The Impact of Climate Change on Growth and Development of Agro-Allied Small Scale Industries in Nigeria

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Abstract

This study investigated the contribution of climate change to the growth of agro-based small scale industries in Ondo state Nigeria. The secondary data utilized were derived from the study of the interrelationship between changing climate and access to raw materials needed for production. Two hundred enterprises were sampled and results analyzed across the regions of the state. The study established that, climate change has reduced the country's arable land and has made access to raw materials difficult and unpredictable leading to collapse of many enterprises. The study also discovered that many of surviving enterprises have had to build their own supply chains by establishing their own farms, reduce production and workforce, leading to low capacity utilization and shortage of processed food and raw materials to industries. The study concluded that the problem could be mitigated through better management of arable and wetlands, enlightenment of manufacturers and processors on coping strategies and improved support from government bodies.

Keywords: small scale industries, climate change, agro-allied industries, manufacturers, raw materials.

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Introduction

Perhaps there has not been any global environmental problem that has been pervasive and overstressed after the Second World War than the phenomenon of climate change. This emanates from the fact that climate change is more complex, and more uncertain than any other environmental problem that the world has come to grapple with. This is because almost every country and every region at different levels of development contributes, and responds to this phenomenon differently and at different rates of successes. Climate change refers to a change in global temperatures and precipitation over time due to natural variability or human activities which may be a threat to human development and survival socially, politically and economically. It is "a change in climate that is attributed directly or indirectly to human activities which alter the composition of the global atmosphere (Parry, 2007). The effects and intensity of this phenomenon depend on the part of the world observation is carried out. In many countries studies have shown that greenhouse gases are rising, and temperatures are increasing especially in the cities. Before the late 1800s, the average surface temperature of Earth was almost 15°C (59°F). Over the past 100 years, the average surface temperature has risen by about 0.7 degree Celsius (1.3 degree Fahrenheit), with most of the increase occurring since the 1970s. Scientists have linked this amount of climate warming to numerous changes taking place around the world including melting mountain glaciers and polar ice, rising sea level, more intense and longer droughts, more intense storms, more frequent heat waves, and changes in the life cycles of many plants and animals. Warming has been most dramatic in the Arctic, where temperatures had risen almost twice as much as the global average.

The continent of Africa and indeed Nigeria has had its own share of the negative impact of climate change with deleterious effects: seasonal cycles are disrupted, as are ecosystems; and agriculture, water needs and supply, and food production are all adversely affected. Global warming also leads to a rise in sea-level with its attendant consequences, which includes fiercer weather, increased frequency and intensity of storms, floods, hurricanes, droughts, increased frequency of fires, poverty, malnutrition, and series of health and socio-economic consequences. It has a cumulative effect on natural resources and the balance of nature. All these have considerable effects on rising poverty where recent figures from the National Bureau of Statistics put at over 60% in 2014.

In a developing country like Nigeria however, the most pervasive impact of climate change apart from reducing liveability of many urban areas has been reduction in food security and raw materials for agro-based industries. According to Medugu *et al* (2010), persistent droughts and flooding, off season rains and dry spells have shortened growing seasons with lakes and rivers drying up in the arid and semi-arid region. The result is that water supply is getting inadequate for use in agriculture, hydropower generation and other uses, and droughts are getting worse where climate uncertainty is growing. The implication of this is that farmers are discouraged from planting from previous crops failures leading to shortages. Therefore, factories are starved of raw materials and would respond in different ways, many of which are negative. However, small scale enterprises which account for about 80% of industries in Nigeria (Akinbinu, 2000; Fatusin, 2012) are more often than not incapacitated by reasons of finance and type of technology to adapt. The impact of the global phenomenon of climate change on agro- based small scale industries and their coping strategies in Ondo state Nigeria is the subject of this study.

Literature Review

There have been global concerns on climate change since 1970s with various protocols and conventions from the Kyoto protocol to the recent Copenhagen agreement where the African representative from Sudan said exclaimed "Africa is burning up". The literature on climate change is centred on three interrelated approaches – the principles behind climate change, the impact, and the adaptive or coping strategies. Before 2,000 years ago, temperature variations have not been systematically compiled into large-scale averages, but they do not provide evidence for warmer-than-present global annual mean temperatures going back through the Holocene (the last 11,600 years). There are strong indications that a warmer climate, with greatly reduced global ice cover and higher sea level, prevailed until around 3 million years ago. Hence, current warmth appears unusual in the context of the past millennia, but not unusual on longer time scales for which changes in tectonic activity. The global emissions are on an accelerating trend and could lead to a 6.4°C (11.5degree F) temperature increase by the end of the century, exceeding conservative estimates with an average warming of over 2.5°C, the world would see some very serious changes (Pachauri, 2008)

Yet it is indeed the impacts of climate change that is most frightening and this has been studied from various perspectives. For instance Confalonieri et al. (2007) investigated epidemiology from climate perspectives and concluded that climate change has altered the distribution of some infectious disease vectors and increased heat-wave-related deaths. Campbell-Lendrum and Woodruff (2003) opined that the phenomenon has increased mortality and morbidity in many countries. Stringer et al. (2009) studied the impact of climate change on agriculture and noted declining agriculture from drought and flooding in developing countries. Sayne (2011) studied climate change from the perspective of security and concluded that it has aggravated communal conflicts in Nigeria. According to him, a basic causal mechanism links climate change with violence in Nigeria. Under it, poor responses to climatic shifts create shortages of resources such as land and water. Shortages are followed by negative secondary impacts, such as sickness, hunger, and jobless¬ness. Poor responses to these, in turn, open the door to conflict.

