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DEPENDABILITY OF TECHNOLOGY IN ADDRESSING ILLUSIONARY TENDENCIES IN COCOA PRODUCTION IN NIGERIA: A CASE STUDY OF *OGUN* STATE.

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Abstract

Productivity and efficiency require accurate measurements of inputs such as input per unit of land in crop production. However, indigenous methods rather than standardized scientific techniques are usually employed in determining measures in Africa, particularly in Nigeria. This study examined the relevance of Global Positioning System (GPS) technology in cocoa farm size determination in *Ogun* State, Nigeria. A total of 150 respondents were sampled through a multistage sampling technique. The data obtained were analyzed using descriptive analysis, student-t test statistic, budgetary and *Probit* regression techniques. Results revealed that predominantly male farmers (87.9%) with age group of 51 - 60 (39.4%) were more involved in cocoa production. Also, average annual cocoa revenue and net income of the respondents were ₦103,469.39 and ₦54,310.34 per hectare respectively. Farm size as determined by farmers was significantly different from that measured by GPS ($p<0.05$). Probit regression showed that age and farming experience ($p<0.05$) as well as extension contact ($p<0.01$) reduced the likelihood of cocoa farmers' farm size illusion. This implies that there was farm (size) illusion among cocoa farmers in the study area which reduced with age, experience and extension visits. The study recommended that stakeholders should incorporate indigenous knowledge in farm size determination with modern technology such as GPS within farmers' capacity building programmes.

Keywords: *farmers, cocoa, illusion, indigenous knowledge, GPS*

Introduction

The cocoa tree originated from South America's Amazon forest and the plant was first given its botanical name by the Swedish natural scientist - Carl Von Linnaeus (1707 - 1778); who called it "*Theobroma*" (food of the gods) in 1753 in a famous publication - *Species Plantarum* (Ayorinde, 1966; Kew, 2016). The cocoa tree reaches maturity between five and six years and can live up to several decades (Chocolate, 2015) up to thirty years or more. In West Africa, the harvesting is between September and October and can extend from January to March (Adeyeye, 2001).

The cocoa industry worldwide is a $5.1billion market, with west Africa growing more than half of the 3million tons sold annually (World Cocoa Foundation, 2014). The scarcity of cocoa produce estimated to reach 1.5million tons, in terms of short fall, by year 2020 in the cocoa industry has had a profound impact on industry pricing (WCF, 2014). In year 2000, cocoa bean was sold at $714/ton but by the spring of 2011, its price was $3,775/ton according to Coffee and Cocoa International (Bloudoff-Indelicato, 2012). The imbalances in cocoa output and pricing have continued up to 2016/2017 season (Sucden, 2017).

Table 1: World Cocoa Production

Year	*Quantity Produced (tonnes)*
1998 – 1990	2,460,000
1990 – 2000	2,905,000
2000 – 2010	3,700,000

Source: FAO, 2012

According to Table 1, world cocoa should grow at a rate of 2.2% a year from 1998 - 2000 - 2010 compared to the 1.7% growth during the previous decade (Agritrade, 2013; WCF, 2014). Demand for cocoa is increasing (Harold and Howard-Yana, 2015) and assuming a 2.0% annual growth, the world will require at least one million more metric tons to meet needs by year 2020 (Sucden, 2017). This is the equivalent of increasing output by the present production of Ivory Coast, the world leading cocoa producer but while demand is increasing, farm yield are declining and unless industries acts the situation will be unsustainable.

