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Research Paper

Resurrecting Nigeria's groundnut pyramid

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Abstract: This study empirically reviewed the production trend of groundnut (*Arachis hypogaea* L.) that was once the pride of Nigeria, with the aim to resurrecting the groundnut pyramid in the country. The study used FAO-sourced annual data that spanned throughout 1961 to 2017 and covered production, area, yield of the studied crop and prices of the studied and competing crops. Collected data were subjected to both descriptive and inferential statistics. The empirical evidence showed the production of groundnut to be affected by area risk and uncertainty- climate change consequence. Furthermore, the future trend of the crop cannot guarantee the food security of groundnut in the country as the annual yield contribution to the annual output will not yield desirable change in the annual output level. Therefore, it becomes imperative for policymakers to inject production and developmental finances into the sector as green alternative remains the best option to salvage the economy of the country which is staggering owing to dampening crude oil prices- a major source of revenue earning. Furthermore, groundnut is now a staple food in virtually all households' diets in the country as it serves as food, oil and condiments, confectionaries, snakes etc., thus a drain on the country foreign reserve owing to the need to strike a balance between demand and supply.

Keywords*:* Groundnut, Growth, Instability, Forecast, Nigeria

Introduction

In Nigeria, groundnut (*Arachis hypogaea* L.) used to be the most valuable export commodity from 1950s to 1970s as evidenced by the famous groundnut pyramid in Kano State. In West Africa, 51% of the total production comes from Nigeria, thus making it the largest producer in the sub-Saharan region. Nigeria total production contributions in Africa and the world at large are 39% and 10%, respectively. With an estimated annual 1.55 million mt, the country is the fourth largest producer in the world and the highest producer in Africa (USDA, 2020).

The country was primed to be the largest exporter of groundnut in Africa until in the late 1970s when it lost its position and the visible groundnut pyramid was wiped out due to combination of dry-spell, rosette epidemic, aflatoxin contamination, diseases, poor technology and weak co-ordination of government policies. These major setbacks have significantly affected the crop productivity, thus production and subsequently made the country to lose its share in the domestic, regional and international markets.

In the Northern part of Nigeria, the crop remains the major source of edible oil as well as livelihoods for the smallholder farmers. Nautiyal (1999) reported that in Nigeria, groundnut provides high quality cooking oil and is an important source of protein for both human and animal diets, and also provides much needed foreign exchange by exporting kernels and cake. As the population continues to surge in the world, the demand for edible oil in many developing countries such as Nigeria will also continue to grow. Groundnut will continue to be important in satisfying this growing demand because it is by far the most nutritive oil-seed in most of the developing countries.

In many West African countries, groundnut oil has traditionally been a significant dietary component. In addition, of recently, the use of groundnut meal is becoming more recognized not only as a dietary supplement for children on protein poor cereals-based diets but also as effective treatment for children with protein related malnutrition (Sadiq *et al.,* 2017). Further, in the international market, there is a large trade boom in the groundnut confectionery.

Policy summersaults of Nigerian government with respect to production, transportation and marketing of the crop, which the government actively engaged in before the groundnut pyramid in the North fizzled out, has been identified as the major stumbling block over the years for the crop which shows much prospect for development of the economy as does in the past (USDA, 2020). Therefore, this research aimed at identifying the challenges and devising a way forward to resurrect the disappeared pyramids in the country, as the crop is a potential revenue buffer for the dwindling economy.

The study objectives were to (i) to examine the trend and growth pattern of groundnut production, (ii) to determine the magnitude and sources of instability of groundnut production, (iii) to determine the source(s) of growth in groundnut production, (iv) to determine the factors influencing farmers' acreage allocation decision, and (v) to forecast the production trend of groundnut production in the studied area.

