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Analysis of Coconut Production Trends Under Three Policy Phases in Nigeria

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ABSTRACT

Coconut is an important crop with numerous economic uses. However, it is not clear how coconut production has performed overtime considering policy inconsistencies within the Nigerian agricultural space. The study therefore measures growth rates, patterns of growth, sources of production growth and instability from a policy standpoint centered on the Structural Adjustment Programme (SAP). Data used for the study covers 1961 – 2017, broken into three sub-periods. The findings reveal slow and stagnant pace of growth across the Pre-SAP, SAP, post-SAP periods. To this end, in a bid to reverse this trend, the study recommends investment in the coconut sector from government and private sector as well as providing favourable long-term land leases. There is a further need to address research and innovation in the coconut ecosystem, support input suppliers, strengthen marketing and transportation opportunities, and provide training on maintenance and protection of coconut from diseases and adverse environmental conditions. In addition, there is need to manage post-harvest losses through proper bagging and packaging which ultimately will enhance processing coconut into a variety of consumer products. These initiatives should accelerate the growth performance of coconut considering the immense benefit coconut offers.

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INTRODUCTION

Coconut is a perennial crop that is mostly grown in tropical regions. According to FAO (2021) the largest producer of Coconut in the world by 2019 was Indonesia and on the African continent, Tanzania ranked 1st position, followed by Ghana, Mozambique and Nigeria. Global coconut products were valued at $12billion in 2018 and the market was expected to grow at a compound annual growth rate of 13.6 % valued at $31 billion by 2026 (Research & Markets, 2019). This increase is driven by the food, health and cosmetic attributes of coconut that is in high demand by industries producing coconut water, coconut flour, coconut milk, coconut oil and coconut chips amongst others. Also, coconut has been finding new markets in baby soaps and creams as an enhancer for dry skin and eczema because of its soothing properties (Iftikhar, 2020). Thus, coconut products are perceived as natural alternatives for the health and lifestyle conscious consumers; and these segments of consumers continue to grow globally as more awareness is created on natural alternatives to chemically processed foods, drinks and body lotions.

According to Voice of Nigeria (2021), the Nigerian coconut market could be worth over $6 billion and the possibility of harnessing more value from the crop can easily be achieved due to the many economic uses derived from the crop. However, coconut potential is still not fully tapped, considering that virtually all parts of the crop are of economic value. Furthermore, compared with rice and oil palm, coconut producers receive little attention from government (Izuaka, 2020). In addition, despite the increasing importance of coconut, there is no research institute that is majorly dedicated to coconut which is not the case for oil palm, cereals and rubber that have dedicated research institutes. At best, coconut is grouped into a general research pool with no clear attention given to the crop; as such there is still no clear policy direction on coconut development in Nigeria.

These challenges require a refocus on coconut considering the huge market potential the crop provides. To this end, there is need to understand the trends (changes) in coconut production from a policy standpoint since these insights are likely to show

production patterns and help direct policy to where improvements can be made.

Growth rate, patterns of growth, sources of production growth and instability are indicators used to capture trends. Accordingly, growth rates are an important means of assessing the production performance of an agricultural commodity or commodities within the geographical boundaries of a country or region over a period of time (Kalidas, *et al.,* 2020). This performance can occur at a positive (increasing) or negative (decreasing) rate; it therefore serves as a pointer to the general 'production health' of the commodity in question. However,, the growth rate alone does not indicate the pattern or pace of growth. Sadiq, *et al.,* (2020) note that the pace of growth can take any of the following patterns: acceleration (rapid growth), deceleration (slow growth) and stagnation (inertia). Acceleration implies positive and statistically significant growth, while deceleration means negative and statistically significant growth. Conversely, stagnation can be either negative or positive but no statistically significant growth.

Furthermore, production growth due to the yield effect is desirable instead of the effect of area, since production is achieved by using less land. In addition, instability in production is a pointer to price fluctuations, which causes inconsistent and undesirable returns to farmers. Therefore, a stable production environment is a desirable outcome.

The prevailing policy environment at the time more often than not drives these outcomes, since changes in growth rates do not just happen by chance. Therefore, in the context of this study, the agricultural policy environment in Nigeria is used as a measure to capture the performance of coconut in a bid to identify policy periods that enhanced positive outcomes in coconut production, area and yield.

