Climate change and business activities: a case of cassava farmers in Ogun state, Nigeria.

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Abstract
Climate change is an observable variation in the climate systems that are attributable to human (anthropogenic) activities and natural process (biogeographical), which alters the atmospheric composition of the earth and ultimately leads to global warming. The relationship between climate change (measured by increasing temperature trend and decreasing rainfall trend) and the business activities of cassava farmers in Ogun State, Nigeria appears not to have been fully examined; this study examines the relationship between climate change and the business activities of Cassava farmers in Ogun State. This study employs survey research design, through the administration of structured questionnaire to cassava farmers in Ijebu-Igbo, Ogun State. The research instrument (questionnaire) was validated using content validity index, through the assessment of five academics staff (in the departments of business administration and agriculture) at Olabisi Onabanjo University, Ago-Iwoye and Ibagun Campus, Ogun state, while the reliability of the instrument was tested through test-retest method by conducting a pilot study. The instrument was administered twice within an interval of two weeks and the outcome of the first pilot study was correlated with that of the second and a Cronbach alpha of 0.79 was obtained, which indicated that the instrument is reliable. The regression model was tested using categorical regression with the aid of STATA version 14.

The findings revealed that climate change is negatively related to the business activities of cassava farmers in Ogun State with coefficient and probability value of: increasing temperature trend (-0.54, p-value<0.05) and decreasing rainfall trend (-0.72, p-value<0.05). It can therefore be concluded that increasing temperature trend and decreasing rainfall trend, have an inverse relationship with the business activities of cassava farmers in Ogun State, Nigeria. It is recommended that the government should come up with eco-friendly policies as well as liaising with other nations to combat global warming as well as creating irrigational facilities to augment decreasing rainfall, cassava farmers should maximize the use of the raining season as well as creating small irrigational facilities.

Keywords: Climate Change, Global Warming, Business Activities, Cassava Farmers

1. Introduction
Significant changes in the environment caused by industrial activities, and their possible climate impact, have progressed toward becoming issues of exceptionally great concern, because variations in climate can truly affect agricultural productivity and many other parts of human activities. In the word of [1], climate change, the most expressed environmental term of present time has been used to refer to the change in current climate brought predominantly by human
being. It is maybe a standout amongst the most genuine environmental issues that the present world populace is confronting however the issue is not new [2]. Scholars [3] have examined the relationship between climate change and business activities, with most asserting that climate change has adversely impacted agricultural business activities. However, the effect of climate change on the business activities of cassava farmers appears not to have been fully explored. In addressing this research gap, this study empirically examines the effect of climate change on the business activities of cassava farmers in Ogun State, Nigeria.

2. Literature Review
Climate is a critical factor of agricultural productivity. The changing climate is expected to have extreme effect on farm production systems across the world. Climate change is a systematic change in the long-term condition of the atmosphere over different decades or more [4]. Actually, climate change indicates a long-term change in the statistical distribution of weather patterns (for example, temperature, precipitation among others) over decades. Climatic condition on earth has changed on all time scales even since long before human activity could have assumed a part in its change. According to [10] climate change is defined as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”. This definition focuses just on the human activity that alters the composition of the global atmosphere and eliminates other human activity impacts, such as, changes in the land surface. Sometimes, the term climate change is utilized to include all climate variability, which can prompt significant confusion. Climate has variability on all time and space scales and will always be changing. [13] defines climate change as a change in the condition of the climate that can be identify through the utilization of statistical tests, by changes in the mean and/or the variability of its properties, and that holds on for an expanded period normally decades or more. Despite the fact that the timeframe it takes the changes to manifest matters, the level of deviation from the normal and its effects on the ecology are most paramount. This prompted [5] to express that secular variations in climate occurring over a period of 100 to 150 years may not qualify as a climate change if conditions will quickly reverse later, however a change in climate usually takes place over a long period of time of no less than 150 years with clear and lasting effects on the environment.

Climate change is clearly connected to human activities and specifically from the burning of fossil fuels and changes in global patterns of land use [6]. The United Nations Environmental Programme (UNEP) defines climate change as extraordinary responses of the weather phenomenon which produces negative effects on agriculture, water resources, human wellbeing, depletion of the ozone layer, vegetations, soil and multiplying of carbon dioxide in the ecosphere [7]. Climate change has the capability of influencing all natural and human systems and possibly a risk to human development and survival socially, politically and economically [8].

2.1. Causes of climate change
At its most fundamental, climate change is caused by a change in the earth’s energy balance – the amount of the energy from the sun that enters the earth (and its atmosphere) is released back into space. The earth is picking up energy as we reduce the amount of solar energy that is reflected out to space – just like people put on weight if there is an imbalance between calories in and calories out [21]
It is important to state that climate change is caused by two basic factors, which include natural processes (biogeographical) and human activities (anthropogenic). The natural processes are the astronomical and the extra-terrestrial factors. The astronomical factor include the changes in the eccentricity of the earth’s orbit, changes in the obliquity of the plane of ecliptic and changes in orbital precession while the extra-terrestrial factors are solar based radiation quantity and quality among others.

