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INCOME CAPITALIZATION METHODOF VALUATION AND THE NATURE OF INCOME FLOW FROM LEASEHOLD MINERAL RIGHTS IN NIGERIA.

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ABSTRACT

The greatest problem encountered by the estate surveyor in the valuation of leasehold mineral rights by the income capitalization method is how to accommodate the unstable income from minerals in order to produce reliable value opinions. Experience has not indicated the best approach to deal with the instability/insecurity of income from mineral rights. This study determines how to deal with the income from leasehold mineral rights in order to conveniently apply it in achieving reliable value opinion by the income capitalization method. It examines how significant the difference is in the value opinions achieved by capitalizing income obtained by adopting the quantity of minerals indicated as annual workings in mining lease and by capitalizing the mean of aggregated actual workings for a number of years. It also sought to formulate a strategy that leads to a reliable value opinion by the income capitalization method of valuation. The survey research method was adopted in this study using a granite industry and a dolomite industry as case studies. A study sample of 355 drawn from a study population of 3,200 comprising 2,400 practicing Estate Surveyors and Valuers, 600 Mineral Workers and 200 staff of the Ministry of Mining and Steel development was used. The Chi-square test at 0.05 level of significance was used to test the hypotheses. The research concluded that the valuation of mineral rights by the income capitalization method using the normal mineral income (unadjusted income from mineral rights) will not produce reliable value opinions. The research therefore recommended the adoption of the adjusted income from mineral rights for valuation of mineral rights by the income capitalization method.

Keywords: Mineral Rights, Income Capitalization, Valuation, Mineral Income Flow.

1. INTRODUCTION

The International Valuation Standards Committee (IVSC) in its 2003 Exposure Draft of the proposed guidance note on the valuation of interest in the Extractive Industries recommended Income Capitalization or Investment Method among others as one of the main techniques for valuation of mineral rights especially for the natural resource component.

Valuation by the Income Capitalization Method is one of the methods adopted in the valuation of interests in properties. The principles of valuation lay emphasis on two things about the income from a property for it to qualify for valuation by the Investment Method.

The income must be regular and secure. Investments in mineral resources generate income by way of returns from sales of minerals produced or royalties received on the minerals as other landed property investments. However, while income from other property investments are negotiated and agreed on, the income from minerals depends on the quantity and quality of minerals produced which creates some problem on its security and regularity.

Briton; Davis & Johnson (1980) argue that valuation by the income capitalization method relies on the rate of return which the investor desires from the capital he invested in the property. This rate of return or yield is used to determine the years purchase which is applied to the annual net income to derive the capital value. The adoption of the method can however only proceed where the property which forms the subject matter of the valuation generates income. Such income should be both secure and regular. Mineral properties earn income for the investors (Lessees) through earnings from the sales of minerals produced annually while income to the Government (Lessor) is the royalty paid on the minerals produced annually. Going by the principles of Valuation, the interests of both the investors (the Lessee) and the Government (the Lessor) can easily be estimated by income capitalization method of valuation. There is however some cloud of doubt on what the actual income to the investor is or what the royalty to the government is?

Every mining lease has a clause on Annual Workings and another clause on the term of the lease. The provision of Annual Workings as the quantity of minerals to be produced or exploited every year in a Mining Lease is a major issue in Mining Leases. Experiences from mining operations have revealed that most mineral operators never achieve the indicated annual workings, neither has any mineral industry produced the same quantity of minerals in any given consecutive two years of the lease term. Given the above circumstances, what income will the Estate Valuer adopt in order to arrive at a reliable value opinion by the income capitalization method? Is it the income derived from the sale of the actual quantity of minerals indicated as annual workings or is it the income derived from the sale of the actual quantity of minerals produced in the year which is very unlikely to be the quantity to be produced the following year?. The misunderstanding which this provision has created in the minds of Estate Surveyors and Valuers is the cardinal reason that prompted this research on the critical examination of the valuation of leasehold mineral rights by the income capitalization method. The study hypothesized that the quantum of income flows from mineral rights do not affect the reliability of value opinions arrived at by the income capitalization method of valuation. Secondly, there is no significant difference between the value opinion obtained by the capitalization of income derived from annual working provided in the mining lease, and the value opinion obtained by the capitalization of the income obtained from the mean actual workings for some years.

2. LITERATURE REVIEW

The International Valuation Guidance note for extractive Industries (2007 Ed.) defined Minerals as many naturally occurring material useful to and or having a value placed on it by human kind that is found in or on the earth's crust. These minerals have further been classified into metallic minerals, industrial minerals, precious stones and fuel or energy minerals. Petroleum was however excluded from the categories of minerals in this definition.

Minerals are land resources, which form part of real estate. They occur naturally and do not need the contribution or activities of man for their original occurrence.

