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The Impact of Environmental Accounting and Reporting on Sustainable Development in Nigeria

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Abstract
The consumption of natural resources and incessant emissions of greenhouse gases in Nigeria are on the increase, and stakeholders are agitating increased information on organizations' interactions with the environment. The study evaluated the relationship between environmental accounting and reporting and sustainable development in Nigeria. Pearson correlation coefficient and OLS were used for data analyses, and was discovered that there is a significant relationship between environmental accounting and reporting and sustainable development; that with environmental accounting encourage organizations to track their GHG emissions and other environmental data against reduction targets, and there are consequences for noncompliance with environmental accounting and reporting. It was recommended that acceptable standard such as ISAR be acknowledged and Graphical indicators be adopted illustrating to users on timely basis whether the organization is performing above, below, or in-line with the targets so that corrective actions can be taken as needed to successfully execute on sustainability initiatives.
Keywords: Environmental Accounting, Sustainable Development, Ozone Layer Depletion, Green House Gases (GHG), Water Usage, Material Use, Energy Usage.

1.0 Introduction

Most environmental degradations and emissions are anthropogenic, an advent traceable to the industrial revolution of late 18th century where economic activities in many communities moved from agriculture to manufacturing. Production shifted from its traditional locations in the home and the small workshop to factories. The overall amount of goods and services produced expanded dramatically. New groups of investors, businesspeople, and managers took financial risks and reaped great rewards.

In the long run the industrial revolution has brought economic improvement for most people in industrialized societies. Many enjoy greater prosperity and improved health. There have been costs, however. Industrialization has brought factory pollutants and greater land use, which have harmed the natural environment (Mastrandrea and Schneider, 2008). In particular, the application of machinery and science to agriculture has led to greater land use and, therefore, extensive loss of habitat for animals and plants. These factors, in turn, have caused many species to become extinct or endangered.

Indeed, the use of natural resources including energy is indispensable to economic development, (Akinbami and Adegbulugbe, 1998), and not devoid of environmental consequences as traceable to the environmental degradation and atmospheric pollution experienced in Nigeria. Yet, Nigeria as a developing country must continue to advance economically and this requires increased exploitation of natural resources. Evidentially, there exist a polarity between Nigeria's GDP and energy consumption, as they are highly correlated. But the exposure here is that, most of the natural resources consumed are nonrenewable and are under threat of depletion, and a persistence consumption of our most valued natural resources in present-day, would compromise the ability of future generations to meet their own needs.

Recently, there have been increased hue and cry about climate change in the world, as it has been highly inimical to our existence; ocean levels keep rising, global warming keeps threatening; yet, natural resources like the forest, serving as natural processor that regulates an appealing atmosphere is being cut down, and the capacity of trees which removes carbon dioxide from the earth is being diminished. According to Uwaegbulam (2011), major parties have been at loggerheads for years and warning as climate disasters are becoming direr.

Ban (2007), in his address at the release of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Synthesis Report, said that "slowing and reversing these threats posed by climate change are the defining challenge of our age". The primary way companies can contribute to solutions is to reduce carbon dioxide and other greenhouse gas emissions in their own operations and supply chains. Consequently, corporate climate reporting on carbon emissions has become a major focus, as disclosure prompts corporate responsibility – in this instance, GHG emissions reduction.

There are positive indicators of environment accounting practices in companies and business organizations in developing countries, yet the practice of environment accounting is not serious enough, as there are no specialized activities in companies or factories to apply it, nor is there planning or research to specially target and define the consumers, public, or owners' needs. Rather, the practice is carried out in an improvised and random manner.

Accounting technology which is expected to keep up with societal demands and proffer solution to socio-economic and environmental challenges is advocating environmental accounting: a panacea for sustainable development, as this paper would underscore.

To this end, the following questions are proposed:

Questions1: Will environmental accounting and reporting accentuate sustainable development in Nigeria?

Question2: Will environmental accounting and reporting prompt compliance with societal expectations of the environment?

Question3: Are there consequences to noncompliance with environmental accounting and reporting?

The associated hypotheses include:

1. H_0: There is no significant relationship between environmental accounting and reporting and sustainable development in Nigeria.
2. Ho: There are no consequences to non-compliance with environmental accounting and reporting.

