

A COMPARATIVE STUDY ON THE EFFECT OF ENVIRONMENTAL FACTOR (E-FACTOR) MODEL ON ANAMMCO AND NIGERGAS ENUGU, NIGERIA

Aniagolu Celestine Obinna (PhD)

Department of Estate Management, Enugu State University of Science and Technology (ESUT) Enugu, Nigeria.

Abstract: *Environmental pollution is one phenomenon that is generally associated with industries in Nigeria. Estate Surveyors and Valuers whose responsibility it is to value all categories of properties in Nigeria have been charged with development of models that would take into consideration environmental pollution tendencies of industries and other facilities generation waste in Nigeria. The E-factor model was developed. The model adopts both the experimentation and survey research method. This study tries to carry out a comparative study on the effect of E-factor on ANAMMCO, a factory with international repute, and NIGERGAS, an indigenous factory. The result shows that while ANAMMCO lost ₦55,337,436 representing 2.09% of the original value NIGERGAS lost ₦16,266,020 representing 14.54% of its original value. This off course shows that ANAMMCO is better equipped than NIGERGAS in terms of environmentally friendly practices. The study therefore recommends that local industries in Nigeria should be properly supervised and that the E-factor model should be used extensively by valuers in practice in Nigeria if they will continue to play the role of environmental protection advocates.*

Keywords: *Environment, Pollution, Environmental Factor, Valuation, Model, Environmental Pollution, ANAMMCO, NIGERGAS*

1.0 Background of the Study:

The twin issues of Environmental management and sustainable development have been the focus of the world for past two or three decades. According to Lead (1997) proponents of these issues have called for a Systems Approach, since no profession, no matter how well trained can claim an exclusive expertise in them. Supporting this view, Ogunba (1999) called for a multi-disciplinary approach in which all professionals should contributed their quota towards making the world a better place.

In Nigeria, the Estate Surveyor and Valuer is the professional whose responsibility it is to interpret the value of all categories of properties for various purposes. In carry out his valuation duties, he depends very much on models developed many decades ago by scholars in Europe and other parts of the world. These models may include the investment method, cost approach, market approach as the primary methods and the residual method and profit basis method as the secondary or hybrid methods. These models according to Aniagolu (2009) have implicit environmental considerations in the form of neighbourhood analysis.

In the face of the world's current focus on environment, these models are considered inadequate for valuation of industries and other facilities generating waste in Nigeria. Advocates of environmental protection in Nigeria then called for models that can consider environmental damages caused by industries and other facilities generating waste and reflect such damages in the final value of industries or facilities. In response to this call Aniagolu (2009) developed the Environmental factor adjusted cost approach to valuation. Aniagolu, Iloeje and Emoh (2015) demonstrated the workability of the model which includes data collection and analysis procedure. Aniagolu, Iloeje and Okwu-Delunzu (2015) applied the model to the valuation of Anambra Motor Manufacturing Company (ANAMMCO) while Aniagolu, Iyi and Ugwu (2015) valued NIGERGAS Company Limited Enugu, Nigeria using the same model.

Against this background, this study focuses on comparing the effect of the model on the two companies.

2.0 Statement of Problem

Anambra Motor Manufacturing Company of Nigeria (ANAMMCO) is a company with international repute. Ownership of the company cuts across international boundaries. Its products are marketed internationally and its staff includes expatriates. By all standards the company has an international reputation. Conversely, NIGERGAS Company of Nigeria is a local company. It is fully owned by Nigerians, its product circulates within the country and there are no expatriates in its staff list. Previous study by Aniagolu, Iloeje and Okwu-Delunzu (2015) had valued ANAMMCO using both the conventional model (Cost Approach to Valuation) and the new model (The Environmental Factor Adjusted Cost Approach to Valuation). Similarly, Aniagolu, Iyi and Ugwu (2015) equally valued NIGERGAS Company of Nigeria using both the conventional model and the E-

factor models. This study therefore tries to compare the effect of the new model (E-factor models) on the two companies bearing in mind that one (ANAMMCO) has an international background while the other (NIGERGAS) has a local background.

3.0 Aim and Objectives of the Study

The aim of this study is to compare the effect of the E-factor model on both ANAMMCO and NIGERGAS. In order to achieve this aim the study will first summarize the valuation of ANAMMCO and NIGERGAS using both the conventional method and the E-factor model. Second, the study would compare results from the two valuations so that inferences can be drawn.

