

THE IMPACT OF DEPRECIATION ON COSTS

MARIANA RADU*

ABSTRACT: *It is known that depreciation is calculated in financial accounting by regulated criteria, depending on a conventional fixed life. Excluding depreciation depending on units produced (applied to buildings and special construction of mines, salt mines, quarries) where it is calculated per unit based on the exploitable reserve of useful mineral substance, the other depreciation methods do not always lead to fair and justified calculation of production costs. In this paper I will show how to record depreciation expenses in management accounting in Romania, the influence of methods of depreciation on costs, which are the restatements that depreciation expenses should be subject to for an accurate determination of production costs.*

KEYWORDS: *depreciation, expenses, costs, assets, restatement.*

JEL CLASSIFICATION: *M41.*

1. INTRODUCTION

In order to exercise control over consumptions and the correct calculation of the cost of manufactured products, management accounting must record in time (at the time of execution) and in full the consumption incurred. For this we need to consider the type or categories of consumption, particularities and how to include them in the cost of manufactured products. Many of the expenses recorded in financial accounting are subject to restatements before being included in costs. Fixed assets depreciation may be recorded into Class 6 “Expense accounts” at permissible value tax, and in costs (Class 9 “Management accounts”) to be distributed in an economic optics reflecting the rate of consumption of economic benefits expected due to assets depreciation. Differences between expenses recorded in the financial accounting and expenses incorporated into costs are known as differences of incorporation.

The purpose of this research is to show the impact of depreciation methods on costs used in Romania. Hypotheses representing the starting point of this research are:

* Lecturer, Ph.D., Valahia University of Targoviste, Romania, meryradu@yahoo.com

1. depreciations, other than straight-line, when practiced, load unevenly the costs of successive periods;
2. the correct calculation of costs require restatements of depreciation expenses.

I used both theoretical research on the concepts, theories and regulations in the field existing so far and also empirical research by presenting case studies trying to find solutions to the problems mentioned.

2. RECORDING DEPRECIATION IN MANAGEMENT ACCOUNTING

Depending on the type of activity, production technology, size of the enterprise, the number of manufactured products, depreciation may be included into management accounting in the following costing items:

1. Direct costs. Depreciation is direct cost when can be identified by object of calculation, case in which it can be included directly in the cost of products, works or services obtained within primary or auxiliary sections. This situation is met in the extractive industry sub-sectors; in the primary and auxiliary sections of homogeneous production; in the situation where on a specific machine within a section of production is manufactured a single product as object of calculation (the machine depreciation shall be wholly incorporated into the cost of obtained product).

In management accounting it is recorded into the account 921 "Costs related to core business", subsidiary detailed on each product. The enterprise may also opt to create a specific costing item called "Direct depreciation". The accounting formula of recording involves debiting account 921, subsidiary "Direct depreciation" (DD), sub-subsidiary "Product X" and crediting account 901 "Internal transactions relating to expenses":

| | | |
|-----------------------------------|---|------------------------------------|
| 921.DD.X. | = | 901 |
| "Costs related to core business". | | "Internal transactions relating to |
| Direct depreciation. Product X | | expenses" |

2. Production overheads. In most cases, however, depreciation is identified by areas or sectors of expense. When identified in the production sections, tracking and control of depreciation expense is achieved through costing items: 922 "Costs related to auxiliary activities" (for auxiliary production sections) and 923 "Production overheads" (for primary production sections), subsidiary accounts split by each auxiliary (AS) and primary (PS) production sections. In this case the accounting formula of taking depreciation costs on tangible assets from financial accounting into management accounting is:

| | | |
|---|---|------------------------------------|
| % | = | 901 |
| 922.AS1 | | "Internal transactions relating to |
| "Costs related to auxiliary activities" | | expenses" |
| Auxiliary production section no 1 | | |
| 923.PS1 | | |
| "Production overheads" | | |
| Primary section of production no 1 | | |

Depreciation included in indirect costs in the sections may be included into the following costing items:

- a) "Expenditure on the maintenance and operation of equipment" EMOE where is recorded the depreciation related to common machinery, vehicles, devices and equipment from the category of fixed assets of the department;
- b) "Expenses of the section" ES, in "General interest expenses of the section" category, where is recorded the depreciation of buildings and of other fixed assets of the department (excluding machinery and means of transport).