2.0 Literature Review

2.1 Sustainable Development

Sustainable development design systems ensure the Bio diversity and life support for healthy ECO systems. Healthy ECO systems translate to our health and future survival, simply because human beings are a smaller aspect of a larger ecology. Unsustainable development began when the conception of progress was defined as industrial growth and economic expansion. The education system and public relations campaign promoted "consumption". Corporate priorities were allocated to profit through what can only be described as "inappropriate technologies". Through systems, manufacturing and construction that today still causes acid rain, ozone depletion, and climate change and leaves a toxic aftermath that permanently affect humans and Eco immune systems (Damanhur, 1991).

Sustainable development is a design involving a social, economic and environment that meets the needs of the present without compromising the ability of future generations to meet their own needs. This is not a new concept. The native American Iroquois confederacy has a tenet it mandates its chiefs to follow, one to which people today are now paying attention to; It simply states that a chief must consider how each of his actions will affect his descendants seven generations into the future. At present the goals of this design are being sort after by the United Nations and are implied by governments. To Zimmerman (2008), the UNEP is the tool of the UN in encouraging sustainable development—increasing standards of living without destroying the environment.

Esan (1998) was of the view that sustainable development is concerned with technologies for pollution reduction; monitoring of technologies to optimize energy mix; peoples' participation in environmental degradation; modern technologies of biomass, wind, solar energy, thereby reducing the ecological and environmental hazards and risk emanating from the use of fossil fuel and nuclear energy in Nigeria.

2.2 Environmental accounting

Environmental accounting covers information relating to all aspects of the environment. It includes environment-related expenditure, environmental benefits of products and details regarding sustainable operations (Irish times, 2000).

According to the world conservative union (n. d) consumption of natural capital- the depletion of natural capital - forests, in particular - is accounted for as income. Thus the accounts of a country which harvests trees very quickly will show quite high income for a few years, but nothing will show the destruction of a productive asset, the forest. Whereas in accordance with conventional business accounting principles, the gradual depletion of physical capital- machines and other equipment – are treated as depletion rather than income. However, most experts on environmental accounting agree that the depletion of natural capital should be accounted for in the same way as other productive assets

Yakhou and dorweiler (2003) specified that Environmental accounting is an inclusive field of accounting. It provides reports for both internal use, generating environmental information to help make management decisions on pricing, controlling overhead and capital budgeting, and external use, disclosing environmental information of interest to the public and to the financial community.

Environmental Accounting enables organizations to track their environmental data and other greenhouse gas (GHG) emissions against reduction targets, and facilitates environmental reporting to provide sustainability related data that is comprehensive, auditable, and timely to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development - economic development, social development and environmental protection in Nigeria, (UNCTAD, 2003).

Consumers and investors are demonstrating increased interest in supporting responsible business practices and are demanding more information as to how companies address risks and opportunities relating to environmental issues (Kercher, 2006).

Wayman (2008), in his study, examined the 500 companies in Europe and America between September 2006 and December 2007, and found 67 per cent (335) issuing environmental reports. Of these 335 CR reports, 87 per cent address climate change, with 78 per cent publishing quantitative GHG emissions data; 65 per cent include a specific climate change section; and 41 per cent address climate change in the CEO or Chairperson introduction. However, only 16 per cent assign management responsibility for addressing climate change. A closer look at their operations shows that organizations with increased report on environmental issues and global warming are receiving increased patronage from stakeholders.

Investors increasingly require that companies pursue environmental accounting strategies that reduce the damage caused to the environment while increasing or at least not decreasing shareholder value. The aim of environmentally sound management is to increase environmental report by reducing the environmental impact while increasing the value of an enterprise, (Schaltegger and Sturm 1989).

According to Yakhou and Dorweiler (2003), Companies are expected to engage in environmental accounting to:

- reassure consumers that they take their responsibilities seriously
- comply with national guidelines
- comply with financial reporting requirements
- express the company's environmental concerns and communicate them to a range of stakeholders.

More so, the theoretical justification of the removal of resources from environment in the comparative benefit of the removed resources and in the ability to ensure that the environment is generally not worse off, (Middleton, 1995); the benefit from mining, he said, must be worth the impact of mining on the environment and damages done to the environment if the environment could be restored.