The impact of climate change can be vast. In Nigeria and most West African countries, some stable ecosystems such as the Sahel Savannah may become vulnerable because warming reinforces existing patterns of water scarcity and increases the risk of drought. With climate change, the country's aquatic ecosystems, wetlands and other habitats may create overwhelming problems for an already impoverished populace. Under these circumstances, Adejuwon (1994) believed that biological productivity in Nigeria will decrease in the event of global warming with an additional consequence of severe shortages in food production in the face of Africa's low level of coping capabilities (Nwafor, 2007; Jagtap, 2007).

Perhaps most important impact of climate change is the impact it has on food security. African continent is already besieged with conflicts and poverty and perhaps the end result of climate change. There is a growing consensus in the scientific literature that, over the coming decades, higher temperatures and changing precipitation levels caused by climate change will be unfavourable for crop growth and yield in many regions and countries (Yesuf *et al*., 2008; Ogbo *et al.,* 2013).

Thus, while the impact of climate change has been explored especially on food production in various studies, the impact on agro-based industries which also depend on agriculture for raw materials supply has

been least explored. There is a careless assumption (either right or wrong) that, since climate change affects agriculture the phenomenon will also affect agro-based industries that are dependent on it. Yet, climate change has the possibility of affecting both sectors proportionately since they are interwoven. Empirical observation reveals that this impact is mostly felt by small scale agro industries because they are more vulnerable due to their weak structures and low technology (Omisakin, 1999; Sanni 2009). All these may lead to weak adaptive capacity, and eventual death of many of such enterprises.

Renewed Emphasis on Small Scale Industries by the Federal Government

Though industries in Nigeria have always been dominated by small scale types, emphasis had long been on the encouragement of large scale industries which were perceived could generate large volume of employment and improve the GDP significantly. The first national development plan 1960 – 1964, and the second national development plans provided for direct government intervention in industrial development through establishment by basic industries such as iron and steel, petrochemical and fertilizer industries. Multinational companies were also encouraged through granting of tax holidays, pioneer status and duties reduction or exemption on imported raw materials and spare parts of factory machines. However, the economic downturn of the 80s and 90s in Nigeria led to the closure of so many large firms due to some reasons such as: import dependency nature of their raw materials, their capital intensive modes of production, high kilowatt of power requirement that Nigerian Power Stations could not meet, lack of competitiveness of their products in the international market, and unfair competition from imports

Following these developments, access to international financial institutions become very difficult for Nigerian enterprises. Foreign portfolio investment could not match up with the requirements; hence Nigeria became unfriendly to investors. As a way out, emphasis started shifting to local raw material dependent enterprises. The government established the Small Scale Industry Equity Investment Fund (S.S.I.E.F), and later the Small Scale Enterprises Development Agency (SMEDAN), to co-ordinate government economic activities on small scale enterprises in 2003.The technology incubation centres were established in many states in Nigeria to provide technical supports to small scale industries. Moreover, access to loans by this industrial sub sector was made easier through the Bank of Industry. The Central Bank in 2005 directed commercial banks to make available to the real sector – manufacturing and agriculture up to 50% of their capital in every financial year. This has resulted in considerable financial assistance to this industrial sub sector reaching 90 billion naira2003, declining to 13.5b naira in 2008.

Methods of Research

The research was carried out with the use of questionnaire which was administered to 200 proprietors of agro-based small scale industrial establishments spread across Ondo state as identified from the register of co-operatives. Samples were taken systematically and every 5th industry was picked. In order to make the study representative of the entire state, six local government areas in the three regions that constitute the state as shown in Fig.1, were purposively sampled and 25% or registered agro-allied manufacturing enterprises were investigated. Secondary data were also collected from ministries, agencies and boards connected to climate change and industrial development (the Federal Bureau of Statistics, Central Bank of Nigeria, and the State Registrar of Co-operatives) and other relevant published works. Data collected were

analyzed using descriptive statistics. Pearson moment correlation coefficient was utilized to investigate relationships. Data analysis were presented in tables and charts

The scope of this study is limited to Ondo State of Nigeria. The state is located between latitudes 5”45’ and 7°52’N and longitudes 4°20’ and 6° 05’E. Its land area is about 15,500 square kilometres. Ondo State is bounded on the east to Edo and Delta states, on the west to Ogun and Osun States, on the north to Ekiti and Kogi States and to the south, the Bight of Benin and the Atlantic Ocean. (See fig. 1)

