

Accounting for Depreciation: Empirical Analyses of the Application of Depreciation Methods in Small and Medium Enterprises in Nigeria.

Adebayo G. Adebayo

Department of Accountancy,
Faculty of business Studies
Rufus Giwa (Former Ondo State) Polytechnic
Owo, Ondo State, Nigeria
E-mail: adebayoga2016@gmail.com

Abstract

This study attempts to analyse and rank according to the popularity of usage of depreciation methods among the small and medium enterprises (SMEs) in Nigeria. Therefore the study does not cover the treatment of depreciation in the financial statement. Questionnaires were used to collect data from 778 SMEs from Edo/Delta, Ekiti, Kwara, Ogun, Ondo and Lagos states. Findings revealed that the first to fourth ranking of the depreciation methods are Straight Line; Annuity; Production units and the Reducing Balance methods. The current findings do not deviate significantly from theoretical literatures and previous research findings. It was recommended that the SMEs in the informal sector be formalized and give them orientation in the area of book-keeping and accounts and asset maintenance through the application of good depreciation principles.

Keywords: *Depreciation Methods, Small and Medium Enterprises, Asset Maintenance.*

1. Introduction

The statement of financial position or statement of affairs of an organization as at a given date is traditionally referred to as the balance sheet. Its main purpose was to communicate information about the financial position of the organization. It summaries information contained in the accounting records in a clear and meaningful pattern. A classification of the statement of financial position shows the “assets” in an order of liquidity (the ease with which assets can be converted to cash in a normal course of business without losing much fund) on one side and the “liabilities” (what the organization owes and when these amount will fall due). An asset constitutes an investment encompassing present or future economic benefits or services acquired and can be valued in monetary units. It must have some special usefulness to the organization. Assets must therefore be differentiated from goods purchased for resale. A company trading in assorted vehicles would have the vehicles as goods bought for resale but such vehicles purposely used for the business are assets. The trading vehicles are stocks (Inventory) in the statement of financial position as current assets. Asset can be fixed or current. A fixed asset is acquired for the purpose of use within the organization and has a useful life that lasts some considerable financial period of time. It is not meant for resale in the organization. A company’s investment in fixed asset is dependent, to a large degree, on its line of business. Some businesses are more capital intensive than others. A current asset is one which is either part of the operation cycle of the organization or is highly to be realized in the form of cash within a financial period. There are some other assets that are referred to as indeterminable. A trade mark or a patent on a product or process that has been developed by the organization itself falls within this category.

1.1 A Sample Statement of Financial Position.

A sample statement of financial position of a small or medium scale enterprise is in Table 1:

Table 1: Statement of Financial Position as at 31 December 2015

	Cost (a)	Depreciation to date(b)	Net book value N'00	N'00
N'00				
Non-current assets				
Goodwill			150,000	50,000
100,000				
Buildings	150,000	60,000		90,000
Machinery	80,000	24,000		50,000
Motor vehicles	<u>40,000</u>	<u>1,6,000</u>		<u>2,4000</u>
	<u>420,000</u>	<u>15,0000</u>		270,000
Current assets				
Inventory(Stock)		80,000		
Accounts receivable(Debtors)		40,000		
Bank		<u>50,000</u>		
			<u>170,000</u>	
Total assets				440,000
Less Current liabilities				
Account payable(Creditors)		40,000		
Corporate tax owing	<u>30,000</u>			
		70,000		
Net current assets				
Non-current liabilities		<u>60,000</u>		
Loan			(130,000)	
Total liabilities			<u>310,000</u>	
Net assets				

Notes:

(a) Non-current assets should normally be shown either at cost or alternatively at some other valuation. In either case, the method chosen should be clearly stated and show the intangible non-current asset (goodwill) separately from the other noncurrent assets.

(b) The total depreciation from date of purchase to the date of the financial position should be shown.

Fixed assets are tangible assets according to Konstantinos and Dimitrios (2015), used to produce income. Buildings, plant, equipment, transportation means, machinery, computer and others are being used for future economic benefits with a useful life of at least one year. Current assets consist of cash, bank, and goods for resale or items having a short life especially if less than a year. Net current asset (Working capital) is current assets less current liability. Intangible assets are asset such as goodwill that has no physical existence.

1.3 Objectives of the Study

The focus of this study is on the fixed tangible definite life assets; and the methods with which these definite useful life assets are depreciated; and to appreciate how these methods are calculated.

Today dedicated software packages are available for the calculations. Amortization and revision of asset useful life and treatment of depreciation in the financial records are outside the feasible consideration of this study. Specifically,

1. To analyse the depreciation methods used by small and medium enterprises, organise the characteristics and the fixed assets of application.
2. Ranking the various methods in order of the frequency of usage and validate whether depreciation methods still maintain the application status quo theoretically and/or practically from previous research findings.

2. Review of Related Literature

2.1 Overview

An asset was defined by Lall (1968), as the embodiments of present or future economic benefits or service potentials measurements in terms of monetary units, accruing to an enterprise as a result of economic events, and the enjoyment of which by the enterprise is secured by the law.

