1. FIXED ASSETS - DEFINITION AND CHARACTERISTICS

Fixed assets represent a part of the business assets of the company and its long-term property, which cannot be easily liquidated (converted into cash). Their characteristics are:

1. Their service period is longer than one year,

2. Their turnover coefficient is less than one,

3. They are gradually consumed during their service period, and

4. Only their depreciable value is allocated to a new product.

The following items are the examples of general categories of fixed assets:

1. Buildings,

2. Computer equipment,

3. Computer software,

4. Land,

5. Machinery,

6. Perennial plants

7. Vehicles,

8. Patents,

9. Means of transport,

10. Licenses, etc.

2. CLASSIFICATION OF FIXED ASSETS

The most commonly used criteria for the classification of fixed assets are:

1. the state of assets and their degree of usability,

2. their form,

3. source of the supply.

Depending on the state of the assets and their degree of usability, fixed assets can be:

1. In preparation (i.e. under construction, assembly) - These are ongoing investments, where fixed assets are prepared for their future functions;

2. In function - Their work enables the execution of the company business tasks;

3. Out of use - Assets that are not used temporarily for certain reasons;

4. Unusable fixed assets - Assets that are fully depreciated and can no longer be used for the purpose for which they were purchased.

According to the form of fixed assets, they are divided into:

1. Tangible assets - physical items with a clear purchase value used by a business to produce goods and services (furniture, computers, machinery, etc.);

2. Intangible assets are non-physical items which help a business generate revenue (patents, copyrights, concessions and trademarks);

3. Cash assets - part of fixed assets that are formed under special circumstances and related to fixed assets, such as: allocated funds for investments in fixed assets, depreciation cash assets, cash collected from the sale of fixed assets or insurance organizations for incurred damages on fixed assets, etc.

Depending on the source of the supply, fixed assets are classified as those obtained from:

1. own sources (capital, reserves, depreciation fund and funds obtained by sale of securities),

2. borrowed sources (loans).

3. VALUES OF FIXED ASSETS

A fixed asset has corresponding value. Basically, the value of a fixed asset represents its price that is used for its recording and tracking in the business books of the company.

Fixed assets are recorded by:

1. their book value,

2. their depreciated value,

3. their net book value.

The book value is the value at which a fixed asset is purchased. This value is mainly used for recording and tracking of fixed assets. Its calculation depends on the way in which fixed assets are obtained. There are three usual ways in which fixed assets are obtained:

1. They can be purchased from a supplier,

2. They can be produced by the company itself

3. They can be donated

If a fixed asset is purchased from a supplier, then the book value consists of invoice value and the costs of acquisition.

Book value = invoice value + costs of acquisition

The invoice value is the price of a fixed asset that is indicated in the invoice of the supplier from whom the asset was purchased. Having in mind the fact that large number of suppliers offers a discount for advance payment, the invoice value can be gross and net. The gross invoice value is the full price of a fixed asset without a discount. The net invoice value is a gross invoice value reduced by a discount.

The costs of acquisition are all costs related to the purchase of fixed assets and costs required to put them into use or, in other words, all costs incurred from the moment when a fixed asset is purchased from a supplier to the moment when it is put into use. These costs include: delivery costs, handling charges, forwarding charges, transport charges, loading charges, customs duties and taxes, costs of training personnel for the use of a fixed asset, etc.

Example: Company "A" purchased machine from the supplier for 50,000 euros. The transport costs are paid 10,000 euros and the installation costs 5,000 euros. Calculate the book value of the machine.

Book value = invoice value + costs of acquisition = 50,000 + 10,000 + 5,000 = 65,000

If a fixed asset is produced by a company itself, then the calculation of the book value consists of two steps. In the first step all cost incurred during the production of a fixed

asset have to be summed in order to determine the cost price. After that, the cost price should be compared with the current market price of such a fixed asset and the lower value should be used as the book value, because the upper limit of the book value is the price of the asset formed at the market. All costs above that limit are the result of a company's miscalculation that it can save some money by producing a fixed asset by itself. They should not be incorporated in the book value because they are the result of subjective factors.