4.0 Methodology

This study adopts the descriptive research methodology drawing its analogy from previous works by Aniagolu, Iyi and Ugwu (2015) and Aniagolu, Iloeje and Okwu-Delunzu (2015). However majority of the data used in these previous studies were generated using the survey and experimentation research methodology.

5.0 ANAMMCO and NIGERGAS Compared

5.1 ANAMMCO

Aniagolu, Iloeje and Okwu-Delunzu (2015) quoting Aniagolu (2009) and MB ANAMMCO (1994) described in details the important features of ANAMMCO. This section will also try to summarize these features.

ANAMMCO as at 2009 when the field work for this study was done is 40% owned by Daimler BenzAG/Mercedes-Benz AG of Germany and 60% owned by different categories of Nigerians at both corporate, state and federal levels. The company leads in the motor assembly market in Nigeria and has attained of 65% local content. The products of the company include trucks of different types and sizes, buses of different capacities (especially commercial buses), fire fighting vehicles, Ambulances, Mobile Clinics and Refuse Disposal Vehicles. The company is also into refurbishment of old cars. These products are marketed both locally and internationally through some acclaimed dealers, distributors and agents.

ANAMMCO as at 1994 has a staff strength of 794 workers which includes about 12 expatriates. The company has a viable staff welfare scheme which covers a medical clinic, staff canteen, staff club (recreational facilities) and a football team. The management of the company is organized at three important levels viz, the Board of Trustees, the Management Committee members and the heads of department.

The company operates two major parallel lines of production namely the body shop and the chassis section. Details of these, as mentioned before have been presented by Aniagolu, Iloeje and Okwu-Delunzu (2015). The company operates a viable waste management system and has an Effluent Treatment Plant (ETP) which comprises an oxidation tank, a biological tank and an equalizing tank all of which are of international standard. Industrial kits such as boots, helmets, overalls, gloves and goggles are provided for members of staff and are strictly enforced. ANAMMCO has a fire station and fire extinguishers and fire alarms are strategically located in the company.

5.2 NIGERGAS

Conversely, Aniagolu, Iyi and Ugwu (2015) quoting NIGERGAS (1980) and Aniagolu (2009) equally described in details the important features of NIGERGAS Company Emene, Enugu, Nigeria. A summary of these features would be attempted in this section.

As at 2009 when the field work for this study was done NIGERGAS company of Nigeria is 100% owned by Enugu State Government. Although the company started as a partnership business between the former Eastern Nigerian Government and Siad Machine Impianti of Italy in 1962, the 1967 Biafran Civil war saw the withdrawal of the foreign partners. NIGERGAS as the name implies specializes in the production of gases such as welding or processing oxygen, medical oxygen, nitrogen, and Acetylene gases. Apart from calcium carbide which was imported from Europe all the other raw materials are locally sourced.

Management of NIGERGAS is at two levels namely the General Manager/Chief Executive Officers and the various Heads of department. The products of the company are marketed locally through distributors and agents. The staff strength of the company as at 2009 is less than 100. When compared to ANAMMCO, the company has no expatriates, no staff welfare scheme such as medical clinic, staff canteen, staff club (recreational facilities) and football club. The company also operates two major lines of production namely the Oxygen plant and the Acetylene plant. Details of this have been discussed by Aniagolu, Iyi and Ugwu (2015). The solid waste management system of the company is not well defined and the effluent recycling plant is not functional at the time of the study. However an improvised system consisting of four septic/sedimentation tanks were in use. Also industrial kits such as boots, helmets, overalls, gloves and goggles were not in use and are therefore not enforced. NIGERGAS has no fire station. Rather, sand buckets and fire extinguishers were in use.

Majority of the fire extinguishers are either not functional or outdated. Fire alarms are completely not in existence.

When the two companies are compared using the discussion in section 5.0, it can be concluded that ANAMMCO is a company with international reputation while NIGERGAS is a local company.

6.0 Valuation of ANAMMCO and NIGERGAS Using the Conventional Method

The conventional valuation method adapted for the valuation is the Cost Approach to Valuation. According to Egolum (1993) the method is founded on the principles of substitution and contribution. Kalu (2002) went further to state that the method is best used in situations where the market approach is unsuitable and the investment method is inapplicable. Dean, Gray and Steel (1986) then stated the types of properties where this method of valuation can be applied as follows; special purpose industrial properties, service properties such as schools, hospitals, churches etc (where comparable sales evidence is not available), any other types of properties where there is no rent passing and there are no comparable sales evidence.

