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IMPACT OF ENVIRONMENTAL MANAGEMENT ACCOUNTING ON CURRENT PRACTICES AND FUTURE SUSTAINABILITY IN SOUTH-WEST NIGERIAN POLYTECHNICS

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Abstract

The increase in environmental-related problems and the award of ISO 14001 certificates to organisations that are environmentally friendly, has propelled government to promote environmental management accounting. This study examines the current accounting practices in the management of environmental costs as well as establishing elements that can improve Environmental Management Accounting (EMA) sustainability within South-west Nigerian Polytechnics. The Levene's test for equality of variances using F-statistic and T-statistical methods under SPSS 17 software package was used to analyse the data collected. The findings showed a strong impact of current accounting practices in the management of environmental costs in South-West Nigerian polytechnics. Environmental sustainability was ranked as significant from an environmental management outlook. Also, some elements as occasioned by institutional pressure, environmental accountability, stakeholders' pressure and

management attitude contributed significantly to EMA utilisation. It was therefore recommended that the system of accounting be restructured and environmental costs charged to cost centres, as EMA provides support for the higher educational sector, as well as the community where we live.

Keywords: Environmental Accounting, Environmental costs, Environmental management accounting, Environmental Performance, Environmental sustainability

INTRODUCTION

The increase in environmental-related problems and the award of ISO 14001 certificates to organisations that are environmentally friendly, has propelled government to promote environmental management accounting within countries (Arvidsson 2004; Simkins & Nolan, 2004). Accounting therefore is presently encountering the problem of accounting for environmental impacts and management of environmental performance. Environmental accounting is the provision of actual environmental costs incurred to stakeholders of an organisation (Bennett & James 2000; Deegan, 2003; Shil & Iqbal, 2005). Environmental management accounting as part of environmental accounting is the target of this study. Hence, EMA can therefore be defined as the management of environmental performance through the benefit of environmental information in order to increase material efficiency, reduce environmental impacts and costs (Bartolomeo, Bennett, Bouma, Heydkamp, James & Wolters, 2000; Bennett & James, 1997; IFAC, 1998a).

A number of shortcomings of management accounting practices exist in the management of costs for the environment. These shortcomings are, but not limited to, environmental costs charged to overhead accounts (Burritt 2004; Deegan 2003; UNDSD 2001), environmental costs not considered as important to organisation operations coupled with the breakdown in communication between accountants and environmental managers (Deegan, 2003; Epstein 1996; UNDSD, 2001). Against this backdrop, the function of EMA has redirected the target of management accounting from the provision of financial information to the minimisation of environmental impacts and utilization of natural resources (IFAC, 2005; HEFCE, 2006). In fact, EMA has attracted interest in the management of environmental resources, but there is an absence of EMA studies on educational institutions (Burritt, 2004). This absence has culminated into this study, so as to fill the gap on the utilization of EMA by South-west Nigerian polytechnics.

Tertiary education and industries outside Nigeria are being included in EMA research; however, polytechnics are yet to be a target of interest. This is as a result of the fact that polytechnics produce less environmental impacts as compared to manufacturing organisations, but they cause very noticeable environmental effects (Bennett, Hopkinson & James, 2006). These effects are the use of paper, energy, water and the production of waste materials. For the purpose of this, the costs of paper, energy, water usage and waste generation are the noticeable environmental costs for polytechnics.

Having theses environmental impacts, polytechnics can maintain the qualities that are valued in the physical environment through the enhancement of environmental sustainability. The environmental impacts caused by these polytechnics need be investigated and managed for the purpose of enhancing environmental performance. This study therefore attempts to investigate the present accounting practices for managing the significant environmental costs and establish elements that can improve EMA sustainability within south-west Nigerian polytechnics.

LITERATURE REVIEW

The Use and Application of Environmental Management Accounting

The use and application of environmental management accounting assist organisations to meet environmental impacts. EMA can be used to make necessary decision in an organisation; for evaluating environmental performance against targets; holds managers accountable and provides integrated reporting. White and Savage (1995), opine that the increase in community agitations makes it important for environmental costs to be accounted for so as to help in decision-making. Gauthier, Leblanc, Farley and Martel (1997) opine that the measurement of performance is an essential element that enhances the achievement of environmental management accounting since organisation essentially manages what it measures. Accountability is also characterised by responsibility to make information available and a right of access to information. In order to enhance cost-savings and environmental performance, environmental data needs to be in report form for users (Adams, 2002).