In the case when a company receives a fixed asset from i.e. long-standing partners free of charge or, in other words, as a present, the basis for calculation of the book value is the market price of a used fixed asset with a similar degree of wear and tear. Then, the costs of acquisition should be added to the basis obtained in this way in order to calculate the book value.

The next fixed asset value that is used for recording in business books is depreciated value. This is the written off value of fixed asset during its previous usage.

Finally, there is the net book value of fixed assets. This value represents the actual value of the fixed asset at a particular point in time. It is a non-depreciated portion of fixed assets. It is calculated when the book value is reduced by the total amount of depreciation calculated up to that specific moment.

Net book value = Book value − Accumulated depreciated value

4. DEPRECIATION – DEFINITION AND ECONOMIC ASPECTS

Calculation of fixed asset expenditure and allocation of its consumption value on the generated output (products, services) is realized through depreciation. Depreciation is defined as a financial expression of fixed assets consumption in the process of reproduction.

Otherwise, depreciation can be observed in two ways as a:

1. cost of fixed assets, and
2. source of investment financing.

On the one hand, depreciation reflects the expenditure of fixed assets in the reproduction process, and, on the other, calculated depreciation is not paid to anyone outside the company, but these financial assets are transferred to the depreciation fund. The depreciation fund is used for the replacement of the existing worn-out assets and purchase of new fixed assets, maintenance of assets, repairs and for other purposes.

In this respect, we distinguish between:

1. simple reproduction of fixed assets,
2. expanded reproduction of fixed assets.

If the depreciation fund is used exclusively for the replacement of worn-out fixed assets, then it is a simple reproduction. On the other hand , if the depreciation fund is used not only for the replacement of worn-out fixed assets, but also for the purchase of new fixed assets (aimed at capacity expansion), then such company has expanded reproduction of fixed assets.

5. DEPRECIATION CALCULATION ELEMENTS

The basic elements for the calculation of depreciation are:

1. depreciation basis ,
2. service period (t),
3. generated output ($\sum Q$).

The basis for depreciation calculation is the book value, because it should be depreciated during the service period. The service period is the period in which the fixed asset should serve its purpose. A correct estimate of the service period ensures the objectivity of the depreciation calculation. It depends on many objective and subjective factors such as: the type of fixed asset, the quality of materials, the nature of technological process, the intensity of use, the way of handling and maintenance, quality of fixed asset and the skill of the fixed asset user. When a company can estimate generated output of fixed asset usage in service period, then, instead of the time dimension, the generated output can be used as an element for the depreciation calculation. In certain circumstances, the expected output can be known in advance or naturally given, like the quantity of ore in some ore deposit. In this case, the depreciation calculation is based on the calculation of the depreciation amount per unit of output.

6. METHODS OF DEPRECIATION CALCULATION

Depending on the elements used for calculation, the two major groups of depreciation methods approved by the international accounting standards are:

1. time based methods,

2. functional method.

The starting point for the calculation of depreciation using the time based methods is the service period of fixed assets. The calculated depreciation does not depend on the generated output. These methods are based on the calculation of the depreciation rate, which represents a percentage of the book value that is allocated in the depreciation fund every year during the service period.

Depending on the dynamics of the depreciation rate over the service period, there are the following basic types of depreciation methods based on time:

1. straight-line method,

2. degressive method,

3. accelerated method.

Straight-line method implies that the depreciation rates are the same every year or in other words, the equal amount of depreciation is allocated in the depreciation fund every year during the service period regardless of the intensity of use or spending of the given asset. In this case, the depreciation rate is calculated as follows:

$$depeciation\ rate = \frac{100\%}{t}$$

In the next step, on the basis of the depreciation rate, the annual depreciation is calculated as a percentage of the book value.

$$annual\ depreciation = \frac{book\ value * depreciation\ rate}{100}$$

Example: Perform a depreciation calculation machine using the straight-line method, if the invoice value is 150,000 euros, the transport costs are 30,000 euros, installation costs are 20,000 euros and the service period is 8 years.