Aniagolu (2009) presented the Cost Approach to Valuation mathematically as follows:

$$CV = V_L + [(V_{BI} + V_{PME} + V_{FF} + V_{MV}) - D]$$

Where:

| | | |
|------------------|---|--|
| CV | = | Capital Value |
| V _L | = | Value of Land |
| V _{BI} | = | Replacement Cost (New) of Buildings and other Improvements |
| V _{PME} | = | Replacement Cost (New) of Plant, Machinery and Equipment |
| V _{FF} | = | Replacement Cost (New) of Furniture and Fittings |
| V _{MV} | = | Replacement Cost (New) of Motor Vehicles |
| D | = | Accrued Depreciation |

6.1 Valuation of ANAMMCO Using the Conventional Method

Aniagolu, Iloje and Okwu-Delunzu (2015) quoting Aniagolu (2009) and Okolo Okolo and Company (1995) presented a summary of the valuation of assets of ANAMMCO as at 11th day of August 1995 after deductions have been done for depreciation as shown in table 1

Table 1: Summary of Valuation of Assets of ANAMMCO

| S/N | Description of Assets | DRC of Assets |
|-----|-----------------------------|----------------|
| 1 | Land | ₦90,396,000 |
| 2 | Building & Improvements | ₦2,171,571,200 |
| 3 | Motor Vehicles | ₦92,468,000 |
| 4 | Plant Machinery & Equipment | ₦214,962,200 |
| 5 | Furniture & Fittings | ₦70,362,300 |
| | Total | ₦2,639,759,700 |

Source: Okolo, Okolo and Company (1995)

6.2 Valuation of NIGERGAS Using the Conventional Method

Similarly, Aniagolu, Iyi and Ugwu (2015) quoting Frank Maluze and Associates (2001) equally presented a summary of the valuation of Assets of NIGERGAS as at 12th September 2001, after deductions have been made for depreciation as shown in table 2.

Table 2: Summary of Valuation of Assets of NIGERGAS, Emene, Enugu.

| S/N | Description of Assets | DRC of Assets |
|-----|-----------------------------|---------------|
| 1 | Land | ₦10,608,000 |
| 2 | Building & Improvements | ₦44,106,000 |
| 3 | Motor Vehicles | ₦10,020,000 |
| 4 | Plant Machinery & Equipment | ₦39,595,000 |
| 5 | Furniture & Fittings | ₦7,517,000 |
| | Total | ₦111,846,000 |

Source: Frank Maluze and Associates (2001).

From the above valuations it could be seen that while the assets of ANAMMCO command a value of ₦2,639,759,700 (Two Billion, Six Hundred and Thirty-Nine Million, Seven Hundred and Fifty-Nine Thousand Seven Hundred Naira), that of NIGERGAS command a value of ₦111,846,000 (One Hundred and Eleven Million, Eight Hundred and Forty-Six Thousand Naira). It could be seen from the above that the assets of

NIGERGAS represent only about 4.24% of the Assets of ANAMMCO. This goes further to confirm the fact that ANAMMCO has assets of international reputation while NIGERGAS is only a local company.

7.0 Shortcomings of the Valuation of ANAMMCO and NIGERGAS Using the Conventional Method

Aniagolu (2009) discussed the shortcomings of the two valuations done with the conventional valuation method as follows:

7.1 Air Pollution

According to World Bank (1978), “air pollution is the presence in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odour, smoke or vapour in quantities, characteristics and duration as to make them actually or potentially injurious to human, plant or animal life or property or which unreasonably interfere with the comfortable enjoyment of life and property”. Hence, the model did not consider the ability of the industry to produce air pollution agents.

7.2 Water Pollution

Again the model did not take into consideration the water pollution tendencies of these industries. Since effluent discharge from the industrial processes if not properly treated would definitely pollute nearby water bodies. Hence the model did not also consider such water pollution parameters as colour, odour, pH conductivity, total solids, dissolved solids, suspended solids, acidity, alkalinity, calcium, magnesium, total hardness sodium, potassium, copper, zinc, iron, manganese, lead, chloride, sulphate, nitrate, dissolved oxygen, BOD, COD, E-Coli, Coliform, oil/grease, total plate count, etc.

