-
Loss from inflation HUF K	0	0	0	0	0	0

Source: own calculation

These tendencies should be stopped at the state level definitely. This can be solved in the simplest way if the assets to be depreciated are revalued every year in line with the rate of inflation, and thus, by logically, the annual value of the amortization is also raised to a higher level.

Then we could say that the entrepreneur "are at their money", since in this case the capital-loss would be not. As long as this is not happened with aspect to assets, each year of inflation causes loss for entrepreneurs. On the one hand, due to the capital loss which was presented, and on the other hand, if it is not possible to increase the costs sufficiently with amortization, then this increases the income before tax of the enterprise, which entails that they have to pay higher tax. This

4. Table: Effect of 5-year linear, degressive, progressive amortization on asset with a gross value of 10 million HUF, with 10% inflation

Year	1	2	3	4	5	Total
Name	Linear depreciation					
amortization %	20	20	20	20	20	100
amortization HUF K	2000	2000	2000	2000	2000	10000
amortization present value, HUF K	1818,2	1652,8	1502,6	1366,0	1241,8	7581,4
accumulated description, HUF K	1818,2	3471,0	4973,6	6339,6	7581,4	-
Loss from inflation HUF K	181,8	347,2	497,4	634,0	758,2	2418,6
Name	Degressive depreciation					
amortization %	35	30	20	10	5	100
amortization HUF K	3500	3000	2000	1000	500	10000
amortization present value, HUF K	3181,9	2479,2	1502,6	683,0	310,5	8157,2
accumulated description, HUF K	3181,9	5661,1	7163,7	7846,7	8157,2	-
Loss from inflation HUF K	318,1	520,8	497,4	317,0	189,5	1842,8
Name	Progressive description					
amortization %	5	10	20	30	35	100
amortization HUF K	500	1000	2000	3000	3500	10000
amortization present value, HUF K	454,6	826,4	1502,6	2049,0	2173,2	7005,8
accumulated description, HUF K	454,6	1281,0	2783,6	4832,6	7005,8	-
Loss from inflation HUF K	45,4	173,6	497,4	951,0	1326,8	2994,2

Source: own calculation

is completely unreasonable, since in this case it is not a real increase in income, but only an “accounting problem”, which resulted from the failure to increase the amortization costs to a higher level (corresponding to reality). Based on the previous, it can be concluded that the development of enterprises is significantly hindered from these two directions.

The previous calculations show that inflation makes it more difficult to replace the asset and clearly requires the supplementation of resources arising in the amortization branch from profit after tax.

In the following analysis, the time value of money, the need to supplement the sources generated in the amortization branch and the determination of the amount of savings required will be discussed in detail. (SZABÓ AND PÁLINKÓ 2004)

The role of the time value of money:

In our article, we addressed the issue of loss due to inflation, which results from the time value of money. It is well known in economic circles that money has a time value, generated by two factors. On the one hand, inflation causes the purchasing value to decrease after a certain time period; and on the other hand, we attach importance to the fact that money, for example an interest-bearing deposit, is able to produce income and increase its own initial amount over time. (BÉLYÁCZ, 2006) In the case of an asset that has been used for several years, this is something that we must pay attention to, if only because of the amount that has to be paid out during replacement. Let us take an example, where we consider how much money needs to be generated each year during the useful life of an asset in order to replace it at the end of its useful life. The calculation compares the linear accounting model and the degressive accounting method and their effects. It is treated as an economic necessity that the operating asset must generate its own depreciation expense and the profit needed to replace it. From this angle, it is concluded that the sources needed to replace fixed assets are generated from two sources:

a. Amortization, which is to be charged as an expense and reduces the profit for the year but does not result in an outflow of cash. This can be understood as a return in nominal value.
b. The replacement of the asset at the end of its useful life requires a higher amount than what it was procured for, and therefore has to be supplemented by operating profit, counterbalancing the effect of inflation.

The replacement source must be generated and “accumulated” over the operational life of the asset.

The question is at what point in time and how much depreciation should be accounted, since according to the Accounting Act, the actual market value should appear in the balance sheet, which is the difference between the cost value and the recorded depreciation expense. (We disregard the value adjustment because it has no effect on costs or profit.) (Act C of 2000). Another question is the amount needed from profit to supplement amortization already accounted for - and recovered during operation - to have the amount needed for replacement at the end of the operating period. The above question is answered by an example below, in which two amortization methods are compared and the effects of the difference are also examined.

Example:

An enterprise purchases a machine with a cost value of HUF 11,000,000 and plans to use it for 10 years. The expected inflation rate for machinery is 10% per year over the period considered. The residual value of the machine is HUF 1,000,000, which can be realised through sale after scrapping. Our question is how much money is needed to supplement the amortization source on the profit side annually if we plan to replace the asset at the end of its useful life with another machine of the same type. Let us examine the situation if the company uses a linear depreciation rate and also the situation if it uses the sum-of-the-years method.

5. Table: Calculation for linear amortization.

Year / Name	1	2	3	4	5	6	7	8	9	10	Total
Amortization, HUF K	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	10000
Profit Source, HUF K	728	728	728	728	728	728	728	728	728	728	7280
Total Source, HUF K	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	17280
Interest rate factor	2,3579	2,1436	1,9487	1,771	1,4641	1,6105	1,331	1,210	1,10	1,00	
Future value by year, HUF K	4075	3704	3367	3061	2783	2530	2300	2091	1901	1728	27540

Note: The profit branch source is understood as profit after tax. HUF K = HUF thousand
Source: own calculation.