Book value = invoice value + costs of acquisition = 150,000 + 30,000 +20,000 = 200,000

t = 8

$$depeciation\ rate = \frac{100\%}{t} = \frac{100\%}{8} = 12.5\%$$

$$annual\ depreciation = \frac{book\ value * depreciation\ rate}{100} = \frac{200,000 * 12.5}{100} = 25,000$$

t	Book value	Depreciation rate	Annual depreciation	Accumulated depreciation	Net book value
1	200,000	12.5%	25,000	25,000	175,000
2	200,000	12.5%	25,000	50,000	150,000
3	200,000	12.5%	25,000	75,000	125,000
4	200,000	12.5%	25,000	100,000	100,000
5	200,000	12.5%	25,000	125,000	75,000
6	200,000	12.5%	25,000	150,000	50,000
7	200,000	12.5%	25,000	175,000	25,000
8	200,000	12.5%	25,000	200,000	0

The application of this method enables the direct calculation of the net book value for each year of service period using the model:

$$net\ book\ value_z = book\ value - \frac{book\ value * z}{t}$$

where z is the specific year during the service period.

The method is widely used in practice because of its simplicity. In addition, the advantage of this method is that it contributes to price stability and enables the formulation and implementation of a long-term stable business policy of the company. The disadvantage that is usually cited is the discrepancy in actual spending and the calculated depreciation.

The degressive method implies that the depreciation rates and therefore the annual depreciation are reduced year by year. Supporters of this method start from the assumption that the fixed asset in the first years of use is new and able to produce higher output and therefore the calculated depreciation is higher. As time passes, fixed asset becomes obsolete and the production possibilities are decreasing, so it is normal that the annual depreciation is decreasing, too. The depreciation rate is calculated using the model:

$$depreciation\ rate_z = 100 * \left[\left(\frac{t - (z - 1)}{t} \right)^2 - \left(\frac{t - z}{t} \right)^2 \right]$$

The annual depreciation is calculated as a percentage of the book value for each year separately, because depreciation rate is decreasing over the period.

Example: By applying a time degressive method, calculate the depreciation of equipment, whose book value is 20,000 euros and the service period is 10 years.

Book value = 20,000

$t = 10$

$$depreciation\ rate_1 = 100 * \left[\left(\frac{10-(1-1)}{10}\right)^2 - \left(\frac{10-1}{10}\right)^2\right] = 100 * \left[\left(\frac{10}{10}\right)^2 - \left(\frac{9}{10}\right)^2\right]$$

$$= 100 * \left[\frac{100}{100} - \frac{81}{100}\right] = 19\%$$

$$depreciation\ rate_2 = 100 * \left[\left(\frac{10-(2-1)}{10}\right)^2 - \left(\frac{10-2}{10}\right)^2\right] = 100 * \left[\left(\frac{9}{10}\right)^2 - \left(\frac{8}{10}\right)^2\right]$$

$$= 100 * \left[\frac{81}{100} - \frac{64}{100}\right] = 17\%$$

$$depreciation\ rate_3 = 100 * \left[\left(\frac{10-(3-1)}{10}\right)^2 - \left(\frac{10-3}{10}\right)^2\right] = 100 * \left[\left(\frac{8}{10}\right)^2 - \left(\frac{7}{10}\right)^2\right]$$

$$= 100 * \left[\frac{64}{100} - \frac{49}{100}\right] = 15\%$$

$$depreciation\ rate_4 = 100 * \left[\left(\frac{10-(4-1)}{10}\right)^2 - \left(\frac{10-4}{10}\right)^2\right] = 100 * \left[\left(\frac{7}{10}\right)^2 - \left(\frac{6}{10}\right)^2\right]$$

$$= 100 * \left[\frac{49}{100} - \frac{36}{100}\right] = 13\%$$

$$depreciation\ rate_5 = 100 * \left[\left(\frac{10-(5-1)}{10}\right)^2 - \left(\frac{10-5}{10}\right)^2\right] = 100 * \left[\left(\frac{6}{10}\right)^2 - \left(\frac{5}{10}\right)^2\right]$$