7.3 Soil Pollution / Solid Waste Management

Also the model made no provision for assessment of level of solid waste management in the industries. Solid waste management involves solid waste generation, collection, disposal and resource recovery. Hence, the model did not consider the possibility of soil contamination from solid waste from industrial process. The soil analysis should have been in the form of Soil Element analysis to determine the level of calcium (Ca), Magnesium (Mg), Sodium (Na₂), Iron (Fe), Aluminium (Al), Lead (Pb), Zinc (Zn), Copper (Cu), Manganese (Mn), Silica (Si), Loss on Ignition (LOI), Titanium (Ti) and Cadmium (Cd).

7.4 Noise Pollution

Noise has been defined by Auton (1979) as “an unwelcome sound”. Noise pollution can come from automobiles, human activities, industrial and commercial activities, railways, tramp-ways, building/construction activities, etc. The existing valuation model does not take into consideration the noise pollution tendencies of industrial processes.

7.5 Industrial Health and Safety

Furthermore, Industrial Health and Safety is of utmost importance to modern day industries. Industrial accidents are usually fatal and attract serious criticism especially where safety measure were not taken seriously. The existing models does not consider the issue of industrial safety and the ability of the industry to provide Health and Safety facilities/ gadgets by way of clinics, helmets, boots, overalls, hand gloves, respirators, ear plugs, nose masks, fire alarm systems, fire fighting system, etc.

8.0 Valuation of ANAMMCO and NIGERGAS Using the Environmental Factor (E-Factor) Adjusted Cost Approach to Valuation

The E-factor model was well explained by Aniagolu, Iloeje and Emoh (2015). The data collection procedure and the data analysis method were clearly discussed. The model as propounded by Aniagolu (2009) is a follows:

$$CV = V_L + V_{BI} + V_{FF} + [(V_{PME} + V_{MV}). E\text{-factor}]$$

Where:

CV = Capital Value of Industry

V_L = Value of Land

V_{BI} = Depreciated Replacement Cost of Buildings and Improvements

V_{FF} = Depreciated Replacement Cost of Furniture and Fittings

V_{PME} = Depreciated Replacement Cost of Plant, Machinery and Equipment

V_{MV} = Depreciated Replacement Cost of Motor Vehicles

E-Factor = Rate of Compliance of the Industry to Environmental Standards

A COMPARATIVE STUDY ON THE EFFECT OF ENVIRONMENTAL FACTOR (E-FACTOR)

Aniagolu, Iloeje and Okwu-Delunzu (2015) applied the E-factor model to the valuation of ANAMMCO. Similarly, Aniagolu, Iyi and Ugwu (2015) valued NIGERGAS using the E-factor model. A summary of the result from the E-factor analysis is presented in table 3.

Table 3: Summary of Result from E-factor Analysis from ANAMMCO and NIGERGAS

| S/No. | Parameters | ANAMMCO | | NIGERGAS | |
|-------|------------------------------|-------------------|-----------------------|-------------------|-----------------------|
| | | Compliance Rate % | Non Compliance Rate % | Compliance Rate % | Non Compliance Rate % |
| 1 | Air Quality | 16.67 | 3.33 | 16.67 | 3.33 |
| 2 | Effluent Discharge | 12.65 | 7.35 | 9.45 | 10.55 |
| 3 | Solid Waste Management | 8.50 | 1.50 | 4.50 | 5.50 |
| 4 | Soil Quality | 8.75 | 1.25 | 10.00 | 0.00 |
| 5 | Noise | 16.67 | 3.33 | 20.00 | 0.00 |
| 6 | Industrial Health and Safety | 18.80 | 1.20 | 5.60 | 14.40 |
| | Total | 82.04 | 17.96 | 66.22 | 33.78 |

Source: Aniagolu (2009)

From table 3 it could be seen that the E-factor analysis for the two companies / factories were done under six parameters namely, Air Quality, Effluent Discharge, Solid Waste Management System, Soil Quality, Noise Pollution, and Industrial Health and Safety.

For Air Quality out of the 20 points allocated to air quality ANAMMCO has a rate compliance of about 16.67 points while the rate of non-compliance is 3.33 points. Comparatively, NIGERGAS has a rate of compliance of the same 16.67 points and a rate of non-compliance of 3.33 point. This shows that the air quality of ANAMMCO and NIGERGAS are exactly the same.