6. Table: Calculation for annuity method.

Year / Name	1	2	3	4	5	6	7	8	9	10	Total
Amortization, HUF K	1818	1636	1455	1723	1091	909	727	545	364	182	10000
Profit Source, HUF K	-90	92	273	455	637	819	1001	1183	1364	1546	7280
Total Source, HUF K	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	17280
Interest rate factor	2,3579	2,1436	1,9487	1,771	1,4641	1,6105	1,331	1,210	1,10	1,00	
Future value by year, HUF K	4075	3704	3367	3061	2783	2530	2300	2091	1901	1728	27540

Note: The profit branch source is understood as profit after tax.
Source: own calculation.

Solution:

a. Resources to replace the asset in 10 years.
The machine has been bought for HUF 11,000,000 and an annual inflation rate of 10% is assumed, the future value at the end of 10 years is 11,000,000 * (1+0.1)10 = 11,000,000 *2.594= 28,534,000 HUF. The result of the calculation shows that by the end of year 10, HUF 28,534,000 must be available to replace the asset at the prices of that year. The amount will be made up of two parts, on the one hand, the HUF 1,000,000 from the sale after scrapping and on the other hand, the funds generated during the operation. Our question is, to have HUF 27,534,000 available at the end of the 10 years (28,534,000-1,000,000), how much of money should we reserve each year? We expect to "save" at a steady rate as we accumulate the resource.

b. The value of the required amount is determined using the annuity method. It is worth taking a look at annuitisation and its role in our example. By annuitisation we mean cash flows of equal amounts, that is we aim to determine how many HUF per year need to be "set aside" - from amortization and profit - in order to have the required HUF 27,534,000 at the end of year 10. For the calculation we assume that the amount of money set aside at the end of the first year will continue to accrue interest for nine years, the amount set aside at the end of the second year for eight years and so on. The annuity factor is 15.9374. The amount of money needed per year is therefore 27,534,000/15.9374= HUF 1,728,000 / year.

c. The required depreciation expense and the additional profit savings are shown in the tables:

The table 5 shows that in the case of linear depreciation, the enterprise must provide a resource of HUF 728 thousand from its profit after tax each year in addition to the depreciation expense to be able to replace the asset. In the case of degressive depreciation, it is assumed that the asset is subject to a higher rate of technical wear and tear and a higher rate of moral obsolescence in the first years of use. (Table 6) Under this assumption, we must apply the declining balance method of depreciation in accordance with the Accounting Act, because the balance sheet should show the lower net value. (Act C of 2000) If the same amount of resources is generated each year for the duration of operation in the calculation, even some losses can be tolerated in the first years, in addition to depreciation.

The asset must be recovered in its operational time, that is, it must generate the resources needed to replace it. The calculation shall take into account that, due to inflation, we will only be able to replace the machine for a higher amount at the end of its useful life compared to when it was originally purchased, and therefore profit is needed. It is another fact that, during the years of use, assets wear and tear to varying extents, both technically and in terms of obsolescence, therefore the fair annual amortization rate also varies. We may conclude that the use of an accounting method other than linear depreciation is justifiable. The asset is expected to recover its costs and to generate a profit during its life. The minimum rate of expected results is the amount needed to supplement the amortization source in order to replace the asset at the end of its useful life.

Depending on the timing of the depreciation of the asset, a different amount of profit after tax should be generated in addition to the accounted amortization.

Based on these calculations, we can conclude that in the case of the linear depreciation method the same rate of wear and tear is assumed, and the same rate of profit source is needed. If the degressive method is used, the amount of depreciation is higher in the first years and even a minimal loss can be tolerated in the first years of the operation of the specific asset. (The amortization recovery will be faster.) This shows that specifying the depreciation methods and rates is of great importance, as it is not natural for an activity to be loss-making in the initial period and then to increase in profit during the rest of the operation.

Summing up our ideas, we may come to an interesting conclusion. The accounted amortization must be synchronised with the wear and tear of the asset in order to show a fair asset value and a fair cost in the annual accounts. To be able to buy a new machine as a replacement for the worn-out one, profit is needed. Thinking in terms of the life cycle of machinery, fair value is a priority, whereas recognised result and the generated source are secondary from an accounting point of view.

However, from a management point of view, the generation of the necessary resource should be targeted, as it is the basis for maintaining the operation.

In addition to the above, it should be noted that the Corporate Tax Act adheres to standards in determining the tax base and therefore the tax payable and the profit after tax. In determining the tax payable, the corporate tax base is determined by considering only depreciation calculated using linear depreciation expense rates laid down by the Act. The tax base thus differs from the actual result generated, so that deferred tax or advance tax may arise, affecting the amount of profit after tax. (LXXXI of 1966 Act)

It is clear that the valuation of tangible assets, their impact on operations or profitability are influenced by a number of factors, thereby making it difficult to obtain a fair valuation of assets in all respects.

This raises the question of how the State can encourage the necessary savings, alongside the responsibility of the entrepreneur. The answer is difficult and complex. On the one hand, it can play a role in bringing down inflation by supporting the efforts of the Central Bank, however, the real toolbox of the government lies in the subsidy system and the tax system. Our recommendations are set out below at a conceptual level only.

It is a fact in economics that inflation increases government revenues. We suggest that the inflationary budget revenue should be used to provide a normative subsidy to entrepreneurs who make investments, depending on the lifetime of the asset being replaced. This subsidy could mitigate the loss due to the time factor.

Another idea is to subsidise savings, in such a way that the investment savings generated using the above calculations and placed in government bonds, are supplemented normatively from the state budget.

In this article, we have dealt with the accounting of non-current assets as an expense, how to determine their balance sheet value, how to expense them and how to secure the savings needed to replace them. We hope that we have succeeded in highlighting a real problem and in stimulating the reader's interest as well. In our next article, we will use model calculations to show the possible forms of public intervention - that we propose.

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