Theoretical Review

In a developed country like Japan, Environmental Management Accounting is primarily guided by the government. Companies disclosing environmental information in Japan follow the rules laid down by the government (Kokubu & Nakajima, 2004). In view of this, the institutional approach can provide a good reason for using Environmental Management Accounting practices. Government pressure gives guidance for researchers to investigate why

Environmental Management Accounting should be sustained. Institutional theorists are concerned with similarity in practices of EMA by organisations (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Powell & DiMaggio, 1991). The force of the government would therefore be needed to compel polytechnics to be responsible for the environment where their operations cover. On the basis of this, the compelling force in accounting for the environmental costs by government could be a significant element for improving EMA sustainability.

Environmental accounting literature also shows the effect of legitimacy and stakeholder theories as part of the commonest theories being used to explain the disclosure of environmental information to users (Deegan, 2002; Gray, Kouhy & Lavers, 1995). Legitimacy theory assumes that there is an interaction between organisations and the community where their businesses operate. Pfeffer and Salancik (1978) opine that higher educational institutions use community's resources, and community judges them on the measurement of their activities. Polytechnics therefore would need to be environmentally accountable and try to conform to accounting practices. Legitimacy theory declares that higher educational institutions are to ensure that they operate within the limits of the community while stakeholder theory stresses the capability of stakeholders to influence the management of organisation, system of accounting and resources needed by organisations (Deegan & Blomquist, 2006).

In order to identify and examine the elements that could improve Environmental Management Accounting sustainability, institutional, legitimacy and stakeholder theories are very relevant to maintain the qualities that are valued in the physical environment and to guide the research focus.

Empirical Review

Literature review shows that most studies on EMA concentrate on examining the accounting practices in manufacturing companies while EMA case studies to the educational sector are not many (Rikhardsson, Bennett, Bouma, & Schaltegger, 2005b). Some tertiary institutions have shown that they are responsible to environmental issues. For example, some higher educational institutions analyse their ecological programme in the light of environmental sustainability (Flint 2001); some undertake to enhance energy saving and reduce land filled waste by increasing recycling rates **(**Bekessy, Burgman, Yencken, Wright, Filho, Garden, & Rostan-Herbert, 2002; NWF, 2007; Uhl & Anderson, 2001; HEFCE, 2006); some conduct environmental audits to ensure compliance with local environmental laws and regulations (Creighton, 1998; Delakowitz & Hoffmann, 2000); and some being awarded environmental friendly certificates, such as ISO 14001 in order to promote environmental management accounting (Arvidsson, 2004; Simkins & Nolan, 2004).

Some educational institutions disclose environmental reporting to show actions taken toward environmental sustainability (GRI, 2007). Environmental responsiveness by tertiary institutions is of various forms. However, study shows that environmental programmes are not regularly carried out. Carpenter and Meehan (2002) stress that the going green programmes are yet to be embraced as a regular business in Australian educational sector. Bennett, Hopkinson and James (2006) also opine that the going green programmes of environmental sustainability are of limited effect on the UK educational sector.

Epstein (1996) argues that an absence of dedication by accountants forms one of the causes for the non-existence of environmental management accounting by educational institutions. Bakker (1998) stresses accounting as a driver for improving campus environmental performance. To this end, this paper will be targeted at examining the accounting practices of polytechnics for managing environmental costs. The three theoretical frameworks would be utilised to investigate elements that could improve Environmental Management Accounting sustainability.

RESEARCH METHOD

The study is a case study research design method. It is a case study because it involves the collection of a very extensive data that will help the researcher uncover important issues in relation to the study. The population of this study consists of the twenty one polytechnics in south-west Nigeria. The twenty one polytechnics in each classification include: federal (5); state (7) and private (9) as shown in the appendix.