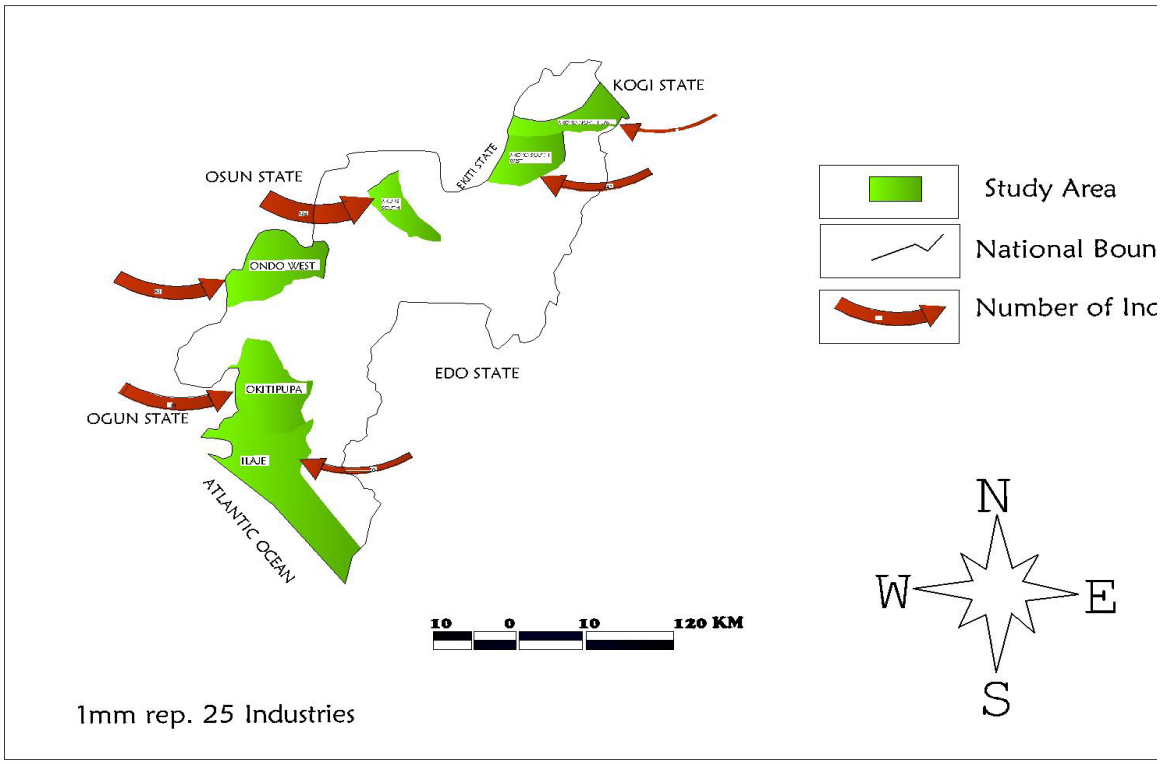

Fig. 1: Proportion of Industries per Local Government in Ondo State

Source: Field work 2015

The indigenous people are mostly Yoruba, made up of Akure, Akoko, Ondo, Ikale, Ilaje and Owo sub-ethnic groups. The inhabitants include ArogboIjaw and Apoi.Ondo state recorded population of 3.4m comprising 1.06m in Ondo North, 1.15m in Ondo central, and 1.22m in Ondo South senatorial districts (2006 NPC census). The structure of the population is such that, about 65% of the population is cosmopolitan, residing in over 21 major and minor towns in the 18 local government areas of the state. The other 35% comprise of the indigenous people as well as migrant farmers.

Ondo state, like most areas of inter-tropical Africa is predominantly an agricultural area. Taking due advantage of the naturally fertile soils, the people of the state were motivated to flee the towns of the interior areas (forest zones of the state) to find their own farm sites, which formed the nuclei of subsequent farm settlements. Owing to suitable climate and edaphic factors, a wide range of crops can be identified in the state. These are the arable food crops, notable among which are yams, cassava and plantain. The state can also boast of commercial crops such as cocoa, benniseed, rubber, cashew, and kola nuts. Among these

two categories of crop is a blend of food and cash crops. They are termed as commercial food crops. They are fundamentally food crops that have been commercialised as a result of monetization of every crop and service. (Ondo State Govt. Gazette 2000)

In most of the villages, palm oil production is significant; providing the major source of oil for human consumption. Mangoes, oranges and pawpaw are important crops produced in the area. Lumbering is also an important economic activity in the state, because it has a considerable cover of secondary forest in addition to the forest reserves and plantations found in the southern parts of the state. Sawmills are scattered all over the state, particularly the southern and central parts of the state to utilized the forest resources. The rich timber resources of the state provide a veritable material base for furniture industries.

Many studies such as Fatusin (2009) have established preponderance of agro dependent industries which accounted for over 35.7% of all manufacturing in Ondo state. Other studies such as (IDC, 2005, Inegbenebor, 2006; Oyeyinka, 2001; Aworawo, 2011;Fabayo, 2009;Yusuff, Olagbemi, and Atere,2011) have identified that small scale industries accounted for over 55% of all manufacturing industries in Nigeria, with Ondo state inclusive. This is relative to the structure of manufacturing which is dominated by primary products and little or no capital goods industries. The state's 2003 policy on industrial development had the objective of using agro-allied industries as a spring board of industrial development, as well as a strategy of curbing high incidence of post-harvest losses of farm produce, hence, the emphasis on the sector.

