THE EFFECTS OF CLIMATE ON COMMERCIAL ACTIVITIES IN SOURTHERN NIGERIA.

A. O. P. ODJUDO and G. O. ATEDHOR

ABSTRACT

Since man and his activities are under the vagaries of weather and climate, this paper is therefore designed to critically analyse the impacts of weather and climate on the patronage of some selected commercial sectors in Southern Nigeria. Four years (2000 and 2003) climatic data of temperature and rainfall were collected from Nigeria Meteorological Station, Lagos and monthly sales record from six commercial sectors (Ice cream, soft drinks, and water; transportation; building/construction; recreation; departmental stores and newspaper) between 2000 and 2003 were collected using questionnaires. The data were analysed using time series analysis, product moment correlation analysis, and extreme variability index.

The results show fluctuation in sales of all the commodities from month to month in line with the varying weather elements. The most and least weather sensitive was (ice cream, water and soft drinks) and departmental stores. Sales were generally higher in all the commodities analysed during the dry season than during the rainy season. Apart from the impact of weather and climate there is sharp increase in sales in virtually all the commercial activities in the months of December and April due to Yuletide and Easter festivities. For these reasons it is therefore recommended among others that entrepreneurs and traders should seek for, and adhere to weather forecast and predictions (especially the long-term forecasts) to avoid unnecessary damages and lost occasioned by adverse weather.

KEY WORDS: Climate, Commercial activities, Sales, Commodities, and Yuletide.

INTRODUCTION

A number of factors affect the economic fortunes of the business world and these include socio-cultural, psychological and environmental factors (Etim, 1994). An aspect of the environmental factor which is weather and climate in many instances, affect commercial activities either directly or indirectly, negatively or positively (Ahmed, 2000). Woodhart (1996) revealed that in the temperate region, hot dry season increases productive activities in clothing, footwear, drinks and tobacco industries, but decreases activities in pottery, glass and utility. In Nigeria, Kosoko (1999) stated that pottery industries are favoured during the dry season while in the rainy season, flood results in the scarcity of the raw material kaolin, which invariably reduces production in the industry. Adagbrasa (2002) also noted that excessive rains or rainstorms lead to flash flooding in most urban areas of Nigeria, this slows transportation and economic activities. Climatic hazards such as flood, windstorm, sandstorm, drought and desertification have caused a lot of damage to crop production resulting in famine, food shortage and increase in prices of food stuff and raw materials in many localities in Nigeria (Ayoade, 1988 and 2002; Odjugo, 2001).

Man's physiologic comfort and his activities in most cases are determined by the prevailing weather condition and to protect himself against the vagaries of weather elements, appropriate design and planning strategies of his activities are needed (Okpara, 1994; Onokerhoraye and Omuta, 1995). This beholds that weather and climate form a veritable integral part or man's economic activities.

Despite the vital role played by weather and climate on man's economic life, very little attention has been accorded to this section of applied climatology. That is why Edett, (2000) stated that much researches have been carried out in the areas of agroclimatology, bioclimatology, synoptic and dynamic climatology but the least emphasis is placed on econoclimatology. In Nigeria, a few studies on econoclimatology include those of Adebayo (1989), Okpara (1994), and Etim, (1994), in Ibadan, Imo State and Owerri

respectively. Apart from Adebayo's work that is empirical, others are qualitative and generalised. The qualitative and generalised approach conflicts with the use of data, which largely form the basis for drawing logical conclusions (Song, 2001). It is on this premise that this paper is designed to critically appraise the impact of weather and climate on the patronage of some selected commercial sectors in Southern Nigeria.

The Study Area

The study area covers Nigeria south of Latitude $7^{0}N$ (Fig. 1). This area falls within the equatorial region (Koppen's Af Climatic Classification). The area experiences very heavy rainfall, which ranges between 2000 mm to 4000 mm annually. The rainfall duration ranges from 8 months to 10 months in a year. Thus, there is a marked rainy and dry season. In the coastal cities of Port Harcourt, Warri and Lagos, slight rain showers begin in the month of February or March while in the other cities in this study, the rainy season starts in the month of March or April. Generally the rainy season in this area begins in April and ends in early November while the dry season starts in late November and extends to March. The mean monthly temperature ranges from $25^{0}C$ to $29^{0}C$ while the mean daily temperature range is from $20^{0}C$ to $33^{0}C$.

