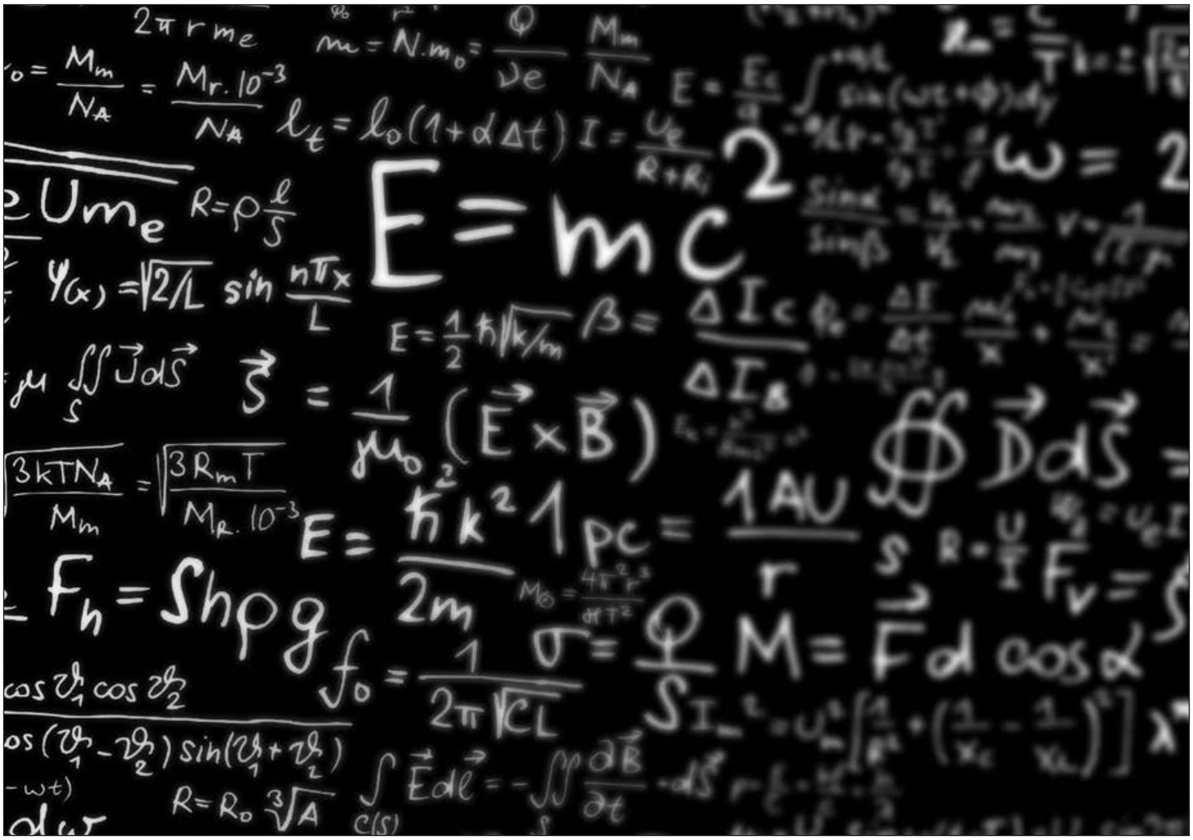

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Principal Component Analysis of Global Warming with Respect to CO_2 Emission in Nigeria: An Exploratory Study

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ABSTRACT

This study has examined the position of Nigeria in relation to carbon dioxide (CO_2) emission in readiness for emission trading as proposed in the Kyoto protocol as a measure of reducing Global warming. It was discovered that Nigeria emits only 0.4% of the total World's CO_2 emission indicating that they will be possible sellers of emission as contained in the Kyoto protocol. Fifty countries were selected for the analysis and some possible correlates of CO_2 were considered. Correlation analysis and Principal Component analysis used revealed that Gross domestic product and Industrial output accounted for 93% of the total variation. Based on this, a very low economic activity is being experienced in the country.