Again, the model assigned 20 marks to effluent discharge quality. From the analysis carried out under E-factor, ANAMMCO made 12.65 points as its rate of compliance while 7.35 points is the rate of non-compliance. Conversely, NIGERGAS rate of compliance stands at 9.45 points while the rate of non-compliance is 10.55%. This shows that ANAMMCO Effluent Treatment Plant (ETP) is working effectively giving the company superior points over NIGERGAS company. Hence the rate compliance of ANAMMCO is far higher than that of NIGERGAS.

It terms of solid waste management system, ANAMMCO made 8.50 points out of the 10 marks assigned by the model, while it recorded a rate of non compliance of 1.5 points. This shows that ANAMMCO has a very active and self-sustaining solid waste management system. When compared with NIGERGAS, a rate of compliance of 4.5 points was recorded while a rate of non-compliance of 5.50 points was recorded. This equally shows that the solid waste management system of NIGERGAS leaves much to be improved upon. Closely related to solid waste management is the soil quality analysis which the model assigned another 10 marks. After the soil quality analysis, ANAMMCO secured a rate of compliance of 8.75 points and lost a rate of non-compliance of 1.25 points. This attests to the fact that ANAMMCO's soil quality is commendable although there is room for improvement. In comparison with NIGERGAS, the rate of compliance to acceptable soil quality is 10.0 full points while the company lost no mark at all. This shows that NIGERGAS's soil quality is in a very good shape. Hence the company only needs to conserve the existing soil quality to avoid contamination.

Noise level was also considered by the model and about 20 marks was assigned to it. At the end of our analysis, ANAMMCO pulled a rate of compliance of 16.67 points and a rate of non-compliance of 3.33 points. The company lost marks because the noise level at the power generating set area was higher than normal. Surprisingly, NIGERGAS scored full 20 marks under noise quality. This can equally be attributed to the fact that the level of activities in the company has quite diminished at the time of the field work and the power generating set which would have increased the noise level is not working.

Finally, for Industrial Health and Safety, the model also assigned 20 marks. ANAMMCO made a total rate of compliance of 18.80 points and a rate of non compliance of 1.20 points. Hence, ANAMMCO attaches very high importance to industrial health and safety. In contrast, NIGERGAS pulled a rate of compliance of 5.60 points and a rate of non-compliance of 14.40 points. This result is a very good evidence that NIGERGAS still has a lot to improve upon in terms of industrial health and safety. From the above it could be seen that ANAMMCO has a total rate of compliance of 82.04 points and a total rate of non-compliance of 17.96 points while NIGERGAS has a total rate of compliance of 66.22 points and a total rate of non-compliance of 33.78 points.

8.1.0 Revaluation of ANAMMCO and NIGERGAS Using the E-Factor Model

As stated earlier Aniagolu, Iloeje and Okwu-Delunzu (2015) applied the E-factor model to the valuation of ANAMMCO while Aniagolu, Iyi and Ugwu (2015) valued NIGERGAS using the E-factor model too. The summary of the two valuations is presented in the sections below.

8.1.1 ANAMMCO

The summary of the valuation is as shown below:

$$CV = V_L + V_{BI} + V_{FF} + [(V_{PME} + V_{MV}) \cdot E\text{-factor}]$$

Where:

CV = Capital Value of Industry

V_L = Value of Land

V_{BI} = Depreciated Replacement Cost of Buildings and Improvements

V_{FF} = Depreciated Replacement Cost of Furniture and Fittings

V_{PME} = Depreciated Replacement Cost of Plant, Machinery and Equipment

V_{MV} = Depreciated Replacement Cost of Motor Vehicles

E-Factor = Rate of Compliance of the Industry to Environmental Standards

Hence, valuation of assets of MB-ANAMMCO, Enugu, Nigeria using the E-factor model is as follows:

$$\begin{aligned} CV &= \text{₦}90,396,000 + \text{₦}2,171,571,200 + \text{₦}70,362,300 + [(\text{₦}214,962,200 + \text{₦}92,468,000) \times 0.82] \\ &= \text{₦}90,396,000 + \text{₦}2,171,571,200 + \text{₦}70,362,300 + [\text{₦}307,430,200 \times 0.82] \\ &= \text{₦}90,396,000 + \text{₦}2,171,571,200 + \text{₦}70,362,300 + \text{₦}252,092,764 \\ &= \text{₦}2,584,422,264 \end{aligned}$$

This shows a loss of value of ~~₦~~ 55,337,436.