The Pre-Structural adjustment programme [hereafter referred to as SAP], SAP and Post-SAP periods are used as basis for delineating the policy periods. While these policy periods appear to be distinct, they overlap, as it is impossible for a policy regime to not stretch beyond the defined demarcations set out in the study. Nevertheless, these demarcations overwhelmingly capture policies that dominate a period which justifies the use of Pre-SAP, SAP and Post-SAP.

For the Pre-SAP period which covers a space of 25 years (1961-1985) saw the independence of Nigeria from British rule and was also a period that agriculture was the main stay of the Nigerian economy as exports of cash crops formed the bulk of foreign exchange earnings. This period witnessed a civil war between 1967-1970, the attendant difficulties of importing due to a war further led to stronger emphasis on agriculture. However, by the mid to late 1970's the oil industry started displacing agriculture as the major foreign exchange earner and with this came the gradual neglect of the agricultural sector. Notwithstanding, the pre-SAP period witnessed agricultural reforms particularly the direct involvement of government in agriculture through price and non-price mechanisms; such as the use of marketing boards responsible for fixing guaranteed minimum prices that ensured ready markets for farmers. Furthermore, the imposition of trade barriers (tariffs, ban, and quota) discouraged imports, which ultimately encouraged domestic agricultural production (Edeme, *et al.,* 2020). Extensive use of input subsidies was prevalent during the period and this further cemented government involvement in the sector.

The SAP policies generally covered the years 1986-1998 and were broadly centred on deliberately integrating Nigeria into the global capitalist world. To accomplish this, it entailed liberalizing the economy through the removal of trade restrictions and the promotion of open borders for trade In addition, price control was removed, by so doing, government withdrew from the price controlling mechanism to allow market forces operate. Furthermore, SAP policies emphasized removal of input subsidies in a bid to align with the ideals of a free market economy.

The post-SAP period heralded the present democratic dispensation and is a mix of both pre-SAP and SAP policies and was aimed at sieving the best from both policy periods. Accordingly, import protection on most agricultural products was reintroduced. SAP policies also welcomed government intervention in agriculture in the area of input subsidies, single digit interest on government backed credit schemes such as anchor borrower's schemes; these measures offer some level of protection as well as competitiveness to farmers.

At present, it is not clear how coconut production has performed overall and in each policy period because the varied policy measures are likely to influence the growth and development of coconut. From a policy standpoint, Antia-Obong (2019) acknowledges that growth and development rarely occur by chance, but are often driven by policies aimed at achieving increasing growth and development overtime. By implication, agricultural policies are intended to influence positive growth in production; however this is not always the case.

Accordingly, the general objective of the study is to examine the trends in coconut area, production and yield in a bid to identify the periods where coconut yield and production experienced increasing and accelerated growth alongside periods with stable and expanding yield contribution to production. By so doing, policy periods that support these measures can

be recommended. The study therefore has the following specific objectives:

To determine the growth rates in coconut area, production and yield in the pre-SAP, SAP, post-SAP and pooled periods.

To determine the growth pattern in area, production and yield of coconut in the pre-SAP, SAP, post-SAP and pooled periods.

To determine the sources of production growth in the pre-SAP, SAP, post-SAP and pooled periods.

To determine the level of instability in area, production and yield of coconut in the pre-SAP, SAP, post-SAP and pooled period.

The remainder of this study is structured as follows; the next section presents the materials and methods, followed by the results section, the discussion section follows after and lastly conclusions to the study are given.

MATERIALS and METHODS

Data Source

Secondary data obtained from the Food and Agriculture Organization statistical database (FAOSTAT) was used in the study.

The dataset for this study was divided into three periods to ease comparison of policy periods and covers pre-SAP era (1961 - 1985), SAP era (1986 - 1998), post-SAP era (1999 - 2017) and the pooled period from 1961-2017 gives a holistic perspective to the study. STATA 15 statistical software was used for analysis.

Modelling Growth Rates

Growth rate is a linear measure, which does not capture effect of compounding; it is calculated over an interval or period i.e. at a point in time. The log-linear model is generally used for this purpose, the regressand takes the logarithm form and the regressor is time variable which can take values from one to infinity (Godara & Krishan 2020; Sharma *et al.,* 2017).