Key words: Globalwarming-CO_2 emission, kyoto protocol, emission trading, possible correlates

INTRODUCTION

In recent years, the effects of Global warming have adversely affected both the environment and the human beings inhabiting the environment. The health hazards of "Pollution" are as much as the environmental hazards. Burnett and Krewski (1994) in their study of air pollution effect on hospital admission rate came up with the fact that the admission rates are highly related to ozone levels (Climate change). The effect of Global warming has virtually touched all aspects of life including Agriculture. The effect on Agriculture was experienced during the global food crises witnessed in 2008. The Guardian Newspaper (2008) Certainly all these effects are source of worry to mankind yet they are responsible for the atmospheric imbalance/Global warming. The question is, is Nigeria part of this problem, otherwise what is her position on this topical issue? It was discovered that the most important green house gas (GHG) is CO_2 and it is the most abundant in the atmosphere (360 ppmv), it has a high calorific power and is easily generated by human activities, essentially by the burning of fossil fuels and wood. CO_2 is the greenhouse gas of reference and the other gases are stated in units of CO_2.

The atmospheric concentration of methane (CH_4) is relatively low (1.72 ppmv), but its calorific power is 63 or 21 times greater than that of CO_2 over a horizon of 20 and 100 years, respectively (IPCC, 2000). CH_4 is emitted mainly from rice cultivation, ruminant digestive processes, anaerobic management of solid waste and biomass burning.

Nitrogen dioxide (N_2O) has different emission sources. It is generated by microbial activity in water, soil and oceans during the degradation of nitrated organic matter, Mackenzie recognizes an increasing amount of N_2O emission due to microbial transformation of the nitrogen contained in wastewater (IPCC, 2002). N_2O has calorific power equivalent to 310-320 times that of CO_2 in a 100-year scenario (Lexmond and Zeeman, 1995; IPCC, 1997). The objective of the study is to estimate the quantity of carbon dioxide (CO_2) emission in Nigeria in readiness for emission trading, which is the measure adopted by the Kyoto Protocol to reduce global warming.

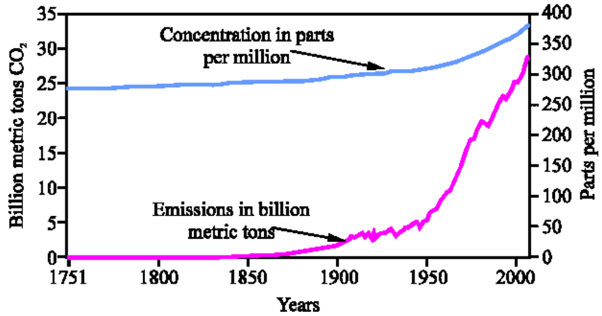

Fig. 1: The concentration of CO_2 in the atmosphere due to emission. Source: Oak Ridge National Laboratory Carbon Dioxide Information Analysis Center

GLOBAL WARMING VIS-À-VIS CO_2 EMISSION

Literature has revealed that Carbon dioxide (CO_2) emission is the major contributor of Global Warming. This CO_2 emission emanates from a lot of economic activities which comprise both Industrial and Agricultural activities that go on globally.

Song *et al.* (2007) in their study, titled "Environmental and Economic assessment of the chemical absorption process in Korea", stated that CO_2 emission from fossil fuel is a major cause for the global warming effect, but it is hard to remove completely in actuality. Moreover, energy consumption is bound to increase for the continuous economic development of a country that has an Industrial formation requiring high-energy demand. Michael (1995) considered carbon dioxide emissions and global GDP. He stated that a positive relationship exists between CO_2 emission and Gross Domestic Product (GDP). He examined per capita income and CO_2 emission of 137 countries across 21 years; it appears that as per capita incomes accelerate across countries emissions increase. Although some parts tend to decelerate, this could be attributed to the fact that high income level leads to increase in demand for environmental protection. Only emissions reduction proposals that assures income will not be adversely affected particularly those of less developed countries will have any possibility of successful implementation. Figure 1 shows the concentration of CO_2 in the atmosphere for a certain period.

THE KYOTO PROTOCOL

A historic agreement to cut down on emission of the main greenhouse gases which are attributed to global warming was agreed in December 1997 in Kyoto, Japan, at the third conference of parties to the framework convention, hence the name "Kyoto protocol".

There, industrialized nations agreed to reduce their collective emissions of greenhouse gases by 5.2% from 1990 levels by the period 2008 to 2012, since the Kyoto protocol commits developed countries to make legally binding reductions in their greenhouse gas emissions. The six gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide ($NO_{2)}$, hydro fluorocarbons (HFCs), per fluorocarbons (PFCs) and sulphur hexafluoride (S_8F).