Emphasis on social contract theory and quality of life theory holds the notions that sovereignty resided in the people for whom governments were trustees and that such governments could be legitimately overthrown if they failed to discharge their functions to the people (Katznelson, 2008).

Ramanathan (1976) further explained the relationships of Social contract theories, viewing a company as an integral part of the society that the society supports and is expected to follow the law of that society. It is expected that they contribute to the society proportionately enough to what the society has given to them. In the same vein, Quality of life theory is about the expectation of society. 'Unrestrained economic development evident from environmental pollution and social ills triggered society's negative attitude towards industrialisation' which associated with environmental pollution and social ills and therefore seen to reduce quality of life and increase social costs. The extent to which an organisation balances back the quality of life of people in the environment where it operates is a good yard stick for measurement here.

2.2.1 The Link of Environmental and Financial Performance

An effective and efficient environmental accounting policy is reached by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts.

The link between an environmental and a financial variable is achieved by measuring the environmental performance of an enterprise with respect to its financial performance.

Environmental conscious manager can increase it disclosures on environmental information by decreasing environmental impact while increasing the value added by the enterprise. Such enterprise use fewer resources and they cause fewer emissions to soil, water and air while producing the same output as their competitors. The higher productivity leads to an increase in the operating margin due to lower costs. Moreover in many cases it also leads to higher sales due to an enhanced value of the products to the consumer or due to an improved public image. In addition, the risk of environmental liability decreases, resulting in lower price of risk taking and contingencies. Embarking on lower use of resources leads to lower stocks of materials and energy, (UNCTAD, 2003).

Envionmental accounting linking the environment and financial performance can be used to forecast the impact of environment issues on future financial performance, thereby creating room for making informed investment decisions. As lower future investments and higher margins are important value driver, substantially influencing future free cash flow, and thus positively contribute to shareholder value.

Though, according to UNCTAD (2003), the problem with constructing environmental accounting indicators is that there are no agreed rules or standards for recognition, measurement and disclosure of environmental information either within the same industry or across industries. Most importantly, there are no rules for consolidating environmental information for an enterprise or for a group of enterprises so that it can be used together and in line with the enterprise's financial items.

Adams (1998) found that there is no consensus either on accounting for environmental performance or on their standardization. The lack of comparability makes it impossible to either measure progress over time or compare the performance of one enterprise with other.

Amidst this exposure, the United Nations conference on trade and development (UNCTAD) which Nigeria belongs advocated - the net value added approach - a quantitative means of quantifying the relationship between the environment performance of a company caused by its activities and economic performance i.e. the financial value produced by the same activities during a specific period.

This in a nutshell, is the ratio of environmental performance over financial performance both measured in monetary units. Denoted as:

$$VA = \frac{\text{Environmental performance}}{\text{Financial performance}}$$

Where environmental performance likened as Energy Consumption measured in units of gigajoules and financial performance: Value Added (Net Sales - Costs of Goods Purchased). This Information is useful in determining the ability of an enterprise to adapt to changes in the environment in which it operates.

Environmental information means any data on an item that relates to an environmental element, while financial information means any data on an item that relates to assets, liabilities, equity, income and/or expenses. Environmental information is measured in physical units, while financial information is measured in monetary units.

GRI (2001) specifies that the ratio of the two items should measure the environmental burden per unit of economic value.

2.2.2 Principles of Environmental Accounting Statement

(a)Element:

Elements are the broad areas or groupings of financial and/or environmental issues of concern to stakeholders (e.g. global warming contribution, energy requirement, waste, assets, liabilities, equity, income and expense, etc.).

(b) Item:

An item or a group of items is information that is related to a specific element (e.g. a specific greenhouse gas, an energy source used, a type of waste, sales, cost of goods and services purchased). A given element may have several items or a group of items.

(c) Indicator:

An indicator is a specific measurement of an individual element that is used to track and demonstrate performance related to the element via recognition and measurement of items. A given element may have several indicators based on different items. To normalize a dynamic development over time, indicators use a reference item to exclude effects of quantitative changes in activities and to make them comparable; examples include "per tonne", "per unit of net value added" or "per unit of sales". As per definition, environmental accounting indicators are set in relation to a financial item, i.e. indicators are ratios composed of an environmental item divided by a financial item, (GRI, 2001).