The human causes; anthropogenic factor in climate change includes human activities that either produce large amount of greenhouse gases into the atmosphere that drains the ozone layer or activities that reduce the amount of carbons absorbed from the atmosphere. The human factors that produce large amount of greenhouse gases include industrialization, consuming of petroleum product, gas flaring, urbanization and agriculture. And the human activities that reduce the amount of carbon sinks are deforestation, alteration in land use, water contamination or pollution and agricultural practices. The human factor has been proven to be responsible for the progressing unequivocal climate change or global warming [13].

Climate change may cause unstable temperature and rainfall pattern and this could affect the planting and harvesting planning. According to Food and Agricultural Organization [9], around 25% of grains, 37% of root and tubers are lost in developing countries because of unstable climate conditions. Likewise, the excessive rise in temperature affects the development process and yields of agricultural products [10, 15] are of the view that extreme meteorological events, such as, spells of high temperature, heavy storm or droughts can seriously disrupt crop production and reduces the effectiveness and duration of pesticide control. Climate change is a threat to rural farmers in developing countries, particularly those living in the tropics and sub-tropics [14].

2.2. Climate Change and Agricultural Business Activities
Climate change is a one of the most serious threat to Nigeria agricultural sector and food security due to its sensitivity and vulnerability to high surrounding temperature and rainfall fluctuations. For example, higher temperatures bring down the yield of desirable crops while empowering weeds and pests' expansion and changes in precipitation patterns improve the probability of short-run crop failure and long run production declines, thus, its variability creates a huge challenge for food production [19]. Climate change impact on agriculture has prompted crop infestation and diseases. Farmers have reported that climate change is responsible for the increase in land degradation.

Cassava as a crop originated from South America and it’s broadly spread as a yearly crop in the tropical and sub-tropical regions for its edible starchy tuber as root. It is a yearly crop that may regularly be left longer that 12 months and normally planted as a sole product or mix with different crops. Production is throughout the entire year activity and it does well in a warm, moist climate. Cassava is exceptionally tolerant and can grow on marginal land where other food crops cannot grow well, but for its highly yield and productivity moderate climatic condition and best soil properties like a light, sandy loam soil of medium fertility and great aeration or drainage are all crucial [14]. Consequently, extreme weather conditions, such as, prolonged drought and excessive amount of rainfall that leads into flood may be detrimental to cassava output.

3. Methodology
This study employs survey research design, through the administration of structured questionnaire to cassava farmers in Ijebu-Igbo, Ogun State. The population of the study is the 84 cassava farmers
in Ijebu-Igbo, Ogun State. Census survey was adopted, which implied that the entire population was used for the study. The research instrument (questionnaire) was validated using content validity index (CVI), through the assessment of five academics staff (in the departments of business administration and agriculture) at Olabisi Onabanjo University, Ago-Iwoye and Ibegun Campus, Ogun state, they assess the instrument on two scale: relevant and not relevant. Using the CVI formula (CVI=n/N)
Where n is the total number of the questionnaire items ticked as relevant;
N is the total number of the questionnaire items.
A CVI of 0.8741 was obtained, which indicate that the instrument (questionnaire) is valid.
The reliability of the instrument was tested through test-retest method by conducting a pilot study. The instrument was administered twice within an interval of two weeks and the outcome of the first pilot study was correlated with that of the second and a Cronbach alpha of 0.79 was obtained, which indicated that the instrument is reliable.
The research instrument (questionnaire) was administered on the entire 84 cassava farmers in Ijebu-Igbo, Ogun State, Nigeria. However, only 71 was returned and found useable, which gave a response rate of 84.5%. The data was analyse using categorical regression with the aid of STATA version 14 software.

4. Results
Table 4.1: Categorical regression summary for hypothesis1 (Dependent variable- Business activities)

| Variable                  | Coefficient |  Fc |  P-Value |
|---------------------------|-------------|-----|---------|
| Increasing temperature trend | -0.54       | 3.92| 0.000   |

R square = 0.6291  
F-Stat=29.54 (0.000)

Source: Authors’ compilation from STATA 14
The result on table 4.1 above revealed that increasing temperature trend has negative significant effect on the business activities of cassava farmers.

Table 4.2: Categorical regression summary for hypothesis1 (Dependent variable- Business activities)

| Variable                  | Coefficient |  Fc |  P-Value |
|---------------------------|-------------|-----|---------|
| Decreasing rainfall trend  | -0.72       | 3.61| 0.000   |

R square = 0.7033  
F-Stat=25.47 (0.000)

Source: Authors’ compilation from STATA 14
The result on table 4.2 above revealed that decreasing rainfall trend has negative significant effect on the business activities of cassava farmers.
5. Conclusion and Recommendation
The study investigates the effect of climate change on the business activities of cassava farmers in Ogun State, using survey research design. The findings revealed that climate change is negatively related to the business activities of cassava farmers in Ogun State with coefficient and probability value of: increasing temperature trend (-0.54, p-value<0.05) and decreasing rainfall trend (-0.72, p-value<0.05). It can therefore be concluded that increasing temperature trend and decreasing rainfall trend, have an inverse relationship with the business activities of cassava farmers in Ogun State, Nigeria. It is recommended that the government should come up with eco-friendly policies as well as liaising with other nations to combat global warming as well as creating irrigational facilities to augment decreasing rainfall, cassava farmers should maximize the use of the raining season as well as creating small irrigational facilities.

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