Nigeria, ranked among the five largest cocoa producers in the world and Africa's second largest economy, is counting on early-maturing, high yielding and disease resistant beans to help double the country's production in 2 years to 500,000 metric tons (Akinwunmi, 2013; WCF, 2014). However, the major problem facing cocoa production in Nigeria is access to land for cocoa farming. More often, smallholder farmers acquire land by renting and pledging cocoa farm or giving it to another farmer in exchange for loan, which the farmer returns to the owner once the loan is paid. Most and very significant too, is the main mode of land acquisition through family inheritance. Other reasons for the decline in cocoa production are small farm holdings, transportation mode, unavailability of labour, low capital and variability in climatic factors. Three key broad issues encapsulating this are:

i. Under-investment:- all crops needs to be supported by research in the laboratory and on the field, through pest and disease control and better agricultural practices, so that they can be of high quality. Albeit, research takes time, cost money and demands sophisticated infrastructure to transfer knowledge to the farmers. As a crop individually grown by individual farmers, cocoa historically has not substantially benefited from government, industrial support and investment needed to put research program in place. One good example of cocoa farmer's illusion is the expectation of government intervention in the production of cocoa. As a result, it lags behind major crops in modern farming practices and knowledge thereby reducing cocoa farm productivity.

ii. Under-performing farm:- farmers struggle with aging cocoa trees that produce less cocoa over time and more hitherto irrelevant pest and disease that can destroy most of the harvest. Many farmers also lack basic agricultural skills and do not have the resources to invest in improving their farm operations and infrastructure, which means farmers often lack education, information and financing to improve their skills and outputs. These result in low farm productivity and income.

iii. Fragmentation:- there are more than 5million cocoa farmers world-wide, many working in remote parts of West Africa, Asia and the Americas (WCF, 2014). Their sheer number makes it difficult to make industry-wide changes. To transform the cocoa industry in the systemic way required, there is need for efficient partnership between various stakeholders such as farmers, NGOs, government, food manufacturers and other interested groups.

Cocoa production is very critical as a source of livelihood of the people in the rural areas of the region where it is produced as it accounts for a high proportion of household's income. Furthermore, apart from providing foreign exchange to exporting countries, cocoa is a means of conserving foreign exchange. This is achieved by producing cocoa based products such as cocoa-butter, cocoa cake, cocoa powder and cocoa wine locally instead of importing them. However, the discovery and exploitation of petroleum, the black gold, led to the decline in the importance attached to the (cocoa) crop in Nigeria. Nevertheless, cocoa still remains Nigeria's second largest foreign exchange earner after petroleum (Adegeye, 1995; CBN, 2014). Nigeria is the fourth largest cocoa grower in the world with production essentially on a smallholder level mainly in *Ekiti*, *Abia*, *Adamawa*, *Akwa lbom*, Delta, *Edo*, *Taraba*, *Kwara*, *Kogi*, *Ondo*, *Osun*, *Oyo*, Cross River and *Ogun* States - whose production accounts for about 70.0% of the country's annual total production amounting to approximately 400 tonnes in terms of quantity.

Illusion and Illusionary Interferences

Illusion is a wrong or misinterpreted perception of a sensory experience (Oxford, 2017). The term illusion refers to a specific form of sensory distortion, which may occur with any of the human senses but visual illusions (optical illusions) are the most well-known and understood (Solso, 2000). An optical illusion is characterized by visually perceived images that are deceptive and misleading. Therefore, the information gathered by the eye is processed by the brain to give, on the face of it, a percept that does not tally with a physical measurement of the stimulus source. A conventional assumption is that there are physiological illusions that occur naturally and cognitive illusions that can be demonstrated by special visual tricks, such as something more basic about how human perceptual systems work. The human brain constructs a word inside the head based on what it samples from the surrounding environment. However, sometimes, it tries to organize these information while other times it fills in the gaps it thinks best (Yoon and Shen, 2008). The emphasis on visual illusions occurs because vision often dominates the other senses. For example, an individual watching a ventriloquist will conclude the voice is coming from the dummy since the individual is able to see the dummy mouth the words (McGurk and MacDonald, 1976). Some illusions are based on general assumptions the brain makes during perception. These assumptions are made using organizational principle (gestalt theory). Other illusions occur because of biological sensory structures within the human body or conditions outside of the body within one's physical environment (Felin *et al,* 2017).