A major characteristic of minerals according to Odumodu (2006) is that they are wasting assets. ENCYC. BRIT accordingly cautioned that since minerals cannot bereplaced after being consumed, all nations should conserve them and use them wisely. ENCYC. AM also believes that in the obvious fact of the wasting nature of minerals, every available quantity of such minerals are vital factors in maintaining high national economic standards in political power among nations, and in the ability of a nation to develop its defence. It is gladdening to observe that Iron, Coal, Copper, Aluminum and Steel which ENCYC. AM grouped as minerals have been discovered to exist in large quantities in Nigeria. The wasting nature or characteristic of minerals, in the words of Odumodu (2006) is due to the fact that they have taken centuries to form and man was neither directly nor indirectly involved in their formation which is why the ability to replicate them as they are has defied man's efforts despite the synthetic equivalent of some minerals which according to ENCYC. BRIT are produced industrially such as rubies and diamonds but which are not the same as the real minerals that have taken centuries to form. It is equally true that industrially, certain biological products which consist of minerals have been produced but they are in the real sense not minerals. Examples are appetite in bones and teeth, phosphate, and oxalate minerals in biological stones.

Rees (1980) indicated that most minerals are latent in nature. This is what creates the need for exploration (search) before they are exploited to make them command value.

The high value which minerals command arise not only from the use to which they are put but also as a result of the efforts put up to search (explore) and work (exploit) them to make them available for use.

The study of mineral deposits has been the concern of geologists for several decades. Their role is to ascertain the mode of origin of the minerals, their composition and the extent of the deposits. The presence of a large quantity of a particular mineral does not make the mineral valuable if the quality is not considered high enough to attract good value in the market. It is the quality of the minerals in a particular deposit that determines its place in the market and gives it the value it commands while the quantity is complimentary in accounting for the total amount that can be realized from it (the deposit) as an investment. Mineral deposits appear in different shapes apart from constitution depending on the style of their formation. Unlike the geologists the valuers main interest is in ascertaining the quantum and the quality of the deposit which are the essential ingredients in the determination of value (Ifediora 1993). The valuer

however relies not on his own skill for these but needs to have proof of these to be able to value with certainty and without equivocation (Odumodu 2006).

As an economic activity mining is very capital intensive, highly rewarding but very risky. Every investor in Mining therefore looks out for high returns to cover the risks. The development of the Solid Minerals Sector has become a cornerstone for sustained economic growth in most African Countries. Minerals not only play substantial role in export earnings and local revenue but also create employment opportunities, fight poverty and improve the general welfare of the citizens of the nations concerned. Mining is therefore not just the technical efforts put in place to produce the minerals. The Key Policy issues for successful mining industry that meet the aspiration of all stakeholders include having competitive legal and fiscal regime for sustainable management of the environmental and social risks which are by products of mining and good governance of the industry (Peter Van Der Veen, 2004).

Before any mining operation commences, the mineral operator must secure a mining lease or license. A lease ordinarily is defined as a grant by one person known as the lessor of the right to use a property for a fixed and determinable period for the payment of rent. This creates the understanding that at the end of the stated term the property reverts to the owner or lessor and the payment of rent ceases. There is also the possibility of renewing the lease if the parties so agree either on the old terms or on new terms. There are significant differences between a Land Lease and a Mineral Lease. At the end of a Mineral (mining) Lease, there is nothing to hand over or to revert to the lessor. The land from which the mineral is exploited which was never part of the lease now reverts to the original land owner as an occupier in line with section 1 subsection 2 of the Minerals and Mining Act 2007. Equally the land in which the mineral existed never remains the same at the end of the Mining Lease in spite of the restoration clause which is always part of a Mining Lease. This is because of the devastation of the land that goes with mining activities.

A Mining Lease is therefore usually granted for a period which will enable the miner (lessee) to exhaust all the minerals in the reserve. Smith (1974) was moved by the above facts to conclude that a Mining Lease is a contract of sale. When a mineral or mining lease is granted as provided in section 65 of the Minerals and Mining Act 2007, three interests are created as opposed to the two interests created in a Land Lease (lessor and lessee). The interests created include the Lessor (government), the Lessee (Miner) and the Landowner all beneficiaries of the terms of the Mining Lease. The Minerals and Mining Act provides for the three interests terms, which make the valuation of each of them by the income capitalization method possible. Section 33 of the Act provides that any mineral obtained in the course of exploration or mining operations shall be liable to the payment of Royalty as prescribed in the Act. The payment of Royalty which is to the lessor (government) is an obligation which the lessee must meet. Equally section 102 of the Act provides for the payment of surface rent by the lessee to the landowner. The Royalty and the surface rent are incomes to the lessor and the land owner arising out of the mining lease and which make it possible for the rights of the twoparties to be valued by the income capitalization method. Income to the lessee derives from mining of the leased mineral which is a tedious and costly process. The minerals produced from the mining is sold by the lessee to generate income.