The cluster sampling technique was adopted in this study. The reason for the choice of cluster sampling technique is that the population of the study is distributed into six clusters of states. This was complemented with the simple random sampling technique in order to ensure that polytechnics in each state, in a given cluster, have equal chance of being selected. The sample size for this study was derived from Burley's formula as popularised by Yamane (1973) for the determination of sample size in a finite population as: $n = N/[1+ N(e^2)$. The application of this formula results in a sample size of 20 polytechnics in South-west Nigeria. The reason for taking a sample size of twenty polytechnics is to ensure robustness of the study and representativeness of the sample.

The clusters are: Ekiti State (1 polytechnic), Lagos State (5 polytechnics), Ogun State (5 polytechnics), Ondo State (1 polytechnic), Osun State (5 polytechnics) and Oyo State (3 polytechnics). The next step in the sampling was to number the polytechnics in each of the clusters in the adequate range. Ekiti State was numbered 01; Lagos State 01 to 05; Ogun State 01 to 05; Ondo State 01; Osun State 01 to 05 and Oyo State 01 to 03. After which, a computer

package on Excel was programmed to select twenty (20) random numbers within the specified ranges in proportion to the cluster's share of the total population. The numbers thus generated were used to choose the polytechnics included in the study sample.

The researcher studied twenty polytechnics in the south-west Nigeria with the use of questionnaire and personal interview with the respondents in charge of accounting functions, environmental management function and polytechnic administration. Respondents were then asked to rate the variables on a 5 – point Likert form Scale from Strongly Agree to Strongly Disagree. A total number of 200 questionnaires were returned by the respondents out of which 160, representing 80% were useable. The unusable portion of 40 questionnaires was not properly filled by the respondents. The validity of the questionnaire was assured by Experts. Pilot survey was adopted for the reliability test that yielded a P-value of 0.016 that was significant at 5% level. The Levene's test for equality of variances using F-statistic and T-statistical methods was used to analyse the data with the aid of Statistical Package for Social Sciences (SPSS) version 17.

ANALYSIS AND RESULTS

The results of the Levene's test for equality of variances based on F-statistic and T-statistic for the two hypotheses are presented below:

Hypothesis 1

H_{01}: There is no significant impact of current accounting practices for managing environmental costs in Nigerian polytechnics

Table 1: Levene's Test of Equality of variances based on F-statistic and T-statistic values for current accounting practices for managing environmental costs in Nigerian Polytechnics

S/N	Test Questions	F-statistic	P-value of F-statistic	Absolute T-statistic	Degree of Freedom	P-value of T-statistic	Test of Sig. (5% or 0.05)	Remark	Decision
A.	**Management of Major Environmental Costs.**								
MMEC1	Consumption of energy, water, paper & waste generation are major environmental challenges.	123.555	0.000	13.832	158	0.000	0.05	Significant	Reject H_{01}

MMEC2	Environmental Policy	132.245	0.021	8.327	158	0.000	0.05	Significant	Reject H_{01}
MMEC3	There is a procedure to measure environmental performance.	226.618	0.000	8.791	158	0.000	0.05	Significant	Reject H_{01}
MMEC4	Reports of major environmental costs in annual reports.	120.029	0.035	19.233	158	0.000	0.05	Significant	Reject H_{01}
MMEC5	Internal report on environmental performance.	127.401	0.028	14.282	158	0.000	0.05	Significant	Reject H_{01}
B.	**Accounting for Major Environmental Costs.**								
AMEC1	Separate account for major environmental costs other than to overhead.	20.232	0.045	16.539	158	0.000	0.05	Significant	Reject H_{01}
AMEC2	Allocation bases used is reasonable in terms of controlling environmental costs.	13.047	0.034	22.027	158	0.000	0.05	Significant	Reject H_{01}
AMEC3	Major environmental costs are considered in a proposed capital project.	17.437	0.000	11.078	158	0.000	0.05	Significant	Reject H_{01}
AMEC4	Environmental performances are assessed with its performance indices.	21.888	0.000	16.025	158	0.000	0.05	Significant	Reject H_{01}
AMEC5	Environmental cost information is requested by management always.	44.588	0.000	11.599	158	0.000	0.05	Significant	Reject H_{01}

