The Effects of Forests on Economic Growth in Nigeria (1990 – 2015)

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ABSTRACT

This study empirically examines the impact of forests on economic growth in Nigeria for the period of 1990 to 2015. Unit root tests were carried out using the Augmented Dickey Fuller (ADF) test, while the Bounds cointegration test was used to establish a long run relationship between the forests and other independent variables and economic growth. An Error Correction Model (ECM) was also employed to determine the nature of the long run relationship. The findings show that forests have a positive effect on economic growth, however, this is not statistically significant. This study recommends that the government should intensify its efforts in the forestry sector so as to improve the productivity of forest resources in Nigeria. Moreover, the Nigerian government should discourage illegal felling of trees and the importation of timber products, as well as engage and develop the rural communities to reduce the pressure on forest resources and ensure sustainable use. The study also recommends the sustainable use of forest resources through ecotourism and the development of the forestry value chain in Nigeria.

Keywords: Forestry, forests, economic growth, ecotourism, ustainable use of forest resources

1. INTRODUCTION

There are a lot of factors responsible for the economic growth of any nation. These factors include population, government expenditure, health, education, institutions, natural resources, human capital etc. In Nigeria, these natural resources range from crude oil to arable land to large expanse of water. However, among the natural resources available to any economy

include forests. According to Oriola (2009), natural resource extraction is based on human and economic activities in forests which include cutting of trees and the hunting of wildlife.

One of the major objectives of any economy is to ensure a consistent economic growth. According to the World Development Indicators, the annual growth in GDP for Nigeria fell from 2.653% in 2015 to - 1.617% in 2016. This fall was heavily as a result of the drop in crude oil prices and was evident in an economic recession that crippled economic activities. These economic events have suggested that the Nigerian economy cannot be sustained on crude oil sales and revenues alone. Idumah and Awe (2017) further corroborated this by stating that most countries with oil have depended on oil revenue for their growth however oil is not sustainable due to its exhaustive nature and as such renewable natural resources such as forestry receive a lot of emphasis due to their potential to transform economies in Sub – Saharan Africa. Therefore, this further emphasizes the need for economic diversification and for government to broaden its sources of income and as such the government needs to explore all tools in its arsenal for development. According to the World Development Indicators, Nigeria has a forest area of 7.67% as a percentage of the total land area in 2015 and an area of 69,930 sq·km. When compared with West African countries like Niger with a forest area of 0.9% (11,420 sq·km) and Togo with a forest area of 3.5% (1,880 sq·km), this value is high however, when compared with some other countries like Cameroon with a forest area of 39.8% (188, 160 sq·km) and Ghana with a forest area of 41.0% (93,370 sq·km), the Nigerian forest area value may be considered as average. According to the National Bureau of Statistics (NBS) Gross Domestic Report Q3 2017, the forestry subsector under the agriculture sector grew by 3.95% in Q3 2017 from 3.89% in Q2 2017 and 2.08% in Q3 2016. This growth however is very minimal and reflects the poor performance of the forestry subsector. According to Aigbe and Oluku (2012), Nigeria used to be a major exporter of timber resources in the 1960s but now Nigeria is not only a net importer of wood but is now facing serious problems in the state of its forests resources and the environment with the country currently losing about 351,000 square kilometres to the desert, which is advancing southwards at the rate of 0.6 kilometres annually. The low productivity and growth of the sector coupled with the alarming rate of deforestation and loss of forest resources give for serious policy concerns and the need to determine the existing relationships between the sector and economic growth. The forests contain both timber products and non – timber forest products (NTFP). Akinni (2013) stated that Non – Timber Forest Products (NTFP) consist of naturally grown stocks of forest resources which could be processed either for household consumption or for local and external trade by the forest users. These NTFPs include a wide range of items such as fruits, seeds, leaves, animal products, latex, fibres and a host of others. These go to show that forests go beyond trees and contain a very wide spectrum of products. Several challenges however plague the forestry sector and forests in general that may account for the poor performance and the loss of its resources. According to Ojo (2004), Nigerian tropical forests are losing their properties due to interference by anthropogenic actions. These anthropogenic actions are human actions that are harsh to the environment. Unsustainable exploitation of forests especially the woody species components and their removal for other non – forest purposes coupled with the current forest management plan(s) have also led to the significant loss of these natural resources (Adeniyi, 2016). Pearce (2001) stated that population change and the consequent demand for land for food production as well as economic incentives have posed serious threats to the forest ecosystems.