Some of the illusions experienced by farmers involve government subsidy, farm size, climate pattern and the issue of start big earn big. The term farm illusion can be regarded as a wrong or misinterpreted perception of farm issues by the stakeholder particularly the farmer. Thus, farm size illusion refers to the sensory distortion of the dimensions of a farm. Hence, this paper examined the relevance of technology in solving farm size illusion among cocoa farmers in *Ogun* State, Nigeria. Specifically, the study described the socio-economic characteristics and the input-output profile as well as assessed farm size illusions of cocoa farmers in the study area.

Farm size illusion of the farmers was conceptualized as a deviation from the exact value of the farm size as determined by GPS technology. In other words, the absolute value of the difference between farmer's farm size estimate and GPS's farm size estimate was adopted as the measure of farmer's farm size illusion.

Methodology

Study Area

Ogun State, located in the Southwest geo-political zone of Nigeria with a total land area of 16,726.26 square kilometers, is bounded on the West by Benin Republic, on the South by Lagos State and the Atlantic Ocean, on the East by *Ondo* State, and on the North by *Oyo* and *Osun* States (IFSERAR, 2009; Awala, 2016). It is situated between Latitude 6.2°N and 7.8°N and Longitude 3.0^0E and 5.0°E (IFSERAR, 2009). The climate of *Ogun* State follows a tropical pattern which has two distinct seasons i.e. a rainy season, lasting from March/April - October/November, followed by a dry season. Rainfall distribution varies from about 1,000mm in the western part to about 2,000mm in the eastern part especially *Ijebu* and *Ogun* waterside LGAs (Cometonigeria, 2011).

Ogun State's NPC (2006) estimated population of 3.7 million people, 4.91 million people currently (given IBRD, 2017 annual growth rate projections), is made up mainly of the *Yoruba* tribe which comprises the *Egba, Yewa, Awori, Egun, Ijebu* and *Remo* ethnic groups. The religious inclinations of the populace are Christianity, Islam and Traditional beliefs. The State is blessed with a conducive climate that supports the cultivation of a variety of arable crops such as yam, cassava, maize, rice, plantain, beans, vegetables as well as citrus fruits such as orange, paw-paw, and pineapple. The major tree crops produced in the State are cocoa, cashew, kola nut, oil palm produce, rubber and coffee. The main occupations of the people are agriculture, tie and dye, fabric making, pottery, quarrying, trading and artisanship with the urban areas mostly dominated by civil servants and other professionals (Cometonigeria, 2011; Awala, 2016). The State is divided by the *Ogun* State Agricultural Development Programme (OGADEP) into four agricultural zones i.e. *Abeokuta*, *Ijebu-ode*, *Ilaro* and *Ikenne* (Table 2).

Table 2: OGADEP Zonal Structure in *Ogun* State

Zones	*Blocks*	*Number of Cells*
Ilaro	4	25
Ikenne	4	30
Ijebu-Ode	6	35
Abeokuta	6	35

A multistage sampling was used to select a total of 50 respondents cocoa farmers in *Ogun* State. The first stage involved a purposive selection of the two prominent cocoa producing ADP zones in the State (*Ijebu-ode* and *Ikenne*). This was followed by a random selection of two blocks from the selected zones in the second stage. The third stage involved a random selection of three cells from the selected blocks while the last stage involved a random sampling of twenty-five households from each selected cells. However, responses from 120 out of the total 150 sampled cocoa farmers were found useful for the analysis of this study (80.0% response rate).

Analytical Techniques

The analytical tools employed in the study were:

Descriptive analysis: This involved the use of tables (i.e. tables of frequency, percentages and means) to describe the socio-economic characteristics of the respondents and also the illusion characterizing cocoa production activity.