(d) Recognition and Measurement**:**

Measuring performance and setting targets is a critical component for organizations to become more productive, more profitable, and more sustainable, (Edward, 2011); and an item can be incorporated if the item satisfies the criteria for recognition and has a value that can be measured in physical or monetary units with reliability. However, value might be estimated; the use of reasonable estimates is an essential part of the preparation of environmental accounting information and does not undermine their reliability. Measurement on the other hand is the determining of the physical or monetary value at which an item is to be recognized.

2.2.3 Environmental accounting and Reporting Issues

The following are generic environmental issues identified by the UNCTAD as impediments to sustainable development:

a. Global warming contribution;
b. Energy use;
c. Water use;
d. Ozone depleting substances;
e. Materials usage.

a) Contribution to global warming.

Greenhouse gas (GHG) emissions include carbon dioxide (CO2), methane (CH4), nitrous oxide (N20), hydro- and perfluorocarbons (HFCs, PFCs) and sulfur hexafluoride (SF6) emissions from fuel combustion, process reactions and treatment processes. The climate change issue related to increasing concentrations of greenhouse gases is a global concern and – because it is closely linked to emissions from energy sources – is

relevant across businesses. The definition of the GHG emissions covers the gases detailed in the Kyoto Protocol and their relative contributions are commonly accepted as detailed in the work of the Intergovernmental Panel on Climate Change. The concept of the "boundary fence" is very important for this indicator. This generally applicable indicator covers only emissions from direct corporate activities, although companies may choose to track significant GHG emissions from suppliers such as electricity providers and also from product use where they feel they are relevant, (www.ghgprotocol.org). This protocol will provide further detail on comprehensive GHG reporting**.** However, the Amount of GHG emissions to air from fuel combustion, process reactions and treatment processes, including CO2, CH4, N20, HFCs, PFCs and SF6 are to be reported in metric tons of CO2 equivalents in connection with the value added to get the net value added per unit of metric ton contributed to global warming.

(b) Depletion of nonrenewable energy resources.

To Muller and Sturn (2001), Energy consumption is a global issue and relevant to all businesses across sectors. The total energy consumed equals energy purchased or obtained (e.g. coal, natural gas) minus energy sold to others for their use (e.g. electricity, steam). The definition agreed for general applicability relates solely to energy consumed and transformed on site, which means that electricity companies would report the purchased energy amount and subtract energy sold, keeping generation and transfer losses as part of their consumption. Companies could further elaborate on energy use by identifying separately the renewable energy consumption and a breakdown into different types of energy sources such as natural gas, oil and others. This can be reported in units of gigajoules (or other appropriate multiplier of joule) and to get the net value added per unit of gigajoules requires information on value added (Net Sales - Costs of Goods Purchased).

(c) Depletion of fresh water resources.

Water consumption is the sum of all fresh water purchased from a water supplier or obtained from surface or ground water sources. Availability of fresh water is a global issue. Even though for many areas there may be no local concern about availability, it is increasingly costly to generate clean water. "Fresh water" includes water used for cooling purposes even if there is no physical contact to process materials, (UNCTAD, 2003). The Sum of all fresh water purchased from public supply, or obtained from surface or ground water sources (including water for cooling purposes) are expected to be reported in cubic meters. And the net value added per cubic meter got through the ratio of total cubic meter of water consumed over value added as the case may be.

(d) Depletion of the ozone layer.

Ozone depleting substance (ODS) emissions are a global concern, defined in the Montreal Protocol which lists the groups of gases that are contributing to the effect and describes their impact potential. This issue has relevance across business, even though the markets of the most dangerous gases have been strongly reduced and less harmful alternatives introduced. Even though the effect will be visible in the stratospheric ozone layer over many decades or even centuries, the indicator might lose its relevance in the near future, when policies to eliminate ODS from applications continue to be implemented successfully on a global scale, (Muller and Sturn 2001). The Amount of ODS emissions to air from processes and losses/replacement from containments (chillers) are to be reported in metric tons of CFC11 equivalents. And the value added per unit of metric ton of CFC11 calculated using the ratio of the total emissions of depletion substance all over net value added.