Seven towns out of 23 major towns were randomly selected for this study. This represents about 30% of towns in the study area. These include Lagos (6.27^{0}N, 3.25^{0}E), Ijebu Ode (6.50^{0}N, 3.55^{0}E), Warri (5.31^{0}N, 5.45^{0}E), Benin City (6.19^{0}N, 5.37^{0}E), Port Harcourt (4.47^{0}N, 7.02^{0}E), Onitsha (6.09^{0}N, 6.48^{0}E) and Owerri (5.29^{0}N, 7.03^{0}E). From the western and mid-western regions, two towns each, were randomly selected while three towns were selected from the eastern region because there are more commercial towns in this zone. All the settlements used are both industrial and commercial towns.

METHODOLOGY

Seven towns were randomly selected in the

A. O. P. ODJUDO, Dept.of Geography and Regional Planning, University of Benin, Benin City, Nigeria. E-mail:paoodjugo@yahoo.com
G. O. ATEDHOR, Dept.of Geography and Regional Planning, University of Benin, Benin City, Nigeria.
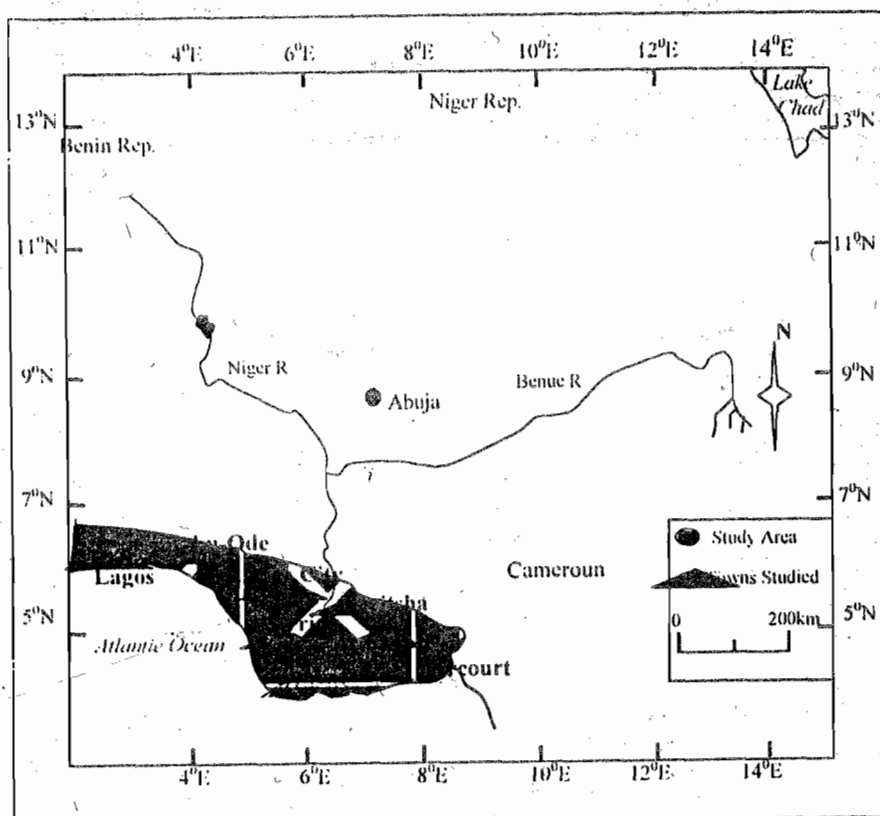
Fig. 1: Nigeria - Showing the Study Area

equatorial belt of Nigeria. Two towns each, from South-western, Midwestern and three from South-eastern Nigeria. These towns include Lagos and Ijebu-Ode (Southwest), Benin City and Warri (Midwest) and Onitsha, Owerri and Port Harcourt (Southeast).