Valuation of surface mineral bearing land according to Briton et al (1980) involves the valuation of an asset which is destroyed (the land) as excavations proceed and ultimately the land loses its mineral value". By this he gave an insight into the difference between valuation of a mineral property and that of other kinds of property. However, Odumodu (2009) quoting Smith (1987) observed that Mineral Lands are sold, and leased in the same manner as any other land and landed property even if it loses its mineral value after mining. Also in the words of Odumodu (2009) "there is hardly any economic transaction that goes on in any normal land that is not possible with mineral bearing land including valuation". On his part, Cartwright (1940) thinks that valuation of mineral property serves two important functions which could be broken into different purposes of valuation of mineral property. According to him, "many of the purposes requiring mineral valuation are as follows:

I. Market related transactions:

a. Purchase of property and royalty
b. Sale of property or royalty
c. Exchange of property
d. Financial security for bonding
e. Management decision making
f. Mine development
g. Mine expansion

II. Legal related reasons (statutory):

a. Eminent Domain/Condemnation
b. Property Taxation Appeals
c. Estate or inheritance tax
d. Mining lease or royalty disputes
e. Business/Marital dissolution
f. Bankruptcy or loan foreclosure
g. Company merger or liquidation.

Any valuer intent on proceeding with the valuation of mineral rights must clearly understand the attributes of minerals. Where the valuer is lacking in the knowledge of minerals, he must seek help from experts on mineral properties such as geologists, geophysists or mining engineers. The input of the client for whom the valuation is to be done is highly essential. The valuer must for the valuation seek information in the followings areas:

1. Size of land in hectares (Deposit Site)
2. Term of the lease and commencement date
3. Yearly production record for the past few years

4. The quantity of minerals in the deposit in tones or the rate at which the deposit exists in the land (e.g X tons/ha)
5. The annual approved rate of working the minerals (e.g Y tones/annum)
6. The rate at which royalty will be paid e.g₦Y.00/tone or it could be a percentage of the annual proceeds. Royalty to the lessee is an outgoing.
7. The rate (e.g₦Y.00/ha/annum at which surface rent will be calculated.
8. The total amount of wages and salaries paid to staff
9. The cost of the machines or equipments to be used in working the minerals. The annual equivalent of the cost will be treated as outgoing or the cost will be treated as capital allowance to be deducted from the capital value realized before the actual value of the interest is confirmed.
10. The annual operational cost of the equipment, which is also an outgoing
11. The unit price of the mineral
12. The total cost of marketing the mineral annually. This is also an outgoing and includes transportation.
13. The nature of the restoration clause and the likely cost of restoration work to be done at the end of the lease. Where restoration work must be done and its cost can be ascertained, the cost, which is a future spending, should be discounted to its present value and the resulting amount deducted from the realized value after capitalization.
14. The appropriate return or discount rate should be ascertained bearing in mind that mining leases are of very short duration. The discount rates are usually high depicting the high risk element in such ventures.

The valuer's awareness of the above facts including other things that concern the interest to be valued would guide the steps he will take in the valuation process which according to Ifediora (1993) will proceed thus:

- ❖ Determination of Gross Income
- ❖ Reduction of the gross income to net income by the deduction therefrom of all identified outgoings or operating expenses.
- ❖ Determination of the appropriate discount rate
- ❖ The capitalization of the net income otherwise known as discounting to achieve the capital value.

In many cases there will be capital expenditure to be undertaken at the end of the term by the holder of the mineral right being valued. This is where there is restoration clause in the lease.

The size of the work to be carried out and the cost of the work as at the time it will be done is already known. This can be discounted to the present value and the resulting value deducted from the value of the mineral rights already determined.

Valuation principles insist that for any income to be relied upon for valuation purposes, that income must be both regular and secure. A situation where the income flow suffers very high fluctuations leaves the beneficiary or recipient of the income in doubt as to the actual amount to call his income. The above inquiry is very vital considering the very nature of minerals. The valuation of the leasehold interest is the main focus of this research because of the circumstances of the income which render it suspect for purposes of achieving reliable value opinion by its capitalization.

3. THEORETICAL FRAMEWORK:

Without doubt valuation principles remain the same regardless of the object of valuation. The age long valuation principles articulated by the American Institute of Real Estate Appraisers (AIREA) for property valuation which in essence are the basic assumptions, postulates and premises still provide the valuation appraisal methods.