Budgetary Analysis: This was employed to determine costs and return for assessment of profit level in cocoa production in the study area:

$$\pi = TR - TC \quad \text{------------------- (i)}$$

where:

π = Profit

TR = Total revenue

TR = Q(P)

Q = Output

P = Price

TC = Total cost

Student t-test: This test assess whether the means of two groups are statistically different from each other. For this study, the test was used to establish if there was any difference between farm size by farmer's estimate and farm size using GPS. The test statistic was executed as follows:-

$$t = \frac{V_i - V_j}{\sqrt{\frac{S_i}{n_i} + \frac{S_j}{n_j}}} \quad \text{--------------------- (ii)}$$

where:

V_i = mean farm size by farmer's estimate;

V_j = mean farm size by GPS estimate;

S_i = sample variance of farmer's farm size estimate;

S_j = sample variance of GPS farm size estimate;
$n_i = n_j$ = number of respondent farmers.

The test statistic was computed with $n_i + n_j - 2$ degree of freedom.

Regression technique: Probit regression model was used to determine the influence of farmer's socio-economic variables on farmer's farm size illusionary tendencies in the study area. The model specification is as follows:-

$$Y_i = \beta_i X_1, X_2, X_3, X_4, X_5, X_6, \mu_i \quad \text{------- (iii)}$$

$$Y_i = Y^* = \begin{cases} 1 \text{ if } Y_i > 0 \\ 0 \text{ otherwise} \end{cases} \quad \text{------- (iv)}$$

where:

Y_i = farm size illusion of farmer *i* (GE – FE)
GE = GPS farm size estimate
FE = farmer's farm size estimate

Y^* = latent variable that takes a value of 1 if farmer has farm size illusion and zero if otherwise
β_i = parameter estimates
X_1 = Age of farmer (years)
X_2 = Sex of farmer (1 if male, 0 otherwise)
X_3 = Farmer's educational status (1 if farmer has formal education, 0 otherwise)
X_4 = Farming experience (years)
X_5 = Cocoa tree (number of trees)
X_6 = Extension contact (1 if farmer receive visit from extension agent, 0 otherwise)
μ_i = stochastic error term

Results and Discussions

Table 3 presents the socio-economic variables of the respondents. Age group 51 - 60 years had the highest proportion (39.4%) among the cocoa farmers with an average of 58.5 years which indicates that cocoa farmers in the study area were, relatively, in the twilight of their active productive years. In other words, relatively older people were more involved than younger ones in cocoa production the in the study area. This is in concord with the findings of others such as Adams (2015), Popoola *et al*. (2015) and Falola *et al*. (2013)

Table 3: Distribution of Respondents by Socio-economic Characteristics

Variable	*Frequency*	*Percent*
Age group		
≤40	4	3.0
41 – 50	25	21.2
51 – 60	47	39.4
61 – 70	36	30.3
≥71	7	6.1
Total	***120***	***100.0***
Mean	***58.5***	**-**
Sex		
Male	105	87.9
Female	15	12.1
Total	***120***	***100.0***
Educational level		
None	23	19.2
Primary education	55	45.8
Secondary education	37	30.8
Tertiary education	5	4.2
Total	***120***	***100.0***
Household size		
≤2	4	3.3
3 – 5	18	15.0
6 – 8	62	51.7
9 – 11	26	21.7
≥12	10	8.3
Total	***120***	***100.0***
Mean	***7.8***	**-**
Labour use		
Hired	80	66.7
Family	40	33.3
Total	***120***	***100.0***

Sex is a vital socio-economic characteristic to be considered because it determines to an extent participation in farming activities. Male are likely to be more involved in agriculture than female because they are stronger and effective in tedious works involved in farming. Majority (87.9%) of the respondents were male, which implies that more male were involved in cocoa farming in the study area. This is similar to the findings of Anyanwu and Agu (1996), Barasa (2006), Amusa (2009), NBS (2013), Oluwalana *et al*. (2017) and Oladeebo *et al*. (2017). Majority (76.6%) of the cocoa farmers had a minimum of basic education, which means that majority of the farmers can at least read and write. A little above (51.7%) half of the farmers had a household size of 6 - 8 persons with an average of about 8 persons. This implies that the farmers had the opportunity of exploiting family labour since more than a quarter (33.3%) of the respondents used family labour for some farm operations.