Methodology

An annual data that spanned over the period of 1961 to 2017 and covered production, area, yield of the studied crop and prices of the studied and competing crops, sourced from the FAO database were used. For thorough investigation, the data were portioned based on the regime shifts which marked the nation's economy *viz*. pre-Structural Adjustment Period (SAP) (1961-1984), SAP (1985-1999) and post-SAP (2000-2017). Furthermore, the collected data were analyzed with the aid of descriptive and inferential statistics. The objective i was addressed through descriptive statistics and growth model analysis, objective ii using the instability indexes (Sandeep *et al*., 2016; Boyal *et al*., 2015; Sadiq *et al*., 2020), Cuddy-Della Valle instability index (Cuddy and Valle, 1978), Coppock's index (Coppock, 1962) and Hazell's decomposition model (Hazell, 1982; Sadiq *et al*., 2020), objective iii using instantaneous change model and Hazell's decomposition model, objective iv using the Nerlove's response model (Sadiq *et al*., 2017; 2020, and objective v using the ARIMA model, using the methodologies described by Sadiq *et al*. (2020) with appropriate modifications.

Results and Discussion

Figure 1 illustrates the production trend of groundnut. A marked cyclical trend in groundnut production was observed during the pre-SAP (Structural Adjustment Programme) period with the production tides been high during the early period of the regime, which subsequently declined during the late period of the regime (Figure 2). Furthermore, a steep rise in the trend of the production was observed throughout the SAP period (Figure 3), which maintained a stable high production tide thereafter with a marginal upward and downward swing during post-SAP period (Figure 4). Production trend was driven by both changes in area and yield - mainly by yield despite evidence of area expansion during the early and late pre-SAP period, respectively. A pronounced influence of yield in driving the groundnut production annually persist through the SAP period despite expansion in the annual area cultivated under the reference crop.

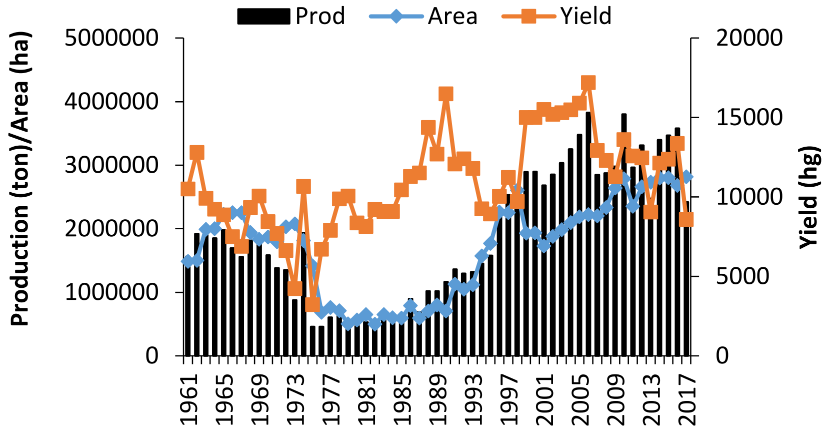

Figure 1. Production trend of Groundnut (1961-2017)

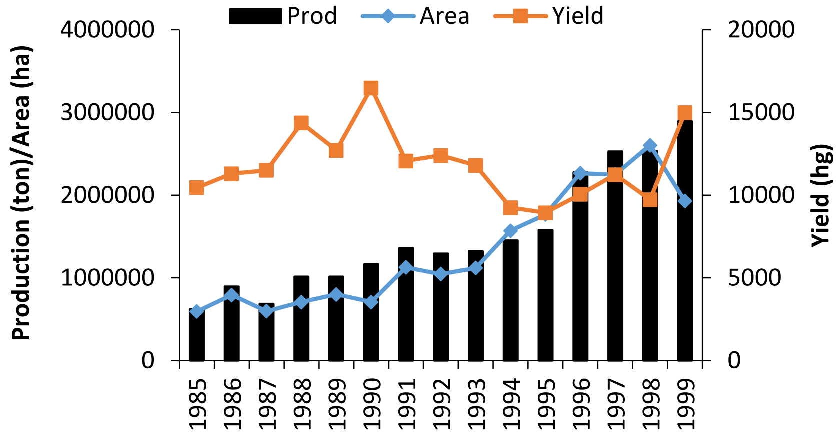

Figure 3. SAP Production trend of Groundnut (1985-1999)