As is the case with valuation theories, the valuation principles derive from and are adopted from economics. According to Ifediora (1993) some of the principles are accepted and axiomatic, while some were simply adapted as mere postulates and yet others were simply established a posteriori. A complete understanding of valuation procedures and techniques is only possible through a clear or proper appreciation of valuation principles and postulates including their implications and applications to valuation. Some of the economic theories from which valuation principles and theories were adapted and adopted include the theories of:

i. Supply and demand
ii. Opportunity Cost
iii. Contribution
iv. Highest and Best Use
v. Competition – to name but a few

Mineral valuation methods in the same manner as valuation theory are eclectic which means they are not limited but keep evolving and developing.

However, inspite of the tendency for new techniques to keep evolving, author like, Ifediora (1993) and Richmond (1985) etc have come to terms with about five (5) valuation methods which include:

i. Income Capitalization or (Investment) Method
ii. Market Data (Comparison) Method
iii. The Replacement Cost Method
iv. The Residual Method, and
v. The Profits or Accounts Method

Interestingly all these methods are in use for the valuation of mineral rights though with modifications where necessary as a result of the statutory nature of mineral valuation.

3. RESEARCH DESIGN

The study adopted a survey approach taking a single shot in data collection from the respondents. So, the research is exploratory in nature and uses established research techniques, procedures and methods to collect and analyze information about the nature of income flow from mineral rights and how it affects the valuation of the leasehold mineral interests by the income capitalization method in Nigeria.

The search for data was effected in six mineral industries spread over three geopolitical zones of the country. The industries are in the South East, South South and North Central geopolitical zones of Nigeria.

The industries and the minerals they produce are as listed hereunder;

1. Crushed Rock Industry Limited Ishiagu – Granite
2. McDaniel's Industry Nigeria Limited Ezzamgbo – Granite
3. Freedom Group Company Limited IkpeshiAkoko Edo – Dolomite
4. Nigerian Coal Corporation, Enugu – Coal
5. Cross River Limestone Limited Calabar and Mfamsing – Limestone
6. Elecab Nigeria Limited Odegi Mbeki–Columbite

The case study includes 2 Granite Industries. One of the industries is Crushed Rock Industries Nigeria Limited located at Ishiagu in Ebonyi State while the second industry is McDaniel's Mining Industry Limited at Ezzamgbo – also in Ebonyi State.

Crushed Rock Industries Nigeria Limited is a large scale International Company with mining industries in many places. Macdonald Mining Industries is a medium scale mining industry with Ezzamgbo as its only industry even though the industry is reasonably large.

The Freedom Group Limited operates in Ikpeshi, Akoko Edo Local Government Area in Edo State. The company is a medium scale private mining industry which operates a dolomite reserve that exists in a 1 square kilometer parcel of land in Ikpeshi community. The reserve sits on a parcel of land which was leased to the freedom group for 10 years since 1990.

The discovery of coal in commercial quantity at the foot of the Udi hills was as early as 1909 during the colonial administration of Nigeria. Coal has since played very significant roles in the Nigerian economy. Five mines were active in the very active days of the Coal Industry namely the Okpara mine, the Onyema mine, the Iva mine, the Obwetti mine and the Ekulu mine. Coal is not only available in Enugu, it is equally found in Benue, Plateau and some other states.

The Cross River Limestone Industry Limited has its deposits at Calabar and Mfamsosin but with the headquarters at Calabar. As in the case with most limestone deposits in the country the Calabar Cement Company Limited (CALCEMCO) is sited in the vicinity of the limestone deposit in Calabar.

The population of study was 3200 made up of 2400 registered Estate Surveyors and Valuers in Nigeria, 600 workers of the mineral industries used as case study and 200 staff of the Ministry of Mine and Steel Development. Estate Surveyors and Valuers constituted the bulk of the population of study since the research focuses on valuation which is their core professional area.

Table 1: The Study Population

	NAMES OF GROUP	POPULATION
1.	Registered Estate Surveyors in the Voters List of the Professional body	2400
2.i ii. iii. iv. v. vi.	Staff of Crushed Rock Industry Limited, Ishiagu, Staff of Macdonald Industry Limited, Ezzamgbo Staff of Freedom Group Industry Limited, IkpeshiAkoko Edo Staff of Nigerian Coal Corporation, Enugu Staff of Cross River Limestone Limited Calabar and Mfamosin Staff of Elecab Nigeria Limited Odegi Mbeki	600
3.	Staff of Ministry of Mining and Steel Development	200

A sample size of 11.09% of the study population (3200) was calculated as 355 and used for safe generalization of study outcome. Thus a sample size of 355 was drawn from the study population. This sample size was proportionately distributed among the groups according to their respective population using sampling ratio of 11.09%, the spread of which is presented in Sample Size Distribution.