Depreciation is the process of allocating to expense the cost of an asset over its useful (service) life on a returned and systematic manner. Such cost allocation is designed to properly match expenses with revenues for income determination. It is therefore a process of cost allocation and is far from being seen as asset valuation. Depreciation expense does not require current outlay of cash. It is an expenses to the profit and loss (P&L) account, provided the organization is operating in a manner that covers its expense (e.g. at a profit) (Wikipedia, n.d). Depreciation should still be charged even if the organization had made a loss. In addition, the term depreciation refers to fall in the value or utility of fixed assets which are used in operations over the definite period of years. In other words, depreciation is the process of spreading the cost of fixed assets over the number of years during which benefit of the asset is received. The fall in value or utility of fixed assets is due to so many causes like wear and tear, decay, effluxion of time or obsolescence, replacement, breakdown, fall in market value etc.

The general rule is that the cost of the asset (or valuation) of fixed assets, less estimated residual value, should be allocated on an equitable bases over the accounting period expected to benefit from their use as a charge in the profit and loss account (Jennings, 2005).

The brake of the method of depreciation rests on the management of an organization, but that the method should be allocated. “as fairly as possible” and maintain consistency. The method should be that which allocates cost to each period in accordance with the practice of overall economic benefits. The periodic depreciation varies considerably among the methods but total depreciation is the same for any given asset life. These methods are acceptable in accounting because each recognizes the decline in the service potential of the asset in a rational and systematic manner (Kimmol, Weygandt and Kieso, 2000). The bases for depreciation of assets may vary. Instead of estimated useful life in years, it may be based on activities such as estimated kilometers to be covered by a vehicle, estimated units to be produced by a machine or estimated hours to be used by a plant. (e.g a generating plant.)

Intangible assets are amortised. Amortization means accounting for loss in value. The word amortization is particularly favoured in connection with the loss in value of intangible fixed costs like goodwill, or purely time – based assets like a lease on a property for a fixed number of years. To amortize an asset or an item of expenditure means to account for its loss in value over a number of years. Tangible Fixed Assets (TFA) form significant element in most business statement of financial position and therefore, it is extremely important that they should be treated properly in the organization’s financial statements. TFA should be recognised when they exist and should be included in the business balance sheet at a time and at a fair description of their values. Any other treatment short of that renders the financial statements highly misleading and affects its true and fair

view.

2.2 Why are Assets Depreciated?

The organizations financial statement must be presented in a true and fair view. All revenues should be realized and all expenditures matched against revenues to show the true profit for the financial year. Anything short of this renders the financial statements highly misleading to the extent of the reported results in the Statement of Comprehensive Income, Statement of Financial Position, Cash Flow Statement and Valued Added Statement. The financial statement therefore does not fairly represent the state of affairs and financial performance of the organization.

Another reason for calculating depreciation is to calculate the recovery of cost that is incurred on fixed assets over their useful life. This ensures the owner's capital is intact. The process is to ensure future provisions to be made for replacement costs when the present asset is out of its useful life in the business.

Depreciation will help an organization to ascertain the true value of an asset; if not calculated, the asset value shown in the accounting books would be higher than the actual or true value. Moreover, depreciation is often added to the cost of production so as to find out the actual cost of production. Machinery and equipment used to produce the product often incurs some sort of wear and tear of the asset. This must be calculated and added to the cost of producing the product. A legal point of view is the Company Act statutes, a company cannot declare dividends until it has calculated depreciation and charged it to the books. These lead to depreciation of assts.

2.3 Causes of Depreciation

The various causes of depreciation were stated by Wood and Sangster (2008); such causes include: (a) physical deterioration, (b) economic factors (c) time factor and (d) depletions.

- **Physical Deterioration** - This is wear and tear as a result of usage of assets such as motor vehicles, buildings; and the effect of erosion, rust, rot or decay by action of wind, rain and other elements of nature on such assets as land (erosion), motor vehicle metals (rust) and wood (rot or decay).
- **Economic Factors** - Obsolescence is a factor, a situation where the assets has not worn out but the loss of value is due to "advances in technology and change in market conditions for the product". Another factor is inadequacy resulting from changing and growth of the business that the capacity of assets was no more capable of meeting production demands.
- **The Time Factor** - Obviously, wear and tear, erosion, obsolescence, inadequacy e.t.c depend on time. This is true of most assets except such assets having legal life fixed in terms of years, (e.g leases, and elapse of patent period). These assets are amortized.
- **Depletion** - Wasting assets, especially natural resources such as mines, quarries and oil wells deplete due to extraction of raw materials from them.

2.4 Depreciation Policy.

Depreciation policy covers various controversial areas like determination of the type of method to use for what asset, determining the asset useful life with residual value which may require the help of professionals. It is a general guide to help an organization from arbitrariness in handling depreciation issues. Depreciation policy ensures uniformity and consistency. Any policy in doubt should be referred to higher authority for clarification. All assets are normally covered irrespective of the nature of the assets. A policy may be stated as below:

2.4.1 Non-Current Assets are to be depreciated to reflect the recoverable amount in the financial statements, over the useful life of the asset.

2.4.2 The depreciation will be calculated on an annual basis for preparation of the year end

accounts.