3. *Administrative overheads*. They are recorded in this costing item, in the category "Administrative overheads", the depreciation of buildings and other fixed assets of general interest and management of the industrial unit. In management accounting is recorded using account 924 "Administrative overheads" not detailed in subsidiary accounts. The accounting formula of taking the depreciation from financial accounting into the management accounting is:

$$\begin{array}{rcl} 924 & = & 901 \\ \text{"Administrative overheads"} & & \text{"Internal transactions relating to} \\ & & \text{expenses"} \end{array}$$

4. *Distribution costs*. In this costing item is recorded the depreciation of fixed assets used in its own distribution network, the account used being 925 "Distribution costs", which usually is not detailed in subsidiary accounts. The accounting formula is:

$$\begin{array}{rcl} 925 & = & 901 \\ \text{"Distribution costs"} & & \text{"Internal transactions relating to} \\ & & \text{expenses"} \end{array}$$

3. INFLUENCE OF METHODS OF DEPRECIATION ON COSTS

It is known that depreciation is calculated in financial accounting by regulated criteria. Excluding depreciation of units produced (applied on buildings and special construction of mines, salt mines, quarries) where it is calculated per unit of product based on the exploitable reserve of useful mineral substance, the other depreciation methods do not always lead to fair and justified calculation of production costs. Straight-line depreciation involves including in the production costs an annual amount equal to the entire life of the fixed capital. Degressive and accelerated depreciation involve including in the production costs an annual amount that decreases from one year to another.

To illustrate how the method of depreciation used may influence the cost of products obtained, works executed, services provided, we shall start from the following simplified example:

We consider a company that during a reporting period had the following costs (excluding depreciation expense of fixed assets) to obtain the production:

| | |
|-----------------------------|-----------|
| - raw materials expenditure | 50000 lei |
| - direct labor | 25000 lei |
| - production overheads | 15000 lei |

(no depreciation)

Cost of production

(without the influence of depreciation) 90000 lei

Depreciation is calculated for the single equipment owned by the enterprise, its input value being of 50.000 lei, normal usage - 5 years.

To avoid allocation calculations of production overheads we assume that the enterprise has homogeneous production and that during the month produced over 100 pieces of finished product.

We intend to calculate the unit cost of the product obtained by including into the cost the full amount of depreciation recorded in financial accounting, depreciation calculated by: straight-line, degressive and accelerated systems.

3.1. Calculation of production cost by using straight-line depreciation regime

Straight-line depreciation rate $K_L = 100 / 5 \text{ years} = 20\%$

Monthly depreciation calculated for the machinery and the total and unit production cost of the finished products is calculated in Table 1.

Table 1. Influence of straight-line depreciation on cost

| Years | Value for depreciation (lei) | Depreciation rate (%) | Annual depreciation (lei) | Monthly depreciation (lei) | Production cost (no depreciation) (lei) | Production cost | |
|-------|------------------------------|-----------------------|---------------------------|----------------------------|---|-----------------|----------------|
| | | | | | | total (lei) | unit (lei/pcs) |
| 0 | 1 | 2 | $3 = 1 \times 2$ | $4 = 3/12$ | 5 | $6 = 4 + 5$ | $7 = 6/100$ |
| 1 | 50000 | 20 | 10000 | 833.33 | 90000.00 | 90833.33 | 908.33 |
| 2 | 50000 | 20 | 10000 | 833.33 | 90000.00 | 90833.33 | 908.33 |
| 3 | 50000 | 20 | 10000 | 833.33 | 90000.00 | 90833.33 | 908.33 |
| 4 | 50000 | 20 | 10000 | 833.33 | 90000.00 | 90833.33 | 908.33 |
| 5 | 50000 | 20 | 10000 | 833.33 | 90000.00 | 90833.33 | 908.33 |

It is noted that straight-line depreciation uniformly affects the cost of production obtained, while it maintains the same value (908.33 lei/pcs.).

3.2. Calculation of production cost by using degressive depreciation regime

Degressive depreciation rate is: $K_D = K_L \times 1.5 = 20\% \times 1.5 = 30\%$

The production cost of product is calculated in Table 2.

In year 3: straight-line depreciation = $(50.000 - 15.000 - 10.500)/3 \text{ years} = 24.500 \text{ lei}/3 \text{ years} = 8.167 \text{ lei}$; degressive depreciation: $24.500 \text{ lei} \times 30\% = 7.350 \text{ lei}$.

Since straight-line depreciation is higher, starting from year 3 straight-line depreciation regime applies. Straight-line depreciation rate $K_L = 100/3 \text{ years} = 33,33\%$.

