



## ***Time Value and Equipment Depreciation***

### ***The Concept of Time Value of Money:***

- The time value of money is a core financial principle that states a sum of money is worth more now than in the future.
- Essentially, a sum of money's value depends on how long you wait to use it; the sooner you use it, the more valuable it is.
- Opportunity cost is a money have today can be invested and accrue interest, increasing its value.
- Inflation is a money may buy less in the future than it does today.
- Uncertainty is something could happen to the money before you're scheduled to receive it.

### ***Methods for Calculating the Time Value of Money:***

**a.** Simple interest method: [ $\text{Simple interest} = P \times R \times n$ ]

**b.** Complex interest method: [ $T = P(1 + R)^n$ ]

**where:**

**T:** future amount of money

**P:** present amount of money

**R:** interest rate

**n:** No. of years

### **Case Study No. 4-1:**

Equipment was bought by 75 million IQD. Its economic life was 5 years. Calculate the cost of owning this equipment on the base of 5% interest yearly.

### **Solution:**



### **a. Simple interest method**

Simple interest =  $75 \times 0.05 \times 5 = 18.75$  million IQD.

Cost =  $75 + 18.75 = 93.75$  million IQD.

### **b. Complex interest method**

Cost =  $75 * (1 + 0.05)^5 = 95.72$  million IQD.

### **The Concept of Construction Equipment Depreciation:**

- The depreciation: is defined as the decrease in market value of an asset over time through wear and deterioration.
- A machine may depreciate (decline in value) because it is wearing out and no longer performing its function.
- Another aspect of depreciation is that caused by obsolescence.
- A machine is described as obsolete when the function it performs can be done in some better way.

### **Different Values of Construction Equipment:**

Construction equipment always has different values:

- **The initial value**: represents the purchase price of an equipment.
- **Salvage value**: represents the expected price for selling the equipment at the end of its useful life.
- **The book value**: represents the current value in the accounting systems. It equals the initial value of the machine minus all the depreciation costs till given time. It always calculated at the end of each year.
- **The market value**: represents the value of the equipment if it is sold in the free market. It is not necessary that the book value equals the market value.



### Methods for Calculating Construction Equipment Depreciation:

There are three common methods for calculating depreciation:

1. Straight-line method.
2. Sum-of-years digits method.
3. Declining balance method.

Each method involves the spreading of the amount to be depreciated over the recovery life of an equipment in a systematic manner. See the following description of methods:

**Straight-line method (S.L.M):** It is the simplest idea to understand as it makes the basic assumption that the equipment will lose the same amount of money gradually over time (i.e., every year) of its useful life until it reaches its salvage value.

$$\text{Annual depreciation} = \frac{P - S}{n}$$

$$\text{Depreciation rate} = \frac{1}{n}$$

$$wBV_i = P - \sum_0^i \text{Annual depreciation}$$

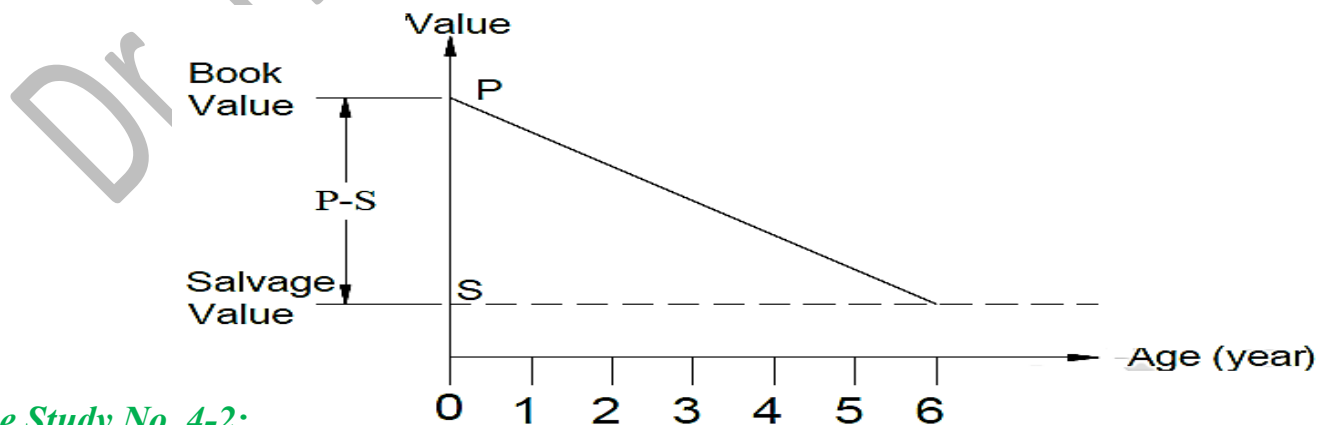
$P$ : The book value

$S$ : salvage value

$n$ : age of machine (useful life)

$BV_i$ : The book value at specific year of useful life of machine.

$i$ : specific year of machine useful life.



### Case Study No. 4-2:



A wheel-loader is a piece of construction machinery that available to purchase by **120000000 IQD**, which has an estimated useful life of **5 years**, and an estimated salvage value of **20000000 IQD**. Calculate the depreciation and the book value **for each of the 5 years** using the **S.L. method**.