The log-linear model generally takes the mathematical form:

$$LnYt_{(1,2,3)} = b_0 + b_1 t + e \quad (1)$$

Where $lnYt_1$ = Natural logarithm of Coconut production measured in tonnes

Where $lnYt_2$= Natural logarithm of Coconut yield measured in hg ha^{-1}

Where $lnYt_3$= Natural logarithm of Coconut area harvested measured in hectares

b_0 = estimated constant regression line

b_1 = estimated growth coefficient

t = linear time trends for each period

e = error term

Percentage growth rate is obtained as follows:

$$\text{Growth rate} = b_1 * 100 \quad (2)$$

Equation 2, gives the average instantaneous percentage growth rate over a specified period. The slope of the log-linear model measures the relative change in the dependent variable for a given absolute change in the value of the independent variable (Antia-Obong & Otung, 2019).

Compound Growth Rate

Compound growth rate is a nonlinear measure, in other words, the effect of compounding takes into account variability or volatility that have occurred overtime (Jagannath *et al.,* 2013), the compound growth rate is expressed as follows:

$$CGR = (\text{antilog } b_1 - 1) * 100 \quad (3)$$

Otherwise expressed as:

$$CGR = (e^{b1} - 1) * 100 \quad (4)$$

Where;

CGR = Compound Growth rate of coconut.

b_1 = estimated growth coefficient or slope.

e = Euler's exponential constant, given a value of 2.71828

Modelling Patterns of Growth

Three patterns of growth, namely; acceleration, deceleration and stagnation, are explored (Kappil, *et al.,* 2021).

A log-quadratic model is fitted for this purpose as follows:

For Coconut production in tonnes, yield in hg ha^{-1} and area harvested in ha:

$$LnYt_{(1,2,3)} = b_0 + b_1 t + b_2 t^2 + e \quad (5)$$

For equation (5), the quadratic time variable t^2 enables measurement of acceleration, deceleration and stagnation. Therefore, the coefficient of interest for the quadratic model is b_2 .

Accordingly,

1. Acceleration is observed, when b_2 is positive and statistically significant.
2. Deceleration is observed, when b_2 is negative and statistically significant.
3. Stagnation is observed, when b_2 is either negative or positive but not statistically significant.

Sources of Production Growth

Decomposition analysis is used to capture the sources of production growth, the procedure has been used in Ikuemonisan *et al .(* 2020 and Antia-Obong & Bhattarai (2012), so does not need to be repeated here.

The equation is expressed thus;

$$P = \underbrace{\frac{(A_{by} * \Delta Y)}{\Delta P} * 100}_{\text{(yield effect)}} + \underbrace{\frac{(Y_{by} * \Delta A)}{\Delta P} * 100}_{\text{(area effect)}} + \underbrace{\frac{(\Delta A * \Delta Y)}{\Delta P} * 100}_{\text{(Interaction effect)}} \quad (6)$$

Where;

P = Production growth

ΔP (Change in Production) = $(P_{cy} - P_{by})$

ΔY (Change in yield) = $(Y_{cy} - Y_{by})$

ΔA (Change in area) = $A_{cy} - A_{by}$

A_{by}, Y_{by} and P_{by} are the base year for area, yield and production of coconut.

A_{cy}, Y_{cy} and P_{cy} are the current year for area, yield and production of coconut.

Accordingly, the area effect, yield effect and interaction effect share percentage contribution towards production growth with each source contributing different percentage levels to production growth.

Instability in Coconut Production

The coefficient of variation (CoV) equation 7 and Cuddy Della Vella analysis (CDVa) equation 8 are used to capture instability in production, yield and area. The CoV is heavily critiqued because it tends to overestimate instability (Kumar, *et al.,* 2017;Ikuemonisan, *et al.,* 2020;Chavhan, *et al.,* 2020). As such, it is necessary to use CoV with other measures of instability, for this study, CDVa is employed because CDVa removes the problem of overestimation and by so doing, provides a more exact measure of instability (Sethi *et al.,* 2022). The CDVa de-trends the coefficient of variation (CoV) by using the adjusted R^2 obtained from the trend equation for each of the periods in area, yield and production.