The protocol was endorsed by 160 countries. It will become legally binding provided at least 55 countries sign up to it, including developed nations who are responsible for at least 55% of emission from the industrialized world. Significantly, the global cut of 5.2% is to be achieved by differential reductions for individual nations. The European Union, Switzerland and the majority of central and Eastern European Unions will deliver reductions of 8%, the US will cut emissions by 7% and Japan, Hungary, Canada and Poland by 6%. New Zealand, Russia and the Ukraine are permitted to increase slightly although at reduced rate to "business as usual scenarios".

Included in the protocol is the provision for emission reduction trading among developed countries. For this to be possible, countries need to know their level of emission to in readiness for this emission trading.

ANALYSIS

The possible correlates which will be considered (but not limited to) here are as follows:

X_2 : Gross Domestic Product (GDP)
X_3 : Industrial output
X_4 : Export output
X_5 : Energy consumption
X_6 : Manufacturing output

where, X_1 is the dependent variable which is the CO_2 emission (Here we can take it to be the Global warming we are considering).

Also if we normalize the data in Table 1 since they are not of the same units, using the formula:

$$Z = \frac{X - \mu}{\sigma} \sim N(0,1)$$

Table 1: CO_2 emission and their possible correlates

S/N	Countries	CO_2 emission in thousand metric tons (X_1)	GDP in $ bn (biggest economies) (X_2)	Industrial output in $ bn (X_3)	Export output in $ bn (X_4)	Consumption of energy in million tones (X_5)	Manufacturing out put $ bn (X_6)
1	United States	6,049,435	11711.8	2,271	12.06	2,280.8	1,523
2	China	5,010,170	1,931.7	893	5.33	1,409.4	889
3	Russia	1,524,993	581.4	182	1.69	639.7	138
4	India	1,342,962	691.2	171	1.14	553.4	101
5	Japan	1,257,967	4,622.8	1,308	5.91	517.1	894
6	Germany	808,767	2,740.6	721	9.33	347.1	495
7	Canada	639,403	978.0	285	3.21	260.6	177
8	United kingdom	587,261	2,124.4	496	6.20	232.0	319
9	South Korea	465,643	691.2	247	2.43	205.3	174
10	Italy	449,948	1,677.8	417	3.85	181.0	294
11	Mexico	438,022	676.5	162	1.63	160.0	111
12	South Africa	437,032	212.8	61	0.47	118.6	38
13	Iran	433,571	163.4	67	0.38	136.4	18
14	Indonesia	378,250	257.6	113	0.72	161.6	73
15	France	373,693	2,046.6	399	5.08	271.3	255
16	Brazil	331,795	604.0	211	0.88	193.2	57
17	Spain	330,497	1,039.9	274	2.35	136.1	153
18	New-Zealand	31,570	98.9	25	0.24	100.1	25
19	Australia	326,757	637.3	124	1.00	112.6	57
20	Saudi Arabia	308,393	250.6	147	533.70	136.1	25
21	Poland	307,238	242.3	96	0.77	93.7	41
22	Thailand	268,082	161.7	70	0.93	88.8	56
23	Turkey	226,125	302.8	56	0.74	79.0	35
24	Algeria	194,001	84.6	44	0.35	55.4	25

Table 1: Continue

S/N	Countries	CO_2 emission in thousand metric tons (X_1)	GDP in $ bn (biggest economies) (X_2)	Industrial output in $ bn (X_3)	Export output in $ bn (X_4)	Consumption of energy in million tones (X_5)	Manufacturing out put $ bn (X_6)
25	Malaysia	177,584	118.3	60	116.00	56.7	37
26	Venezuela	172,623	110.1	41	0.43	50.5	19
27	Egypt	158,237	78.8	27	0.38	126.1	24
28	United Arab Emirates	149,188	104.2	57	0.77	68.5	58
29	Netherlands	142,061	579.0	132	3.49	80.8	68
30	Argentina	141,786	153.0	50	0.38	59.9	34
31	Pakistan	125,669	96.1	58	1.14	69.3	63
32	Czech Republic	116,991	107.0	37	0.62	60.3	25
33	Nigeria	114025	58.0	40	0.47	41.8	40
34	Belgium	100716	352.3	80	2.73	97.3	49
35	Greece	96,695	205.2	42	0.41	27.5	18
36	Israel	71,247	116.9	60	0.42	27.5	17
37	Austria	69,846	292.3	81	1.42	107.5	45
38	Chile	62,418	94.1	38	3.56	87.7	58
39	Hungary	57,183	100.7	35	0.53	50.5	22
40	Colombia	53634	97.7	27	0.87	159.0	58
41	Sweden	53,033	346.4	87	1.52	104.7	44
42	Denmark	52,956	241.4	51	0.98	105.1	29
43	Singapore	52,252	106.8	35	1.22	100.0	29
44	Switzerland	40,457	357.5	76	1.99	108.0	53
45	Hong Kong	37,411	163.0	78	0.98	100.0	24
46	Norway	87,602	250.1	87	0.96	135.1	19
47	Philippines	80,512	84.6	27	0.43	56.5	20
48	Finland	65,799	185.9	50	0.64	103.1	32
49	Portugal	58,906	167.7	39	0.46	27.0	22
50	Ireland	42,353	181.6	56	1.53	103.8	42