Table 2: Sample size distribution

S/N	NAME OF GROUP	POPULATION	PERCENTAGE CONTRIBUTION TO SAMPLE SIZE	ACTUAL NUMBER CONTRIBUTED
1.	Registered Estate Surveyors in the 2010 Voters List	2400	11.09	266
2.	Staff of Crushed Rock Industry Limited, Staff of McDaniel's Mining Industry Limited, Staff of Freedom Group etc.	600	11.09	67
3.	Staff of Ministry of Mining and Steel Development	200	11.09	22
		3200	11.09	355

The above technique was adopted in the determination of the contribution of each subgroup to the sample size in order to ensure there is equitable representation of the subgroups in the sample.

In the actual administration of questionnaires on the samples, the stratified Random sampling technique was adopted. Both primary and secondary data were used to accomplish the objectives set for this research. As a result both primary and secondary sources of data collection were employed. The primary data collected were obtained through the administration of questionnaires and oral interviews on the sample population. Though literature was difficult as a result of the subject matter of the study, secondary data were gathered by reference to documented materials by way of review of related literature. Such documents as ministerial briefings on solid mineral development, inventory on Nigerian Minerals, National Policy on Solid minerals, Journals, Newspapers, Lecture Notes and books on Valuation generally were seriously referred to. The questions raised were face validated to ensure that the instrument contained questions which would elicit answers that are relevant enough for the attainment of the research objectives. The face validation was done by allowing experts in valuation and expert in minerals and mining to assess them and offer their advice on their effectiveness. The reliability or dependability of the instrument was confirmed using the test retest method at which a coefficient of reliability of 0.85% was obtained.

Frequencies and percentages were employed. Chi-square was also used to test for association between the effect of income flow on the reliability of the value opinion arrived at by the income capitalization method of valuation.

4. RESULTS

Analysis was based on 315 sets of instrument accepted after screening. The results of the analysis are presented and discussed below according to the objective and hypothesis of the study which have earlier been stated as:

To ascertain which income flows; annual workings or the mean actual workings from leasehold mineral interests leads to a reliable value opinion by the income capitalization method.

Null Hypothesis Ho: There is no significant difference between the value opinion obtained by the capitalization of income derived from annual workings provided in the mining lease, and the value opinion obtained by the capitalization of the income obtained from the mean actual workings for some years.

Descriptive Analysis

The respondents (Estate Surveyors) gave the factors responsible for the instability of the incomes from mineral rights as shown;-

TABLE 3- factors that cause instability/insecurity of income from mineral rights

Options	Response Details	Frequency	Percentage	Valid Percentage	Cumulative Percentage
A	Latency of Mineral	85	32%	32%	32
B	Machine/Equipment Breakdown	98%	36.8	36.8%	36.8
C	Flooding of Mines	5	1.9%	1.9%	1.9
D	Health Condition of workers	8	3%	3%	3
E	Quality of Minerals	70	26.3%	26.3%	26.3
TOTAL		**266**	**100**	**100**	**100**

It is observed that out of the 266 Estate Surveyors Sampled, 85 or 32% believe that the strongest factor responsible for the instability/unpredictability of the income from mineral rights is the Latency of Minerals. Another 98 of them or 36.8% are of the view that the breakdown suffered by the Machines and Equipment used in the mining operations create sufficient disruptions which disturb operation and therefore negatively impact on mineral productions which invariably translates to the income instability. As many as 70 or 26.3% responded that the instability in the income is caused by variations that do occur in the quality of minerals produced which affect the prices people are prepared to pay for them. 5 out of the remaining samples or 1.9%allude the problem to flooding which occurs from time to time in the mines thus making production halt until the flood water is taken care of. The last 8 or 3 % believe that the environment in which mining is carried out is usually hazardous and will create health problems for the workers which will always affect their productivity. They believe that under such circumstances that the rate at which the workers work will fluctuate in line with the state of their health and will therefore continually vary productions which will in turn vary the income.

Opinions of the mineral operators were sought on whether the income (from mineral rights) has many impact on value opinions derived by the income approach to valuation and whether the insertion of annual workings as clause in mining leases will make the income (from mineral rights) to become stable and by extension become more secure as to have no impact on the value opinions. This further emphasized the fact that income from mineral operations is both unstable and insecure.