(e) Material usage: resources such as the Sum of weight of all materials purchased or obtained from other sources, including: raw materials for conversion, other process materials (such as catalysts, solvents), pre- or semi-manufactured goods and parts are expected to be reported in metric tons. And the unit of metric ton per net value added disclosed.

3.0 Methodology

The study adopted the survey research design and data were drawn from both primary and secondary sources. The primary data were elicited from respondents drawn from Rivers state and Lagos state; while the secondary data were from previous researchers contributions. A sample size of 400 respondents was used after applying the Yaro Yamani sampling determination techniques on a population size of three million people. Data collected were analyzed using Pearson correlation coefficient, student t-test and MANOVA at 95% level of confidence. The Pearson correlation coefficient and student were denoted as:

$$r = \frac{n\sum XY - \sum X\sum Y}{\sqrt{n\sum X^2 - (\sum X)^2 \quad n\sum Y^2 - (\sum Y)^2}} \qquad \text{and} \qquad tt = r\sqrt{\frac{n-2}{1-r^2}}$$

4.0 Research Results and Findings

The valid questionnaires retrieved was 379, representing 95% of the distributed; while results on questions relating to environmental accounting and reporting accentuating reductions in emissions, material usage, energy usage, and tree felling, e.t.c; and organizations keying into governments' sustainable development programmes are presented in tables 4.01 and 4.02 in the appendix.

Test of Hypotheses

Hypothesis 1

H_o: There is no significant relationship between environmental accounting and sustainable development in Nigeria.

H_1: There is a significant relationship between environmental accounting and sustainable development in Nigeria.

The calculated Pearson Correlation Coefficient (r-cal.) used to evaluate the correlation between the dependent variable and the explanatory variable is given as 0.74 see table 4.03 in the appendix; and the application of the r-cal. to test the level of significance between the variables via the student t-test, is presented as follows:

$$tt = \frac{r\sqrt{n-2}}{1-r^2} = \frac{0.74\sqrt{4-2}}{1-(.74)^2} = \frac{1.0465}{0.4524} = 2.313$$

The result shows that environmental accounting is positively associated with sustainable development in Nigeria, as the calculated t-value of '2.313' was greater than the critical- value '1.96' needed for significance at 0.05% alpha level of significance.

We therefore reject the null hypothesis and accept the alternative hypothesis that states that there is a significant relationship between environmental accounting and reporting and sustainable development in Nigeria.

Hypothesis 2

H_o: There are no consequences to non-compliance with environmental accounting and reporting

H_1: There are consequences to non-compliance with environmental accounting and reporting

A one-way between-groups multivariate analysis of variance (MANOVA) is performed to test Hypothesis 2. The descriptive statistics of the respondents classified as preparers, auditors and users is as shown in Table 4.04; see appendix. The sample size of valid respondents is 387, preparers (accountants) are 97, auditors are 95 and accounting information users (stock brokers, financial analyst, bankers, educators, consumers, surrounding communities, business partners, employees, civil society organisations and regulators) are 195. The large number of cases makes it ideal to use MANOVA in testing the hypothesis. The questionnaires were utilized as dependent variables, while occupation stands as the independent variable.

Multivatriate Test for Hypothesis 2

The multivariate tests of significance are conducted using Wilks' Lamda. This is employed to check for statistically significant differences. If the significant level is less than 0.05, then it can be concluded that there is a difference among the groups (Pallant, 2004). However, the result from table 4.05 shows that the Wilks' Lamda value is 0.574 with a significant value of .000; which is lower than 0.05; therefore there is a statistically significant difference in the perception of preparers, auditors and users of accounting information on the consequences for non-compliance with environmental accounting and reporting.

Thus, for Hypothesis 2, H_o is rejected and H_1 is accepted.

5.0 Discussion, Conclusions and Recommendations

The purpose of this study was to examine whether there exist a relationship between environmental accounting and reporting and sustainable development in Nigeria and to evaluate whether environmental accounting prompt compliance with societal expectations of the environment and if noncompliance attracts consequences.