Source: Calculated from List of countries by their CO_2 Emission while other variables where obtained from (The Economist fact book, 2007; CDIAC, 2006)

Table 2: Analysis of CO_2 emission with respect to possible correlates of CO_2 using the correlation matrix

	X_1	X_2	X_3	X_4	X_5	X_6
X_1	1.000	0.799	0.847	-0.012	0.982	0.892
X_2	0.799	1.000	0.972	-0.027	0.863	0.935
X_3	0.847	0.972	1.000	-0.006	0.884	0.986
X_4	-0.012	-0.027	-0.006	1.000	-0.020	-0.044
X_5	0.982	0.863	0.884	-0.020	1.000	0.908
X_6	0.892	0.935	0.986	0.044	0.908	1.000

We obtain the values of Z_is as shown in Table 3.

From the normalized data above, the first 8 Countries have negative values of CO_2 emission, this shows that they are emitting more than the average. The correlation analysis of the normalized data is as follows:

The result of the correlation analysis of Table 4 which was obtained from the normalized data above is the same with that obtained from the raw data result of Table 2. This shows that normalization has not changed the result since, given that:

Table 3: Normalized CO_2 emission data and possible correlates

S/N	Countries	Z1	Z2	Z3	Z4	Z5	Z6
1	USA	5.075033	6.11	5.41	-0.04	5.59	5.08
2	China	4.124944	0.64	1.80	-0.12	3.23	2.75
3	Russia	0.938820	-0.11	-0.05	-0.17	1.15	0.00
4	India	0.772408	-0.05	-0.08	-0.18	0.92	-0.14
5	Japan	0.694703	2.15	2.89	-0.12	0.82	2.77
6	Germany	0.284051	1.09	1.36	-0.07	0.36	1.31
7	Canada	0.129219	0.11	0.22	-0.15	0.13	0.14
8	UK	0.081551	0.75	0.77	-0.11	0.05	0.66
9	S Korea	-0.02963	-0.05	0.12	-0.16	-0.02	0.13
10	Italy	-0.04398	0.50	0.56	-0.14	-0.09	0.57
11	Mexico	-0.05488	-0.06	-0.11	-0.17	-0.15	-0.10
12	S Africa	-0.05579	-0.32	-0.37	-0.19	-0.26	-0.37
13	Iran	-0.05895	-0.35	-0.35	-0.19	-0.21	-0.44
14	Indonesia	-0.10952	-0.30	-0.23	-0.18	-0.14	-0.24
15	France	-0.11369	0.71	0.51	-0.13	0.15	0.43
16	Brazil	-0.15199	-0.10	0.02	-0.18	-0.06	-0.30
17	Spain	-0.15318	0.14	0.19	-0.16	-0.21	0.05
18	N Zealand	-0.42646	-0.38	-0.46	-0.19	-0.31	-0.42
19	Australia	-0.15660	-0.08	-0.18	-0.27	-0.30	-0.18
20	S Arabia	-0.17339	-0.30	-0.14	6.77	-0.21	-0.42
21	Poland	-0.17444	-0.30	-0.35	-0.18	-0.33	-0.36
22	Thailand	-0.21024	-0.35	-0.35	-0.18	-0.34	-0.30
23	Turkey	-0.24860	-0.27	-0.38	-0.18	-0.37	-0.38
24	Algeria	-0.27796	-0.39	-0.41	-0.19	-0.43	-0.42
25	Malaysia	-0.29297	-0.37	-0.37	1.32	-0.43	-0.37
26	Venezuela	-0.29751	-0.38	-0.42	-0.19	-0.44	-0.44
27	Egypt	-0.31066	-0.40	-0.46	-0.19	-0.24	-0.42
28	UAE	-0.31893	-0.38	-0.38	-0.18	-0.39	-0.30
29	Netherlands	-0.32545	29.00	-0.12	-0.18	-0.15	-0.36
30	Argentina	-0.32570	-0.35	-0.40	-0.19	-0.42	-0.38
31	Pakistan	-0.34043	-0.39	-0.38	-0.18	-0.39	-0.28
32	Czech	-0.34837	-0.38	-0.43	-0.19	-0.42	-0.42
33	Nigeria	-0.35108	-0.41	-0.42	-0.19	-0.31	-0.36
34	Belgium	-0.36324	-0.24	-0.32	-0.32	-0.33	-0.32
35	Greece	-0.36692	-0.32	-0.42	-0.19	-0.50	-0.44
36	Israel	-0.39019	-0.37	-0.37	-0.19	-0.33	-0.45
37	Austria	-0.39147	-0.28	-0.32	-0.18	-0.29	-0.34
38	Chile	-0.39826	-0.39	-0.43	-0.15	-0.34	-0.30
39	Hungary	-0.40304	-0.38	-0.44	-0.19	-0.44	-0.43
40	Colombia	-0.40629	-0.38	-0.46	-0.18	-0.15	-0.30
41	Sweden	-0.40684	-0.25	-0.30	-0.17	-0.30	-0.35
42	Denmark	-0.40691	-0.30	-0.40	-0.18	-0.29	-0.40
43	Singapore	-0.40755	-0.38	-0.44	-0.18	-0.31	-0.40
44	Switzerland	-0.41833	-0.24	-0.33	-0.17	-0.29	-0.31
45	Hong Kong	-0.42112	-0.35	-0.32	-0.18	-0.31	-0.42
46	Norway	-0.37523	-0.30	-0.30	-0.18	-0.21	-0.44
47	Philippines	-0.38172	-0.39	-0.46	-0.19	-0.43	-0.43
48	Finland	-0.39517	-0.34	-0.40	-0.19	-0.30	-0.39
49	Portugal	-0.40147	-0.35	-0.43	-0.19	-0.51	-0.43
50	Ireland	-0.4166	-0.34	-0.38	-0.17	-0.30	-0.35