Table 4: Annual Workings and Stability/Security of Income

Options	Response Details	Frequency	Percentage	Valid Percentage	Cumulative Percentage
a	Strongly Agree	0	0%	0%	0%
b	Agree	0	0%	0%	0%
c	Unsure	4	5.9%	5.9%	5.9%
d	Disagree	14	20.9%	20.9%	20.9%
e	Strongly Disagree	49	73.2%	73.2%	73.2%
TOTAL		**67**	**100%**	**100%**	**100%**

Table 4 shows that out of the67 mineral operators who answered the question, 49 or 73.2% strongly disagreed or were convinced that the insertion of Annual workings as clause in mining leases does not in any way make any impact on income generation by the mineral right. 14 other mineral workers or 20.9% also do not agree that (disagree) the insertion of Annual Workings in mining leases makes any contribution to the income generating ability of mineral rights. The 49 who strongly disagreed and the 14 who simply disagreed make a total 63 out of the 67 mineral workers or 94.1% who hold the view that annual workings inclusion as a clause in mining lease does not in any way affect the quantum of income which is generated annually by the mining industries. The income from mining operation is highly factor dependent and the factors have been identified in the analysis carried out in table 3 to include:

i. Latency of minerals
ii. Machine/Equipment failure
iii. Flooding of mines field,
iv. Quality of the minerals and
v. Health problem of miners none of which does not have a negative impact on Annual Workings.

Estate Surveyors were asked to make a choice between expected income derived from annual workings and income derived from actual mineral production for adoption in valuation by income capitalization method to achieve a reliable value opinion.

Table 5: Choice between income derived from Annual Workings and income derived from actual mineral productions for adoption in valuation

Options	Response Details	Frequency	Percentage	Valid Percentage	Cumulative Percentage
a	Expected income from annual workings	5	10%	10%	10%
b	Income from actual workings	11	23.4%	23.4%	23.4%
c	Average of a and b	8	17%	17%	17%
d	None of the above	23	49%	49%	49%
Total		47	100%	100%	100%

Responses displayed in table 5 show varying opinion in which a majority of the respondents numbering 23 or 49% declared none of the two sources nor even a combination of both of them as being capable of producing any income that can give reliable value opinion when capitalized. Some 5 of the respondents or 10.6% think that expected income based on annual workings can produce reliable opinion on capitalization. This opinion is however faulted by the fact that income from expected annual workings remains hypothetical

since it has hardly been achieved. Those who chose the actual workings as the best basis for realizing income which on capitalization will produce reliable opinion numbered 11 which translates to 23.4%. the volatile nature of the actual workings renders it unreliable. The incompatibility between the annual workings (which only exists on the paper on which it is written) and the actual workings which is very volatile makes the recommendation of the 8 respondents or 17% of the 47 respondent estate surveyors who have done valuation of mineral interests also unacceptable.

Estate Surveyors who have gained experience in the valuation of mineral rights by the income capitalization method were passionately requested to volunteer information on how best the income from the minerals can be adjusted to produce reliable value opinion when capitalized. Not more than 10 respondents answered this question. Out of the 10, only 2 recommendations were considered reasonable for trial. Out of the two recommendations, one suggested the adoption of the mean actual workings for a number of years but was not specific on the number of years. The next recommend a mean of 3 years to 5 years actual workings insisting that the more the number of years adopted, the more reliable the outcome will be.

Statisticians define the mean as the most frequently used measure of central tendency. Asika (1990) says that it is the best measure of centrality because the sum of the differences between data/observation values and the mean is zero. He added that because of the above characteristic, the mean value may be said to be the most typical value in any distribution. The mean value according to him is affected by the value of any observation both the low and the high. Alio (2008), while agreeing with the position of the mean as the best measure of central tendency added that the mean can be used to generalize the average performance of a population because it gives the combined performance of a group.

The followings are demonstration valuations based on

i. Income from expected annual workings
ii. Income based on mean actual workings using data obtained from two out of the case study industries:
    a. Crushed Rock Industries Limited- Ishiagu
    b. Freedom Express Group Limited, Ikpeshi, Akoko Edo

Data Presentation

CRUSHED ROCK INDUSTRIES

Table 6. rushed rock industries

YEARS	ANNUAL WORKINGS	MEAN ACTUAL WORKINGS	DEVIATION
2010	1,000,000	490,000	-510,000
2011	1,000,000	600,000	-309,000
2012	1,000,000	703,000	-400,000
2013	1,000,000	705,000	-297,000
2014	1,000,000	425,000	-295,000

Crushed Rocks Industries 2010

- Deposit = 30,000,000 tonnes
- Annual Workings = 1,000,000 tonnes/annum

- Calculated Mean
- Actual Workings = 585,000 tonnes/annum
- Market price = ₦5,000.00/tonnes
- Outgoings SummedUp @ 30% = 30% of income

Table 7

A – BASED ON ANNUAL WORKINGS	B - BASED ON MEAN ACTUAL WORKINGS
1000,000 tons/annum selling @ N5,000/ton	Actual workings = 584,600 tonnes/annum Approximately = 585,000
Gross Income = 5,000,000.00p.a	Selling @ N5,000.00/ton Gross Income ……. N2,921,000,000p.a
Less Outgoings @ 30% …… 0.7	Less Outgoings: @ 43% …. 57
Net Income N3,500,000.00	A deposit of 30 million tons being mined @ 585,000 tons/annum
YP 30yrs @ 15% & 4% … 5.9584	YP 51 yrs @ 15% and 4% … 6.3996
Capital Value μ_1 = N20,854,400,000	Capital μ_2 = **₦10,669,733,000**