From the result, Table 1 shows the Levene's test of equality variances based on T-statistic and F-statistic values for current accounting practices for managing environmental costs in Nigerian polytechnics, as proxy for management of major environmental costs and accounting for major environmental costs respectively. For the management of major environmental costs which is also a proxy for the five formulated test questions, it is evident that both the F-statistic and T-statistic has a p-value that is lesser than the test of significance at 5%. Also, for accounting for major environmental costs, it is equally evident that both the F-statistic and T-statistic has a p-value that is lesser than the test of significance at 5%. The overall test therefore revealed that all the variables tested are significant in explaining the measure of impact of current accounting practices for managing environmental costs in Nigerian polytechnics.

Decision: The null hypothesis is rejected and it is concluded that there is a significant impact of current accounting practices for managing environmental costs in Nigerian polytechnics.

Hypothesis 2

H_{02}: There is no significant impact of elements that could improve EMA sustainability in Nigerian polytechnics

Table 2: Levene's Test of Equality of variances based on F-statistic and T-statistic values for elements that could improve EMA sustainability in Nigerian polytechnics

S/N	Test Questions	F-stat	P-value of F-statistic	Absolute T-statistic	Degree of Freedom	P-value of T-statistic	Test of Sig. (5% or 0.05)	Remark	Decision
A.	**Institution Pressure**								
IP1	Polytechnics always consider the major environmental costs when making management decisions.	109.044	0.000	18.622	158	0.000	0.05	Significant	Reject **H_{02}**
IP2	External pressures always force the Polytechnics to account for any of its impacts on the environment.	112.377	0.025	21.126	158	0.000	0.05	Significant	Reject **H_{02}**

B.	**Environmental Accountability**								
EA1	The Polytechnics is always accountable for the major environmental costs incurred.	89.533	0.000	13.183	158	0.000	0.05	Significant	Reject H_{02}
EA2	Information on environmental cost could be gotten from the bursary division, or environmental management related divisions of the Polytechnics.	10.215	0.002	14.192	158	0.000	0.05	Significant	Reject H_{02}
EA3	The Polytechnics are accountable to stakeholders in terms of managing environmental costs.	98.230	0.000	21.737	158	0.000	0.05	Significant	Reject H_{02}
C.	**Stakeholder Pressure**								
SP1	The stakeholders of the Polytechnics are conscious of what the polytechnics have done, or will do, to manage its major environmental costs.	566.075	0.000	14.553	158	0.000	0.05	Significant	Reject H_{02}
SP2	The stakeholders have the power to force the Polytechnics to change its current accounting practices to the management of environmental costs.	107.954	0.000	13.132	158	0.000	0.05	Significant	Reject H_{02}

D.	Management's Attitude to Environmental Management Accountability Sustainability								
MAEMAS1	It would beneficial to the Polytechnics for the major environmental costs to be brought to the attention of the management.	53.908	0.000	15.359	158	0.000	0.05	Significant	Reject H_{02}
MAEMAS2	The Polytechnics have provided enough incentives to motivate academic departments or administrative divisions to control or reduce environmental costs.	52.858	0.000	16.076	158	0.000	0.05	Significant	Reject H_{02}
MAEMAS3	The Polytechnics have provided major environmental cost information as a means to increase environmental awareness and encourage behavioural change.	38.751	0.000	13.027	158	0.000	0.05	Significant	Reject H_{02}

From the result, Table 2 shows the Levene's test for equality of variances based on T-statistic and F-statistic values for elements that could improve EMA sustainability in Nigerian polytechnics, as proxy for institutional pressure, environmental accountability, stakeholder pressure and management's attitude to environmental management accountability sustainability respectively. It is therefore evident that both the F-statistic and T-statistic has a p-value that is lesser than the test of significance at 5% in all the variables tested. The overall test revealed

that all the variables tested are significant in explaining the measure of impact of elements that could improve EMA sustainability in Nigerian polytechnics.

Decision: The null hypothesis is rejected and it is concluded that there is a significant impact of elements that could improve EMA sustainability in Nigerian polytechnics.