Implication of climate change

Climate change, Land Use and Availability of Industrial Raw Materials

There has been progressive decrease in Nigeria's arable land over the years, yet the population has continued to increase at an average of 2.5% in the past 15 years (National Population Commission, 2006) reducing from 105 hectare in 1960 to 82 million hectares in 1986 to 2008. However, only about 34 million hectares (or 42%f the cultivable area) were being cultivated. A lager part of this land was farmed under bush fallow, a technique whereby an area is left idle for varying periods to allow natural regeneration of soil fertility. Another 18 million hectares were classified as permanent pasture, but lager part of this land had the potential to support crops. About 20 million hectares were covered by forests and woodlands. Most of this land also had agricultural potential. The country's remaining 19 million hectares were made up of buildings or roads, or considered wasteland.

In a study conducted by Abbas (2012), it was discovered that the agricultural lands also decreased to 57043.44ha (15.68%) with the level II classes of farmland/fallow being 56935.41ha (15.65%), and plantation being 108.03ha (0.03%) during the same period. The natural/semi natural primary class experienced further decline in 2008. The total extent of the natural/semi natural primary class was 144249.91ha (48.72%) in 2008. The coverage of the primary classes are; heavy forest 76425.70ha (30.09%), light forest/thicket 29056.31ha (7.98%), palm swamp 29882.71ha (8.21%) and scrub/grasslands 8885.19ha (2.44%). it was estimated that Nigeria lost its arable lands heavy forests, and palm swamps by as much as -3.60 ,-0.83, and -3.67 between 1986 to 2008. This is reflected in GIS image in Fig.2 and 3.