2.4.3 Groups of assets will use the same method of depreciation.

If an asset does not completely fit into one of the categories below, reference will be made to higher authority for clarification.

- Land No depreciation
- Buildings and Building modifications 2% (50yrs) Straight line method
- Plant and Machinery 20% (5yrs) Straight line with nil residual value.
- Furniture and Equipment 10% (10yrs) Straight line with nil residual value
- Computer Equipment and Software 33% (3yrs) Reducing Balance Method
- Assets under construction. These are not depreciated until the assets are brought into use.

The nature of depreciable fixed assets may determine the type of methods to use. Some fixed assets may be depreciated using a straight line method especially if such assets were not characterised by high risk of obsolescence or accelerated fall in value. It may be appropriate to use the reducing balance method, which charges more in the early years for depreciable assets having the main value obtained from the asset in its earliest years. In countries where depreciation is allowed as tax deductible, for example in India, (instead of capital allowances in countries like Nigeria), no choice of depreciation method and rates for tax purposes is available to companies. The depreciation method accepted for computing tax liability is the written down value (or diminishing balance) method.

2.5 Recognition of Tangible Fixed Assets

Although a fixed asset may retain its usefulness and therefore its value, for a considerable time, it remains true that (with the possible exception of freehold land) every fixed asset has a finite useful economic life (Hodge, 2008). That is to say that the value of every fixed asset must be declining towards nil as the asset approaches the end of its useful life.

“Depreciation is provided on cost of valuation by equal annual amount over the estimated useful life of the assets”. Where accounts are prepared under the historical cost convention, Leadly (1992) opined that tangible fixed assets should, in accordance with cost concept, be recorded initially at their original transaction value.

This value may either be the cost of purchase or the cost of construction (when constructed by the business itself). The purchase price of assets and certain expenses incidental to acquisition of such assets are capital expenditure and should be charged to the assets accounts. Examples of cost determination on some assets are:

- **Land:-** The purchase price plus broker’s or estate agent’s commission, legal fees, costs of survey and obtaining, vocation possession.
- **Building:-** Purchase price plus cost of re-modeling reconditioning, or altering the building for intended use; development charges, professional fees for design and supervision.
- **Plant and Machinery:-** Purchase price plus freight, custom duties and handling charges with transit insurance, cost of preparing foundation and installation.
- **Motor Vehicle:-** The invoice shall include value added tax (VAT), cost of registration plates and other fitments and delivery charges.
- **Investment:-** The principal investment plus all other or incidental costs to guarantee safety of the investment.

The guiding principle, according to Leadly (1992), is that all expenditure incurred in bringing the

asset in question to working condition for its intended use at its intended location should be taken into account. SAS No. 3 opined that where items, property, plant and equipment are to be carried at revalued amounts, an entire class or property, plants and equipment should be revalued or the selection of the items for the revaluation should be systematic and consistent.

The value of intangible assets is, however, very subjective due to the nature of such assets. For instance the value of goodwill is based on some criteria difficult to value such as established business and its reputation, location of business e.t.c.

Depreciation may be included in the manufacturing account especially in the extractive industry subsectors and is part of the costs relating to core business (Radu, 2013). Other cost areas are relating to production overhead and administrative overhead.

2.6 Some Depreciation Concepts

A critical study of the definitions of depreciation occasions some concepts of depreciation. Ezejelue (1999) highlights three of such concepts; Maintenance of Capital, Valuation Techniques and, Replacement of Assets. Other concepts include Notional charge and Estimates concepts.

2.6.1 Maintenance of Capital Concept - This concept holds that income is the positive difference between closing capital and opening capital. This income is the net of the compensation for any resource used up in operating the business. The capital to be maintained can be regarded as the original investment expressed in monetary terms or in terms of current replacement values either at the beginning or end of the accounting period. The concept, however, does not allow for separating operating income from the year-end adjustment such as extra-ordinary gains and/or losses.

2.6.2 Valuation Techniques Concept - Depreciation is not a decrease in the economic value of an asset. The economist noted depreciation as a fall in value but the accountant approaches this task as a matter of allocation rather than valuation. The capital cost of an asset, less its terminal scrap value, is spread over the estimated useful life, gradually translating an asset into an expense.

2.6.3 Replacement of Asset Concept - It is not the objective of replacing a giving asset at the end of its useful life that depreciation is charged (SSAP 12). It is mistaken to see the amount calculated for depreciation as set aside to provide a fund with which to replace the asset. The annual depreciation charge rather, reduces the profit available for distribution and is reinvested in the business. Even when the accumulated depreciation is released at the end of asset life, the fund may not be used to buy another asset, but as the management deems appropriate.

2.6.4 Notional Charge Concept - Unlike other overhead like rates, electricity, salaries where actual cash flow takes place, depreciation is a notional charge [the value of a benefit where no actual cost is incurred, and as such no cash flow occurs]. The charge is merely a book keeping entry. It is charge to represent the benefit enjoyed by the organization even though, no actual cost is incurred.

2.6.5 Estimate Concept - If the depreciation charge for an asset should have any meaningful objective, the useful life of asset, the rate of obsolescence and physical deterioration or extent of inadequacy and the eventual scrap value should be known. Unfortunately, most of these factors are estimates. Depreciation charge is therefore subjective rather than exact.