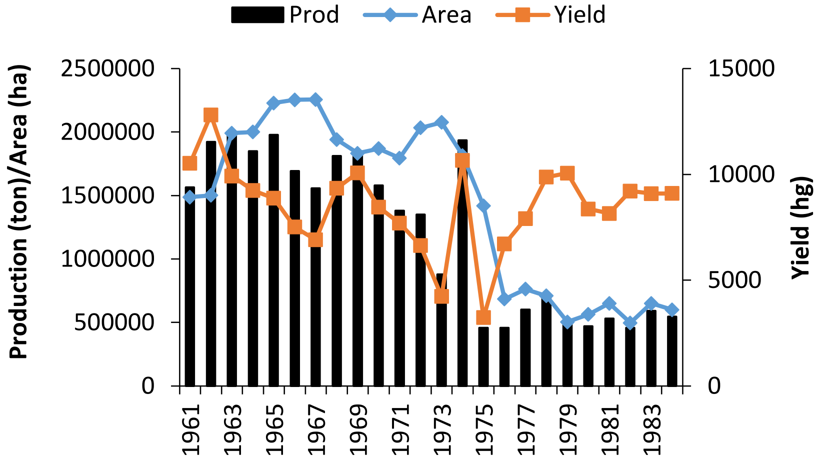

Figure 2. Pre-SAP Production trend of Groundnut (1961-1984)

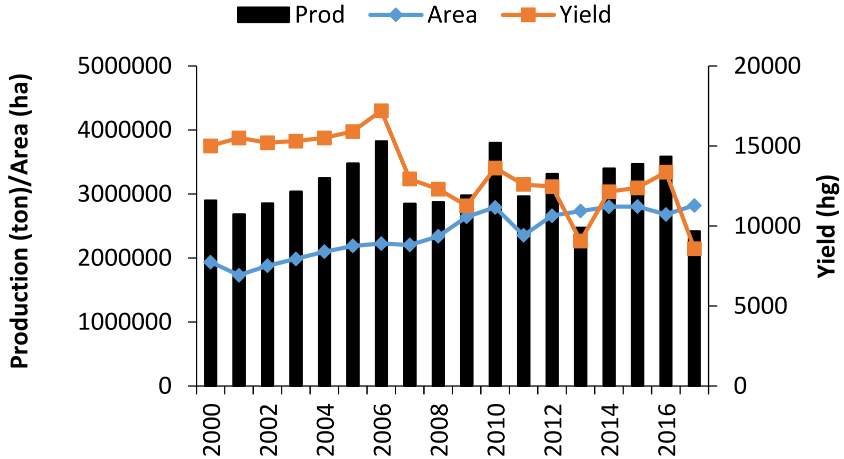

Figure 4. Post-SAP Production trend of Groundnut (2000-2017)

Afterward, the joint influence of both area expansion and yield increase were responsible for the inclined-declined changes that marked groundnut production during the post-SAP period. Therefore, it can be inferred that the complete disappearance of the groundnut pyramid which visible occurred during the pre-SAP and early SAP regimes owed major to poor productivity of the crop in the studied area.

The results of the average annual change in the production of groundnut showed the average annual area to be marked by a slight decline from the pre-SAP to SAP periods and thereafter, steeply inclined by almost two-fold during the post-SAP period (Table 3). Conversely, the average annual yield was on the increase vis-à-vis the regime periods with the changes been arithmetical. Consequently, the average annual production exhibited a similar trend change with what was observed for the average annual yield. Therefore, these results justified the groundnut production trend observed graphically. Results of the growth pattern showed the annual area to be marked by a negative significant growth rate (-6.7%) during the pre-SAP era and thereafter, juxtaposed to a positive significant growth rate which transient through the SAP era (10.9%) to post-SAP era (2.8%). However, for the yield, it ebbed i.e. it was marked by a negative growth rate which transient throughout the regime shifts. For the production, the pre-SAP witnessed a negative significant annual growth rate which thereafter, juxtaposed into positive annual growth rate that transient the two consecutive succeeding policy regimes. The negative growth rate in all the production parameters during the pre-SAP period may owe to the shock of civil war which lasted for almost half of a decade in the country. Generally, for the overall period, the area, yield and production witnessed incremental significant changes in the annual growth rate with the influence of both area and yield been almost simultaneous (Table 1).