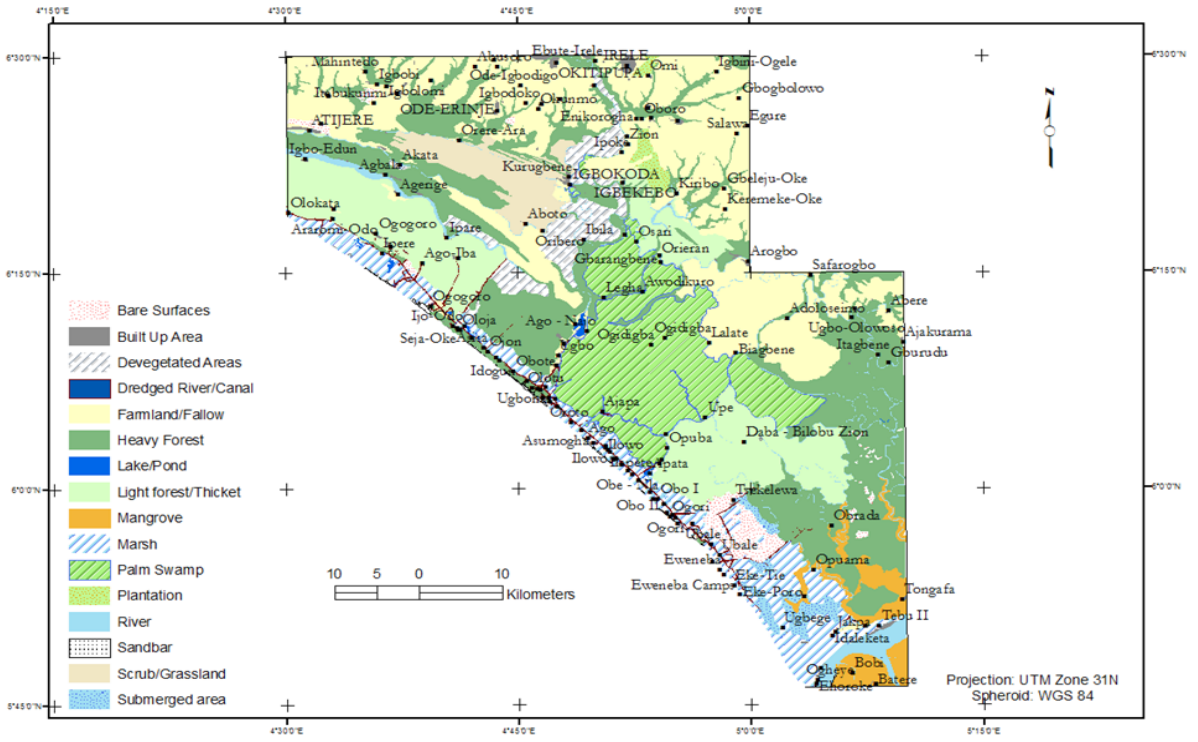

Fig. 2. Land Use and Land Cover of Ondo South in 1986

Source: LANDSAT image, 2012

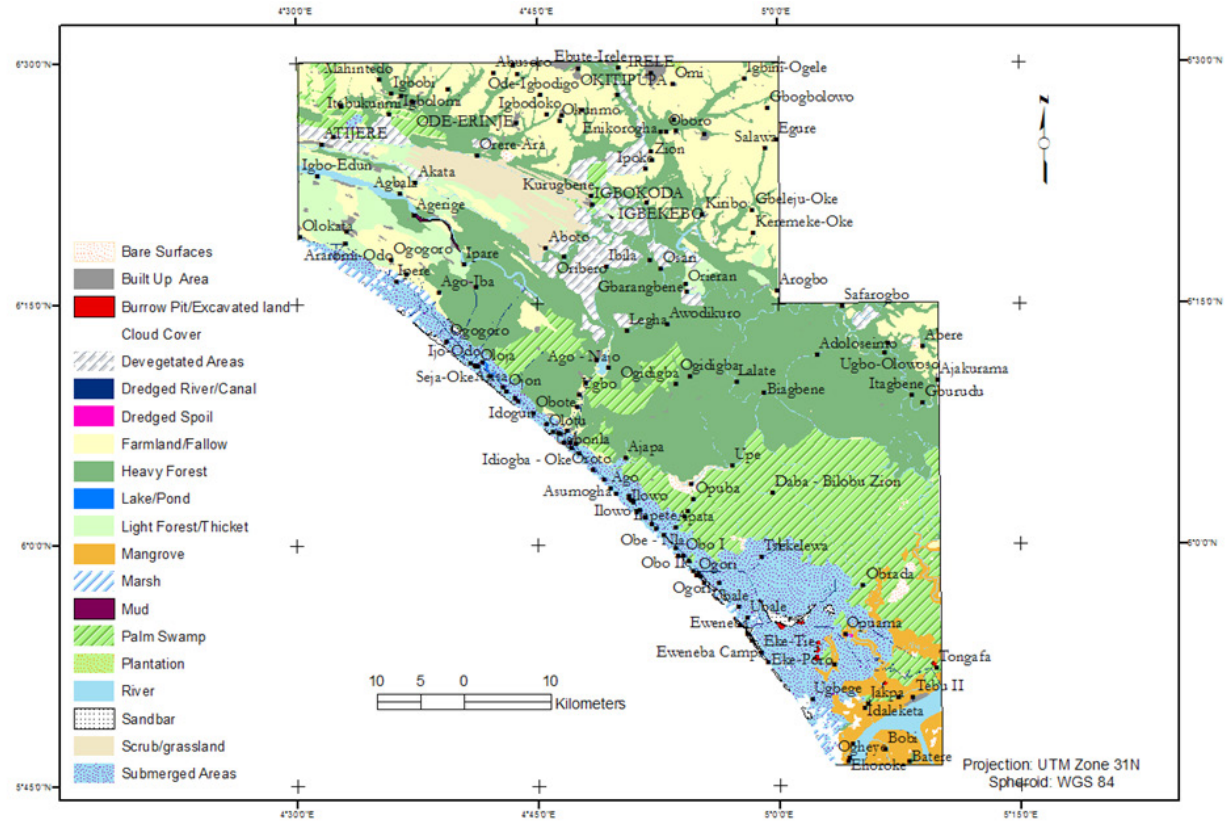

Fig. 3.Land Use and Land Cover of Ondo South in 2008

Source: LANDSAT Image, 2012

The reducing cultivable land has impacted on reduced industrial raw materials production. For example,

Nigeria imported unprocessed wheat, unprocessed sugar and unprocessed rice for industries, totalling $4 billion in 2013 (Thisday publication, 2015). In the same vein, cassava production of which Nigeria is the largest producer in the world which also feed the country's food processing mills like starch and chips plants has stagnated to 46million tons in 2014 (IITA, 2016) Tomato and crude palm oil, major raw materials for producing pastes and vegetable oil cannot meet overall demand by processing plants to the extent that the country depends on imported tomato concentrates from china to the tune of $360 million in 2013 even though the country is the largest producer of the commodity in Africa producing about 1.8 million tons in 2004 (Ugonna, 2015).

At the national conference on climate change held in University of Lagos in 2003, climate change was declared mostly responsible for the reduction in cultivable land over the past years as a result of inconsistencies in weather elements, leading to desertification in the north of the country, flooding in the south, and general aridity in the middle belt. According to Tucker *et al*(1991), desertification spread from the Sahara North to South of the country—an average of 5.5km every year—thereby affecting food and raw material production of the country's mostly food based industries.

Implication of Depleting Raw Material for Industries

Changes in land use, especially shrinking wetland and arable land, where most of the raw materials for agro-allied industries are sourced means that, farmers would have to adopt irrigated agriculture to produce these raw materials which they would not have had to ten years ago. Considering the fact that irrigated agriculture constitutes less than 3% of arable land in Nigeria this has the effects of reducing raw material production. The implication is that manufacturers move further inland to non-traditional sources in the rural areas in order to source for raw materials. This creates lots of problems for manufacturers because agro-allied small scale industries have market orientation as a major locational factor. Majority (45%) of small scale industries were sited between 0 – 10kms from the city centres in order to establish them. The number of enterprises was correlated with distance from the city centres to see the relationship as shown in Table 1.

Table 1: Correlation between Distance from City Centres and the number of Small Scale Industries

Descriptive statistics

	Mean	Std. Deviation	N
Mean distance	15.83	8.841	6
No. of enterprises	117.67	86.299	6

Correlation

	Mean distance	No. of employees
Mean distance	1	-.972
Number of enterprises	-.972	1

* Correlation is significant at 0.01 level (2 tailed) N = 6.

Source: Field work, 2015

The negative correlation of -974 indicates an inverse relationship between distance and the number of plants from the centre and correlation is significant at 0.01 degrees of freedom. This indicated that enterprises preferred to locate within the cities not the hinterlands where many got raw materials. These enterprises had no problems getting their raw materials from the hinterland in the past. However, recent shortages in raw materials from crop failures are now putting pressure on them to further move inland. It was discovered that 25% of enterprises located their plants between 0 – 10km from the centres of cities while 22% of those located within10 – 15 km were prepared to move their plants further into the hinterlands, or a location they would be able to source their raw materials cheaply with minimum stress. It is therefore established that raw materials shortages from climate change has changed the major factor of location of food-based small scale enterprise from market orientation to sources of raw materials.

