

**LOGIC IN RELATION
"AMORTIZATION, REVERSIBILITY, EFFECTIVENESS
FROM THE USE OF LONG – TERM MATERIAL ASSETS"**

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Abstract. *This article considers expenses for amortization in connection with reversibility and effectiveness from the use of long – term material assets. As a result of critical analysis, the thesis that the quantity of expenses for amortization must serve as a sum of turnover in given indicators for reversibility of long – term material assets is defended. It is accented on the dependence of average speed of reversibility of long – term material assets for the enterprise from their structure and individual (for separate groups of long – term material assets) speed of reversibility. On the base of binding the indicators for reversibility and effectiveness from the use of long – term material assets, the opportunity of analysis of indicator "Amortization on 1 lev of sales" is given. The numerical data used in the article is exemplary.*

Key Words: *Amortization, reversibility, effectiveness, assets.*

According to Law of accountancy (article 15, paragraph 1) enterprises calculate amortization of amortizing assets (long – term material and non –material assets), in correspondence with applicable accountancy standards. (1) This article is about amortization of long – term material assets in connection with reversibility and effectiveness of their use. Greater part of long – term material assets is liable to amortization. The remainder is not – amortizing long – term material assets, which come out of the condition that they are completely amortized - to their residual value or they keep their consumer value in the process of their use. The concrete composition of not – amortizing long – term material assets is pointed in acting accountancy standards (point 1 from SS -4 Reporting of amortization) (2).

The amortization is systematic distribution of asset's amortization sum in its useful life. (3)

Total value amount of amortization of long – term material assets for a certain period of review finds its accountancy expression in debit of account "Costs for amortization" (from where it is pointed in the report for incomes and expenses) and on account "Amortization of long – term material assets".

Principally the value amount of amortization depends on amortization sum and amortization rate (4), however for separate periods of review in the frames of economically founded and considered period of amortization (i.e. the amortization quota depends also on the accepted and applied methods of amortization.

In SS -4 Reporting of amortization are regulated two major groups for amortization method – linear and non-linear. From their side the non-linear methods of amortization are divided into two subgroups:

- decreasing non – linear method of amortization
- increasing non – linear method of amortization

Towards the first subgroup refer:

- method of decreasing remainder (constant – degressive method)
- method of uniform decrease
- method of decreasing sum of numbers
- method of uneven decrease

In the second subgroup are included:

- method of uniform increase
- method of increasing sum of numbers
- method of uneven increase

The enterprise can apply different methods of amortization for different groups of assets with a similar purpose. The application of different amortization methods is not allowed for one and the same group of similar assets (5), because they are in one group of amortizing assets, according to the requirements pointed in article 55 from Corporate income taxation act. (6)

For each group of similar assets, amortization quotas and not –amortized values can be calculated for separate years in use of different amortization methods. The received results can be subjected to comparative analysis with the aim to base the decisions which method of amortization to be adopted and used.

The change in amortization quotas depends not only on alteration in amortization rates, (which is diverse in different amortization methods), however it also depends on the dynamics of long – term material assets itself in the frames of corresponding period of review. For determining the value amount of annual amortization with considering dynamics of long –term material assets, the following formula can be used:

$$AM = \frac{A_o \cdot A_n}{100} + \frac{A_p \cdot A_n \cdot t_p}{100 \cdot 12} + \frac{A_i \cdot A_n \cdot t_i}{100 \cdot 12},$$

where AM is the value of annual amortization

Ao, Ap and Ai Amortization sum of long – term material assets correspondingly in the beginning of the year, of those entered during the current year, and material assets that have come out during the current year (with unexpired period of amortization)

An – Amortization rate

Tp – number of months (7) in which long – term material assets will function

ti – number of months in which expired long – term material assets will not function.