Source: Same as in Table 1 above

Table 4: Analysis of normalized CO_2 emission data with respect to their possible correlates

	Z1	Z2	Z3	Z4	Z5	Z6
Z1	1.000	0.799	0.847	-0.012	0.982	0.892
Z2	0.799	1.000	0.972	-0.028	0.863	0.935
Z3	0.847	0.972	1.000	-0.006	0.884	0.986
Z4	-0.012	-0.028	-0.006	1.000	-0.020	-0.044
Z5	0.982	0.863	0.884	-0.020	1.000	0.908
Z6	0.892	0.935	0.986	-0.044	0.908	1.000

$$U = \frac{X - A}{B},\ V = \frac{Y - D}{C},\ r_{xy} = r_{uv}$$

where A, B, C and D are constants.

RESULTS

The correlation between CO_2 emission and other possible correlates carried out indicates that there is a strong correlation between CO_2 emission Gross domestic product, GDP, Industrial Output, Energy Consumption and manufacturing output. Furthermore, it can also be seen that there is a positive correlation among the possible correlates of CO_2 emission. For instance, there is a positive correlation between GDP (X_2), Industrial Output (X_3), Energy consumption (X_5) and manufacturing output (X_6), with the following values, 0.972, 0.863 and 0.935, respectively.

There is also a positive correlation between Industrial output (X_3), Energy consumption (X_5) and manufacturing output (X_6), with the values 0.884, 0.884 and 0.986, respectively.

Finally, there is a correlation between Energy Consumption (X_5) and manufacturing output (X_6) with the value 0.908.

Meanwhile, there is a negative, correlation between Export output and CO_2 emission, also between Export and other possible correlates of CO_2 emission. The reason is understandable and could be attributed to the fact that what is being exported may be raw materials or goods or items that may not be emitting CO_2.