The study established from the responses of proprietors that between years 2006 and 2018, manufacturers/ farmers move an average of 0.22km inland every year to get raw material from farmlands (see Table 2) since irrigation agriculture is not common among the farmers. This puts a lot of stress on the manufacturers who indicated an average increase in transport cost of 21.2% over the last three years from the extra miles they have to cover to source raw materials

Table 2. Average Inland Travel to Purchase Raw Materials

Year	Average Movement/Period	Cummulative Average
2006-2008	0.25km	0.22km
2008-2010	0.23km	
2010-2012	0.21km	
2012-2014	0.37km	
2014-2016	0.1km	
2016-2018	0.2km	

Source: Field work, 2015 (Updated, 2018)

On the other hand, climate change has led to increases in incidences of flooding. There were reports of flooding over the years with the most severe occurring in 2013 (NIMET, 2017). This affects raw material production in two folds: longer drying period and inaccessibility to the rural areas where the products are produced. This led to high mortality among particularly agro-allied industries as well as a fall in capacity utilization. For instance the Manufacturers Association of Nigeria (MAN) in 2016 reported factory closures of 272 enterprises, most of which are agro-allied small scale enterprises (MAN Bulletin, 2017; Businessnews, 2017)

Capacity utilization

The capacity utilization among enterprises fell over the past three-year period. This according to the entrepreneurs relates to the fact that, supply of raw materials had dwindled over the past three years and imports have grown. Fig. 4 indicated that capacity utilization in food or agro based enterprises fell from 59% in 2015 to 48.5% in the first quarter of 2017.

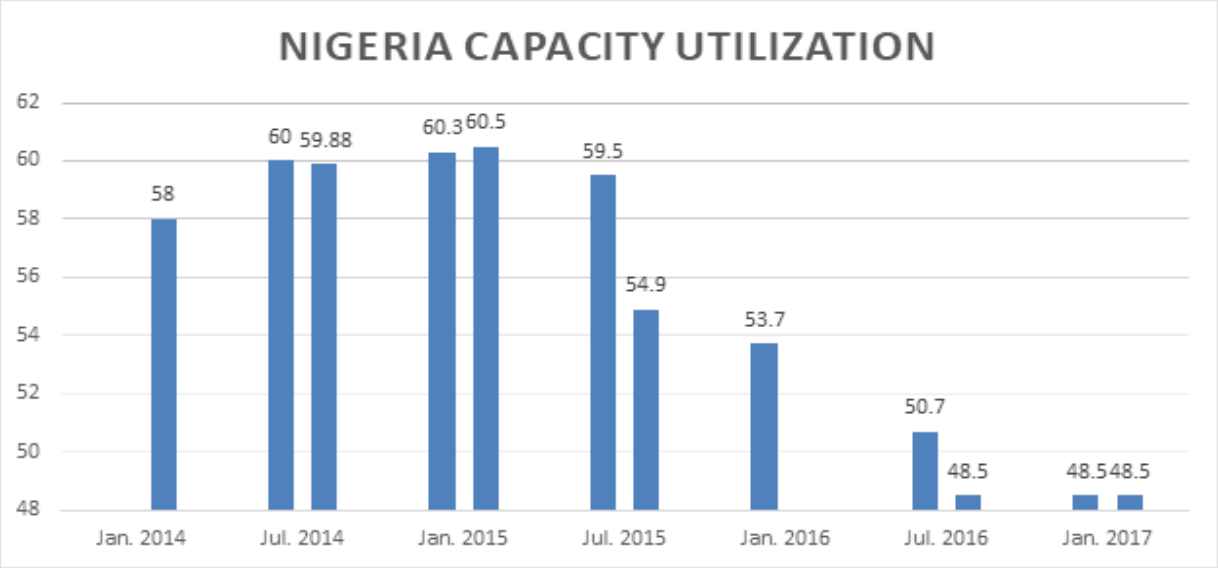

Fig. 4: Bar chart showing Nigeria Capacity Utilization

Source: Tradingeconomics.com (Central Bank of Nigeria, 2017)

The figure above given by Central Bank of Nigeria (2017) included both small and large scale industries. However, this study indicates that capacity utilization among small scale industries fell by as much as 34%. Proprietors of industries were asked to rank the major reason for the falling capacity utilization which led to reduction in capacity utilization; their responses are shown in table 4, Proprietors as shown in Table 4 picked dwindling access to raw materials as the major problem facing them. This is related to the phenomenon of climate change in two respects—yields and evacuation.