Table 4 revealed that the average age of cocoa plantation in the study area was 18 years. The average cocoa planting density was 1,128 trees yielding 418.78kg of cocoa beans per hectare on farms employing 26.12 labourdays of labour, 69.05kg of fertilizer, 2.59kg of herbicide and fungicide, 2.38lt of insecticides as well as 12 units of tools and implements in cocoa production per hectare.

Table 4: Respondents Input-output Profile

Variable		*Mean*	*Std. Dev*
Plantation Age		18.0	9.41
Cocoa Trees		1,128.23	1450.75
Labour		26.12	36.41
Fertilizer		69.05	95.56
Herbicide/Fungicide		2.59	1.25
Insecticide		2.38	2.10
Tools		12	9.01
Cocoa Yield		418.78	325.85
Cocoa Revenue		103,469.39	90695.80
Cocoa Income		54,310.34	78103.02
Farm Size			
Farmer's Estimate		1.47	1.66
GPS Estimate		1.52	1.78
t-Statistic		***-0.23***	**-**
p-Value		***0.82***	**-**
Nominal Farm Illusion		-0.05	1.20
t-Statistic		***2.35*****	**-**
p-Value		***0.03***	**-**
Absolute Farm Illusion		0.45	1.11
Farm illusion	None	19	15.8
	Illusion	101	84.2

The (mean) revenue generated from cocoa by the farmers was ₦103,469.39 and the profit amounted to ₦54,310.34 per hectare. The farmers estimated their cocoa farm size at an average of 1.47ha while the average GPS estimate of the farm size was 1.52ha. Given the nominal value of (the farm size) illusion (-0.05ha), there was no significant difference between farmer's estimate of farm size and GPS reading of farm size ($p>0.05$). However, there was a significant difference between farmer's estimate of farm size and GPS reading of farm size ($p<0.05$) taking into cognizance the absolute value of the illusion (0.45). This means that cocoa farm sizes are not perfectly determined by the farmers when measured using indigenous techniques.

The Probit regression model met the required goodness-fit-criteria as well as other statistical, econometric and economic criteria. Table 5 shows that age and farming experience ($p<0.05$) as well as extension contact ($p<0.01$) reduced the likelihood of cocoa farmers having farm (size) illusion while effective hectrage i.e. the number of cocoa trees per hectare ($p<0.1$) increased the likelihood of the farmers in the study area having harm size illusion.

Table 5: Determinants of Farmers' Illusionary Tendencies in Cocoa Farming

Variables	*Coefficients*	*Std. Error*	*Z*	*p-Value*	*Marginal Effect*
Constant	-5.303**	2.220	-2.389	0.017	-
Age	-0.170**	0.068	-2.498	0.017	-0.055
Sex	1.340	1.271	1.054	0.292	0.273
Education	0.029	0.059	0.492	0.623	0.010
Farming experience	-0.424**	0.176	2.409	0.016	-0.138
Cocoa Trees	0.273*	0.160	1.713	0.087	0.145
Extension contact	-3.158***	0.878	3.597	0.000	-1.027
χ^2-Statistic	171.050**	-	-	0.000	-
Log likelihood	-12.903	-	-	-	-
Pseudo-R^2	0.869	-	-	-	-

****P<0.01, **P<0.05, *P<0.1*

A year increase in farmer's age and farming experience reduced farmer's likelihood of having farm size illusion by 5.5% and 13.8% respectively while contact with extension agent reduced farmer's illusion by 102.7%. However, a 1 tree increase in effective hectrage would increase farmers' farm illusion by 14.5%. There is the possibility that as farmers matured over the years and gather experience in cocoa farming and has opportunity of extension visits, the indigenous technique of farm size determination became standardized.