$$= 100 * \left[\frac{36}{100} - \frac{25}{100}\right] = 11\%$$

$$depreciation\ rate_6 = 100 * \left[\left(\frac{10-(6-1)}{10}\right)^2 - \left(\frac{10-6}{10}\right)^2\right] = 100 * \left[\left(\frac{5}{10}\right)^2 - \left(\frac{4}{10}\right)^2\right]$$

$$= 100 * \left[\frac{25}{100} - \frac{16}{100}\right] = 9\%$$

$$depreciation\ rate_7 = 100 * \left[\left(\frac{10-(7-1)}{10}\right)^2 - \left(\frac{10-7}{10}\right)^2\right] = 100 * \left[\left(\frac{4}{10}\right)^2 - \left(\frac{3}{10}\right)^2\right]$$

$$= 100 * \left[\frac{16}{100} - \frac{9}{100}\right] = 7\%$$

$$depreciation\ rate_8 = 100 * \left[\left(\frac{10-(8-1)}{10}\right)^2 - \left(\frac{10-8}{10}\right)^2\right] = 100 * \left[\left(\frac{3}{10}\right)^2 - \left(\frac{2}{10}\right)^2\right]$$

$$= 100 * \left[\frac{9}{100} - \frac{4}{100}\right] = 5\%$$

$$depreciation\ rate_9 = 100 * \left[\left(\frac{10-(9-1)}{10}\right)^2 - \left(\frac{10-9}{10}\right)^2\right] = 100 * \left[\left(\frac{2}{10}\right)^2 - \left(\frac{1}{10}\right)^2\right]$$

$$= 100 * \left[\frac{4}{100} - \frac{1}{100}\right] = 3\%$$

$$depreciation\ rate_{10} = 100 * \left[\left(\frac{10-(10-1)}{10}\right)^2 - \left(\frac{10-10}{10}\right)^2\right] = 100 * \left[\left(\frac{1}{10}\right)^2 - \left(\frac{0}{10}\right)^2\right]$$

$$= 100 * \left[\frac{1}{100} - \frac{0}{100}\right] = 1$$

t	Book value	Depreciation rate	Annual depreciation	Accumulated depreciation	Net book value
1	20,000	19	3,800	3,800	16,200
2	20,000	17	3,400	7,200	12,800
3	20,000	15	3,000	10,200	9,800
4	20,000	13	2,600	12,800	7,200
5	20,000	11	2,200	15,000	5,000
6	20,000	9	1,800	16,800	3,200
7	20,000	7	1,400	18,200	1,800
8	20,000	5	1,000	19,200	800
9	20,000	3	600	19,800	200
10	20,000	1	200	20,000	0

Within this method, the net book value of fixed asset for a certain year is calculated using the model:

$$net\ book\ value_z = book\ value * \left(\frac{t-z}{t}\right)^2$$

The accelerated method implies that the depreciation rates and therefore the annual depreciation are increased year by year. Supporters of this method start from the assumption that the fixed asset in the first years of use is less consumed because it is operated at less than full capacity, so production of output is lower and therefore the calculated annual depreciation is also low. As time passes, the fixed asset is worked out and the production possibilities are increasing, so the annual depreciation is increasing, too. The depreciation rate is calculated using the following model:

$$depreciation\ rate_z = 100 * \left[\left(\frac{z}{t}\right)^2 - \left(\frac{z-1}{t}\right)^2\right]$$

The annual depreciation is calculated as a percentage of the book value for each year separately, because depreciation rate is increasing over the period.

Example: By applying a time accelerated method, calculate the depreciation of equipment, whose book value is 20,000 euros and the service period is 10 years.