Climatic data and information on commercial activities were the basic data needed in this study. The climatic data (temperature and rainfall) used were obtained from the Nigeria Meteorological Station, Lagos between January 2000 and December 2003. Information on monthly sales or patronage from six commercial sectors was collected through the use of questionnaire and personal interview. These include information from 5 departmental stores; ice cream, water and soft drinks; building / construction stores; newspaper depots; recreation centres and inter/intra-city motor parts. Their sales between 2000 and 2003 were collected and computed. In each commercial sector in every town, 10 copies of the questionnaire were distributed, A total of 60 copies of the questionnaire in each town and a grand total of 420 were distributed and analysed.

The data were analysed using time series analysis, product moment correlation analysis, and extreme variability index. The extreme variability index (EVI) according to Woodhart (1996) and Ayaode (2002) is stated as:

$$EVI = \frac{R_1 \times 100}{M_1} \qquad 1$$

Where: R_1 = The range of each variable
M_1 = The mean of each variable
100 = Percentage

RESULTS AND DISCUSSIONS

The demand for ice cream, cold water and soft drinks is more susceptible to climatic fluctuations and variations (Figs. 2 and 3). This is a clear expression of the rational consumption pattern of man based on his physiological comfort. When the weather is sultry as in the case of dry season months of November to March, his demand for cold drinks increases. That is why the sales of cold drinks are extremely high during the peak period of the dry season (February to March) Figure 3. Conversely when the weather becomes cold, demand for cold drinks gradually decreases as observed during the rainy season months of April to October (Fig. 2).

Obviously with the increase in rainfall amount and frequency from the months of April through July, a sharp downward trend was recorded in the sales of ice cream, water and soft drinks. But with decrease in rainfall and increase in temperature as a result of August-break (Short dry season), the sales in August became slightly higher than that of July and September. Thereafter, a gradual increase in sales was recorded until December, which recorded the highest peak sales. The very high sales in these commodities in the month of December could not be attributed to high temperature alone but with combined effects of Yuletide (Christmas) and New Year festivities. In the absence of these festivities, a reduction in the sales of these commodities is expected because of cool weather experiences in December and January in this region due to the effects of the tropical continental air mass that brings harmattan (Cold, dry and dusty weather). Thus a period of high temperature and low or no rainfall favours the sales of these commodities while rainy season with its associated low temperature is the least favourable time for the sales of these commodities. Similarly, Fellmann et. al. (1999), noted that the production and distribution of primary economic activities and manufactured goods are weather related.

In order to facilitate movement of people in pursuance of their economic and other goals either within or outside the towns requires transportation. Since transportation is so crucial for the daily running of man's activities, bad weather, especially heavy rainfall can only stop one totally from where he intends going when the journey is not very important. But when it becomes unavoidable as revealed by most respondents, they find all possible means of coverage to where they can easily board vehicle.
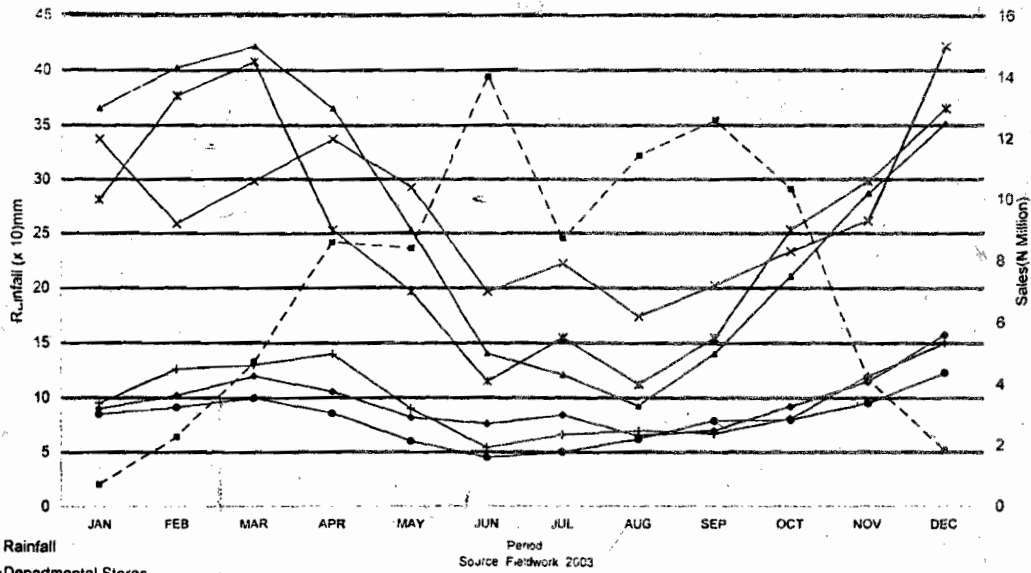
Legend:
- ■ Rainfall
- ◆ Departmental Stores
- ● Newspaper
- + Recreation
- ▲ Ice Cream,Water & Soft Drinks
- ✖ Transportation
- ✹ Building/Construction