The CoV and CDVa are expressed as follows:

$$\text{CoV} = \frac{\text{Standart deviation}}{\text{mean}} * 100 \quad (7)$$

$$\text{CDV}_a = \text{Cov} * \sqrt{1 - \text{Adjusted } R^2} \quad (8)$$

RESULTS and DISCUSSION

Growth Rates in Area, Yield and Production

The pre-SAP period shows that area, production and yield experienced positive growth rates and were all statistically significant at the 1 % level as observed on table 1. The result for coconut production growth rate was 0.75 points higher than yield and 0.15 points higher than area. In Nigeria, different crops have experienced positive growth rates in Pre-SAP period. For instance, Antia-Obong & Otung 2019 found positive growth rates (ρ > 0.01) for beer of barley production. In addition, Sadiq (2014) found area, production and yield of rice in the pre-SAP period to had positive (ρ > 0.01) growth rates but the pre-SAP period in that study was from 1970-1985, which is nine years short of the current pre-SAP period for this study. On the contrary, Sadiq (2014) witnessed negative growth rates in area, yield and production for groundnut in the pre-SAP period. In addition, Ibitoye *et al.* (2017) observed negative growth rate in cotton production between 1960-1985.

The SAP period shows a negative growth rate in area, while yield and production have positive (P<0.01) growth rates. This means that as yield and production were increasing, area harvested was decreasing although not at a statistically significant level. This finding is at variance with studies conducted in Nigeria; wherein in the SAP period, Nmadu *et al.* (2015) found area harvested for yam had positive and significant growth rates. In the same study, cassava area and production had positive and significant growth rates with yield decreasing. This was also the case for groundnut (Sadiq *et al.* 2020), rice (Sadiq 2014) and cotton production (Ibitoye *et al.* 2017).

Table 1. Percentage growth rates and compound growth rates of area, yield and production of coconut in Nigeria from 1961-2017

Periods	Area	Yield	Production
Pre-SAP	0.75***	0.15***	0.90***
(1961-1985)	(0.002)	(0.000)	(0.002)
SAP	-0.46	4.32***	3.85***
(1986-1998)	(0.006)	(0.007)	(0.003)
Post-SAP	0.38***	3.29***	3.68***
(1999-2017)	(0.001)	(0.002)	(0.002)
Pooled	0.51***	1.93***	2.45***
(1961-2017)	(0.001)	(0.001)	(0.001)

Note: *** represents ρ < 0.01; figures in parentheses are standard errors.
Source: Own editing based on data

The findings for the pre-SAP period are similar in terms of having positive growth rates and being

statistically significant at the 1% level. The magnitude of the growth rates show that production was 3.61%, followed by yield at 3.29% and area at 0.38%. The gap in the growth rates showed that production was 0.37 % higher than yield and 3.23 % higher than area showing that lower positive growth rate in area translated to a high grow rate in yield and an even higher growth rate in production. In the context of studies conducted in Nigeria, Antia-Obong & Otung (2019) also found positive growth rate for beer of barley production for the post-SAP period 1999-2014. The results obtained are similar to the study done by Sadiq (2014) where in area, yield and production had positive growth rates for the period 1995-2013. However, in the case of yam and cassava, area and production showed positive growth rates with yield having declining growth rate (Nmadu *et al.,* 2015).

The entire period covering 57 years experienced increasing growth rates in area, yield and production. In other words, the only negative growth rate, which was with respect to area harvested for the SAP period did not overwhelm the positive growth rates for the pre-SAP and post-SAP periods, hence the pooled period experienced positive and statistically significant growth rate. While most studies in Nigeria (Antia-Obong *et al.,* 2019; Ibitoye *et al.,* 2017) for the entire period tend to show similar results with positive growth rates for area, yield and production. However, the study by Nmadu *et al.* (2015) on cassava in Nigeria is an exception where in the entire period covering 27 years witnessed a decline in yield growth rates and an increase in area and production growth rates which is possibly as a result of the shorter period covered in their study.