The alteration in amount of amortization in different periods of review is connected directly with reversibility of long – term material assets. In this connection we would note that in literature (8) is distributed the attitude that indicators for turnover of long – term material assets (and in general for long – term assets) are determined on the base of incomes i. e. as a relation of net incomes from sales of production (9) towards the value amount of long – term material assets. In this case the name "turnover of main production capital" is touched i. e. the capital which is put into long – term material assets and is engaged in basic production activity of the enterprise. According to us the statement for formality of such formulation (10) is well-grounded, because the name "turnover of capital" of this indicator does not respond to its content This is the fact, because part of production capital, which is put into long – term material assets participates in turnover of capital value, only with the amortization of these assets (11). Namely on the grounds of this the sum of amortization must be used as a sum of turnover in determination of indicators for characterization of reversibility of long – term material assets. These indicators are:

1. Duration of reversibility (T^{ob}).

2. Speed of reversibility (V^{ob}).

These two indicators can be calculated with the following formula:

$$T^{ob} = \frac{\Delta MA}{AM} \quad \text{and} \quad V^{ob} = \frac{AM}{\Delta MA}, \text{ where}$$

ΔMA is average annual value amount of long – term material assets on amortization value
AM is the amount of annual amortization

From its side the annual average value amount of long – term material assets (ΔMA) can be calculated with the following formula:

$$\Delta MA = \Delta MA_o + \frac{\Delta MA_p \cdot T_p}{12} - \frac{\Delta MA_i \cdot t_i}{12}, \text{ where}$$

ΔMA_o is the amount of long – term material assets in the beginning of the year

ΔMA_p is the amount of long – term material assets entered during the year

ΔMA_i is the value amount of long – term material assets which have come out during the year

t_p and t_i are symbols which have already been clarified above

The indicator for duration of reversibility shows the time (in years) in continuation of which is realized one full turnover of long – term material assets' value.

The indicator for speed of reversibility shows what part from the realized turnover of long – term material assets for the corresponding period of review from full turnover of long – term material assets' value during entire amortization period

Example (on data from Table 1)

Table 1 (thousand levs)

Indicators	Previous year	Current year
1. Average annual amount of long –term material assets	80 000	75 000
2. Sum of amortization	14 378	15 774

On the base of this data is found the reversibility of long – term material assets, which is as follows:

1. Duration of reversibility

For the previous year:

$$T_0^{OB} = \frac{\Delta MA_0}{AM_0} = \frac{80\,000}{14\,378} = 5.56 \text{ years}$$

For the current year:

$$T_1^{OB} = \frac{\Delta MA_1}{AM_1} = \frac{75\,000}{15\,774} = 4.75 \text{ years}$$

2. Speed of reversibility

For the previous year:

$$V_0^{OB} = \frac{AM_0}{\Delta MA_0} = \frac{14\,378}{80\,000} = 0.1797 \text{ years}$$

For the current year:

$$V_1^{OB} = \frac{AM_1}{\Delta MA_1} = \frac{15\,774}{75\,000} = 0.2103 \text{ years}$$

The data received from calculated indicators show that there is acceleration of reversibility of long – term material assets in comparison with the previous year.

Long – term material assets are diverse in their content and purpose. In conformity with objective process of material and moral wearing out of different groups and kinds of long – term material assets, the use of different amortization methods is economically well – grounded (and as it has been pointed) allowed by law. This leads to differences in the speed of reversibility of different groups long – term material assets. The average reversibility of long – term material assets for the enterprise can be presented with the following formula.

$$V^{OB} = \frac{\sum \Delta_i \cdot V_i}{100}, \text{ where}$$

\bar{D}_i is the structure of long – term material assets, characterizing the percentage of separate groups of long – term material assets in their total value amount.

V_i is the individual (on separate groups of long – term material assets) speed of reversibility.

Via methods of determined factor analysis, it can be specified and given evaluation for influence of two factors over acceleration or delaying of long – term assets' reversibility.

- 1) change in the structure of long – term material assets and
- 2) change in individual reversibility (on separate groups of long – term material assets)

Example (on the data in Tables № 2 and 3).

Table 2

Groups of long – term material assets (12)	Average amount of long – term material assets			
	previous year		current year	
	thousand levs	percentage	thousand levs	percentage
I. Buildings and facilities	19 520	24.40	17 400	23.20
II. Machines and equipment	44 480	55.60	44 850	59.80
III. Transportation means without automobiles	3 360	4.20	2 775	3.70
IV. Computers	3 840	4.80	3 075	4.10
V. Automobiles	1 680	2.10	1 725	2.30
VI. Other long – term material assets	7 120	8.90	5 175	6.90
Total:	80 000	100.00	75 000	100.00

Table 3

Groups of long – term material assets	Amortization for the year			
	previous year		current year	
	thousand levs	percentage	thousand levs	percentage
I. Buildings and facilities	742	5.16	609	3.86
II. Machines and equipment	10 675	74.25	12 558	79.61
III. Transportation means without automobiles	235	1.63	222	1.41
IV. Computers	1 536	10.68	1 384	8.77
V. Automobiles	336	2.34	380	2.41
VI. Other long – term material assets	854	5.94	621	3.94
Total:	14 378	100.00	15 774	100.00

On the data from table 2 and 3 can be determined the speed of reversibility of separate groups and totally for long – term material assets.