Period
Source Fieldwork 2003

Fig.2: Impact of Rainfall on sale of Commodities

Legend:
- ■ Temp
- ◆ Departmental Stores
- ● Newspaper
- + Recreation
- ▲ Ice Cream,Water & Soft Drinks
- ✖ Transportation
- ✹ Building/Construction
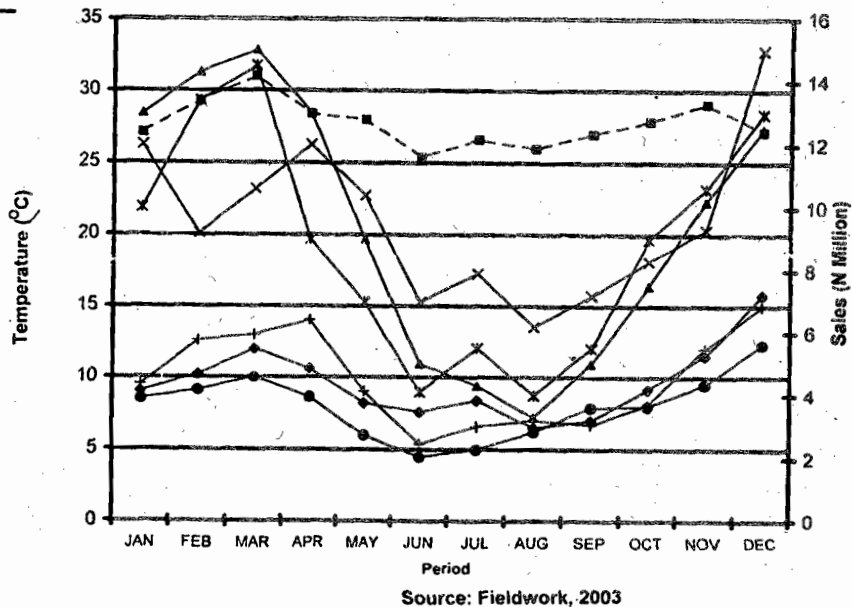
Period
Source: Fieldwork, 2003

Fig.3: Impact of Temperature on Sale of Commodities

High temperature and bright weather during the dry season period encouraged higher patronage in the transport industry, while the rainy season recorded the least patronage (Fig. 4). This could be attributed to the disturbing effects of rains and the threat of clouds, which cause psychological withdrawal from going out or travelling. Comparing the inter- and intra–city transport services, it is observed that the former is more vulnerable to weather hazards than the latter. This could be attributed to the distance covered between homes and parks by the travellers under such unfavourable weather condition to board a vehicle. In the same vein, Adagbrassa (2002) observed that flooding is a major problem in the movement of goods and services in Lagos during the rainy season.

Apart from weather elements, festivity can also be seen as a factor that affects transportation. The highest patronage of transportation is recorded in the months of December, January and April. These periods correspond with the Yuletide and Easter celebration when people often travel to visit parents, friends, and relatives among others. This peak is more pronounced in inter-city than the intra-city transport services. Recorded sales of fuel (petrol and diesel) were also reduced drastically during the rainy season. This could be as a result of the drastic reduction in the flow of passengers during the wet season.