Book value = 20,000

t = 10

$$depreciation\ rate_1 = 100 * \left[\left(\frac{1}{10}\right)^2 - \left(\frac{1-1}{10}\right)^2\right] = 100 * \left[\left(\frac{1}{10}\right)^2 - \left(\frac{0}{10}\right)^2\right] = 100 * \left[\frac{1}{100} - \frac{0}{100}\right]$$
$$= 1\%$$

$$depreciation\ rate_2 = 100 * \left[\left(\frac{2}{10}\right)^2 - \left(\frac{2-1}{10}\right)^2\right] = 100 * \left[\left(\frac{4}{10}\right)^2 - \left(\frac{1}{10}\right)^2\right] = 100 * \left[\frac{4}{100} - \frac{1}{100}\right]$$
$$= 3\%$$

$$depreciation\ rate_3 = 100 * \left[\left(\frac{3}{10}\right)^2 - \left(\frac{3-1}{10}\right)^2\right] = 100 * \left[\left(\frac{3}{10}\right)^2 - \left(\frac{2}{10}\right)^2\right] = 100 * \left[\frac{9}{100} - \frac{4}{100}\right]$$
$$= 5\%$$

$$depreciation\ rate_4 = 100 * \left[\left(\frac{4}{10}\right)^2 - \left(\frac{4-1}{10}\right)^2\right] = 100 * \left[\left(\frac{4}{10}\right)^2 - \left(\frac{3}{10}\right)^2\right] = 100 * \left[\frac{16}{100} - \frac{9}{100}\right]$$
$$= 7\%$$

$$depreciation\ rate_5 = 100 * \left[\left(\frac{5}{10}\right)^2 - \left(\frac{5-1}{10}\right)^2\right] = 100 * \left[\left(\frac{5}{10}\right)^2 - \left(\frac{4}{10}\right)^2\right] = 100 * \left[\frac{25}{100} - \frac{16}{100}\right]$$
$$= 9\%$$

$$depreciation\ rate_6 = 100 * \left[\left(\frac{6}{10}\right)^2 - \left(\frac{6-1}{10}\right)^2\right] = 100 * \left[\left(\frac{6}{10}\right)^2 - \left(\frac{5}{10}\right)^2\right] = 100 * \left[\frac{36}{100} - \frac{25}{100}\right]$$
$$= 11\%$$

$$depreciation\ rate_7 = 100 * \left[\left(\frac{7}{10}\right)^2 - \left(\frac{7-1}{10}\right)^2\right] = 100 * \left[\left(\frac{7}{10}\right)^2 - \left(\frac{6}{10}\right)^2\right] = 100 * \left[\frac{49}{100} - \frac{36}{100}\right]$$
$$= 13\%$$

$$depreciation\ rate_8 = 100 * \left[\left(\frac{8}{10}\right)^2 - \left(\frac{8-1}{10}\right)^2\right] = 100 * \left[\left(\frac{8}{10}\right)^2 - \left(\frac{7}{10}\right)^2\right] = 100 * \left[\frac{64}{100} - \frac{49}{100}\right]$$
$$= 15\%$$

$$depreciation\ rate_9 = 100 * \left[\left(\frac{9}{10}\right)^2 - \left(\frac{9-1}{10}\right)^2\right] = 100 * \left[\left(\frac{9}{10}\right)^2 - \left(\frac{8}{10}\right)^2\right] = 100 * \left[\frac{81}{100} - \frac{64}{100}\right]$$
$$= 17\%$$

$$depreciation\ rate_{10} = 100 * \left[\left(\frac{10}{10}\right)^2 - \left(\frac{10-1}{10}\right)^2\right] = 100 * \left[\left(\frac{10}{10}\right)^2 - \left(\frac{9}{10}\right)^2\right]$$
$$= 100 * \left[\frac{100}{100} - \frac{81}{100}\right] = 19\%$$

t	Book value	Depreciation rate	Annual depreciation	Accumulated depreciation	Net book value
1	20,000	1	200	200	19,800
2	20,000	3	600	800	19,200
3	20,000	5	1,000	1,800	18,200
4	20,000	7	1,400	3,200	16,800
5	20,000	9	1,800	5,000	15,000
6	20,000	11	2,200	7,200	12,800
7	20,000	13	2,600	9,800	10,200
8	20,000	15	3,000	12,800	7,200
9	20,000	17	3,400	16,200	3,800
10	20,000	19	3,800	20,000	0