From all these, the following relationships can be generated;

$$X_1 = F(X_2, X_3, X_5 \text{ and } X_6) \quad (1)$$

$$X_2 = F(X_3, X_5 \text{ and } X_6) \quad (2)$$

$$X_3 = F(X_5 \text{ and } X_6) \quad (3)$$

$$X_5 = F(X_6) \quad (4)$$

Since $X_5 = F(X_6)$, we can establish the following relationship with other correlates

$$X_1 = F(X_2, X_3 \text{ and } X_5) \quad (5)$$

Provided that there exists a positive relationship among X_2, X_3, X_5 and X_6, apart from their relationship with X_1.

Let g denote X_2, X_3 and X_5, such that $X_5 = F(X_6)$.

Then

$$X_1 = F\ (g) \tag{6}$$

where, g now represents all the possible correlates of CO_2 which also correlates among themselves (i.e., there exists positive relationship among all the correlates being considered).

Let us denote CO_2 emission (X_1) with Y, then Eq. 6 becomes

$$Y = F\ (g) \tag{7}$$

For the various countries of the world the estimate of CO_2 emission Y can be estimated from the possible correlates of CO_2 emission g, such that;

$$\hat{Y} = F\ (g) + w \tag{8}$$

where, w stands for other possible correlates of CO_2 emission which are not considered in this study. Therefore, we can use Eq. 8 above to estimate the CO_2 emission for some of the countries that have no numerical value for their CO_2 emission provided that the value of the possible correlates of CO_2 emission exists in their data bank.

The analysis of principal components carried out show the following results;

$$Y_1 = (-0.436)x_1 + (-0.452)x_2 + (-0.456)x_3 + 0.012x_4 + (-0.442)x_5 + (-0.450)x_6$$
$$Y_2 = 0.027x_1 + (-0.000)x_2 + 0.017x_3 + 0.999x_4 + 0.005x_5 + (-0.022)x_6$$
$$Y_3 = 0.728x_1 + 0.141x_2 + (-0.379)x_3 + (-0.025)x_4 + 0.085x_5 + (0.547)x_6$$
$$Y_4 = 0.079x_1 + 0.0523x_2 + 0.248x_3 + (-0.004)x_4 + (-0.809)x_5 + (0.059)x_6$$
$$Y_5 = 0.498x_1 + (-0.706)x_2 + 0.336x_3 + (-0.013)x_4 + (-0.319)x_5 + 0.198x_6$$
$$Y_6 = 0.160x_1 + 0.066x_2 + (-0.688)x_3 + 0.023x_4 + (-0.202)x_5 + 0.674x_6$$

The variances (Var Y_i) = λ_i are as follows:

$\lambda_1 = 4.5947$
$\lambda_2 = 1.0007$
$\lambda_3 = 0.2160$
$\lambda_4 = 0.1510$
$\lambda_5 = 0.0344$
$\lambda_6 = 0.0032$

The proportion of the total variance explained by the K_{th} principal Component is given by

$$\frac{\lambda_k}{\lambda_1 + \lambda_2 + \ldots\ldots + \lambda_p}$$

It follows that the proportion of the total variance explained by the first principal component will be:

$$\frac{\lambda_1}{\lambda_1+\lambda_2+......+\lambda_6}=\frac{4.5947}{4.5947+1.007+0.2160+0.1510+0.34+0.0032}=0.76=76.6\%$$

The proportion of the total variance explained by the second principal Component will be

$$\frac{\lambda_2}{\lambda_1+\lambda_2+......+\lambda_6}=\frac{1.0007}{4.5947+1.0007+0.2160+0.1510+0.0344+0.032}=0.167=16.7\%$$

The proportion of the total variance explained by the third principal component will be

$$\frac{\lambda_3}{\lambda_1+\lambda_2+......+\lambda_6}=\frac{0.2160}{6\ 4.5947+1.0007+0.2160+0.1510+0.0344+0.0032}=0.36=3.6\%$$

Therefore, summing up will yield 76.6% +16.7% +3.6% = 96.9%. But still the first and second Principal components have yielded up to 93.3% of the total variance, so we can as well make use of only the first and the second principal components. The first principal component explains 76.6% of the total variance, the first two principal components collectively; explain 93.3% of the total variance. Consequently, variation is summarized very well by two principal Components and a reduction in the data will be from 50 Countries (observations) on six variables (possible correlated of CO_2) to 50 Countries (observations) on two principal components (possible correlated of CO_2). The eigen values that were used for isolation are CO_2 emission and Gross domestic product. These factors accounts largely for Global warming.

