An Analysis of Depreciation in Engineering Economics

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Abstract—*The objective of this research is to study the analysis of depreciation as a challenging factor in engineering economics. Depreciation is the decrease in value of physical properties with the passage of time and use. Most assets are worthless as they age. Production equipment gradually becomes less valuable through wear and tear. This lessening in value is recognized in accounting practices as an operating expense. Instead of charging the full purchase price of a new asset as one-time expense, the outlay is spread over the life of the asset in the accounting records. Annual depreciation deductions are intended to match the yearly fraction of value used by an asset in the production of income over the assets actual economic life.*

1. INTRODUCTION

Depreciation is the decrease in value of physical properties with the passage of time and use. Most assets are worthless as they age. Production equipment gradually becomes less valuable through wear and tear. This lessening in value is recognized in accounting practices as an operating expense. Instead of charging the full purchase price of a new asset as one-time expense, the outlay is spread over the life of the asset in the accounting records. Annual depreciation deductions arc intended to match the yearly fraction of value used by an asset in the production of income over the assets actual economic life. The actual amount of depreciation can never be established until the asset is retired from service.

Depreciation can be defined in three senses like physical depreciation, which is caused due to physical decay. Economic depreciation is the loss of value of an asset due to outdated technology and in accounting sense depreciation is the estimated value of fall in the worth of an asset. In accounting, depreciation charge is included in the cost of production of the asset. Depreciation is a permanent continuing and gradual shrinkage in the book value of a fixed asset.

2. CAUSES OF DEPRECIATION

Assets depreciate its value for several reasons.

2.1. Physical Depreciation

Depreciation resulting in physical impairment of an asset is known as physical depreciation. This type of depreciation results in the lowering of the ability of a physical asset to render its intended service. The primary causes of physical depreciation are (a) deterioration due to action of the elements including the corrosion of pipe, the rotting of timbers, chemical decomposition and so on. (b) Wear and tear charges (c) Physical decay, (d) Time factors etc.

2.2. Functional Depreciation

Functional depreciation results not from a deterioration in the assets ability to serve its intended purpose, but from a change in the demand for the services it can render. The demand for the services of an asset may change it is more profitable to use a more efficient, unit, there is no longer work for the asset to do, or the work to the done exceeds the capacity of the asset.

2.3. Technological depreciation

Due to advancement of new technology, the old technology becomes outdated, so it loses its value. Obsolescence resulting from the discovery of another asset that is sufficiently superior to make it uneconomical to continue using the original asset. Assets also become obsolete when they are no longer needed.

2.4. Depreciation due to Accident

Sometimes due to accident or sudden failure the asset loses its technological characteristic inherent in it.

2.5. Depreciation due to Depletion

Consumption of an exhaustible natural resources to produce product or services is termed as depletion. Removal of oil, timber, rock, or minerals from a site decreases the value of the holding. This decrease is compensated by a proportionate reduction in earnings derived from the resources.

2.6. Monetary Depreciation

A change in the price level also decreases the value of owned assets. If prices rise during the life of an asset, then

comparable replacement become more expensive. This means that the capital recovered will be insufficient to provide an adequate substitute for the worn out asset.

2.7. Depreciation due to Time Factor

There are some assets, which loses its values after a particular period. Particularly the assets having lease, copyrights and patents right loses its value after the time is over.

2.8. Depreciation due to Deferred Maintenance

Sometimes the loss of value of asset begins very quickly due to deferred maintenance. If proper materials are not used or instructions to operate the machine are not properly obeyed the loss of value start.

2.9. Depreciation Accounting

Before going through the different method involved in the calculation of depreciation we should have sufficient knowledge about the depreciable property. Depreciable property is that property which can amortize or depreciated. Depreciable property may be tangible and intangible. Tangible property is any property that can be seen or touched. Intangible property are property which are not tangible like copyrights and patent rights. Depreciable tangible property is of two types i.e. Real and personal. Personal property are those property, which is not real estate, they are machinery and equipment.

Real property is land and anything that is erected on. Land is never depreciable.

Property is depreciable if it fulfills the following requirements:

a) The property must be used in business or help to produce income.

b) The property must be something that wears out, decays, deteriorates, becomes obsolete, or loses value from natural causes.

c) It must have determinable life and that life must be longer than 1 year.

In general, if property does not fulfill the above conditions can't be regarded as depreciable property.

3. DEPRECIATION METHODS

There are various depreciation method have evolved from time to time but there are three basic methods to understand the various calculation of depreciation schedules that are presently, in effect, it is first necessary to become acquainted with the three methods on which the current schedules are based. Some current depreciation schedules are based on straight line depreciation and other are based on a combination of straight line depreciation and declining balance depreciation.

Before going to discuss the basic methods and other methods of depreciation, we should know some additional terms for clear understanding of the problem.

P = Purchase price (unadjusted basis) of assets. (This is the initial cost of occurring an asset (purchase price + sales taxes) including transportation expenses.

S= Salvage value or future value at end of asset's life. It is the expected selling price of a property when the asset can no longer be used by its owner.

N = useful (tax) life of asset - The expected period of time that a property will be used in a trade or business or to produce income.

n = number of years of depreciation

Dt (n) = Annual depreciation charges.

Bt(n) = Book value shown on accounting records at end of year. It is the original cost, basis of the property, including any adjustment.

Bt(0)=p

4. STRAIGHT-LINE METHOD

The most widely used and simplest method for the calculation of depreciation is straight line method. The straight line method assumes that the value of an asset decrease at a constant rate. Thus if an asset has a first cost of Rs.5,000 and an estimated salvage value of Rs.500, the total depreciation and over its life will be Rs. 4,500. If the estimated life in 5 years, the depreciation per year will be 4,500/5 = 900. This is equivalent to a depreciation rate of 1/5 = 20% per year.

General expression for the calculation of depreciation and book value may be developed for the straight-line method.

The depreciation in any year is

$Dt = PF-F / N$

General expression for the straight line method

End of the Year	Depreciation Charge	Book value at the end of the Year
0		P
1	P-F/n	P-(P-F/n)
2	P-F/n	P-2(P-F/n)
3	P-F/n	P-3(P-F/n)

End of the Year	Depreciation Charge	Book value at the end of the Year
N	P-F/n	P-t(P-F/n)
N	P-F/n	P-n(P-F/n)

The book value is $Bt = P = t(P-F/n)$ and the depreciation rate per year is 1/n

Example: From the following data find out

a) The depreciation charge during year 1

b) The depreciation charge during year 2

c) The depreciation reserve accumulated by the end of year 3

d) The book value at the end of year 3

Initial con of the asset = Rs. 5000

Life time = 5 years   Salvage value = 0 The cost of capital 5%

5. SOLUTION

(a) &. (b) In case of straight line method as the depreciation charge is constant, the depreciation charges for year 1 and 2 is constant

Dt(1)=Dt(2)=P-F/n=. 5000/5=1000 per year

(c) The depreciation reserve at the end of the third year is the sum of the annual depreciation charges for the first three years and is equal to 3 (1000) = Rs. 3000

(d) The book value at the end of third year is = 5000 – 3 (5000/5)=2000

Bt (3) = 5000- 3000 = Rs. 2000

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