Table 4: Major Problems Facing Food Processing Enterprises

Effect of small enterprises	Freq.	%	Ondo North	Ondo Central	Ondo South
1. Poor access to Finance	55	28	10(22%)	25(27.2%)	20(10.5%)
2.Dwindling raw material sourcing	63	32.9	13(28.9%)	29(31.5%)	21(38.9%)
3.Low purchasing of products	15	7.8	3(6.7%)	7(7.6%)	5(9.3%)
4. Stringent environmental policy	44	23	18(40%)	21(22.8%)	5(9.3%)
5. Poor skilled workers	191	100.	45	92	54

Source: Field work, 2015

Over the past 4 years unexplained flooding has increased in Nigeria, with the most severe recorded in 2013 and 2017 (NIMET) which according to NBS made food growing belts in Nigeria inaccessible, thereby increasing food and raw materials shortages to processing mills especially rice mills. This puts a lot of stress on small scale processors. This is because while it was easier for large scale enterprises to import or develop their own supply chain, it was difficult for small enterprises (owing to their limited capital and logistics). On the other hand, climate change has increased the incidence of flooding and erosion, affecting rural feeder roads where evacuation of these raw materials takes place.

This also has implication on employment. Agro-allied enterprises account for between 50-60% of industrial

employment in Nigeria and 35.7% in Ondo state particularly (NBS, 2011; Fatusin, 2014). This sector indeed has tremendous potentials to grow, yet it is being constrained by dwindling raw materials. Out of the 126 enterprises sampled, 27% has reduced their workforce by 20% over the past year, 15% over the past six months and 8% in the last three months. Reasons given included: Poor sales (21%), Debt burden (12%); Poor electricity (15%); and shortage of raw materials 42%. Others are less significant.

The shortage of raw materials has also impacted the quality of products since manufacturers now make use of inferior raw materials, which otherwise they would not have used. This has therefore negatively impacted on sales and exports. Increasingly, many consumers are opting for imports which are of more quality and cheaper. In 2015, the European Union banned import of processed foods from Nigeria. Ondo state has been affected since the state is the source of many of the processed materials (like yam flour and cassava flour) which were exported to Europe and America. Reasons given for the ban was poor quality products. Poor products sales has considerable impact on poverty, which the World Bank describes as endemic in Nigeria since 60% of the population live on $1 per day (Human Development Index 2017). Poor sales by manufacturers create chain reaction that affect farmers, transporters, primary and secondary processors, and manufacturers themselves.

The study proceeded by investigating the impact of reduction in access to raw materials on proprietors' income. What proprietors earn currently was compared to previous earnings, among different categories of income groups of proprietors in 2012 to identify the degree of changes(see table 5)

Table 5: Comparative Analysis of Previous Income, with Current Income Received

Estimated Previous Mean monthly income received (₦)2012	Freq. of response	Estimated Mean monthly income received (₦)2015	Freq. of response	No of proprietors that have had their incomes increased or reduced
Below 20,000	22	Below 20, 000	19	-3
30, 000	18	30, 000	21	+3
40, 000	92	40, 000	74	-18
50, 000	62	50, 000	58	-4
60, 000	12	60, 000	14	+2
Over 70, 000	8	Over 70, 000	15	+7
Total	180		180	

Source: Field work, 2015

Table 5 shows dwindling fortunes of manufacturers whose standards of living have reduced. Manufacturers were asked to compare their incomes in year 2012 with that of year 2015. The figure revealed that among those earning about ₦20000 in 2012 who were 22 proprietors in the year has reduced to 19 in 2015. The greatest reduction however, was among those earning about ₦40000 in 2013 who were 92 in the year but the figure reduced to 74 in 2015 implying a slip among 18 manufacturers. This has affected willingness to expand or establish new enterprises in the state as shown in Table 6.

Table 6: Response of Proprietors on Willingness to Expand within next Three Months

Response	Frequency	Percent	Valid percent	Cumulative percent
To shut down	42	21	21	21
To reduce production	91	45.5	45.5	66.5
To produce on Demand	59	29.5	29.5	96
Don't Know	8	4	4	100.0
Total	200	100.0	100.0	

Source: Field work, 2015

Out of the 200 proprietors who responded to production trends in the next 3 months, 45.5% thought of reducing production, 29.5% decided to only produce when there is demand, while 21% have decided to shut down.

Coping strategies

Though fatality among firms was reported at 14% between year 2012 and year 2015, many surviving proprietors have had to adopt coping strategies to survive. These mitigating strategies ranged from structural reforms to reduction in productivity and improvement in logistic to guarantee unhindered raw material supply. These, as indicated in Table 7 ranged from direct farming in order to guarantee input supply, granting of loans and farming imputes to farmers, and establishment of retail and purchasing departments that would transact with farmers.

Table 7: Entrepreneurs' Adaptive Strategies

Products of Small Exp.	Freq	%	Ondo North	Ondo Central	Ondo South
Direct Farming	65	32.5	10(15.4%)	15.5(23.9%)	7(11%)
Reduction in Production	40	20	7(17.5%)	3(7.5%)	10(25%)
Investment in Logistics	50	25	15(30%)	4(8%)	6(12%)
Establishment of wholesale Department	10	5	1(10%)	3(30%)	1(10%)
Granting of Loans to farmers by Manufacturers	15	7.5	2.5(16%)	2(13.3%)	3(20%)
Import of raw materials	20	10	3(15%)	5(25%)	2(10%)
Total	200	100	102	107	88

Source: Field work, 2015

Considering the fact that these are small scale enterprises, the coping strategies put in place to survive have put a lot of stress on them since they have very little capacities financial, technical and logistic to do these effectively. This contributed to high fatality among the enterprises.