Therefore, it can be inferred that both area expansion and technology interchangeably, played a key influence in driving the production level of groundnut in the stydt area. Besides, the empirical evidence showed the status of the compound growth rate (CGR) for area to be deceleration-acceleration-deceleration vis-à-vis the regime shifts. If the yield level was doubled during the pre-SAP, SAP and post-SAP regimes, the yield status would have accelerated, and then stagnant and decelerated thereafter, respectively. Consequently, the CGR status of the production would have been a deceleration, acceleration and a stagnation vis-à-vis the policy regime periods if the production of the reference crop increased by two-fold.

Table 1. Growth pattern of groundnut production

Variables		Pre-SAP	SAP	Post-SAP	Overall
Area (ha)	CGAR %	-6.7***	10.9***	2.8***	1.2***
	AA	1421750	1325413	2380848	1699271
	Status	-5177.394***(D)	6804.76***(A)	-2051.53***(D)	2044.47***(A)
Yield (hg)	CGAR %	-0.7**	-0.8NS	-2.6***	1.00***
	AA	8524.33	11821.80	13348.61	10915.54
	Status	24.68**(A)	-5.930^{NS}(S)	-4.671***(D)	-0.942***(D)
Production (ton)	CGAR %	-7.4***	10.2***	0.2NS	2.3***
	AA	1193792	1510200	3119169	1885071
	Status	-636.39***(D)	10311.17***(A)	-5284.93^{NS}(S)	2047.12***(A)

Source: Authors' computation, 2020; SAP = Structural Adjustment Programme; AA = Annual Average; A = Acceleration; D = Deceleration; S = Stagnation. *** significant at p=0.001; ** significant at p=0.05; * significant at 9.0.1; NS = Non-significant.

<u>Sources of Change in the Production Level</u>

The results of the instantaneous source of change in the average production vis-à-vis the regime shifts showed that the average annual production level during the pre-SAP to be driven by yield effect while the area effect predominates in driving the annual average production change during the SAP and post-SAP periods (Table 2). The area effect was the major driving force for incremental change in the average annual production level despite the pull-down effect of yield effect and interaction effect. Therefore, the effect of area in bringing about change in the average annual production level of the study crop predominates in the studied area.

Table 2. Sources of change in groundnut production (Intra-wise %)

Source of change	Pre-SAP	SAP	Post-SAP	Overall
Area effect	10.49209	74.78194	-232.032	317.0754
Yield effect	46.82779	54.94869	323.398	-82.2239
Interaction effect	42.67321	-29.7284	8.608195	-134.829
Total change	100	100	100	100

Source: Authors' computation, 2020; SAP = Structural Adjustment Programme

Furthermore, the results of sources of change due to the economy structural change showed "change in mean yield" to be the driving force that made the average production level of SAP regime to be higher than that of the pre-SAP era. Contrarily, 'change in mean area" predominates in making the average annual production level of post-SAP regime to be higher than that of SAP regime (Table 3). Therefore, it can be inferred that the change in the level of groundnut production in the studied area did not exhibit a unique pattern as area effect and yield effect interchange simultaneously.

Table 3. Sources of change in groundnut production (Inter-regime wise %)

Source of change	Pre-SAP to SAP	SAP to Post-SAP
Area effect	148.25	12.42
Yield effect	-25.97	76.57
Interaction effect	-10.04	9.89
Covariance effect	-12.23	1.12
Total change	100	100

Source: Authors' computation, 2020; SAP = Structural Adjustment Programme

Magnitude and Sources of Instability

The evidence from the CV showed the magnitude of volatility in both the area and yield to be high and moderate respectively, during the pre-SAP era, thus the reason for the high precipitation of shock in the production. However, during the SAP period, the shock generated as a result of area expansion was high while the yield precipitated low instability. Contrarily, the magnitude of instability as revealed by the CV indices showed a simultaneous low instability in both the area and yield during the post-SAP regime. Therefore, high area instability and simultaneously low area-yield were what have triggered the high and low volatilities in the production of groundnut during the SAP and post-SAP regimes respectively.