Conclusion and Recommendation

This study showed that farm size illusion existed in the study area but reduced significantly with extension visits. Hence, the use of indigenous knowledge in farm size determination when advocating for the application of modern technology such as GPS should not be de-emphasized; rather, stakeholders should enhance (cocoa) farmers' empowerment through capacity building programmes in conjunction with ADPs and incorporate indigenous knowledge into the curricula of these programmes.

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References

Adams, A. A. (2015). Cocoa: A Farmer's Nightmare Crop. International Centre for Investigative Reporting.

www.icirnigeria.org/cocoa-a-farmers-nightmare-crop/. Retrieved 10th November, 2017.

Adegeye, A. J. (1995). Production and marketing of cocoa in Nigeria. In *Cocoa revolution in Nigeria: proceedings of a National Seminar on Revolutionizing Nigeria's Cocoa Industry*. University of Ibadan, Ibadan, Oyo State, Nigeria; 28-30th November. Agegeye, A. J. and Ajayi, W. O. (eds), Adaptive Research Group (Pub.). 186p. ISBN 9783187333.

Adeyeye, C. T. (2001). Cocoa production and price stability: An industrial relations perspective. An International Labour Organization Research Paper, ILO, Geneva, Switzerland. www.ilo.org/public/english /iira/documents/congresses/regional/lagos2011/4thsession/session4b/cocoa.pdf. Retrieved 30th September, 2017.

Agritrade, (2013). Trends in global cocoa production. http://agritrade.cta.int /en/layout/set/print/Agriculture/Commodities/Cocoa/Trends-in-global-cocoa-production. Technical Centre for Agricultural and Rural Cooperation, The Hague, The Netherlands. Retrieved 30th September, 2017.

Akinwunmi, A. A. (2013). Special Address to the World Cocoa Foundation. WCF, Washington DC, USA.

Amusa T. A. 2009. Contributions of women to household production decisions in cocoa based agro-forestry households of Ekiti State, Nigeria. Unpublished M.Sc. Thesis, Department of Agricultural Economics, University of Nigeria, Nsukka.

Anyanwu, A. C. and Agu, V.C. (1996). Gender issues and priorities in agricultural extension delivery system. In *Sustainable development in rural Nigeria*, *Proceedings of the Eight Annual Conference* of the Nigerian Rural Sociological Association. Adedoyin, S. F. and Aihonsu, J.O.Y (Eds). pp. 108 -118.

Awala, V. (2016). Ogun State at 40: 10 interesting historic facts you need to know about the State. *Information Nigeria*. www.informationng.com/2016/01/ogun-state-at-40-10-interesting-historic-facts-you-need-to-know-about-the-state.html. Retrieved 22nd Aug. 2017.

Ayorinde, J. A. (1966). Historical notes on the introduction and development of cocoa industry in Nigeria. *Agricultural Journal*, *3*: 18-23.

Barasa, C. 2006. Poultry as a tool in poverty eradication and promotion of gender equity. In *The agricultural sector programme support in Uganda*, *Proceedings* of a workshop on Gender and poverty in Entebbe, Uganda. Entebbe, A. C. (ed.). pp. 67-73.

Bloudoff-Indelicato, M. (2012). Africa grows too hot to grow chocolate: Climate change may be disrupting the cocoa farms of West Africa. *ClimateWire*, Scientific American. www.scientificamerican.com/ article/africa-grows-too-hot-to-grow-chocolate/. Retrieved 22nd Aug. 2017.

Central Bank of Nigeria. (2014). *Annual Report and Statement of Account*. CBN, Abuja, Nigeria.

Chocolate. (2015). About the cacao tree. www.chocolate.org/articles/the-cacao-tree-facts-about-theobroma-cacao.html.

Chocolate Organization, Newport Beach, California, USA. Retrieved 30th September, 2017.

Cometonigeria. (2011). Ogun State – "Gateway state". www.cometonigeria.com /region/south-west/ogun-state/. Retrieved 22nd Aug. 2017.