For the previous year: For the current year:

I	742 : 11 520 = 0.038	609 : 17 400 = 0.035
II	10 675 : 44 480 = 0.24	12 558 : 44 850 = 0.28
III	235 : 3 360 = 0.07	222 : 2 775 = 0.08
IV	1 536 : 3 840 = 0.4	1 384 : 3 075 = 0.45
V	336 : 1 680 = 0.2	380 : 1 725 = 0.22
VI	854 : 7 110 = 0.12	621 : 5 175 = 0.12

On the ground of received data and the data for structure of long – term material assets in table 2, first we calculate speed of reversibility for the entire combination of long – term material assets for two consecutive years.

For the previous year:

I	22.40 . 0.038 = 0.9272
II	55.60 . 0.24 = 13.344
III	4.20 . 0.07 = 0.294
IV	4.80 . 0.40 = 1.92
V	2.10 . 0.20 = 0.42
VI	8.90 . 0.12 = 1.068
100.00	17.9732

$$V_0^{OB} = \frac{\sum D_0 \cdot V_0}{100} = \frac{17.9732}{100} = 0.1797$$

For the current year:

I	23.20 . 0.035 = 0.812
II	59.80 . 0.28 = 16.744
III	3.70 . 0.08 = 0.296
IV	4.10 . 0.45 = 1.845
V	2.30 . 0.22 = 0.506
VI	6.90 . 0.12 = 0.828
100.00	21.031

$$V_1^{OB} = \frac{\sum D_1 \cdot V_1}{100} = \frac{21.031}{100} = 0.2103$$

As it can be seen we receive the same quantities for the indicator "Speed of reversibility of long – term material assets". There is acceleration of reversibility – for the previous year the part of realized turnover by long – term material assets from the full turnover is 17.97 %, and for the current year this part is 21.03 %, i. e. the increase is with 3.06 points. This increase is due to the influence of the two factors mentioned above. To determine the influence of each of these two factors, the conditional speed of reversibility must be specified in advance – in structure of long – term material assets for the current year, but in speed of reversibility on separate groups of long – term material assets for the previous year. i. e.

$$V_{us}^{ob} = \frac{\sum D_1 \cdot V_0}{100}$$

Calculation of conditional speed of reversibility

I	23.20	.	0.038	=	0.8816
II	59.80	.	0.24	=	14.352
III	3.70	.	0.07	=	0.259
IV	4.10	.	0.40	=	1.64
V	2.30	.	0.20	=	0.46
VI	6.90	.	0.12	=	0.828
	100.00				18.4206

$$V_{us}^{ob} = \frac{\sum D_1 \cdot V_0}{100} = \frac{18.4206}{100} = 0.1842$$

Influence of the first factor: this is the difference between conditional speed of reversibility and speed of reversibility of long – term material assets for the previous year i.e.

$0.1842 - 0.1797 = +0.0045$ acceleration in reversibility as a result of change in the structure of long – term material assets or 0.45 percentage points .

Influence of the second factor: It is determined as the difference between factual (for the current year) and conditional speed of reversibility of long – term material assets i. e.

$0.2103 - 0.1842 = +0.0261$ – acceleration of reversibility as a result of changes in individual (of separate groups) reversibility of long – term material assets.

Or complicated influence of both factors is 0.0306, respectively. 3.06 points acceleration of reversibility ($0.0045 + 0.0261$), as it has been determined above.

Commitment of reversibility with effectiveness of long – term material assets' use represents interest from analytical point of view. In this commitment there is possibility for analysis and evaluation of dynamics of indicators for the percentage of amortization in value volume of sales.

The dependence can be presented via the formula:

$$\frac{AM}{O} = \frac{AM}{DMA} \cdot \frac{O}{DMA} \quad \text{or} \quad \frac{AM}{O} = \frac{AM}{DMA} \cdot \frac{DMA}{O}$$

where

O is the value volume of sales

AM

----- - percentage of amortization in volume of sales

O (amortization of 1 lev of sales);

O

----- - coefficient of loading of long –term material assets

DMA

ДМА

----- - coefficient of assumption

О

For illustration we will use the example data contained in table 4.