By applying degressive depreciation is found that:

- ✗ while depreciation is calculated using the degressive depreciation rate (in our example in the first two years) the production cost is loaded with depreciation increasingly less;

- ✗ while depreciation is calculated based on the straight-line depreciation rate, the production cost remains equal, but at a lower value than in the degressive depreciation period.

Table 2. Influence of degressive depreciation on cost

| Years | Value for depreciation (lei) | Depreciation rate (%) | Annual depreciation (lei) | Monthly depreciation (lei) | Production cost (no depreciation) (lei) | Production cost | |
|-------|------------------------------|-----------------------|---------------------------|----------------------------|---|-----------------|----------------|
| | | | | | | total (lei) | unit (lei/pcs) |
| 0 | 1 | 2 | $3 = 1 \times 2$ | $4 = 3/12$ | 5 | $6 = 4 + 5$ | $7 = 6/100$ |
| 1 | 50000 | 30.00 | 15000 | 1250.00 | 90000.00 | 91250.00 | 912.50 |
| 2 | 35000 | 30.00 | 10500 | 875.00 | 90000.00 | 90875.00 | 908.75 |
| 3 | 24500 | 33.33 | 8167 | 680.58 | 90000.00 | 90680.58 | 906.81 |
| 4 | 24500 | 33.33 | 8167 | 680.58 | 90000.00 | 90680.58 | 906.81 |
| 5 | 24500 | 33.33 | 8166 | 680.50 | 90000.00 | 90680.50 | 906.81 |

3.3. Calculation of production cost by using accelerated depreciation regime

In the first year the accelerated depreciation rate is applied $K_A = 50\%$. From the second year straight-line depreciation rate is applied: $K_L = 100/4$ years = 25%. The following production costs are obtained:

Table 3. Influence of accelerated depreciation on cost

| Years | Value for depreciation (lei) | Depreciation rate (%) | Annual depreciation (lei) | Monthly depreciation (lei) | Production cost (no depreciation) (lei) | Production cost | |
|-------|------------------------------|-----------------------|---------------------------|----------------------------|---|-----------------|-----------------|
| | | | | | | total (lei) | unit (lei/pcs.) |
| 0 | 1 | 2 | $3 = 1 \times 2$ | $4 = 3/12$ | 5 | $6 = 4 + 5$ | $7 = 6/100$ |
| 1 | 50000 | 50 | 25000 | 2083.33 | 90000.00 | 92083.33 | 920.83 |
| 2 | 25000 | 25 | 6250 | 520.83 | 90000.00 | 90520.83 | 905.21 |
| 3 | 25000 | 25 | 6250 | 520.83 | 90000.00 | 90520.83 | 905.21 |
| 4 | 25000 | 25 | 6250 | 520.83 | 90000.00 | 90520.83 | 905.21 |
| 5 | 25000 | 25 | 6250 | 520.83 | 90000.00 | 90520.83 | 905.21 |

It is found that:

- due to a rather large depreciation in the first year of functioning of the fixed asset, and production cost of the product is high this year;
- from the second year, meaning the year when straight-line depreciation applies, the cost of production is equal, however at a much lower value than the value calculated in the first year.

Following the results obtained in the case study presented, we conclude indeed that:

- depreciations, other than straight-line, when practiced, unequally load the costs of successive periods;
- depreciation is calculated on a rigid manner depending on a conventional fixed period of life: if a fixed asset is removed from service prematurely, the related expense increase excessively the costs; conversely, if a fixed asset is used longer than the initial period, costs will minimize.

4. INCLUDING DEPRECIATION INTO COST

Regulated criteria to calculate the depreciation in financial accounting may not always be used for a correct calculation and justification of the production costs. The depreciation method used should reflect the way in which the future economic benefits of an asset are expected to be consumed by the entity.

In compliance with the standard IAS 16 “Tangible assets” the life of an asset shall be determined through the analysis of several factors: the estimated level of asset use by the enterprise (based on production capacity or estimated production); the expected physical wear (depending on the operating conditions); obsolescence occurred or to occur; legal limits on the use of the asset (the leases).