Testing the Difference in the values of mineral lease of Crushed Rock Industries Limited

μ_1 = ₦20,854,400,000.00

μ_2 = ₦10,669,733.00

n1= 5, $\partial 1 = 0$

n2 =5 $\partial 2$ = ₦2,251,000

Step 1: H0: $\mu_1 - \mu_2 = 0$

H1: $\mu_1 - \mu_2 \neq 0$

Step 2: $\propto = 0.05$ (i.e 5%)

Step 3: Critical Values $Z\propto/2 = \pm 1.9$

Step 4: The test Statistic.

$$Z = \frac{(\mu_1-\mu_2) - 0}{\sqrt{\frac{\partial_1^2}{n1} + \frac{\partial^2_2}{n2}}}$$

i.e. $Z = \frac{(20,864,400,000 - 10,480,000,000) - 0}{\sqrt{\frac{0}{5} + \frac{2,251,000^2}{5}}}$

10,454,400,000

= (1,565.545)

1,565.545 > 1.96

Conclusion:

We therefore reject the null hypothesis and conclude that there is significant difference in the values of the interest (leasehold) determined based on the expected annual workings and the mean actual workings.

Table 8 Freedom Express Group Limited (Dolomite Industry) Ikpeshi, Akoko Edo

ANNUALWORKINGS	MEAN ACTUAL WORKINGS	DEVIATION
15,000 tons	**36,000 tons**	**-114,000 tons**
150.000 tons	**40,000 tons**	**-110,000 tons**
150,000 tons	**47,000 tons**	**- 103,000 tons**
150,000tons	**77,000 tons**	**-73,000tons**
150, 000tons	**106,000tons**	**-44,000tons**
	306,000 tons Mean Actual Workings = 61,200 tons	

Mineral in Deposit

25 yrs lease granted in 2007 @ an Annual Workings of 150,000 tons = 3,750,000 tons

Explanatory Note:

The Passage of 3 yrs (2007 to 2010) means that a total of 150,000 x 3 = 450,000 tons has been worked. Therefore balance of minerals in the Deposit =3,750.000 – 450,000 = 3,300.000 tons as at the end of December 2010 at an average actual working of 61,200 tons/annum it will take 3,300,000 ÷ 61,200 years = 54 years to exhaust.

Table 9. Valuation

ANNUAL WORKINGS	MEAN ACTUAL WORKINGS
150,000 tons/annum @ ₦2000/tons	61,200 tons/annum @ ₦2000/ton
Gross income – ₦300,000,000	Therefore, Gross Income … ₦122,400,000,000
Less Outgoings @ 20% …….. 80	Less Outgoings @ 49% (Details of expenditure on outgoings

	collected through oral interview of personnel) 0.51.
Net Income	Net Income ₦ 62,424,000.00
YP 23 years @ 15% & 4% … 5.6399	Therefore, YP 43 years @ 15% and 4%… 6.4321
(25 years lease granted in 2007) Capital Value = **₦1,353,567,000.00**	**Capital Value = ₦401,517,410.00**

μ1 = ₦1,353,567,000.00

μ1 = ₦401,517,410.00

n1= 5, ∂1 = 0

n2 =5, ∂2 = ₦13,116,482

Step 1: H0: μ1-μ2 = 0

H1: μ1- μ2≠0

Step 2: ∝ = 0.05 (i.e 5%)

Step 3: Critical Values Z ∝/2 =± 1.9

Step 4: The Test Statistic

$$Z = \frac{(\mu_1-\mu_2) - 0}{\sqrt{\frac{\partial_1^2}{n1} + \frac{\partial^2_2}{n2}}}$$

$$\text{i.e } Z = \frac{(1{,}353{,}567{,}000 - 401{,}517{,}410) - 0}{\sqrt{\frac{\partial 2}{5} + \frac{13{,}116{,}482^2}{5}}}$$

$$= \frac{952{,}049{,}590}{5{,}865{,}869.08}$$

= (16,20384)

16,2038> 1.96

Decision:

We therefore reject the null hypothesis and conclude that there is significant difference between the values of the leasehold interest based on the expected annual workings and the mean actual workings.