Government Intervention

The government interventions to improve the agro-based enterprises in Nigeria have been in the area of ecological support funds, for states most affected by climate change in order to improve access to raw materials granting of loans and inputs to farmers and manufacturers and controlled imports of raw materials.

However, the study found out that this has not been far reaching enough and has impacted very little—judging from the opinions of manufacturers. Government has not been forthcoming in releasing the funds to states with ecological problems relating to climate change. The study as shown in Fig.5 below brings to the fore, the perception of manufacturers on the effectiveness of government policies on mitigating the effects of climate change on their businesses. It revealed an overwhelming negative (62%) since the problem faced over the years have continued despite governments feeble interventions.

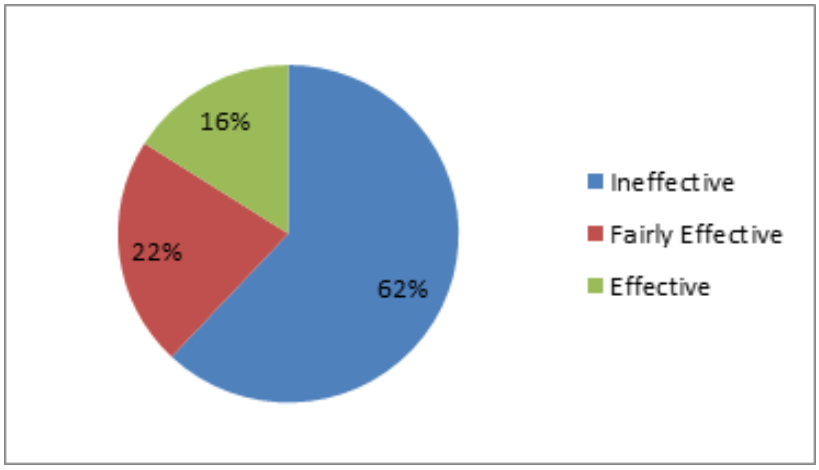

Fig. 5: Manufacturers' Perception of Effects of Governments Intervention.
Source: Field work 2015.

The study further evaluated reasons for this perception among manufacturers as shown in Table 8. Most of the reasons given relates to poor accessibility to funds by manufacturers mostly affected by climate change due to high rate of corruption among government officials (36%) and bureaucracy in the civil service (10%).

Table 8: Reasons given for poor Government Intervention

Reasons	Frequency	Percent	Valid %	Cumulative %
The money don't get to us	62	31	31	31
No clear cut method of disbursement of funds	43	21.6	52.6	52.6
Misapplication of funds	73	36.7	36.7	89.3
Too much bureaucracy in release of funds	21	10.5	10.5	100
Total	199	100.0	100.0	

Source: Field work, 2015.

Summary and Conclusion

This study investigated the impact of the phenomenon of climate change on small scale agro-based industries in Nigeria with Ondo state as a case study. The study recognized the symbiotic relationship between manufacturers and farmers who actually produce the raw materials used by 200 processors sampled whom previous studies revealed suffered severely from climate change in term of desertification in the North and flooding in the South.

This study discovered that food processing industries predominate among industries in the state and Nigeria as a whole, accounting for over 60% of the entire industries in the state. With that being the case, agro-allied small scale industries are very important to the economy of the state. However, sourcing raw materials for production has become a major challenge to these manufacturing enterprises. The study discovered that there has been progressive decrease in the country's arable land, reducing from 105 hectare in 1960 to 82 million hectares from climate change phenomenon. This has impacted negatively on production of industrial raw materials from crop failures, putting huge pressure on manufacturers to further move inland (rural areas) to get raw materials

The study estimated from the response of manufacturers that, 25% of firms located between 0 – 10km from the centres of cities and 22% of those located within 10 – 15 km were prepared to move their plants further into the hinterlands or locations they would be able to source raw materials. Capacity utilization in this sector therefore fell from 59% in 2015 to 48.5% in the first quarter of 2017, However, in spite of this situation, only 21% thought of closing their enterprises as against 45.5% who sought to reduce production as an adaptive measure. To cope with the situation, about 70% entrepreneurs embarked on direct farming in order to supplement the purchasing of raw materials to guarantee ceaseless production, 25% sought to improve their logistics, with about 17% of those in this category buying trucks to move products from the rural areas to where their factories are based, while 20% reduced production.

The study also discovered that government intervention to cushion the effects of climate change in form of ecological support fund to improve farmlands was perceived by 62% of the manufacturers as not being well utilized. Many cited misappropriation of funds by government officials as a major factor responsible for the failure of the programme

Recommendation

From the discussion so far, it is clear that the federal government and the 36 states government of Nigeria have adopted laisser-faire attitudes to climate change, which further affects the country's arable land and agro-allied industries. Yet the country needs to grow the sectors in order to achieve its development goals of halving poverty and unemployment by the year 2020. There is a symbiotic relationship between agriculture and agro-based industries, therefore efforts to improve the latter should also incorporate the former. The country requires an improved arable lands through better management and conserving the wetlands to mitigate the effects of climate change. The country also needs to improve storage capabilities to reduce post-harvest losses of agro-allied raw materials, improve access to the country's ecological support funds, and improve the country's rural roads to facilitate evacuation of raw materials. Manufacturers are encouraged to form cooperatives and formalize the informal small scale enterprises, so that they can have access to government's interventions.

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