According to this method, the net book value of a fixed asset for a particular year is calculated using the following model:

$$net\ book\ value_z = book\ value - book\ value * \left(\frac{z}{t}\right)^2$$

The starting point for calculation of depreciation using the functional method is the generated output. This method is based on the calculation of the depreciation quota, which represents an amount of the book value that is allocated in the depreciation fund for each output unit. The depreciation quota is calculated using the model:

$$depreciation\ quota = \frac{book\ value}{\Sigma Q}$$

The annual depreciation is calculated by multiplying the depreciation quota by the annual production volume (Qg).

$$annual\ depreciation = depreciation\ quota * Qg$$

Example: Company "S" purchased a freight vehicle whose book value amounts to 100,000 euros and the service period is 5 years. It is estimated that the vehicle will pass 50,000 km during the service period, as follows: I year 10,000 km, II year 12,000 km, III year 8,000 km, IV year 9,000 km and V year 11,000 km. Perform a calculation of the depreciation of a freight vehicle using the functional method.

Book value = 100,000

t = 5

ΣQ = 50,000 km

$$depreciation\ quota = \frac{book\ value}{\Sigma Q} = \frac{100,000}{50,000} = 2$$

t	Book value	Depreciation quota	Qg	Annual depreciation	Accumulated depreciation	Net book value
1	100,000	2	10,000	20,000	20,000	80,000
2	100,000	2	12,000	24,000	44,000	56,000
3	100,000	2	8,000	16,000	60,000	40,000
4	100,000	2	9,000	18,000	78,000	22,000
5	100,000	2	11,000	22,000	100,000	0

The advantage of time based methods is the fact that they ensure obtaining sufficient funds for the purchase of new assets and replacement of worn-out assets at the end of their service period, and the disadvantage is the discrepancy between calculation of depreciation and the real wear.

On the other hand, the advantage of the functional method is an objective calculation of depreciation, which follows the real wear of fixed assets and disadvantage is the fact that if a fixed asset is used insufficiently during the service period, a company may experience a situation that at the end of the service period there are no sufficient funds in the depreciation fund to purchase a new asset in order to replace the worn out one.

7. RESIDUAL VALUE OF FIXED ASSETS

The presented depreciation methods did not take into account the fact that fixed assets usually have a certain value or, in other words, they are not fully depreciated after expiry of the service period. In that sense, the residual value is the value that a fixed asset can have after the expiry of the service period. Therefore, the residual value needs to be estimated and taken into account in determining the depreciation rate and depreciation quota.

By including the residual value, the model for calculating the depreciation rate changes to:

$$depreciation\ rate = \frac{book\ value - residual\ value}{book\ value * t} * 100$$

Example: Company "B" purchased a machine for 130,000 euros. Its service period is 6 years. The supplier approved a rebate of 10% for an advance payment. Until the date of putting the machine into operation, the company had the following costs: transport costs 15,000 euros, installation costs 10,000 euros and costs of material needed for installation 3,000 euros. The company paid the machine 3 days before delivery. It is estimated that the machine will have a residual value of 15% of NVOS after the expiry of the service period. Perform a depreciation calculation for the machine.

Invoice value = 130,000

Rebate = 10% of invoice value = 13,000

Book value = invoice value + costs of acquisition = (130,000 − 13,000) + 15,000 + 10,000 + 3,000 = 145,000

t = 6

Residual value = 15% of book value = 21,750

$$depreciation\ rate = \frac{book\ value - residual\ value}{book\ value * t} * 100 = \frac{145,000 - 21,750}{145,000 * 6} * 100$$
$$= 14.17\%$$

$$annual\ depreciation = \frac{book\ value * depreciation\ rate}{100} = \frac{145,000 * 14.17}{100} = 20,546.5$$

t	Book value	Depreciation rate	Annual depreciation	Accumulated depreciation	Net book value
1	145,000	14,17%	20,546.5	20,546.5	124,453.5
2	145,000	14,17%	20,546.5	41,093.0	103,907.0
3	145,000	14,17%	20,546.5	61,639.5	83,360.5
4	145,000	14,17%	20,546.5	82,186.0	62,814.0
5	145,000	14,17%	20,546.5	102,732.5	42,267.5
6	145,000	14,17%	20,546.5	123,279.0	21,721.0