2.7 Practical Depreciation Calculation by Methods

The following basic data shall be used uniformly to analyse the application of the various depreciation methods to permit meaningful comparison.

1. Cost of the fixed asset (C) = N1000
2. Useful life of fixed asset (N) = 5years
3. Scrap, salvage or residual value (S) = N 100
4. Annual depreciation charge (D) = percentage on cost of asset if straight line method is used.
5. Rate of Depreciation (R) = percentage on cost of fixed asset if the reducing balance method is used.

The various methods of depreciation under consideration are arranged alphabetically as below.

2.7 1. The Annuity Method

This method provides for depreciation by means of periodic charges, each of which is a constant proportion of the aggregate of the cost of asset depreciated and interest charged at a predetermined rate per period on the written down values of the asset at the beginning of each period. The capital locked up in the asset is regarded as earning interest: a constant annual charge is credited to the asset account. The calculation ensures that the asset would have its cost (less any scrap or residual value) written off plus the interest earned. In the explanation below, the general amount of depreciation is calculated from actuarial tables compiled for the purpose of employing the formula: Periodic cost of annuity whose present value is 1 is $= (r)/[1 - (1+r)^{-n}]$ where r = rate of interest N = number of years of the term. Using C-S (i.e.N1000 – N100= N900), the annual depreciation charge is :

$$D = \frac{900(r)}{1 - (1+r)^{-5}} \quad D = \frac{900(0.15)}{1 - (1.15)^{-5}} = \frac{135}{1 - \frac{1}{(1.15)^5}} = \frac{135}{1 - \frac{1}{2.011}}$$

$$= \frac{135}{1 - 0.4973} = \frac{135}{0.503}$$

D = N268.55

Table 2. Calculation with Notional Interest

Yr1	Yr2	Yr3	Yr4	Yr5	
900	766.45	612.86		436.24	233.13
135	114.97	91.93	65.44	34.96	
<u>1035</u>	<u>881.42</u>	<u>704.79</u>	<u>501.67</u>	<u>268.09</u>	
- 268.55	- 268.55	- 268.55	- 268.55	- 268.09	
<u>766.45</u>	<u>612.86</u>	<u>436.24</u>		<u>233.13</u>	NIL
				+ 100	

The method charged interest on opening balance of the current year and added to current year balance before deducting depreciation charge. The method recognizes the time value of money. Computation may be difficult for the less quantitatively minded.

2.7.2 The endowment policy method

This method ensures that there is liquid fund for asset replacement cost. This is different from sinking fund method which provides for the cost of the asset alone.

Depreciation is provided by means of periodic charges which aggregates with compound interest over the life of the asset, and would be equal to the replacement cost. Simultaneously with each periodic charge, an investment accumulates at compound interest to provide fund equal to asset cost at the end of asset life. The method does not normally recognize a residual or scrap value. A demonstration is as below:

In addition to the initial data, suppose a replacement cost of the N1,000 asset would be N1,250; the calculation of depreciation uses the basic sinking fund formulae as follows:

The basic sinking fund formula is $P = \frac{A(R^n - 1)}{R - 1}$ where P = price/cost of asset, A = amount the

end of the period and is equivalent to the depreciation (D), $R = 1+r$ and $r = 0.15$. Rearranging, $C = D(R^n - 1)/(R - 1)$ and transformed as $D = C(R - 1)/(R^n - 1)$ where C = Replacement Cost
= N12500

$D = N12500(0.15)/(2.01 - 1)$; $D = N12500(0.15)/(1.01)$; $D = N12500(0.15/1.01)$;

$D = N12500(0.14851)$; $D = N1854.6$

Table 3.

Year	1	2	3	4	5
Particular					
Balance b/f	-	1854.6	3987.38	644.09	9260.7
Interest (15%)	-	278.18	598.11	966	1896.1
Annual Prov.	1854.6	1854.6	1854.6	1854.6	1854.6
Annual Investment	1854.6	2132.78	2452.11	2820.6	3243.7
Bal c/f	1854.6	3987.38	644.09	9260.7	12504

In table above, the annual investment is the annual provision plus interest carried forward. The result is added to previous year balance carried forward (bal c/f) to give the current year balance c/f. The current year balance carried forward is the net year balance brought forward (bal b/f).

At the end of the 5th year, an amount of 12,504 (rounded to N12500) was available. In practice, the annual investment for year 5 would not actually be made. The cash would be added to the proceed of the sale of the investments to provide fund needed for the purchase of another asset at the replacement cost of N2500.

2.7.3 The Production (or Machine) Hour Method

This method recognizes that the value of the machine depreciates faster than the mere used. The problem is that the number of hours during useful life is highly subjective if the machine hour capacity was not supplied by the manufacturer. Motor vehicle depreciation can also be based on maximum kilometer to be covered during useful life. The method is accurate for assets which wear-out through use, rather than over-time.