**Solution:**

$$\text{Depreciation rate} = \frac{1}{n} = \frac{1}{5} = \mathbf{0.2}$$

$$\text{Annual depreciation} = \frac{120000000 - 20000000}{5} = 20\,000\,000 \text{ IQD/year}$$

$$BV_i = P - \sum_0^i \text{Annual depreciation}$$

$$BV_1 = 120000000 - 20000000 = 100\,000\,000 \text{ IQD}$$

$$BV_2 = 120000000 - 2 * 20000000 = 80\,000\,000 \text{ IQD}$$

$$BV_3 = 120000000 - 3 * 20000000 = 60\,000\,000 \text{ IQD}$$

$$BV_4 = 120000000 - 4 * 20000000 = 40\,000\,000 \text{ IQD}$$

$$BV_5 = 120000000 - 5 * 20000000 = 20\,000\,000 \text{ IQD}$$

Year	Book value (IQD)	Depreciation during year (IQD)	Book value (IQD) at end of year
0	120 000 000	000 000 000	120 000 000
1	120 000 000	20 000 000	100 000 000
2	100 000 000	20 000 000	80 000 000
3	80 000 000	20 000 000	60 000 000
4	60 000 000	20 000 000	40 000 000
5	40 000 000	20 000 000	20 000 000



**Sum of the years digits method (S.Y.D.):** This is method a term applied to accounting methods which permit rates of depreciation faster than straight line. The rate of depreciation is a factor times the depreciable value (P-S). This factor is calculated as follows.

$$\text{Sum of the year digits} = 1 + 2 + 3 + 4 + 5 + 6 + \dots + n$$

$$\text{Ratio of depreciation during a specific year} = \frac{n - m + 1}{\text{Sum of the year digits}}$$

**where:**

***n:*** Age of machine (useful life).

***m:*** Specific year of machine useful life.

**Case Study No. 4-3:**

A Scraper is a piece of earthmoving machinery that available to purchase by **125 million IQD**. It's economic life **5 years**. Find the book value of the equipment at the end of each year by **S.Y.D.** if the salvage value **12.5 million IQD**.

**Solution:**

$$\text{Sum of the year digits} = 1 + 2 + 3 + 4 + 5 = 15$$

$$\text{Ratio of depreciation during first year} = \frac{5-1+1}{15} = \frac{5}{15} = 0.333$$

$$\text{Total depreciation} = 125\,000\,000 - 12\,500\,000 = 112\,500\,000 \text{ IQD}$$



<u>End of Year</u>	<u>Ratio of Depreciation</u>	<u>Total Depreciation (IQD)</u>	<u>Depreciation During Year (IQD)</u>	<u>Book value (IQD)</u>
0	0	000 000 000	000 000 000	125 000 000
1	5/15	112 500 000	37 500 000	87 500 000
2	4/15	112 500 000	30 000 000	57 500 000
3	3/15	112 500 000	22 500 000	35 000 000
4	2/15	112 500 000	15 000 000	20 000 000
5	1/15	112 500 000	7 500 000	12 500 000

**Declining balance method (D.B.M.):** In this method the depreciation calculated can provides for larger portions of cost to be written off in the early years. Therefore, this method nearly approximates the actual loss in market value with time.

The estimated salvage value (S) is not included in the calculation, but the book value cannot go below the salvage value.

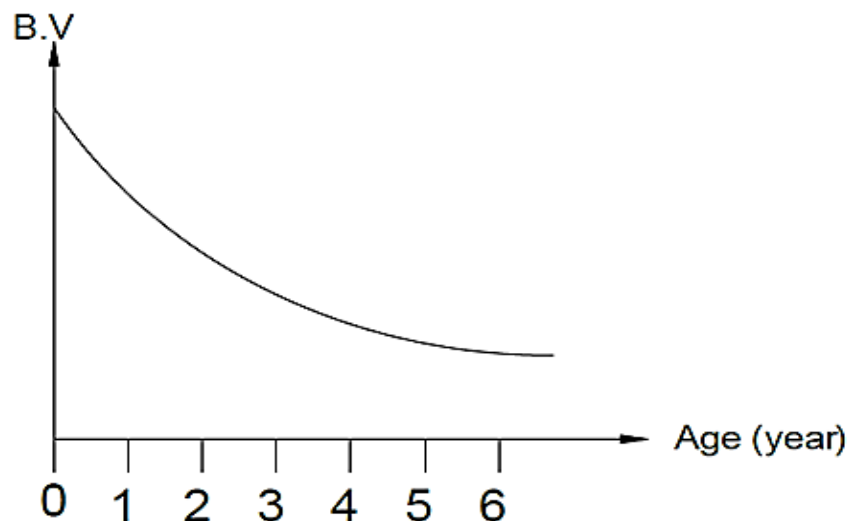
$$\text{Ratio of depreciation} = \frac{1}{n} * 2$$

**The annual value of depreciation**

$$= \text{Ratio of depreciation} \times \text{Book value at each year}$$

where:

*n*: Age of machine (useful life).





**Case Study No. 4-4:**

An excavator is a piece of construction machinery that available to purchase by (60 million IQD). It's economic life (5 years). Calculate its book value at the end of each year by declining balance method.

**Solution:**

$$\text{Ratio of depreciation} = \frac{1}{n} * 2 = \frac{1}{5} * 2 = 0.4$$

***The annual value of depreciation at end of first year***  
 = 0.4 \* 60 000 000 = 24 000 000 IQD

***The new of book value at end of first year***  
 = 60 000 000 – 24 000 000 = 36 000 000 IQD

<u>End of Year</u>	<u>Ratio of Depreciation</u>	<u>Depreciation During Year (IQD)</u>	<u>Book value (IQD)</u>
0	0	00 000 000	60 000 000
1	0.4	24 000 000	36 000 000
2	0.4	14 400 000	21 600 000
3	0.4	8 640 000	12 960 000
4	0.4	5 184 000	7 776 000
5	0.4	3 110 400	4 665 600