Also, the model for calculating the depreciation quota changes to:

$$depreciation\ quota = \frac{boobook\ value - residual\ value}{\Sigma Q}$$

Example: Company "B" purchased a machine for 500,000 euros. The supplier approved a rebate of 15% for an advance payment. In addition, the company also had the following expenditures: transport costs of 20,000 euros, customs duties costs 32,000 euros, annual insurance premiums of 5,000 euros, trial work costs 7,000 euros and other administrative costs 6,000 euros. The service period of the equipment is 7 years. It is estimated that 70,000 units of products will be produced during the service period with uniform annual production and that, the equipment will have a residual value of 25% of book value after the expiry of the service period. The company paid the equipment three days after the delivery. Perform the depreciation calculation of equipment using a functional method.

Book value = invoice value + acquisition costs = 500,000 + 20,000 + 32,000 + 6,000 = 558,000

t = 7

ΣQ = 70,000

Qg = 70,000 / 7 = 10,000

Residual value = 25% of book value = 139,500

$$depreciation\ quota = \frac{book\ value - residual\ value}{\Sigma Q} = \frac{558,000 - 139,500}{70,000} = 5,9786$$

t	Book value	Depreciation quota	Qg	Annual depreciation	Accumulated depreciation	Net book value
1	558,000	5.9786	10,000	59,786	59,786	498,214
2	558,000	5.9786	10,000	59,786	119,572	438,428
3	558,000	5.9786	10,000	59,786	179,358	378,642
4	558,000	5.9786	10,000	59,786	239,144	318,856
5	558,000	5.9786	10,000	59,786	298,930	259,070
6	558,000	5.9786	10,000	59,786	358,716	199,284
7	558,000	5.9786	10,000	59,786	418,502	139,498

8. REVALUATION OF FIXED ASETS VALUE

In market conditions, frequent changes in the market value of fixed assets are usual. This is especially true in unstable economies characterized by price fluctuations. After a certain time, the book value does not correspond to the market price. In such circumstances, companies perform constant adjustment of the book value recorded in the business books with prices established on the market. This procedure is called revaluation. It is essentially a re-determination of the value of fixed assets.

Revaluation goals:

1. real expression of the company's asset value,
2. objective calculation of fixed assets expenditures,
3. real expression of business results.

These goals are interdependent and linked to one another. The real expression of the company's asset value implies real representation of the book value as a basis for the depreciation calculation. The real representation of the book value enables an objective calculation of depreciation as a part of the total expenditures. The objective calculation of the total expenditures further enables a realistic expression of business results.

The most commonly used methods of revaluation are:

1. estimation method,
2. coefficient method.

The estimation method involves formation of appropriate team of experts in the company that determines the market price for each asset and according to that adjusts its book value. The advantage of this method is the objective adjustment of the values of the fixed assets according to changes in market prices. On the other hand, the main disadvantage of this method is that it can be rationally applied in companies with a small number of fixed assets. In larger companies, however, with a large number of fixed assets, the application of this method is hampered. The estimation would last for a long time and cause excessive costs, which in some cases exceeds the benefits of revaluation.

Example: Company "A" purchased a machine whose invoiced value amounts to 76,000 euros. Installation costs amount to 15,000 euros and the cost of training staff to use the machine is 5,000 euros. The service period of the machine is 8 years. It is estimated that the machine will have a residual value of 32,000 euros after expiration of service period. In the seventh year there was an increase in prices, so the price of the given machine increased to 110,400. Calculate machine depreciation using a straight-line method.