Falola, A., Ayinde, O. E. and Agboola, B. O. (2013). Willingness to take agricultural insurance by cocoa farmers in Nigeria. *International Journal of Food and Agricultural Economics*, *1*(1): 97-107.

Felin, T., Koenderink, J. and Krueger, J. I. (2017). Rationality, perception, and the all-seeing eye. *Psychonomic Bulletin and Review*, *24*(4): 1040-1059.

Harold, S. and Howard-Yana, S. (2015). The race to save chocolate. www.scientificamerican.com/article/the-race -to-save-chocolate/. Scientific American, New York, USA

Institute of Food Security, Environmental Resources and Agricultural Research. (2009). *Ogun*. State: Diagnostic survey report. www.unaab.edu.ng/attachments/ OgunReport3.pdf. Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State, Nigeria. Retrieved 30th Dec. 2016.

International Bank for Reconstruction and Development. (2017). Population growth (annual percentage). IBRD, The World Bank. http://data.worldbank.org/indicator/SP.POP.GROW. Retrieved 22nd Aug. 2017.

Kew Sience. (2016). Plants of the world online: *Theobroma cacao* L. Royal Botanic Garden, UK. www.powo.science.kew.org/taxon/urn:lsid:ipni.org:names:320783-2. Retrieved 30th December, 2016.

McGurk, H. J. and McDonald, J. (1976). Hearing lips and seeing voices. *Nature*, *264*: 746-48. DOI: 10.1038/264746a0.

Nigerian Bureau of Statistics. (2013). Gender Dimensions to Livelihoods in Nigeria. http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/NigeriaNBS_GenderLivelihoods_Final.pdf. Retrieved 10th November, 2017.

National Population Commission. (2006). 2006 population and housing census: Population distribution by sex, state, LGA, and senatorial district.

www.population.gov.ng/images/Vol%2003%20Table%20DSx%20LGAPop%20by%20SDistrict-PDF.pdf. NPC, Abuja, Nigeria. Retrieved 22nd Dec. 2016.

Oladeebo, J. O., Ganiyu, M. O. and Omotayo, A. O. (2017). Analysis of poverty level and land management practices among maize-based food crop farmers in *Oyo* State, Nigeria. In *Agribusiness Development*: *Panacea for economic recession in Nigeria*, *Proceedings of the* Nigerian Association of Agricultural Economists (NAAE). Ayinde, I. A., Obayelu, A. E., Sanusi, R. A. and Akerele, D. (eds.).

Oluwalana, E. O. A., Shittu, A. M. and Olaomi, O. O. (2017). Determinants of nutritional status of preschool children of farming households in southern parts of Nigeria. In *Agribusiness Development*: *Panacea for economic recession in Nigeria*, *Proceedings of the* Nigerian Association of Agricultural Economists (NAAE). Ayinde, I. A., Obayelu, A. E., Sanusi, R. A. and Akerele, D. (eds.).

Oxford Dictionary. (2017). Illusion. https://en.oxforddictionaries.com/definition/illusion. Retrieved 30th September 2017.

Popoola, O. A., Ogunsola, G. O. and Salman, K. K. (2015). Technical Efficiency of Cocoa Production in Southwest Nigeria. *International Journal of Agricultural and Food Research*, *4*(4): 1-14.

Solso, R. L. (2000). *Cognitive Psychology.* Boston, Allyn and Bacon (Pub.). 602p, 6th Edition*.* Boston, USA. ISBN 0-205-30937-2.

Sucden Financial. (2017). Bittersweet outlook for cocoa.

www.sucdenfinancial.com/media/133729/sucden_financial_monthly_report_february_2017.pdf.

World Cocoa Foundation. (2014). Cocoa market update.

www.worldcocoafoundation.org.Cocoa-Market-Update-as-of-4-1-2014.pdf. WCF, Washington DC, USA.

Yoon, M. J. and Jackie, S. (2008). First- order Modeling and Stability Analysis of Illusory Contours. *Journal of Visual Communication and Image Representation*, *19*(1): 42-55.