If a power generating set costs N1,000 and was expected to work for 8,000 hours, the depreciation charged should be : $\frac{N1000}{8000hrs} = N0.125/hr$. The annual hours used are 1000, 1500, 2500, 1800,

and 1200 for years 1 to 5 in the Table 4 below:

Table 4. The calculation for 5years

Year	Hours	Depreciation	Depreciation ₦
1	1,000	1000 x 0.125 =	125.00
2	1,500	1500 x 0.125 =	187.50
3	2,500	2500 x 0.125 =	312.50
4	1,800	1,800 x 0.125 =	225.00
5	1,200	1,200 x 0.125 =	150.00
Total	8000		1,000

Table 5. Depreciation Allocation for Asset's Useful Life

Year	1	2	3	4	5
Opening Balance	1000	875	687.5	375	150
Depreciation	125	187.50	312.5	225	150
Closing Balance	875	687.5	375	150	Nil

2.7.4 The Production Units Method

This is a replica of the production hours only that outputs are used as against hours worked. The total expected units of output to be produced by an asset should be established. Depreciation may be based on cost less scrap (salvage or residual) value. A machine costing N1,000 with a scrap value of

N100 was to produce 5000 units of bottle corks. The output per Naira = $\frac{N900}{5000\text{units}}$ =

N0.18/unit

Table 6. The usage for 5years

Year	No. of Corks produced	Depreciation Calculation	Depreciation ₦
1	2,000	2000 x 0.18 =	360
2	1,000	1000 x 0.18 =	180
3	800	800 x 0.18 =	144
4	8000	8000 x 0.18 =	144
5	400	400 x 0.18 =	72
			900

Table 7. Depreciation Allocation for Asset's Useful Life

Year	1	2	3	4	5
Opening Balance	1000	640	460	316	172
Depreciation	360	180	144	144	72
Closing Balance	640	460	316	150	100
Scrap					-100

2.7.5 Reducing Balance Method

The reducing balance method calculates depreciation charge by applying a percentage to be calculated to the net book value of the asset. The result is that the depreciation charge is higher in the early years of the assets life, than in the later years. The formula for calculating the rate to be used is:

$$R = \text{Rate of depreciation} = 1 - \sqrt[N]{\frac{\text{Scrap}}{\text{Cost}}}$$

N = The estimated useful life = 5years

S = Scrap (Residual or salvage) value N100

C = Cost of Asset = N1000

$$R = 1 - \sqrt[5]{\frac{N100}{N1000}} = 1 - \sqrt[5]{N0.10} = 1 - (N0.10)^{\frac{1}{5}} = 1 - \left(\frac{1}{N0.10}\right)^{0.2} = 1 - 0.6309$$

R = 36.90 Percent

The annual depreciation charge would be calculated as follows:

Year	Cost	₦
1.		1,000

	Depreciation 0.369 (1000)	(369)
2.	Balance B/f	631
	Depreciation 0.369 (631)	(232.84)
3.	Balance b/f	398.16
	Depreciation 0.369 (398.16)	(146.92)
4.	Balance b/f	251.24
	Depreciation 0.369 (251.24)	(92.71)
5.	Balance b/f	158.53
	Depreciation 0.369 (158.53)	58.50
	Estimated Scrap Value	100.

When using this method, a salvage value should be provided no matter how small to make the formula valid. This method is highly reliable for those assets, such as motor vehicles, whose repair cost increase as the asset becomes older.

Table 8. Depreciation Allocation for Asset's Useful Life

Year	1	2	3	4	5
Opening Balance	1000	631	398	251	158
Depreciation (36.90%)	-369	-233	-147	-93	-58
Closing Balance	631	398	251	158	100
Scrap Value					-100

2.7.6 Repair Provision Method

The method of providing the aggregate of depreciation and maintenance cost by means of periodic charges, each of which is a constant proportion of the aggregate of the cost of the asset depreciated and the expected maintenance cost during its life span (Owler & Brwon, 1980). From management experience of the nature of the asset, the amount of the repair is added to the cost and any of the applicable methods can be used. If an asset costs ₦1,000, one or two major repairs of say, ₦250 can be added. This brings the revised cost to ₦1250, less any residual value.

2.7.7 Revaluation Method

Where there are a few expensive assets, it is not difficult to draw up the necessary accounts for depreciation. There are however, many non-current assets for which the calculation will not be worth doing and in fact, may be impossible. Some businesses will have low cost tangible non-current (fixed) assets (Wood & Sangeter, 2008).

Revaluation is applicable in garages or engineering works where there will be a lot of spanners, screw drivers, and others small tools; brewers will have creates, laboratories will have many small, low cost glass instruments.

The total cost of all these tools would be ascertained at the beginning of each accounting year as opening balance. . At the end of the year, the difference between the opening balance and the closing balance represents the depreciation charge. Therefore, the assets are treated as consumables. All broken, spoilt and lost items represent the depreciation for the period. Revaluation requires time and attention at least, and possibly professional expertise as well, which is costly. Ordinarily, revaluation may always be difficult and subjective unless there is an active market in the relevant kind of asset, where current values may be observed.