Discussion of Results

The result of the two hypotheses tested revealed statistical significance on the impact of current accounting practices for managing environmental costs and on elements that could improve environmental management accounting (EMA) sustainability in South-West Nigerian polytechnics. This will in many ways promote environmental sustainability. It will also have greater impacts on improving environmental performance as opposed to Bennett, Hopkinson and James (2006) who argued that environmental sustainability programmes in the UK higher educational sector have limited effects on improving environmental performance.

The overall evidence suggests a greater impact of EMA on current practices and future sustainability due to the overriding effects of the management of major environmental costs, accounting for major environmental costs, institution pressure, environmental accountability, stakeholder pressure, and management attitude to environmental management accounting sustainability within the scope of the study considered. The result is also in agreement with Bakker (1998) and Keniry (1995) that saw accounting as a driving force for improving campus environmental performance and one of the best ways to drive environmental accountability at higher educational institutions.

CONCLUSION

In this study, attempts were made to examine the impact of environmental management accounting on current practices and future sustainability in South-West Nigerian polytechnics. The Institutional, legitimacy and stakeholders' theories were used to develop the hypotheses tested in this study. On the basis of the overall result, it could therefore be concluded that there are significant impacts of environmental management accounting (EMA) utilisation within the polytechnics as opposed to limited impacts recorded in the literature.

POLICY IMPLICATION AND RECOMMENDATIONS

The result showed a greater impact of environmental management accounting (EMA) on current practices and future sustainability in South-West Nigerian polytechnics. This shows that the findings of this study supported the uses and applications of EMA by the higher educational

sector. It therefore indicates that there is need for policy shift in favour of environmental accounting if EMA is to achieve its sustainability in Nigerian polytechnics.

On the basis of the foregoing, the study hereby recommends that the accounting system should be restructured and major environmental costs charged to responsibility centres. This can provide support for the educational sector and the community where we live.

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APPENDICES

```
/VARIABLES=MMEC1 MMEC2 MMEC3 MMEC4 MMEC5
/CRITERIA=CI(.95).
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T-Test

```
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Group Statistics

	RESPONDENTS	N	Mean	Std. Deviation	Std. Error Mean
MMEC1	>= 4	80	2.85	1.115	.125
	< 4	80	4.71	.455	.051
MMEC2	>= 4	80	3.66	.635	.071
	< 4	80	4.41	.495	.055
MMEC3	>= 4	80	3.16	.947	.106
	< 4	80	4.16	.371	.042
MMEC4	>= 4	80	3.01	.646	.072
	< 4	80	4.71	.455	.051
MMEC5	>= 4	80	2.66	.476	.053
	< 4	80	3.84	.561	.063

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
MMEC1	Equal variances assumed	123.555	.000	-13.832	158	.000	-1.863	.135	-2.128	-1.597
	Equal variances not assumed			-13.832	104.652	.000	-1.863	.135	-2.129	-1.596
MMEC2	Equal variances assumed	132.245	.021	-8.327	158	.000	-.750	.090	-.928	-.572
	Equal variances not assumed			-8.327	149.137	.000	-.750	.090	-.928	-.572
MMEC3	Equal variances assumed	226.618	.000	-8.791	158	.000	-1.000	.114	-1.225	-.775
	Equal variances not assumed			-8.791	102.708	.000	-1.000	.114	-1.226	-.774
MMEC4	Equal variances assumed	120.029	.035	-19.233	158	.000	-1.700	.088	-1.875	-1.525
	Equal variances not assumed			-19.233	141.955	.000	-1.700	.088	-1.875	-1.525
MMEC5	Equal variances assumed	127.401	.028	-14.282	158	.000	-1.175	.082	-1.337	-1.013
	Equal variances not assumed			-14.282	153.879	.000	-1.175	.082	-1.338	-1.012

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  /VARIABLES=AMEC1 AMEC2 AMEC3 AMEC4 AMEC5
  /CRITERIA=CI(.95).
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T-Test