Book value = invoice value + acquisition costs = 76,000 + 15,000 + 5,000 = 96,000

t = 8

Residual value = 32,000

$$Revaluation\ coefficient = \frac{110,400}{96,000} = 1.15$$

$$depreciation\ rate = \frac{book\ value - residual\ value}{book\ value * t} * 100 = \frac{96,000 - 32,000}{96,000 * 8} * 100$$
$$= 8.33\%$$

$$annual\ depreciation = \frac{book\ value * depreciation\ rate}{100} = \frac{96,000 * 8.33}{100} = 7,996.8$$

t	Book value	Depreciation rate	Annual depreciation	Accumulated depreciation	Net book value
1	96,000	8.33%	7,996.8	7,996.8	88,003.2
2	96,000	8.33%	7,996.8	15,993.6	80,006.4
3	96,000	8.33%	7,996.8	23,990.4	72,009.6
4	96,000	8.33%	7,996.8	31,987.2	64,012.8
5	96,000	8.33%	7,996.8	39,984.0	56,016.0
6	96,000 *1.15 **110,400**	8.33%	7,996.8 *1.15 **9,196.3**	47,980.8 *1.15 **55,177.9**	48,019.2 *1,15 **55,222.1**
7	110,400	8.33%	9,196.3	64,374.2	46,025.8
8	110,400	8.33%	9,196.3	73,570.5	**36,829.5**

Residual value * Revaluation coefficient = 32,000 * 1,15 = 36,800

Using the coefficient method the new book value is determined by applying the appropriate revaluation coefficients to the existing (recorded) book value. The advantage of the coefficient method is a simple and rational application (they insure low costs and they are not time-consuming) and its disadvantage is insufficient objectivity because the same coefficient is applied to the whole group of fixed assets, although their prices have changed to a different extent.

Example: Company "X" purchased the machine for 110,000 euros. The supplier offered 20% rebate of for an advance payment. Transport costs were paid 16,000 euros, installation costs 8,000 euros and the cost of materials needed for installation is 4,000 euros. The service period of the machine is 9 years and it is estimated that after the expiration of this period, machines will have a residual value of 16,000 euros. The machine was paid two days before delivery. In the third year, the machine did not work. In the fourth year, prices rose by 15%. After that, in the sixth year prices rose again, by 20%. Calculate machine depreciation using a straight-line method.

Book value = invoice value + acquisition costs = (110,000 - 22,000) + 16,000 + 8,000 + 4,000 = 116,000

Residual value = 16,000

t = 9

$$Revaluation\ coefficient_2 = \frac{100 + 15}{100} = 1.15$$

$$Revaluation\ coefficient_5 = \frac{100 + 20}{100} = 1.2$$

$$depreciation\ rate = \frac{book\ value - residual\ value}{book\ value * t} * 100 = \frac{116,000 - 16,000}{116,000 * 8} * 100$$
$$= 9.58\%$$

$$annual\ depreciation = \frac{book\ value * depreciation\ rate}{100} = \frac{116,000 * 9.58}{100} = 11,112.8$$

t	Book value	Depreciation rate	Annual depreciation	Accumulated depreciation	Net book value
1	116,000	9.58%	11,112.8	11,112.8	104,887.2
2	116.000 *1.15 **133.400**	9.58%	11,112.8 *1.15 **12,779.7**	22,225.6 *1.15 **25,559.4**	93,774.4 *1.15 **107,840.6**
3	133.400	9.58%	12,779.7	38,339.1	95,060.9
4	133.400	9.58%	12,779.7	51,118.8	82,281.2
5	133.400 *1.2 **160.080**	9.58%	12,779.7 *1.2 **15,335.7**	63,898.5 *1.2 **76,678.3**	69,501.5 *1.2 **83,401.7**
6	160.080	9.58%	15,335.7	92,014.0	68,066.0
7	160.080	9.58%	15,335.7	107,349.7	52,730.3
8	160.080	9.58%	15,335.7	122,685.4	37,394.6
9	160.080	9.58%	15,335.7	138,021.1	**22,058.9**

Residual value * Revaluation coefficient$_2$ * Revaluation coefficient$_5$ = 16,000 * 1.15 *1.2 = 22,080