2.7.8 Sinking Fund Method

Depreciation is provided by means of fixed periodic charges, which aggregated with compound interest over the life of the asset, would equal the cost of the asset. Simultaneously with each periodic charge, an investment of the same amount would be made in fixed interest to securities,

which would accumulate at compound interest to provide, at the end of the life of the asset a sum equal to its cost. The basic sinking fund formula is:

$$P = \frac{A(R^n - 1)}{R - 1} \quad \text{where } P = (\text{Price/Cost of Asset}), \quad A = (\text{Amount of Depreciation}), \quad R = (r+1), \quad \text{and } r$$

= 0.15. This can be stated as $C = D (R^2 - 1)/(R - 1)$ and transformed as $D = C (R - 1)/(R^2 - 1)$
 $D = 1000(0.15)/(2.01 - 1) = 1000(0.15)/(1.01) = 150/1.01 = 148.51$

Annual depreciation provision = ₦ 148.51

Table 9. Depreciation Allocation for Asset's Useful Life

Year	1 ₦	2 ₦	3 ₦	4 ₦	5 ₦
Balance b/f	-	148.51	319.29	515.69	740.95
Interest (15%)	-	22.27	47.89	77.35	111.14
Annual Provision	148.51	148.51	148.51	148.51	148.51
Annual Investment	148.51	170.78	196.40	225.86	259.05
Balance b/f	148.51	319.29	515.09	738.58	1000

*Adjusted by ₦ 0.60 for rounding errors.

2.7.9 Sum of the Years' Digits

This method is popular in the use according Wood and Sangster (2008). The method produces a similar but has dramatic pattern of depreciation charge to that resulting from the reducing balance method. It provides for higher depreciation to be charged early in the life of an asset with lower depreciation in later years. The useful life of the asset is express relative to sum of the years' digit. The simplicity of this method enables it to plough ahead against the reducing balance method in small and medium enterprises.

The formulae is: $[(\text{Number of years of life remaining}) * (\text{Cost} - \text{Scrap})] / [(\text{Sum of year digits})]$. An asset with 5 year useful life, the "Sum of digit" is $5+4+3+2+1 = 15$ digits. Depreciation charge for each year will be as in Table

Table 10. Calculation with Sum of Year Digits

Year	Digits of Remaining Life	Cost - Scrap (1000 - 100 = 900) Naira	Annual Dep = (Digits) * (N900)
1	5/15	900	300
2	4/15	900	240
3	3/15	900	180
4	2/15	900	120
5	1/15	900	60
Total			900

Table 11. Depreciation Allocation for Asset's Useful Life

Year	1	2	3	4	5
Opening balance	1000	700	460	280	160
Depreciation	300	240	180	120	60
Closing balance	700	460	280	160	100
Scrap Value					-100

2.7.10 The Straight Line Method

The straight line depreciation is a constant depreciation of each year of the assets accounting life

(Bealy, Myers and Marcus, 2004). This is the easiest of all the methods discussed so far. It involves writing off an equal amount of the asset's value of the assets life. The depreciation charge is:

[Cost of Asset less Residual (Scrap) value]/ [Estimated useful life]

With C = ₦ 1000 and scrap = ₦ 100, depreciation for the five years is

$$\begin{aligned} (\text{Cost} - \text{Scrap})/5 &= \text{₦ } 900/5 \\ &= \text{₦ } 180 \text{ per annum} \end{aligned}$$

Alternatively, (N180)/(N900) = 0.20 or 20% rate on cost less scrap.

Table 12. Depreciation Allocation for Asset's Useful Life

Year	1	2	3	4	5
Opening balance	1000	820	640	460	280
Depreciation	180	180	180	180	180
Closing balance	820	640	460	280	100
Scrap Value					-100

2.8 Small and Medium Scale Enterprises

The various definition of SMEs is more or less contingent rather than programmed with in a fixed coordinates of natural boundaries depending on the level of its role as a catalyst for economic development. A firm that can be categorized as small scale in advanced economy may be medium or large in a country like Nigeria. Various criteria for classification were being used such as number of employees, capacity of turn over and capital base. The various council of industry (NCI) streamlined the various determinants in 1992 but was revised in 1996 and in 2001 (Ukeje, 2003). The latest revision by SMEDAN, (2007) was as follows:

Table 13 Classification of Enterprises.

Size/Category	Employment	Assets (NMILLION) Excluding Land and Building
Micro Enterprises	Less than 10	Less than 5
Small Enterprises	10 – 49	5 – 50
Medium Enterprises	5 – 199	50 – 500

2.9 Depreciation Methods in Practice

A survey was carried out in late 2001 of 446 companies in eleven States of the federation by Oloidi (2001) to determine the methods used in practice as compared to those that are theoretically available. Ten methods were investigated. A summary of the result is in Table 13

Table 14. Depreciation methods Ranked in order of frequency and percentage.

Depreciation Method	Frequency of usage	Percentage	Ranking
Annuity	25	4.27	6
Endowment policy	9	1.54	9
Production unit	36	6.15	5
Production hour	43	7.35	4
Reduction balance	89	15.21	2
Repairs provision	25	4.27	6
Revaluation	60	10.26	3
Sinking fund	21	3.59	8
Straight-line	269	45.98	1
Sum of year digits	8	1.37	10

Total	585	100	
--------------	------------	------------	--

Research Questions.