Patterns of Growth

The findings from Table 2 show that growth pattern for the pre-SAP period was stagnated which means that the rate of growth was sluggishly unnoticeable. In other words, pace of growth witnessed in area, yield and production for the pre-SAP period was at a standstill i.e. slow to the point of being negligible. Previous studies on patterns of growth on pre-SAP area, yield and production are mixed. For instance, Sadiq *et al.* (2020) found that for the pre-SAP period groundnut harvested area and production was decelerating (slow rate of growth) and yield was accelerating (fast rate of growth). While for the same period, Sadiq (2014) found area, yield and production of rice to be accelerating.

The findings show pattern of growth in area and yield to be stagnant, while production was decelerating which means that the rate of SAP era coconut production was occurring at a slow rate, whilst rate of growth for area and yield was negligible.

The deceleration in production seems to be justified in this context, since area and yield contribute to production and both experienced stagnation in pace of growth which invariably influenced pace of production growth. There was deceleration in area, yield and production for the period. In other words, growth rate was slow across area, yield and production. This finding is not consistent across post-SAP periods. In the case of rice production and yield, there was accelerated growth, while growth rate in area was slow (Sadiq, 2014). Groundnut growth rate slow for area and yield with production growth rate stagnated (Sadiq *et al.,* 2020).

Table 2. Patterns of growth for area, yield and production of coconut in Nigeria for 1961-2017 period

Periods	Area	Yield	Production
Pre-SAP	-0.0002	-0.0001	-0.0002
(1961-1985) n=25	(0.0004)	(0.0001)	(0.0004)
	(Stagnation)	(Stagnation)	(Stagnation)
SAP	-0.0011	-0.0007	-0.0018**
(1986-1998) n=13	(0.0019)	(0.0021)	(0.0007)
	(Stagnation)	(Stagnation)	(Deceleration)
Post-SAP	-0.0009***	-0.0007**	-0.0016***
(1999-2017) n=19	(0.0002)	(0.0003)	(0.0003)
	(Deceleration)	(Deceleration)	(Deceleration)
Pooled	-0.0000	0.0004***	0.0004***
(1961-2017) N=57	(0.0000)	(0.0000)	(0.0000)
	(Stagnation)	(Acceleration)	(Acceleration)

Note: *** represent $\rho < 0.01$, ** represent $\rho < 0.05$, figures in parentheses are standard errors.
Source: own editing based on data

For the entire period under study, growth rates in yield and production were accelerating with area stagnated. In a similar study on yam and cassava, Nmadu & Baba(2015) found that area, yield and production growth rates of yam occurring at a slow rate, while cassava yield and production growth rates stagnated and that of area decelerated.

Decomposition of Coconut Production in Nigeria

From Table 3, the source of production growth in the pre-SAP show that area harvested contributed the most to production at 67.86 %, followed by yield at 26.08 %, the combined effect of area and yield contributed the least to coconut production for the pre-SAP period at 6.06 %. In the SAP era, a massive 91.95 % was contribution of yield to production growth, leaving area effect with 5.65 % and interaction effect with the least contribution of 2.40 % to production growth.

In the post-SAP period, the highest contribution to production growth was made by yield with 80.09 percent, followed by area with 11.97 percent, and the least contribution was made by interaction effect with 7.93 percent. For the entire period, the effect of yield dominated with 61.4%, followed by interaction effect with 24.39% and area effect having 14.2% as the least contribution to production growth. Clearly, it is observed that for the entire 57 years of period, yield effect contributed more than double the effect of area towards entire production growth while the interaction effect of yield and area contributed less than half of the yield.

Table 3. Percentage decomposition of area, yield and their interaction towards increasing Coconut production in Nigeria

Periods	Area effect	Yield effect	Interaction effect	Total %
Pre-SAP (1961-1985) n=25	67.86	26.08	6.06	100
SAP (1986-1998) n=13	5.65	91.95	2.40	100
Post-SAP (1999-2017) n=19	11.97	80.09	7.94	100
Pooled (1961-2017) N=57	14.20	61.41	24.39	100

Source: own editing based on data

Instability in Area, Yield and Production

The Cuddy Vella Della (CDVa) instability figures in general show lower instability in the sub-periods and pooled period than that of coefficient of variation (CoV) which as already stated, CoV tend to over estimates instability index , hence the study reports results for CDVa.