Generally, the CV of the overall period showed the production instability to be high which owed to high fluctuation in area expansion (Table 4). Furthermore, in determining the exact direction of the production instability (CDII; Sadiq *et al*., 2020), it was observed that the production instability was moderate during the first structural change and low for the succeeding structural changes *i.e.* SAP and post-SAP regimes. The low instability effect of both area and yield dampened the fluctuation extent of the production during SAP and post-SAP regimes while the simultaneous moderate effect of both the area and yield was responsible for temperament instability noticed in the production of groundnut during the pre-SAP era. Contrarily, the area and yield instabilities were high and low respectively for the overall period with a consequential effect of high instability in the production level of groundnut in the studied area (Table 4).

The empirical evidence showed the effect of price volatility on the production level of groundnut to be high across the policy regime shifts as evident by the CII indexes which were above the peak threshold. Therefore, it can be inferred that the reason for the high instability in the production of groundnut owing to price fluctuation can be hedged between arbitrage and speculation effects based on market intelligence and information. Though, the empirical evidence using volatility models *viz.* GARCH model will prove the extent of the arbitrage and speculation effects in determining price volatility which is responsible for triggering the high production instability evidence in the studied crop. Further, for the overall period, the price fluctuation effect made the instability status of production to be high, thus the reason for high instability in area and yield (Table 4).

Table 4. Magnitude of instability in groundnut production

Regimes	Variables	CV	CDII	CII
Pre-SAP	Area	46.913	26.24614	46.5353
	Yield	23.978	23.65208	50.26351
	Production	51.84	25.76401	56.20232
SAP	Area	51.598	16.63986	45.16818
	Yield	18.178	17.82927	41.4844
	Production	47.344	11.69311	48.53411
Post-SAP	Area	15.385	5.65281	59.27802
	Yield	17.352	11.70456	39.62221
	Production	13.369	13.32883	59.98133
Overall	Area	44.044	40.9159	51.58349
	Yield	27.594	23.21835	46.0573
	Production	54.87	45.37985	55.37053

Source: Authors' computation, 2020; Cuddy-Della Valle instability index (Cuddy and Valle, 1978); CII = Coppock's instability index (Coppock, 1962; Sadiq *et al.*, 2020)

The empirical evidence showed "change in mean yield" to be the major risk that account for variation in the average annual production level between the pre-SAP and SAP regimes. Between the SAP and post-SAP regimes, fluctuation in the average annual production level was majorly driven by "change in area variance", while for the overall period, "change in area variance" which is a risk and "change in residual" which is an uncertainty predominates in causing variation in the annual average production level of groundnut in the country (Table 5).

Table 5. Sources of instability in groundnut production

Source of variance	Pre-SAP to SAP	SAP to Post-SAP	Overall
Change in mean yield	132.29	-31.82	28.35
Change in mean area	-2.21	17.37	2.96
Change in yield variance	-0.72	0.82	1.17
Change in area variance	32.65	141.80	75.75
Interaction between changes in mean yield and mean area	-0.75	2.48	-2.16
Change in area yield covariance	-54.25	-24.24	1.14
Interaction between changes in mean area and yield variance	0.09	1.83	-0.53
Interaction between changes in mean yield and area variance	30.15	38.99	-73.32
Interaction between changes in mean area and yield and change in area-yield covariance	-15.90	-24.78	-1.00
Change in residual	-21.35	-22.45	67.65
Total change in variance of production	100	100	100

Source: Authors' computation, 2020; SAP = Structural Adjustment Programme

<u>Farmers' Acreage Response</u>

The Nerlovian's response regression model (Sadiq *et al.*, 2020) revealed that the linear functional form is the most suitable among the functional forms tried, given that it met the economic, statistical and econometric criteria (Table 6). Thus, the linear functional form of the multiple regression was chosen as the lead equation as the best fit for the specified equation. The diagnostic test results showed the residual to be normally distributed, no problem of heteroscedasticity, no serial correlation and no arch effect as indicated by their respective t-statistics which were not different from zero at 10% degree of freedom (Table 6). In addition, the empirical evidence showed the model specification to be adequate, the parameter estimates were stable i.e. did not drift and there is no structural break in the equation despite that the sample has different sub-population (regimes) as evident by their respective t-statistics, which were not different from zero at 10% degree of freedom (Table 6). Furthermore, exploration of the measure of goodness of fit to test the reliability of the results, the empirical evidence showed absence of spurious correlation and spurious regression: the measure of goodness of fit (0.94) is less than the value of the Durbin-Watson statistic (2.22). With these ample evidences, there is a statistical sense in the least squares, thus the least squares are reliable for future prediction given that they are efficient and consistent (Table 6).