DISCUSSION

Currently, action to stem the emission of green house gases as encapsulated in the Kyoto protocol is restricted to the developed countries which requires that they (developed countries) cut their green house gas emissions by 5% compared to 1990 levels by the period between 2008 and 2012, Emission Trading in the Kyoto Protocol Finished and Unfinished Business (1997).

Although Nigeria does not belong to developed countries and thus not required to take any abatement action for now, the measures adopted by the international community will not only have a serious effect for Nigeria in terms of economy, but also the fact that poor regions, particularly, Africa, appear at greatest risk from the projected effect of global warming. For Nigeria in particular, the economy is largely dependent on oil produce as discovered from the literature and general awareness, therefore to reduce emission means to reduce oil production which is the back bone of their economy. From all indications if the measures proposed by the United Nations to check emission (Global warming) come to hold developing countries like Nigeria who depends solely on oil for their economic growth will be adversely affected. Lu *et al.* (2007) adopted the Divisia index approach (a method whereby all the factors that affects the emission of carbon dioxide are divided into various components) to explore the impacts of five factors on the total carbon dioxide emissions from highway vehicles in Germany, Japan, South Korea and Taiwan during 1990-2002. CO_2 emission was decomposed into emission coefficient, vehicle fuel intensity, vehicle ownership, population intensity and economic growth. This is a clear indication that CO_2 emission could be used to asses the economic statues of a country.

The study by Michael (1995) considered carbon dioxide emission and global GDP where he stated that there exists Positive relationship between CO_2 emission and Gross Domestic Product (GDP) such that as per capita income increases CO_2 emission increases. One cannot comfortably advocate for reduction in GDP so as to reduce CO_2 emission instead an alternative measure of reducing CO_2 emission without necessary affecting GDP should be considered.

Furthermore, the study by Lu *et al.* (2007) (opcit) suggested that the rapid growths of economy and vehicle ownership were the most important factors responsible for the increased CO_2 emission. It will not be realistic to advise reduction in vehicle ownership, since it is clear that people that have not owned a car will aspire to have at least one and a family that is managing one would want to increase the number to at least two for more comfort. We should rather advocate for clean development Mechanism which has already started in some part of Europe (though not too common). Also one cannot say that since rapid growth of economy leads to increase in CO_2 emission that countries should reduce the activities that increases the growth of their economy but to adopt an alternative way of reducing CO_2 emission while the growth of their economy continues to be on the increase. Jabro *et al.* (2008) in their study on carbon dioxide flux as affected by tillage and irrigation of soil converted from perennial forages to annual crops, stated that among greenhouse gases, carbon dioxide (CO_2) is one of the most significant contributors to regional and global warming as well as climatic change. From all indications any factor that triggers off CO_2 emission contributes to global warming.

CONCLUSION

Conclusively, based on this study, we now know the countries that are responsible for the high concentration of CO_2 in the atmosphere vis-à-vis global warming. Also, it was found out that CO_2 emission in Nigeria is low which implies that Nigeria can enter into trading with most developed countries that are emitting more CO_2 than required, to maintain atmospheric balance. This does not mean that Nigeria should relax because she is not emitting even enough rather she should look for ways of improving her economic growth by improving on industries, going back to the era of Coal production to reduce much concentration on oil, encouraging Agricultural activities that will be using up the CO_2 being emitted as a result of the industrial activities going on and some other areas that can boost her economic activities.

RECOMMENDATIONS

Based on the study so far, the following recommendations apply:

- Diversification of the economy away from oil production and channeling resources to manufacturing and service sectors of the economy including agriculture provides the key to Nigeria's economic stability. This will ensure that the global shift away from fossil fuel energy sources will not create any significant negative impact on the economy in the future. Nigeria needs to act fast in this regard
- Increase government participation is crucial in the global climate change deliberation. Nigeria can only be sure that its interest is protected in the emergent global abatement strategy if it increases its level of participation
- Further studies should explore the quota given to Nigeria so as to know the space they will sell or trade upon

- Further studies should look into other gases that have the same effect as CO_2 in the atmosphere vis-a-vis global warming
- Finally, as individuals, the choice we make contributes positively or negatively to global warming. Choosing modern technology can reduce our use of fossil fuels and help protect the planet. Proper consideration should be accorded to landscape in our homes. We should plant trees and protect the forest in order to boost the oxygen content in atmosphere, buy energy saving electronic and appliances, replace incandescent light bulbs with compact fluorescent bulbs. Furthermore, saving energy at home is positive to the environment and also reduces the domestic spending cost

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