According to IAS 16, the enterprise will be the one that will estimate the useful life of the asset. To be more precise, the professional reasoning must be manifested in full, not only at the beginning of the “life” of an asset, but also during it, when maybe it will be necessary to review the life cycle, in accordance with the mode of consumption of the future benefits. Useful life must be periodically reviewed and amended, if current estimates differ significantly from the earlier ones, it may be extended through repairs and improvements that add to the performance or, on the contrary, it can diminish as a result of technological progress or changes in the market structure. Thus, similar machines used by different enterprises acting on different markets, can have different lives.

In order to avoid conventional criteria used for calculating depreciation in the financial accounting in Romania, and which lead to its uneven incorporation into costs in successive periods, as well as for the accurate calculation of the cost of production of the goods produced by the enterprise, we recommend the inclusion of depreciation into costs based on economic criteria. Depreciation costs calculated this way shall be taken into account into incorporated costs and generate positive or negative “differences of incorporation” (Budugan, 2002, p. 213).

Management accounting allows the determination of the costs based on a depreciation that differs from the depreciation charges of financial accounting in three essential points:

- ✘ depreciation of a fixed asset in management accounting is calculated, not depending on the value of the purchase, but according to a present value: this value is based on market prices or, alternatively, on the coefficients established by experts in construction and equipment, or by any other means which the enterprise management deems appropriate; therefore, it is an allocation for the asset’s renewal;
- ✘ in financial accounting the duration of use of a fixed asset is a conventional duration: it is a probable duration of use. It may be different from the actual duration of use based on which depreciation should be included in the cost;
- ✘ depreciation incorporation into costs is made as long as depreciation remains in operation: a prematurely antiquated equipment no longer causes depreciation expense included in cost; on the contrary, an equipment left in operation beyond the fiscal depreciation period or the period originally established as conventional duration determines hereinafter a depreciation expense.

The annuity for depreciation expense included in the cost is calculated for every asset or group of assets according to the relationship:

Annuity included into cost = Value of use of the asset /Planned duration of use.

Example: For a given period for a machine is recorded a tax depreciation of 10% per year. The machine has an entry value of 50.000 lei. One year after its entry in the enterprise patrimony, the management believes that the machine, which currently has a value of 70.000 lei (market price) will be used 6 more years.

The annual depreciation is:

- in financial accounting: $50.000 \text{ lei} \times 20\% = 10.000 \text{ lei per year}$
 $\Rightarrow 833,33 \text{ lei per month.}$
- in management accounting is retained the straight-line depreciation and the value incorporated into costs is: $70.000 \text{ lei} : 6 \text{ years} = 11.666,67 \text{ lei per year}$
 $\Rightarrow 972,22 \text{ lei per month.}$
- difference of incorporation: $11.666,67 - 10.000 = 1.666,67 \text{ lei per year}$
 $\Rightarrow 138,89 \text{ lei per month.}$

Schematically, each month, this aspect can be observed as shown in Figure 1.

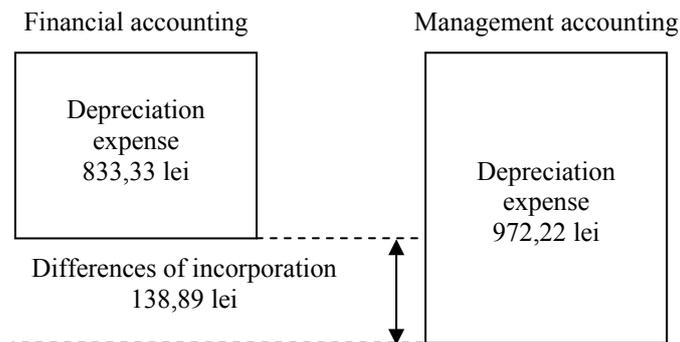


Figure 1. Incorporation of depreciation expense

The incorporation of depreciation into costs thus determined shall be valid, however, as long as the actual activity volume corresponds to the normal activity volume.

When depreciation is calculated in relation to time represents a fixed expense because it does not change when the activity volume changes. Depreciation included in the calculation article "Production overheads", or in other words, included in the fixed production overhead is allocated over costs based on normal production capacity.

Insufficient competitiveness of Romanian products on foreign markets is determined among other things also by partial use of the companies' equipment. Choosing the method of allocation of fixed costs, therefore, also depreciation expenses, should take into account the extent of utilization of production capacity. Thus, if we are dealing with a company where production capacities are used in full, depreciation can be fully absorbed by product cost and recovered by price. If the company is going through a period of crisis that manifests itself by reducing the activity, I appreciate that it is appropriate to employ the *method of rational imputation of structure cost*

(including depreciation). This way through the price will be recovered only a part of these expenses for the product concerned to keep its competitiveness on the market, and managers will be forced, given this situation, either to cut these expenses by forgoing the capabilities that they own and don't use, or to intensify the work of market prospecting to find those products required by the market with which to cover the entire production capacity.