Table 6. Farmers' acreage response

Variables	Parameters	t-stat	Mean	SRE	LRE
Intercept	364109 (233722)	1.558^{NS}	-	-	-
GP_{t-1}	-8.73866 (8.132)	1.075^{NS}	16982.43	-0.093	-0.736
CP_{t-1}	5.29744 (5.310)	0.997^{NS}	24977.16	0.083	0.656
SP_{t-1}	0.954002 (6.690)	0.142^{NS}	22030.71	0.013	0.104
GPR_{t-1}	27.8188 (13.705)	2.030**	2305.37	0.040	0.318
CPR_{t-1}	-10.6878 (5.663)	1.887*	5814.695	-0.039	-0.308
SPR_{t-1}	22.8058 (22.716)	1.004^{NS}	2626.06	0.038	0.297
Y_{t-1}	33.047 (17.108)	1.932*	10701.02	0.222	1.753
YR_{t-1}	-82.243 (27.043)	3.041***	1131.703	-0.058	-0.461
T_t	-850.502 (6519.89)	0.130^{NS}	24.5	-0.013	-0.103
WI_{t-1}	-476900 (163698)	2.913***	0.986241	-0.295	-2.332
A_{t-1}	0.873504 (0.0746)	11.70***	1562182	0.856	6.765
R^2	0.93978				
F-stat	49.656 {4.86e-18}***				
Durbin-Watson	2.223 {0.4691}^{NS}				
Autocorrelation	0.7332 {0.397}^{NS}				
Arch effect	0.8409 {0.3591}^{NS}				
Heteroscedasticity	11.295 {0.4189}^{NS}				
Normality	0.3897 {0.8229}^{NS}				
CUSUM test	0.5284 {0.6006}^{NS}				
RESET test	1.5741 {0.2223}^{NS}				
	0.18457 {0.9985}^{NS}				
	0.24725 {0.2999}^{NS}				

Source: Authors' computation, 2020; CUSUM = cumulative sum; RESET = Ramsey Regression Equation Specification Error; *** significant at p=0.001; ** significant at p=0.05; * significant at 9.0.1; ^{NS} Not-significant. Values in ( ), [ ] and { } are standard error, t-statistic and probability level respectively. SRE = short-run elastic; LRE = long-run elasticity; Refer to the text for the abbreviation of variables.

The measure of goodness of fit (R^2) indicated 94% variation in the current acreage of groundnut in the studied area is been explained by the economic variables involved in the economy phenomenon of farmers' acreage response while 6.02% represent the influence of the disturbed economic reality. Furthermore, the empirical evidence showed six exogenous information *viz.* lagged yield, weather index, lagged yield risk of groundnut, lagged price risk of groundnut, lagged price risk of cowpea and the lagged acreage to be the economic variables that significantly influenced farmers' decision on current acreage allocation cultivated under groundnut as indicated by their respective least squares which were different from zero at 10% degree of freedom.

The positive significant impact of lagged yield in inducing expansion on the current extent cultivated under groundnut implied that improved groundnut varieties coupled with the recommended technological practices were adopted. Thus, the high productivity of the crop in the studied area stimulated expansion in the current area cultivated in the studied area. The negative significance of the weather index revealed that the food security of groundnut: a staple and cash crop duality feature, is been threatened by climate change - dry spell due to untimely rainfall cessation, thus affecting the current acreage allocated to groundnut in the studied area. It was observed that the farmers were risk-averse to failure- yield loss in order to avoid lost of equity given that the bulk of the crop is produced by farmers having tiny and uneconomic holdings. In addition, coupled with the tiny and uneconomic holdings, these farmers are resource-poor, and loss of equity capital can lead to loss of livelihood, thus causing a decline in the current acreage cultivated under groundnut. Besides, the farmers are risk averse to fluctuation (high) in the price of cowpea as surge in the price of cowpea forced the farmers to shift to the cultivation of cowpea, thus affecting the current acreage cultivated under groundnut. However, the farmers had preference for price risk in the situation when the groundnut supply fall short of the demand, thus impacted positively on the current area cultivated under groundnut. Furthermore, the empirical evidence revealed that the crop is cultivated on small-scale basis and shifting to the production of alternative crops is capital intensive for these resource-poor farmers, thus the non-significant of the owned lagged price coefficient.