In general, each period under investigation exhibited different instability across area, yield and production. From Table 4, CDVa less than 15 indicates low instability and all CDVa figures were below 15 which implies that price of coconut has been stable over time.

Table 4. Instability index for area, yield and production

Periods		Area	Yield	Production
Pre-SAP	CoV	9.41	1.68	10.09
(1961-1985) n=25	CDVa	7.86	1.33	7.96
SAP	CoV	7.74	19.28	14.74
(1986-1998) n=13	CDVa	7.89	9.30	3.71
Post-SAP	CoV	3.69	18.17	19.85
(1999-2017) n=19	CDVa	3.13	4.29	5.18
Pooled	CoV	10.45	36.85	44.38
(1961-2017) N=57	CDVa	6.77	13.71	13.38

Source: own editing based on data

This price stability is possibly due to the current state of coconut utilization in Nigeria, where in consumption is mostly direct to consumers with limited value addition or industrial application that would require large volumes enough to distort the general price level.

In the pre-SAP period, although production index was lower than 15, it was the most unstable period, followed by area and with yield being the least unstable. For the SAP period, yield was the most unstable, followed by area and production the least unstable. The post-SAP period showed that production was the most unstable, followed by yield and area. Moreover, the pooled period indicates yield to be the most unstable, followed by production and lastly area the least unstable.

General Discussion

While the pre-SAP witnessed positive and statistically significant growth rates, unfortunately, the pattern of growth translated to stagnation. This is

instructive and brings to the fore, the importance of not only relying on growth rates in policy formulation; because it is clearly seen from the results that this may be misleading because patterns of growth expose the character of the growth process and a stagnated growth pattern more often than not reveals structural weaknesses which implies a situation of growth without development. By implication, pre-SAP policies supported increase growth whilst neglecting actual coconut development which would have in general accelerated coconut production. In other words, pre-SAP policies worthy of note such as; import restrictions through tariffs, ban, quota, the use of marketing boards by government agencies which guaranteed markets for agricultural produce as opposed to relying on the free market, amongst others only led to increasing growth rate without a corresponding increase in pace of growth.

With respect to source of output growth, area contributed the most to production; implying that the area dedicated to coconut cultivation was expanding during this period. This finding is not surprising, because during this period Nigeria emerged from independence and agriculture was the main stay of the economy coupled with the civil war of the mid 1960's led to the country looking more favourably towards agriculture of which coconut focused prominently. With the increase in area for coconut, effect of yield was somewhat elevated for this period. The combined effect of area and yield contributed the least to production; possibly due to the already pronounced stand-alone effect of area and yield on production growth.

For the same period, instability was generally low, with yield being the least unstable and this is expected considering that yield is a function of production over the area which experienced low instability. The results points to low disruption in coconut production in the sense that coconut being a perennial crop, at maturity yield tends to be stable overtime hence, low instability in yield is expected. Furthermore, at this stage of cultivation the coconuts are young and yields are optimum.

The SAP period covers 13 years and featured curtailment of government credit support to agriculture and removal of government managed marketing boards. By doing so, government intervention in agriculture was relaxed towards deliberate market liberalisation and deregulated markets where in market forces determined the trajectory of economic activities. To this end, growth rate in area decreased, whilst growth rates in yield and production increased. This result suggests that during the SAP period, expansion in area decreased, while yield and production continued to increase. Again, the perennial nature of coconut may likely explain this result, since decrease growth rate in area did not lead to decrease in yield and production. It can be adduced that the already cultivated area continued to produce increasing yield and production without the need to increase area. According to Coconut life Cycle (2021) a typical coconut tree can take 3 to 8 years to bear fruits and can continue bearing fruits up to 100 years. This finding suggests that coconut continue to yield on already cultivated land for long periods of time due to the nature of the crop without need to expand area however, over time growth rates of yield begin to fall as the crop ages.

Not surprising, with a negative growth in area, the pace of growth with respect to area stagnated, the pace of yield growth also stagnated which indicates that a decreasing and stagnated growth in area resulted in stagnation in yield even though growth rate in yield was positive. With stagnation in both area and yield, production experienced slow pace of growth (deceleration), which means that growth rate in production was decelerating at an increasing rate of growth bearing in mind that production growth was positive.