The reasonable imputation allows including in the cost of products only a fraction of the fixed costs that correspond to a level of activity estimated as being normal. Thus, the cost will include all variable expenses related to the real activity and the proportion of fixed costs related to the level of activity considered to be normal. Therefore, it is about a calculation of a cost corrected with the variations in activity.

The rational imputation of fixed overhead (RF) involves first determining rational imputation coefficient (k), according to the relationship:

$$k = \text{Actual level of activity} / \text{Normal level of activity} \quad (1)$$

Rational imputation of fixed overhead (RI_{fo}) and incorporable into products cost is:

$$RI_{fo} = RF \times k \quad (2)$$

where: RF – real, actual fixed overhead.

It is calculated the difference of imputation (DI) between the real fixed overhead and rational imputation of fixed overhead and it is recognized as an expense of the period:

$$DI = RF - RI_{fo} \quad \text{or:} \quad DI = RF \times (1 - k) \quad (3)$$

This difference may represent: *the sub-activity cost*, when the actual level of activity is lower than the normal level of activity, or can represent *over-activity benefit*, when the actual level exceeds the normal level of activity.

Thus, the fixed production overhead can be divided into two categories: that which is attributable to activities and products and corresponds to the structure expenditure corrected by the report: actual activity/normal activity and that which corresponds to the sub-activity or possibly the over-activity and that will not be attributed to products or activities, affecting directly the outcome of the exercise when it has emerged.

Example: Starting from the example shown above, we assume that the normal production of the production section is of 120 pieces. Unit variable costs are 900 lei/pcs. We assume that fixed costs of the section (fixed production overhead) consist solely of depreciation charges and are in the amount of 972.22 lei. In March of year N within the section were achieved 100 pieces produced. We are dealing with a sub-activity, the actual production being less than the normal production of 20 pieces. The unit production cost, calling for the rational imputation of fixed costs is calculated in table 4.

Table 4. Calculating the production cost

| Indicators | Normal level of activity | March (actual level of activity) |
|-----------------------------------|---|--|
| Production volume | 120 pcs. | 100 pcs. |
| Variable costs | 120 pcs. x 900 lei/ pcs. = 108.000 lei | 100 pcs. x 900 lei/ pcs. = 90.000 lei |
| Rational imputation coefficient k | 100 pcs./100 pcs. = 1 | 100 pcs./120 pcs. = 0,8333 |
| Depreciation included into cost | 972,22 lei x 1 = 972,22 lei | 972,22 lei x 0,8333 = 810,15 lei |
| Total production costs | 108.000 lei + 972,22 lei = 108.972,22 lei | 90.000 lei + 810,15 lei = 90.810,15 lei |
| Unit production cost | 108.972,22 lei/120 pcs. = 908,10 lei/ pcs. | 90.810,15 lei/100 pcs. = 908,10 lei/ pcs. |

In analyzing the sub-activity we should consider eliminating from the cost of the product the increases the sub-activity cost give rise to, making that products are not accepted in the market because of their high prices.

Note that in the example shown, despite the fact that real depreciation (calculated according to the amount of depreciation use and duration of use) is of 972.22 lei per month, in costs has been included only the amount of 810.15 lei. The difference of 162.07 lei (972.22 lei – 810.15 lei) represents the sub-activity cost and affects only the result in financial accounting. The inclusion of depreciation expenses in the costs (the entire amount of fixed costs by the way) based on the rational allocation coefficient leads to a balance of the unit production cost (908.10 lei/pcs.), regardless of changes in the volume of activity of the enterprise.

5. CONCLUSION

After the results obtained in the case studies presented above we can conclude that depreciations, other than straight-line, when practiced, unequally load costs of successive periods. Number one hypothesis is thus validated.

The second hypothesis is also validated, the presented restatements of depreciation costs in financial accounting aiming at a rational determination of the production costs calculated in management accounting. The depreciation inclusion into costs should consider the extent of utilization of production capacity. Each year must be recalculated the depreciation included into costs based on the current value of the asset and the probable duration of use. Also, the assets must be actually operating and depreciation expenses must be incorporated into the cost as long as the asset is used, even if it is fully depreciated in financial accounting.

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