Further, it was observed that the farmers adjust slowly the current area cultivated under groundnut as evident by the adjustment coefficient which is 0.127. The short-run and long-run elasticities were -0.09 and -0.736 respectively, indicating the acreage responsiveness of the crop to price changes during the immediate succeeding period for the former while the later reflects the acreage responsiveness of the crop to price change if given sufficient time. Thus, it can be inferred that in the long-run, the impact of price policy instrument on groundnut production is insignificant. This finding is contrary to the finding of Jain *et al*. (2005) where the acreage responsive of groundnut to price changes in the long-run was high, thus, indicated that the price policy instrument impacted substantially on groundnut in the long-run. It is worthwhile to note that negative supply response is not an uncommon feature as revealed by previous studies (Jain *et al*., 2005; Sadiq *et al*., 2017; 2019; 2020). Evidence showed that the farmers are faced with high constraints *viz.* technological and institutional, as the time needed for price effect to adjust and materialize would be 22.15 years. This did not come as a surprise as the visible groundnut pyramids which disappeared for almost four decades is yet to re-surface in the studied area. Furthermore, the result showed that the investment on the infrastructure development, agricultural research and technologies had no impact on the crop as indicated by the non-significant of the time trend index at 10% degree of freedom.

Production Forecast of Groundnut

The ADF-GLS and KPSS unit root tests results showed the variables to be integrated of the same order I (1) (Sadiq *et al*., 2020), implying that they all became stationary after first difference (Table 9). This shows that the variables are Gaussian white noise. For the forecast, the ARIMA at different level showed ARIMA (1,1,0), ARIMA (1,1,0) and ARIMA (1,1,0) to be the best fit to forecast production, area and yield respectively, given that they have the lowest AIC values (Table 7).

Table 7. Auto Regressive Integrated Moving Average (ARIMA) model

Items		Production	Area	Yield
ADF-GLS test	Level	-1.475	-1.2566	-2.3832
	1st Diff	-4.280	-4.3827	-4.7783
KPSS test	Level	1.8057	1.10244	1.40623
	1st Diff	0.1186	0.20196	0.07553
ARIMA (1,1,1)(AIC)		1611.531	1554.32	1021.79
ARIMA (1,1,0)(AIC)		1609.859	1552.67	1019.83
ARIMA (0,1,1)(AIC)		1609.982	1552.68	1020.905
Autocorrelation test		2.543^{NS}	3.3125^{NS}	0.7412^{NS}
Arch LM test		3.718^{NS}	0.4274^{NS}	3.639^{NS}
Normality test		4.633*	7.0877**	0.07185^{NS}

Source: Authors' computation, 2020; ARIMA = Auto Regressive Integrated Moving Average ADF = augmented Dickey–Fuller; ADF-GLS and KPSS critical levels at p=0.05 are -3.03 and 0.462, respectively. Arch-LM = Autoregressive Conditional Heteroscedasticity-Lagrange Multiplier; *** significant at p=0.001; ** significant at p=0.05; * significant at 9.0.1; NS = Not-significant.

Furthermore, in determining the reliability of the ARIMAs for forecasting, evidence showed the Theil's inequality coefficient (U) and the relative mean absolute prediction error (RMAPE) to be less than 1 and 5% respectively (Table 9). Thus, the chosen ARIMAs can be used for *ex-ante* projection with high projection validity and consistency as the predictive error associated with the estimated equations in tracking the actual data (*ex-post* prediction) are insignificant and low.