Yield effect contributed the most to production growth with nearly entire production (92%) contributed by yield growth. This finding is instructive because it buttresses the point that coconut at maturity 'takes a life of its own' without necessarily having to increase area to boost yield. Of course, this is due to the perennial nature of coconut, therefore, it is difficult to assert if SAP policies enhanced yield or if it is a case of nature and nurture. Howbeit, since it was during the SAP period that yield contributed nearly entirely to production growth, SAP polices are ascribed to the outcome. However, the large yield effect also generated the most unstable period, as earlier noted; instability was generally (<15) as such is not a cause for concern.

The Post-SAP period witnessed on average positive growth rates in area, yield and production, but these growth patterns occurred at a slow pace (deceleration). In other words, growth rate in area, yield and production was decelerating at an increasing rate. The character of growth helps to identify strength and weaknesses in the growth process in the sense that strength in this context implies acceleration (fast pace) in growth, weakness implies deceleration in growth rate (slow pace) and stagnation implies inertia. This finding further buttresses the point that coconut growth occurred without corresponding structural developments that would fasten the growth process.

In terms of contribution to production growth, yield effect accounted for 80%; this means that productivity of coconut played a bigger role in the production of coconut than the effect of area or the interaction of both area and yield. This finding to a large extent mirrors that of SAP period however, in this case

growth in area was positive which suggests that area effect slightly increased during post-SAP period. The implication is that area expanded during the Post-SAP period. As earlier noted, instability was generally low across area, yield and production which means any changes occurring was smooth and fairly erratic during the period. The findings show that primary coconut sector thrives in a free market economy; however as with agriculture in general, government intervention is invaluable.

For the entire 57 years, growth rate was positive for area, yield and production, which means that there was increase in area, yield and production for the entire period. Interestingly, the pattern of growth showed stagnation for area, while yield and production witnessed acceleration. This finding is important because it means that as growth pattern in area was in a state of inertia, growth pattern in yield and production was moving at a fast pace. This implies that coconut in Nigeria over 57 years tended towards being efficient because area dedicated to coconut did not move as fast as the yield and production obtained from the area. In addition, yield effect contributed the most to production growth and was accompanied with low instability.

CONCLUSION

This study aimed at investigating the trends (changes) and pattern of the changes in coconut production over a 57 years of period divided into three somewhat distinct and over lapping policy phases that have a bearing on agricultural growth and development in Nigeria.

The findings for the pre-SAP period showed stagnated positive growth rates across area, yield and production growth rates. The SAP period witnessed stagnated decrease in area, stagnated increase in yield and production was decelerating at an increasing rate. The post-SAP period findings show that area, yield and production was decelerating at an increasing growth rate. The pooled period shows that whilst area witnessed stagnated positive growth rates, yield and production was accelerating at an increasing rate. Taking into account totality of situation, the pooled period shows that coconut sector is moving in a positive direction since stagnation in area was accompanied by acceleration in yield and production.

However, the same cannot be said of the sub-periods, at best the SAP period where declining area was met with increase yield and production seems to hold some promise. In addition, findings revealed that the pre-SAP period was dedicated to area expansion with yield expansion dominating the SAP, post-SAP and pooled periods. Instability was generally low in all sub-periods and the entire period, which is a pointer to a stable price regime for coconut for the period.

RECOMMENDATIONS

In general, the findings reveal structural weaknesses in coconut production. Due to the slow and stagnated pace of growth across the pre-SAP, SAP and post-SAP periods. In a bid to reverse this trend, the study recommends investment in the coconut sector from the government and private sector. Firstly, hybrid varieties of coconuts need to be replanted to secure the future of coconut farms while also providing favourable long term land lease. Furthermore, farmers need to be continuously trained and supported on new technologies. There is need to address research and innovation in the coconut ecosystem, support input suppliers, strengthen marketing and transportation opportunities and provide training on maintenance and protection of coconut from diseases and adverse environmental conditions. In addition, there is also the need to manage post-harvest losses through proper bagging and packaging which ultimately will enhance processing of coconut into a variety of consumer products. These measures will likely reverse the structural weaknesses identified in the study, which has hampered the pace of coconut production growth.

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