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Group Statistics

	RESPONDENTS	N	Mean	Std. Deviation	Std. Error Mean
AMEC1	>= 4	80	2.34	.550	.061
	< 4	80	4.04	.737	.082
AMEC2	>= 4	80	2.55	.571	.064
	< 4	80	4.41	.495	.055
AMEC3	>= 4	80	2.96	1.061	.119
	< 4	80	4.41	.495	.055
AMEC4	>= 4	80	2.61	.803	.090
	< 4	80	4.25	.436	.049
AMEC5	>= 4	80	2.91	1.116	.125
	< 4	80	4.50	.503	.056

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AMEC1	Equal variances assumed	20.232	.045	-16.539	158	.000	-1.700	.103	-1.903	-1.497
	Equal variances not assumed			-16.539	146.166	.000	-1.700	.103	-1.903	-1.497
AMEC2	Equal variances assumed	13.047	.034	-22.027	158	.000	-1.863	.085	-2.030	-1.695
	Equal variances not assumed			-22.027	154.881	.000	-1.863	.085	-2.030	-1.695
AMEC3	Equal variances assumed	17.437	.000	-11.078	158	.000	-1.450	.131	-1.709	-1.191
	Equal variances not assumed			-11.078	111.897	.000	-1.450	.131	-1.709	-1.191
AMEC4	Equal variances assumed	21.888	.000	-16.025	158	.000	-1.638	.102	-1.839	-1.436
	Equal variances not assumed			-16.025	121.780	.000	-1.638	.102	-1.840	-1.435
AMEC5	Equal variances assumed	44.588	.000	-11.599	158	.000	-1.588	.137	-1.858	-1.317
	Equal variances not assumed			-11.599	109.843	.000	-1.588	.137	-1.859	-1.316

```
T-TEST GROUPS=RESPONDENTS(3.5)
  /MISSING=ANALYSIS
  /VARIABLES=IP1 IP2
  /CRITERIA=CI(.95).
```

T-Test

```
[DataSet0]
```

Group Statistics

	RESPONDENTS	N	Mean	Std. Deviation	Std. Error Mean
IP1	>= 4	80	3.70	.624	.070
	< 4	80	5.00	.000	.000
IP2	>= 4	80	2.05	.855	.096
	< 4	80	4.38	.487	.054

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
IP1	Equal variances assumed	109.044	.000	-18.622	158	.000	-1.300	.070	-1.438	-1.162
	Equal variances not assumed			-18.622	79.000	.000	-1.300	.070	-1.439	-1.161
IP2	Equal variances assumed	2.377	.025	-21.126	158	.000	-2.325	.110	-2.542	-2.108
	Equal variances not assumed			-21.126	125.374	.000	-2.325	.110	-2.543	-2.107

```
NEW FILE.
T-TEST GROUPS=RESPONDENTS(3.5)
  /MISSING=ANALYSIS
  /VARIABLES=EA1 EA2 EA3
  /CRITERIA=CI(.95).
```

T-Test

```
[DataSet1]
```

Group Statistics

	RESPONDENTS	N	Mean	Std. Deviation	Std. Error Mean
EA1	>= 4	80	3.50	.871	.097
	< 4	80	4.88	.333	.037
EA2	>= 4	80	3.73	.595	.067
	< 4	80	4.84	.371	.042
EA3	>= 4	80	2.98	.795	.089
	< 4	80	4.96	.191	.021

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
EA1	Equal variances assumed	89.533	.000	-13.183	158	.000	-1.375	.104	-1.581	-1.169
	Equal variances not assumed			-13.183	101.562	.000	-1.375	.104	-1.582	-1.168
EA2	Equal variances assumed	10.215	.002	-14.192	158	.000	-1.113	.078	-1.267	-.958
	Equal variances not assumed			-14.192	132.438	.000	-1.113	.078	-1.268	-.957
EA3	Equal variances assumed	98.230	.000	-21.737	158	.000	-1.988	.091	-2.168	-1.807
	Equal variances not assumed			-21.737	88.103	.000	-1.988	.091	-2.169	-1.806

```
DATASET ACTIVATE DataSet0.
T-TEST GROUPS=RESPONDENTS(3.5)
  /MISSING=ANALYSIS
  /VARIABLES=SP1 SP2
  /CRITERIA=CI(.95).
```