From the empirical results, the stakeholders affirmed that environmental accounting and reporting is positively related to sustainable development and there are consequences to non-compliance.

Unsustainable consumption of natural resources, increased contribution to GHG, contribution to ozone layer depletion amongst others are prevalent in Nigeria and serve as impediments to favorable business climate and human inhabitation in general. At present, the possible means of averting the prevailing menace is outright reduction of organizational activities in relation to the aforementioned problems and to rekindle this desire, investors and stakeholders are swaying organizations to account on their environmental activities.

Environmental accounting and reporting enhances the quality of decision-making, requiring organizations to establish a baseline (standard) of its greenhouse gas emissions, energy usage, resource usage and other key environmental indicators, and set reductions targets and a realization of the importance of changing unsustainable consumption and production patterns alongside protecting and managing Nigerian natural resources. These accounting information are necessary for accountability, comparability and probity; and when not made available, could be tantamount to being bias, not transparent, fraudulent and liable to risk; which could

dissuade patronages from consumers, suppliers, investors, surrounding communities and possible sanction from government who are becoming conscious of organization's contribution to sustainable development.

Stakeholders increasingly require companies to manufacture goods efficiently and at competitive prices without harming the environment. The aim is to enhance sustainable development by reducing the environmental impact while increasing the value of an enterprise, satisfying human needs, contributing to the quality of life, and resource intensity through environmental performance reporting occasioned by the ratio between an environmental variable and a financial variable that measures the environmental performance of an enterprise with respect to its financial performance.

Measuring performance and setting targets is a critical component for organizations to become more productive, more profitable, and more sustainable. Monitoring key metrics such as energy, waste, material and water leading to reductions in greenhouse gas emissions, waste management, and material usage with operational efficiency improvements and cost savings. When armed with factual data, Nigerian organizations can benchmark and effect behavioral change to reduce environmental impacts.

It is therefore recommended that standard/baseline on environmental issues be identified and the use of Graphical indicators be adopted illustrating to users on a timely basis whether the organization is performing above, below, or in-line with the targets so that corrective actions can be taken as needed to successfully execute on sustainability initiatives.

This corrective action is to be conducted through a constant reduction of resources and emissions in all the organizations value chain and progressively producing goods and services as though they were consuming more environmental resources. This is indeed in line with the assertion by the UNCTAD which requires decreased environmental impacts while increasing the added value by the enterprise such that in both the short and long run, the Nigerian Economy would experience a constant and viable social, economic and environment that meets the needs of the present without compromising the ability of future generations to meet their own needs which sustainable development stands for.

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Appendix

Table 4.01:Environmental accounting and reporting can accentuate reductions in emissions, material usage, energy usage, tree felling, e.t.c.

	Frequency	Percent
SD	37	9.8
D	126	33.2
A	112	29.6
SA	104	27.4
Total	379	100.0

Field survey, 2012

Table 4.02:Organizations can key into governments' sustainable development programmes

	Frequency	Percent
SD	66	17.4
D	132	34.8
A	100	26.4
SA	81	21.4
Total	379	100.0

Field survey, 2012

Table 4.03:Pearson correlation coefficient result on Environmental Accounting and Reporting and Sustainable Development

Variable Cal	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r – cal.
ENV_ ACC	1041	3213	2894	0 .74
SUS_DEV	954	2790		

Source: SPSS analysis

Table 4.04: Descriptive Statistics on the Consequences of Noncompliance with environmental accounting and reporting (Hypothesis 2)

	Occupation	Mean	Std. Deviation	N
Noncompliance with environmental accounting and reporting will increase risk and legal liabilities.	Preparers	3.4330	.81531	97
	Auditors	3.0105	.53584	95
	Accounting information users	2.2256	.79972	195
	Total	2.7209	.91030	387
Non-reporting of relevant environmental accounting information impedes stakeholders' patronage.	Preparers	3.1753	.93553	97
	Auditors	3.5053	.52336	95
	Accounting information users	2.4667	.69806	195
	Total	2.8992	.85635	387

Source: Field Study (2012)

Table 4.05 Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Wilks' Lambda	.049	3723.787[a]	2.000	383.000	.000
OCCU	Wilks' Lambda	.574	61.177[a]	4.000	766.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + OCCU

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