Table 8. One step ahead forecast of groundnut production

Period	Production (hg)		Area (ha)		Yield (t)	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
2013	2475430	318962.9	2732700	2685448	9055	12518.71
2014	3399158	2866764	2799773	2756826	12141	10656.65
2015	3467445	3026415	2801756	2823861	12376	10688.55
2016	3581800	3466149	2680000	2825419	13365	12265.4
2017	2420000	3560521	2820000	2702856	8582	12899.52

Source: Authors' computation, 2020

Table 9. Validation of models

Variable	R^2	RMSE	RMSPE	MAPE	RMAPE (%)	Theil's U
Production (hg)	0.996647	598684.2	136146.3	-10289.3	-3.10369	0.861034
Area (ha)	0.999463	86258.47	2718	-1486.5	-0.10541	0.973885
Yield (t)	0.999169	2231.63	534.83	-9.22	-3.24415	0.831902

Source: Authors' computation, 2020; mean absolute prediction error (MAPE), relative mean square prediction error (RMSPE), relative mean absolute prediction error (RMAPE) (Paul, 2014)

The results of the one-step-ahead of the sample production forecast showed the tendency of cyclical trend with the trend ebbing in the years 2019 and 2021; and thereafter, a marginal rise in the production which will persist till the end of the forecast period (Table 10).

Table 10. Out of sample forecast of the variables

Year	Production (hg)			Area (ha)		
	Forecast	LCL	UCL	Forecast	LCL	UCL
2018	2952264	2168159	3736370	2844563	2373087	3316040
2019	2749713	1848629	3650796	2868374	2199426	3537322
2020	2865895	1788005	3943785	2892179	2071989	3712370
2021	2843823	1643768	4043878	2915985	1968392	3863578
2022	2881720	1559421	4204019	2939790	1880001	3999580
2023	2893605	1464063	4323147	2963596	1802401	4124791
2024	2916773	1385627	4447919	2987402	1732972	4241831
2025	2935047	1309395	4560699	3011207	1670008	4352406
2026	2955444	1240172	4670716	3035013	1612327	4457699
2027	2974920	1174614	4775226	3058818	1559066	4558570
2028	2994795	1113240	4876350	3082624	1509577	4655670
2029	3014497	1055082	4973913	3106429	1463354	4749505
2030	3034275	999967	5068582	3130235	1419996	4840474

Year	Yield (t)		
	Forecast	LCL	UCL
2018	10833	6721	14945
2019	9773	5121	14426
2020	10272	4688	15856
2021	10037	3853	16222
2022	10148	3333	16962
2023	10096	2742	17450
2024	10120	2247	17993
2025	10109	1756	18461
2026	10114	1305	18923
2027	10111	870	19353
2028	10113	457	19768
2029	10112	60	20164
2030	10112	320	20546

Source: Authors' computation, 2020; LCL = lower confidence level; UCL = upper confidence level

The production trend will be driven by the marginal persisting rise in the area as the yield will be marginally fluctuating upward and downward. This showed that the agricultural tailored policies did not exert significant impact on the groundnut production in the country. Thus, there is a need for adequate intervention, *viz.* production finance to revive this sector as the crop in the recent times has become a staple food in virtually all households in the country. This showed that the food security of groundnut is under a serious threat, which if not tamed will continue to drain the foreign reserve of the country just like wheat which has made the country to be at the mercy of the USA, thus a serious draining on the country purse. Besides, a similar intervention aimed at boosting rice production *viz.* total ban on importation and the adequate provision of production and development finances-CBN Anchor borrower programme, should equally be extended to groundnut as it is now a necessity in Nigerian's households' food plate owing to its multi-dimensional purpose.

Conclusion and Recommendations

The performance of groundnut in the country was affected by poor investment on technology and infrastructure. Further, the effect of area predominates in bringing about change in the annual production level instead of yield. The decision of the farmers on acreage allocation was governed by both institutional and non-institutional factors. The empirical evidence showed area risk and uncertainty to be the factors that are responsible for variability in the annual average production level of groundnut in the studied area. There is need to adjust to climate smart agricultural practices to mitigate the consequence of climate change and low productivity. The future trend of the crop cannot guarantee food security of the crop in the studied area as the contribution of the annual yield will not give a desirable change in the annual output of groundnut. Therefore, in the light of the foregoing, the study recommends the need for the policymakers to support the sector with production and development finances as the crop played a very vital role in sustaining the economy of the nation from 1960s to late 80s and still stand a better chance to buffer the current dwindle economy.

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