T-Test

```
[DataSet0]
```

Group Statistics

	RESPONDENTS	N	Mean	Std. Deviation	Std. Error Mean
SP1	>= 4	80	3.10	1.001	.112
	< 4	80	4.84	.371	.042
SP2	>= 4	80	3.29	1.070	.120
	< 4	80	4.91	.284	.032

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SP1	Equal variances assumed	566.075	.000	-14.553	158	.000	-1.738	.119	-1.973	-1.502
	Equal variances not assumed			-14.553	100.317	.000	-1.738	.119	-1.974	-1.501
SP2	Equal variances assumed	107.954	.000	-13.132	158	.000	-1.625	.124	-1.869	-1.381
	Equal variances not assumed			-13.132	90.110	.000	-1.625	.124	-1.871	-1.379

```
DATASET ACTIVATE DataSet1.
T-TEST GROUPS=RESPONDENTS(3.5)
  /MISSING=ANALYSIS
  /VARIABLES=MAEMAS1 MAEMAS2 MAEMAS3
  /CRITERIA=CI(.95).
```

T-Test

```
[DataSet1]
```

Group Statistics

	RESPONDENTS	N	Mean	Std. Deviation	Std. Error Mean
MAEMAS1	>= 4	80	3.79	.706	.079
	< 4	80	5.00	.000	.000
MAEMAS2	>= 4	80	2.63	.862	.096
	< 4	80	4.41	.495	.055
MAEMAS3	>= 4	80	2.93	.868	.097
	< 4	80	4.38	.487	.054

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
MAEMAS1	Equal variances assumed	53.908	.000	-15.359	158	.000	-1.213	.079	-1.368	-1.057
	Equal variances not assumed			-15.359	79.000	.000	-1.213	.079	-1.370	-1.055
MAEMAS2	Equal variances assumed	52.858	.000	-16.076	158	.000	-1.788	.111	-2.007	-1.568
	Equal variances not assumed			-16.076	126.020	.000	-1.788	.111	-2.008	-1.567
MAEMAS3	Equal variances assumed	38.751	.000	-13.027	158	.000	-1.450	.111	-1.670	-1.230
	Equal variances not assumed			-13.027	124.261	.000	-1.450	.111	-1.670	-1.230

List of 21 Polytechnics in South-West Nigeria

S/N	Name of Institution	Status	State/Location
1	Federal Polytechnic, Ado-Ekiti	Federal Polytechnic	Ekiti
2	Yaba College of Technology	Federal Polytechnic	Lagos
3	Lagos State Polytechnic	State Polytechnic	Lagos
4	Grace Polytechnic	Private Polytechnic	Lagos
5	Lagos City Polytechnic	Private Polytechnic	Lagos
6	Wolex Polytechnic	Private Polytechnic	Lagos
7	Federal Polytechnic, Ilaro	Federal Polytechnic	Ogun
8	Gateway Polytechnic Saapade	State Polytechnic	Ogun
9	Moshood Abiola Polytechnic	State Polytechnic	Ogun
10	Allover Central Polytechnic, Sango-Ota	Private Polytechnic	Ogun

11	Marvic Polytechnic, Odeda	Private Polytechnic	Ogun
12	Rufus Giwa Polytechnic, Owo	State Polytechnic	Ondo
13	Federal Polytechnic, Ede	Federal Polytechnic	Osun
14	Osun State college of Technology, Esa-Oke	State Polytechnic	Osun
15	Osun State Polytechnic, Iree	State Polytechnic	Osun
16	Polytechnic, Ile-Ife	Private Polytechnic	Osun
17	Southern Nigeria Institute of Innovative Technology, Ifewara	Private Polytechnic	Osun
18	Federal College of Animal Health & production Technology, Ibadan	Federal Polytechnic	Oyo
19	The Polytechnic, Ibadan	State Polytechnic	Oyo
20	The KINGS Poly, Saki	Private Polytechnic	Oyo
21	Tower Polytechnic, Ibadan	Private Polytechnic	Oyo

Source: Wikipedia, 2015