The following research questions are formulated in order to achieve the objectives of the study.

1. Are the various assets fairly represented?
2. How are the depreciation methods ranked and which methods take the 1st to 3rd position?
3. Is there any correlation with previous findings ranking?
4. Is there any significant deviation from the previous findings?

3. Methodology

3.1 Research Design.

The research design employs the survey design by the use of questionnaire to make descriptive and explanatory analysis of responses.. The dependent variable is the “methods of depreciation” such as Annuity; Endowment; Production hours; Production units; Reducing balance; Repairs provision; Revaluation; Sinking fund; Straight line and Sum of year digits methods. The independent variable is “type of fixed assets” such as Motor vehicle; Machinery/Equipment; Fixtures and Fittings; Computer hardware; and Tools. Descriptive and explanatory research were used to analyse frequency distribution and percentages

Descriptive research encompasses the collection of a wide range of data arranged , tabulated and/or represented graphically in a meaningful form of information Explanatory research focuses on why questions. For example, it is one thing to describe the frequency of occurrence of a depreciation method; it is quite a different thing to develop explanations about why a depreciation method is as high as it is; why some types of assets favoured one type of method or why the rate of use some is higher in some others.

3.2 Population

The study population consists of all small and medium enterprises in Edo/Delta, Ekiti, Kwara, Ogun, Ondo,and Lagos states.

3.3 Sample and Sampling Methods

The sample for the study is seven hundred and seventy eight (778) respondents. The states used were purposively sampled and there were much focus on the state capitals where respondents were randomly sampled. In kwara state for example, all the samples were from Ilorin, the state capital; though there were more spread in Ekiti, Ondo and Lagos states. Despite random sampling of respondents, only those who showed interest treated the questionnaires distributed. The pattern of sample composition is in Table 14

Table 15. Pattern of Sample Composition.

States	Number of Respondents	Percent(%)
Edo/Delta	94	12.08
Ekiti	142	18.25
Kwara	40	5.14
Ogun	98	12.60
Ondo	149	19.15
Lagos	255	32.78
Total	778	100

3. Pilot Study.

Ondo state was used as pilot study to test run the instrument used to make necessary corrections, clear ambiguities, restructures presentations and adjust all weaknesses revealed by the pilot study. Eventually there were no significant variances in the pilot questionnaire and the questionnaire were part of those eventually used for the study.

3.4 Instruments

Questionnaire was used in data collection. It is a simple instrument that required some demographic variables in Section A and tabulation in Section B. Respondents were only to tick the type of depreciation they used against what assets. The tabulation runs the five assets earlier mentioned on the top row and the ten (10) depreciation methods on the first column. Respondents only trace depreciation method to the asset{s} of application. While the instrument was validated, the structure does not require calculation of reliability coefficient.

3.5 Administration of Instrument.

The distribution of questionnaires was carried out by research assistants. These research assistants were HND students of the Department of Accountancy Rufus Giwa (former Ondo State) Polytechnic Owo , Ondo State, Nigeria. They had been trained to understand the nature and the objective of the study. Administration of the instrument was costly, time consuming and tedious. About 1000 questionnaires were distributed initially since the last quarter of 2014 through the whole of 2015, compilation and screening of the questionnaires in 2016. Many questionnaires were rejected for want of various defects such as inability to understand the basic principle of depreciation, for example using production hours/units for TOOLS and/or FIXTURES & FITTINGS.. Some respondents used two methods of depreciation for a single asset. About 778 questionnaires were used eventually. It is hoped that timing effects would not have any significant effect on the validity of the study outcome.

3.6 Statistical Analyses.

The mean usage per method and Spearman's Rank Correlation were used for analyses.

5. Presentation and Analyses of Data.

Tables are titled A-1 to A-3 under analysis of data.

Table A-1. Assets, Type and Frequency of Depreciation Application.

S/N	Assets Methods	Motor Vehicle	Machinery/Equipments	Fixtures/Fittings	Computer Hardware/IC T	Tools	Total	Average**	Rank
1	Annuity	245	161	111	141	N/A	658	658/4=165	2
2	Endowment	120	154	85	97	N/A	456	456/4=114	8
3	Production hours	98	237	N/A	80	N/A	415	415/3=139	5
4	Production units	N/A	213	N/A	97	N/A	310	310/2=155	3
5	Reducing balance	188	154	139	106	N/A	587	587/4=147	4

6	Repairs provision	110	157	131	140	62	600	600/5=120	7
7	Revaluation	139	84	185	118	103	629	629/5=126	6
8	Sinking fund	155	102	102	85	N/A	444	444/4=111	10
9	Straight line	265	252	197	205	N/A	919	919/4=230	1
10	Sum of year digits	127	105	83	131	N/A	446	446/4=112	9
Total									

*Field work 2014-2016

** The average is based on application per asset. For example, production units method average is $([213+97]/2) = 155$. The same is applicable to other methods

N/A = Not Applicable- for example, it is theoretically against accounting for depreciation principles to use any other methods for TOOLS rather than revaluation. An aberration was allowed here for repairs provision because some of the SMALL/MEDIUM businesses rusted knowledge of making provisions for tools rather than revaluing.