8.1.2 NIGERGAS

Similarly, the summary of the valuation of NIGERGAS using the E-factor model is as follows:

$$CV = V_L + V_{BI} + V_{FF} + [(V_{PME} + V_{MV}) \cdot E\text{-factor}]$$

Where:

CV = Capital Value of Industry

V_L = Value of Land

V_{BI} = Depreciated Replacement Cost of Buildings and Improvements

V_{FF} = Depreciated Replacement Cost of Furniture and Fittings

V_{PME} = Depreciated Replacement Cost of Plant, Machinery and Equipment

V_{MV} = Depreciated Replacement Cost of Motor Vehicles

E-Factor = Rate of Compliance of the Industry to Environmental Standards

Therefore, valuation of NIGERGAS using the E-factor model is as follows:

$$\begin{aligned} CV &= \text{₦}54,714,000 + \text{₦}7,517,000 + [(\text{₦}39,595,000 + \text{₦}10,020,000) \times 0.662] \\ &= \text{₦}54,714,000 + \text{₦}7,517,000 + [\text{₦}49,615,000 \times 0.662] \\ &= \text{₦}54,714,000 + \text{₦}7,517,000 + \text{₦}32,845,130 \\ &= \text{₦}95,579,980 \end{aligned}$$

This shows a reduction in value of about ~~₦~~16,266,020 (Sixteen Million, Two Hundred and Sixty Six Thousand and Twenty Naira) and 14.54% loss of value.

9.0 Summary of Valuation of ANAMMCO and NIGERGAS Using both Methods

The summary of the valuations for ANAMMCO and NIGERGAS using the conventional Cost Approach to Valuation and the E-factor model is as presented in table 4.

Table 4: Summary of the Valuations for ANAMMCO and NIGERGAS

| S/N | Parameters | ANAMMCO | NIGERGAS |
|-----|-------------------|---------------|-------------|
| | | ₦ | ₦ |
| | Valuation Method | | |
| 1. | DRC Model | 2,639,759,700 | 111,846,000 |
| 2. | E-factor Model | 2,584,422,264 | 95,579,980 |
| 3. | Decrease in Value | 55,337,436 | 16,266,020 |
| 3. | Rate of Decrease | 2.09% | 14.54% |

Source: Aniagolu (2009)

A COMPARATIVE STUDY ON THE EFFECT OF ENVIRONMENTAL FACTOR (E-FACTOR)

Table 4 shows that the difference in value arising from the application of two models in ANAMMCO is ₦55,337,436 (Fifty Five Million, Three Hundred and Thirty Seven Thousand, Four Hundred and Thirty Six Naira). This represents a loss of value of 2.09% arising from the application of the new models. Hence, ANAMMCO lost ₦55,337,436 in the value of its assets because it is 17.96 points away from attaining international best practices in environmental protection. For NIGERGAS, it could also be seen that a loss of value of ₦16,266,020 (Seventeen Million, Two Hundred and Sixty Six Thousand and Twenty Naira). This represents a loss of value of 14.54%. So NIGERGAS lost ₦16,266,020 in the value of its assets because it is 33.78 points away from international best practices.

10.0 Discussion of Findings

ANAMMCO and NIGERGAS companies have been valued using both the conventional cost approach to valuation and the environmental factor adjusted cost approach (E-factor model) to valuation. The results show that ANAMMCO is 82.04% compliant to environmental standards and 17.96% non-compliant. Similarly, NIGERGAS is 66.22% compliant to environmental standards while the company is 33.78% non-compliant.

When interpreted in terms of value, ANAMMCO on one hand recorded a ₦55,337,436 loss of value when the valuation figures for the conventional cost approach was compared with of the E-factor model. This represents a loss of value of 2.09%. On the other hand, NIGERGAS recorded a loss of value of ₦16,266,020 when the valuation figures from the two models were compared. This equally represents a 14.54% loss in value.