Summary of Test Statistics

$$S_2 = \sqrt{\frac{(490 - 585)_2 + (600 - 585)_2 + (703 - 585)_2 + (705 - 585)_2 + (425 - 585)_2}{5 - 1}}$$

$$= \sqrt{\frac{9025 + 225 + 13924 + 1440 + 25600}{4}}$$

= 125.67 tons

X 5,000

=**2,251,318.99**

$$S_2 = \sqrt{\frac{(36 - 61.2)_2 + (40 - 61.2)^2 + (47 - 61.2)_2 + (77 - 61.2)^2 + (106 - 61.2)^2}{5 - 1}}$$

$$= \sqrt{\frac{635.04 + 449.44 + 201.64 + 249.64 + 2007.04}{4}}$$

$$= \sqrt{\frac{35428}{4}}$$

= 29,760 x 1000
= 29,760

In the light of the analysis above, it really matters which of the figures one adopted in the valuation of the leasehold interest. Adopting the expecting annual workings figure which is rarely ever achieved by any mineral extracting company, will lead to overvaluation of the interest. This is because the figure is more or less a hypothetical one different from the actual or realistic figure based on the capabilities of the company concerned known as the actual workings. Because of the annual discrepancies in the actual workings, it is equally unsafe to rely on the actual workings for any given year, hence the decision to adopt the mean of the actual workings for a given number of years.

4.1 Hypothesis testing

The Chi-square was used to test the hypothesis formulated to guide the study result which is presented on Table 10

Table 10: Result of the difference between the value opinion by using income flow from annual workings and income from mean actual workings

S/N	Item Statements (Variables)	Strongly Agree		Agree		Unsure		Disagree		Strongly Disagree		d.f	X^2 Cal	X^2 tab	P-Value
		F	%	F	%	F	%	F	%	F	%				
1.	Actual workings differ from the annual workings indicate in the mining lease	36	53.7	17	25.4	4	6.0	5	7.5	5	7.5	4	56.20	0.711	<0.05
2.	Actual workings are usually lower than the annual workings	37	55.2	21	31.3	3	4.5	4	6.0	2	3.0	4	70.239	0.711	<0.05
3.	If there is always a big difference between the Annual Workings(Mineral Productions stated in the lease) and Actual Workings (Actual Mineral productions) would you agree that the income generated from the sales of the minerals will equally differ significantly.	38	56.7	13	19.4	7	10.4	4	6.0	5	7.5	4	60.090	0.711	<0.05

Decision Rule: Since the X2 cal (56.209, 70.239, 60.090) are greater than the X2 tab (0.711, d.f = 2), for the items, we reject the null hypothesis and accept the alternative. Therefore there is a significant difference between the two values.

The variability of the actual workings over the years means that even the income from the actual working lacks sufficient security – and could result to zero any year as a result of the menacing factors which impact on the income. To base income on the annual workings is wrong because the annual workings are hardly ever achievable in reality. All the valuations carried out by consultant Estate Surveyors who made copies of their valuation available to us relied on expected annual workings as the source of the income which they capitalized. One of the Industries among the case studies has not been producing for the past five months as a result of the breakdown of their Jaw Crusher which has defied repair efforts. It is estimated that it will cost more than ***₦100,000,000.00 (Hundred Million Naira***) to procure a new one.

For this industry, this year's mineral production will be abysmally low and the income resulting from its sale will be correspondingly low. To base valuation of the industry on the capitalization of such income will be gross under valuation. It is proper to stress that one of the mistakes many estate surveyors make is their non realization that annual workings though occasionally stated in the lease is only a guide used in fixing the term of the lease and not that it must be produced every year of the lease duration. Briton (1980) actually said that the main intention of the parties (lessor and lessee) in fixing a mining lease is to enable the lessee to as much possible exhaust all the minerals in the reserve leased to him. This is why it is mandatory when applying for a mining lease for the applicant to get all the relevant information from the Mining Cadastre Office especially the proved quantity of minerals in the reserve he is applying for. These he must adopt in the feasibility report which he will submit and will equally indicate the capacity of the plant and equipment as well as the strength of the staff he will put together. All these will reveal the level of production the Industry will likely be making annually. This estimated production capacity (as adjusted by experts in the Mining Cadastre Office) that the office applies to the estimated quantity of minerals in the reserve will determine the number of years (duration) it will take the applicant to exhaust the minerals in the reserve. This then is the lease term.

5. CONCLUSION

It is not safe to base the income to be capitalized on annual workings because it is almost unrealizable and therefore lacks security neither is it safe to base it on actual workings because of its irregularity. In situations of varying income, population or figure, statisticians have always advocated the adoption of the mean for providing a safe and reliable figure to work with. Such figures must however be based on actual incomes.

6. RECOMMENDATIONS

Conclusions were drawn based on the findings made in this research after the findings have been discussed with reference to some underlying principles. Valuation principles state that security and regularity of income are key factors in the adoption of such income for valuation in order to achieve reliable and credible value opinion from such exercise. Based on the findings, the study finally recommends the adoption of the Mean Actual Workings as basis for the derivation of income to be used in valuations by the Income Capitalization Method.

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