Table 15 is the outcome of the field work since September 2014 to the end of 2015.

1. All the assets were fairly represented. None of the assets are without any particular depreciation methods.
2. The depreciation methods are ranked by adding applicable cells together and divided by the number of cells. The ranking shows that the Straight Line method was ranked 1st, Annuity method was ranked 2nd and Production Units was ranked 3rd.
3. The comparison of the previous findings and ranking (Oloidi, 2001) with the present findings and ranking shows a Spearman's Rank Correlation of 0.754 and significant at 5% level (2-tailed)
4. There is no significant difference in the ranking of depreciation methods as at 2001 and as at 2015 about 15 years after.

Table A-2 Ranking Comparison of the depreciation methods.

Depreciation Methods	Annuity	Endowment	Prod Hrs	Prod Units	Reducing Balance	Repairs Provision	Revaluation	Sinking Fund	Straight Line	Sum of Yr Digits
Previous Findings Ranking	6	9	5	4	2	6	3	8	1	10
Current Findings Ranking	2	8	5	3	4	7	6	10	1	9

Table A-3 Correlations

			VAR0000 1	VAR0000 2
Spearman's rho	VAR0000	Correlation Coefficient	1.000	.754*
	1	Sig. (2-tailed)	.	.012
		N	10	10
	VAR0000	Correlation Coefficient	.754*	1.000
	2	Sig. (2-tailed)	.012	.
		N	10	10

*. Correlation is significant at the 0.05 level (2-tailed).
2-tailed)

5. Conclusion and Recommendation

5.1 Conclusion

This study has demonstrated the application of depreciation methods in small and medium enterprises in Nigeria. Some of these SMEs do not really understand the principles of depreciation. Some did not know the difference between repairs provision and revaluation methods. Some even indicated using production units for fixtures and fittings and worst still, straight line method for tools. Some indicated using two methods for a particular asset; probably still indicating the method in use previously and later changed. Most of these SMEs are in the informal sector and therefore not bound to abide by any accounting standards, unlike registered and incorporated entities. At least this study has created an insight into the activities of the SMEs as far as application of depreciation is concerned.

5.2 Recommendation

The first step in standardizing these SMEs is to formalize them as against their informal characteristics and give them proper orientation by arranging seminar/workshop for them in the area of record keeping, simple accounting and asset maintenance in form of depreciation

5.3 Limitation of the study?.

The field work on this study started late in 2014 and continued throughout 2015 with the publication in October 2016. It is however believed that timing effect may not have significantly affected the relevance of this study. Users of the outcome of this study should take note.

REFERENCES

- Breadly, R.A Mysers, S.C & Marcus, A.J (2004). "Fundamentals of Corporate Finance", New York: Mc Graw Hill/Irwin
- Depreciation (n.d) in Wikipedia. Retrieved on March, 29 2014 from <http://en.wikipedia.org/wiki/depreciation>
- Hodge Robert (2008). "Accounting-A foundation", South Western: CENGAGE learning.
- Jennings, A.R (2005). "Financial Accounting, 2nd Edition", London: Thomson Learning.
- Kimmel, P.D; Weygandt, J.J & Kieso, D.E (2000). "Financial Accounting- Tools for Decision Making". New York: John Willey and Sons Inc.
- Konstattinos, J. Liapis and Dimitrios, D. Konstianis(2015) Depreciation Methods and Life Cycle

- Costing (LCC) Methodology, *procedia Economics and Finance* 19, 314-324. Retrieved on October 24, 2016 from www.sciencedirect.com
- Lall, R.M (1968): An enquiry into the nature of assets, the New York Certified Public Accountant; November; 793-7
- Leadly, K.A (1992): Accounting for Tangible fixed assets, ACCA Students Newsletter, January, Pp.48-52
- McDonough, M (ed)(2010). Why Depreciate Fixed Assets? Retrieved on October 22 from <http://www.brighthub.com/office/finance/articles/76494.aspx>
- Mariana, Radu (2013) The Impact of Depreciation on Costs *Annals of the University of Petroșani, Economics*, 13(1), 251-260
- Oloidi, G.A (2001) A Comparative Study of the Depreciation, Methods used in Nigerian Companies. *The Student Accountant* Rufus Giwa Polytechnic, Owo Ondo State Nigeria 3(1),30,42-43
- Owlar, L.W.J & Brown, J.L (1980):” Wheldon’s Cost Accounting and Costing Methods”. London: Macdonald and Evans.
- Pandey, I.M (2003):” Financial management, 8th Edition”. New Delhi: Vicas Pub. House Ltd.
- SMEDAN,(2007). 2007 Annual Report. SMEDAN, Abuja. Accessed from <file:///C:/Users/hp/Desktop/MSMEs/MSMEs%20Pnadh592.pdf>
- Sutter, Brian (2014) Methods of Asset Depreciation. Accessed on November, 10 2016 from <http://www.waspbarcode.com/>
- Ukege, E.U (2003): Employment Creation Through Small and Medium Scale Enterprises: Country
- Wood, F and Sangstar, A. (2008). “Frank Wood’s Accounting 1, 11th Edition”. Harlow: FT Prentice Hall.