When the results are placed side by side, it could be seen that ANAMMCO is more environmentally friendly than NIGERGAS. Also ANAMMCO has more valuable assets when compared to that of NIGERGAS since assets of NIGERGAS represent only about 4.24% of that ANAMMCO. Hence, in size ANAMMCO is a bigger company than NIGERGAS.

Further, ANAMMCO is only about 17.96% away from attaining international best practices on Environmental Standard while NIGERGAS is about 33.78% away from same. This shows that NIGERGAS still has a lot of work to do in terms of installation of pollution of abatement equipments in the company. This is very necessary in terms of Air and Water pollutions and solid waste management system. The noise and soil quality levels need to be conserved properly since they are so far excellent.

Finally, in terms of industrial health and safety, NIGERGAS is still very far behind when compared to ANAMMCO. Safety precautions in terms of hand gloves, helmets, boots, overalls, ear plugs, nose masks, fire alarms, respirators, firefighting equipments, clinics etc need to be embraced by management of the company and a safety manager be employed for enforcement.

12.0 Conclusion

In conclusion, the Estate Surveyor and Valuer should continue playing her role as an environmental protection advocate in Nigeria. The E-factor model should be adopted in the valuation of industries and other facilities generating waste in Nigeria. This will help reduce the general over-valuation of properties that are not environmentally sound in Nigeria.

REFERENCES

- [1] Lead International Inc. (1997); Costa Rica Case Study and Sustainable Development. LEAD International Inc. New York.
- [2] Ogunba, A. O. (1999); Environmental Resource Valuation: New Challenges for Estate Surveyors and Valuers in 21st Century. A Paper Presented During 1999 NIESV National Conference in Calabar.
- [3] Aniagolu, C.O. (2009); A Model for Integrating Environmental Considerations into the Valuation of ANAMMCO and NIGERGAS in Emene Industrial Layout, Enugu Nigeria. An Unpublished Doctorial Research Thesis, ESUT, Enugu.
- [4] Aniagolu, C.O, Iloeje, A. F and Emoh, F. I.(2015); A Model for Integrating Environmental Considerations into the Valuation of Industries in Enugu Urban Area, Nigeria. International Journal of Engineering Research and Application Vol.5, Issue 6 (Part-3) June, 2015.
- [5] Aniagolu, C.O, Iloeje, A. F and Okwu-Delunzu, V. (2015); Application of Environmental Factor Model to the Valuation of Anambra Motor Manufacturing Company (ANAMMCO) Enugu, Urban Area, Nigeria. International Journal of Engineering Research and Application Vol.2, Issue 8 August, 2015.
- [6] Aniagolu, C.O, Iyi, E. A and Ugwu, L. N.(2015); Valuation of NIGERGAS Company, Emene, Enugu, Nigeria using the Environmental Factor (E-Factor) Model. International Journal of Latest Research and Technology Vol.1, Issue 3 August, 2015.
- [7] NIGERGAS (1980); Key Facts about NIGERGAS Company Limited. Industrial and Medical Gas Producers” Information Leaflet, Enugu, Nigeria.
- [8] Egolum, C. C. (1993); “Real Estate Valuation Theories and Practice in Nigeria” The Estate Surveyor and Valuer, Vol.17 No.1 Pp.31 – 38.

A COMPARATIVE STUDY ON THE EFFECT OF ENVIRONMENTAL FACTOR (E-FACTOR)

- [9] Kalu, I.U. (2002); *Valuation: An Economic Contribution to Environmental Degradation Remediation. The Estate Surveyor and Valuer*, Vol.25, No.1, pp26-31.
- [10] Deane, T.M., Gray, R.N. and Steel, H.W. (1986); *Real Estate Valuation*. Progress, Publishing House, Enugu, Nigeria.
- [11] Frank Maluze & Associate (2001); Report on Valuation of Assets of NIGERGAS Limited, Emene, Enugu Nigeria. December 2001
- [12] Okolo, Okolo and Company (1995); Mercedes-Benz ANAMMCO Emene, Enugu Asset Valuation Report. September, 1995.
- [13] World Bank Report (1978); "Water Supply and Waste Disposal" Poverty and Basic Needs Series, September,1978.
- [14] Aution, J. T. (1979); "Occupational Safety and Health Management" MacGraw-Hall Book Co. London.
- [15] MB ANAMMCO (1994); Mercedes-Benz ANAMMCO at a Glance. Information Leaflet, Enugu, Nigeria.