Demand for building/construction materials is highest during the months of November to April. This corresponds with the dry season, while the wet season witnesses a very low

Source: Fieldwork, 2003
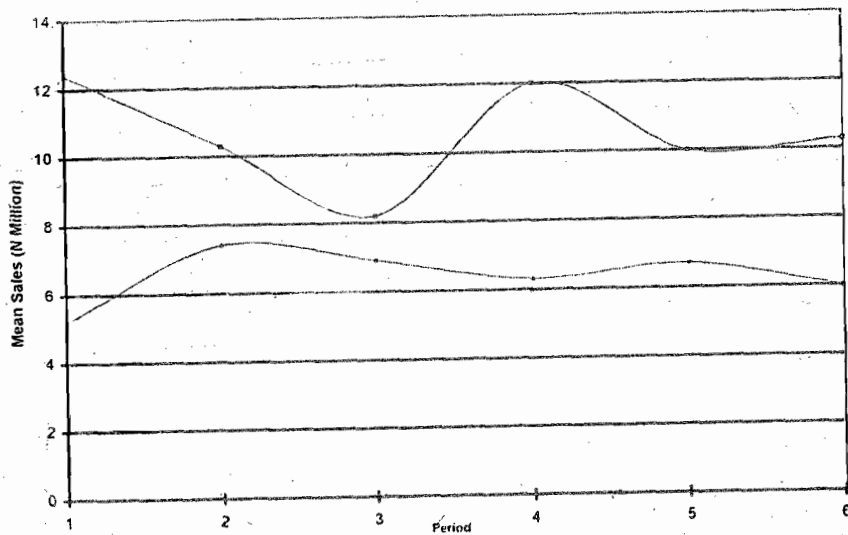
● Wet Season
■ Dry Season

Fig.4: Impact of Seasonal Variation on the Sale of Commodities

purchase. Sales are greatly affected during the rainy season because the workers are seriously prevented from working outdoors. Heavy rains also cause a lot of damages to structures and bricks. To prevent damages and economic loss, building and construction works are often carried out more during the dry season. Maunder (1989) showed that losses in the building and construction industries in U. S. A. and U. K. due to adverse weather are high annually and that, an upward of 10% of such losses could have been avoided through the appropriate use of the weather forecasts available at all times.

The most weather-sensitive variable among building materials is white - sharp or coarse sand. It is found within the flood plains or beaches of the rivers that is why its digging takes place more during the dry season when the flood has receded into the valleys. The supply is usually high at this period and the price is always very low. During the rainy season, the floodplains or beaches will be flooded and the marshy nature of the roads to the beaches disturbs vehicular movement to evacuate the commodity. This results in low supply and increase in prices. As a result of the seasonal variation in the availability of the coarse or sharp sand, the rational economic man will decide to purchase the needed quantity during the dry season when the supply is high and the price is low. The sales of zinc, asbestos, head-pans, spades and trowels are higher not during the dry season, but toward the end of the rainy season, that is from September to November. Response from buyers and the dealers interviewed reveals that higher cost of these materials is anticipated during the dry season. Such patronage could be attributed to psychological (panic buying) and economic reasons in an attempt to minimise cost. The sales of cement are permanently high during the dry season while that of paints is higher during the terminating point of dry season and on-set of rains (March – May).

The demand for newspapers and magazines is more during the dry season months of November to March. For, heavy rains prevent vendors from performing maximally as it disturbs readers from coming out to buy.

Majorities of the variables considered in the departmental stores are weather sensitive. Demand for umbrella and raincoats are generally higher during the rainy season, but the highest sales were recorded in the early periods of rainfall (April-June). Different brands of shoe exhibit

weather - oriented sales. Rubber shoes showed higher demand during the wet season unlike leather shoes, which had higher demand during the dry season, most especially the early dry season months of November and December. This trend can also be linked with the influence of Yuletide celebration. Furthermore, the sales of tea and bread are highest during the cold / dry harmattan period and the intense rainy season months of December-January and June-September respectively. It was expected that the sales of bread will be disturbed or reduced by rainfall and the associating high relative humidity, but the study shows the contrary. The increase in sales of bread during these cool months is not unconnected with the high sales of tea, which is jointly demanded

The demand for yam, garri, rice, and beans, is not all that weather dependent since their sales are almost uniform throughout the year because of their necessity to man as staple food within this part of the tropical world. The month of December saw a sharp rise in the sales of rice and beans. This can be ascribed to the impact of Christmas celebration.