Table 4

Indicators	Previous year	Current year	Deviation	Percentage of dynamics
Initial data thousand levs				
1. Average amount of long – term material assets	80 000	75 000	-5 000	93.75
2. Amortization	14 378	15 774	+1 396	109.71
3. Net income from sales of production	120 000	123 060	+3 060	102.55
Additionally calculated indicators:				
4. Amortization of 1 lev of sales (2 : 3), lv..	0.1198	0.1282	0.0084	107.01
5. Speed of reversibility (2 : 1)	0.1797	0.2103	0.0306	117.03
6. Coefficient of assumption (1 : 3), lv.	0.6667	0.6095	-0.0572	91.42
7. Coefficient of loading (3: 1), lv. .	1.50	1.6408	+0.1408	109.39

From the data in the table, it is obvious that amortization on 1 lev of sales increases by 0.0084. This increase is due to the factors:

- 1) increase of reversibility of long – term material assets
- 2) increase of effectiveness from the use of long – term material assets.

The influence of these factors is as follows:

1. As a result of acceleration of long – term assets' reversibility, the amortization on each lev of sales increases by 0.0204 lv. or (+0.0306 . 0.0667).
2. As a result of increase of effectiveness from the use of long – term material assets, the amortization on 1 lev of sales has decreased by 0.0120 lv. +(-0.0572 . 0.2103).

Or totally the increase of amortization on 1 lev of sales is 0.0084 (+0.0204 – 0.0120).

The dependence expressed via two formulas pointed above and the received results from the realized analysis show that with acceleration of long – term assets' reversibility, the amount of transferred value (amortization) in the value of sales increases. Meanwhile with the increase of effectiveness from the use of long –term material assets, the amortization on 1 lev of sales decreases. In this way via increased effectiveness from the use of long – term material assets can be counteracted to accelerated amortization.

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4. In method of decreasing remainder (constant – degressive method), the base for determination of value amount of amortization, is the not –amortized value for each year from the adopted amortization period
5. For details see Dushanov, Iv, , M. Dimitrov, Course on accountancy of enterprise S , Romina, page 147
6. The corporative income taxation act, published in Governmental newspaper, edition.105, from 22 December 2006
7. The issue for the number of months is normatively regulated (see article 58 from Corporative income taxation act) the calculation of tax amortization starts from the beginning of the month in which the tax amortizing asset is put into exploitation.
8. For example see Dinev, D, and D. Neikov, Finances of modern firm, Consulting firm , VAT, 1992, page 246; Зудилин, А., П., Анализ хозяйственной деятельности предприятия в развитых капиталистических стран, М., 1986, page 93; Nikolov, N, Financial analysis of economic activity of the enterprise, UNWE, publisher "Stopanstvo" , S, 1993, page 40
9. The article is about an enterprise with main industrial activity – production and sale of output
10. Georgiev, G, Economic analysis of the enterprise, Varna, 1940, page 123
11. Actually the relation between net amount of incomes from sales of production and average amount of long –term material assets expresses the resource effectiveness of these assets, or this is the indicator coefficient of loading. The opposite indicator is coefficient of assumption. These indicators are touched further in the expose.
12. The grouping is conformable to requirements of Corporative income taxation act , article 58.

LOGIKA U ODNOSU AMORTIZACIJA, REVERSIBILNOST, EFEKTIVNOST KORIŠĆENJA DUGOROČNIH MATERIJALNIH AKTIVA

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U članku se razmatraju troškovi amortizacije vezano za reverzibilnost i efektivnost korišćenja dugoročnih materijalnih aktiva. Kao rezultat kritičke analize brani se teza po kojoj kvantitet troškova amortizacije mora da služi kao promet u datim indikatorima za reverzibilnost dugoročnih materijalnih aktiva. Potencira se zavisnost prosečne brzine reverzibilnosti dugoročnih materijalnih aktiva preduzeća od njihove strukture i pojedinačne (za odvojene grupe dugoročnih materijalnih aktiva) brzine reverzibilnosti. Na osnovu povezivanja indikatora za reverzibilnost i efektivnost od korišćenja dugoročnih materijalnih aktiva data je mogućnost za analizu indikatora "Amortizacija po 1 levu prodaje".

Ključne reči: *amortizacija, reversibilnost, efektivnost, aktiva*