Visits to recreational centres are higher during the dry season than during the wet season (Figures 2-3). Robinson (1976) revealed that the summer favours recreation and tourism in the temperate region. In the tropics, Odjugo (1997) has found that while the in-door recreational activities were less weather sensitive, the out-doors were seasonally influenced. The most seasonally affected recreational sites are the botanical gardens and the art galleries. There were more visits to these spots during the dry season months of December to April. Pool offices, gambling and casino centres recorded the highest visits during the rainy season. Sales in hotels are more during the dry season but the difference is not significant when compared to that of the rainy season.

Seasonally, all the economic activities exhibited higher patronage during the dry than the rainy season (Fig. 4). The result of the Extreme Variability Index shows that the most and least weather sensitive among the variables considered were (ice cream, water and soft drinks) and departmental stores respectively (Table 1). From the correlation analysis (Table 2), it is observed that temperature is positively correlated with all the variables considered. But there is a stronger correlation between temperature and ice cream/water/soft drinks, newspapers and building/construction

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materials with the last two showing the highest negative correlation with rainfall. This implies that while rainfall is detrimental to the sales of virtually all the commodities, temperature enhances their patronage.

Table 1: Seasonal Variability of the Economic Activities

Economic Activities	Extreme Variability Index (%)
Ice cream, water and soft drinks	88.4
Building Materials	80.1
Transportation	79.1
Recreation	41.6
Newspaper	34.2
Departmental Store	30.9

Source: Fieldwork, 2003

Table 2: Correlation between Weather Elements and

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
X_1	1.0							
X_2	0.21	1.0						
X_3	0.10	-0.53*	1.0					
X_4	0.66*	-.012	0.57*	1.0				
X_5	0.69*	-0.75*	-0.62*	-0.34	1.0			
X_6	0.89*	-0.81*	0.37	0.79*	-.062*	1.0		
X_7	0.56*	-0.41*	0.58*	0.65*	0.50*	0.76*	1.0	
X_8	0.93*	-0.62*	0.66*	0.74*	0,35	0.30	0.73*	1.0

Economic Activities

* = Significant at 0.05

X_1 = Temperature; X_2 = Rainfall; X_3 = Departmental Stores; X_4 = Recreation

X_5 = Building/Construction; X_6 = Newspaper; X_7 = Transportation;

X_8 = Ice Cream, Water & Soft Drinks

CONCLUSION

The paper is able to reveal that the demand for, and supply of economic goods and services are in response to the dynamics of weather and climate. Fluctuation in sales from month to month in line with the varying weather is a major characteristic of all the commodities considered in this study. Such fluctuation or variability is highest in ice cream, water and soft drinks, building/construction materials and transportation but lowest in departmental stores. Sales are generally higher in all the commodities analysed during the dry season that is sunny with higher temperatures than during the rainy season with poor weather and low temperatures. This clear distinction could be as a result of disturbance caused by rainfall during the rainy season that makes movement difficult, unlike the dry season with bright sunlight that encourages movement and economic transactions at all times. However there are some commodities that had higher patronage during the rainy season. These include rubber shoes, raincoats, tea and bread among others. There is sharp increase in sales in virtually all the economic activities considered in the months of December and April. This could not be attributed to weather alone but with a combined effect of Yuletide and Easter celebrations observed by the people living in this region who are mainly Christians.

It could be recommended based on the findings that entrepreneurs and traders should seek for and adhere to weather forecast and predictions (especially the long-term forecasts) to avoid unnecessary damages and lost occasioned by adverse weather. Based on such weather data, producers could only increase production and supplies when the weather and climate permit the desired demand. Finally, since the dry season is found to be the most favourable time for marketing, it is therefore recommended that all the "Trade Fairs" (International, National and State) should be organised during the dry season and/or close to the festive periods of Christmas and Easter for maximum patronage and sales.

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