Poverty and ignorance have also contributed to the low productivity of the forestry subsector and the depletion of forest resources. This is because the forests are usually located

in rural areas and as such the forests and its products provide sources of energy, food and income for these rural dwellers leading to over exploitation and illegal use of this natural resource. Furthermore, as more forest products are used wrongly for example, as chewing sticks or wooden electric poles, it may result in the poor performance and productivity of forests and the forestry sector in general. In recent times, Nigeria's forests have also been hideouts for criminals and as such many forests are usually avoided for security reasons and have to a degree contributed to the insecurity problems in Nigeria. Insecurity is a deterrent to business growth and expansion. Other problems include inadequate data on the state of forest resources in Nigeria, deforestation, illegal felling of trees among others. The absence of sufficient data may affect the effectiveness of government policies on the forestry sector. If these issues persist and the forests are not given adequate attention, the forests will continue to yield less productivitywhich will be compounded with problems of deforestation.

The forests can contribute to economic growth in more ways that do not require the depletion of forest resources. The sustainable and conservative use of forest resources is a sure way of growing the Nigerian forestry sector. The forests can contribute to economic growth via ecotourism. Even though, all the required frameworks and facilities for ecotourism are not present, the importance and potential for impact are not to be overlooked as it can provide employment for rural dwellers, recreation, improve rural areas and generate revenue even in foreign exchange. The forests contain a wide range of animals, trees and shrubs that may also attract foreign researchers who are interested in learning more about the ecosystem that are present in Nigeria's tropical forests. In order to navigate these forests, they have to employ people from the rural areas and unemployment in these areas is reduced and the general standard of living may improve as well as development of such areas. Furthermore, the government may earn revenue and foreign exchange by giving licenses to these research bodies to carry out research in Nigeria's forests. The results of research may bring about exposure on the ecosystem and ecological features on Nigerian forests. Also, the results of this research may have value for other industries such as pharmaceuticals and sawmills. Indigenous research institutes and organisations in Nigeria may also benefit from the exposure and expertise of foreign research bodies. As these viable opportunities for the forests and forestry subsector get explored, the government will broaden its sources of income and the full potentials of the forests will be maximised which will lead to increase in employment opportunities, more exposure, increase in the standard of living of rural areas as well as the conservation of the forests and the wildlife.

Therefore, given the importance of the forest sector in an economy, this study will seek to investigate potentials inherent in the forestry sector and show how these potentials can be turned to actual growth via effective recommendations. Furthermore, many studies only show how forests contribute to economic growth however this study will seek to go a step further by adding more inclusive data to the model that will be used to explain the effects of forests on the Nigerian economic growth and employ appropriate econometric techniques to understand the relationship between the variables under study.

2. THE CONTRIBUTIONS OF FORESTS TO THE NIGERIAN ECONOMY

Forest resources have been a major source of development for many states in Nigeria. They do not only cater for wood, wild foods, medicines, soil conservation, carbon dioxide storage and landscape beauty but additionally contribute in stimulating, foreign exchange

earnings, employment and economic growth as the Food and Agricultural Organisation (FAO) stated that the forest sector contributes about $468 billion to national income, representing 1% of global GDP in 2006 (Jaunky and Lundmark, 2016).The forests have contributed to national economies all over the world in many aspects. The forests have had benefitted the Nigerian economy in areas relating to employment, exports, foreign exchange earnings, creation of industries etc.

Forests worldwide provide values which is classified as direct use values (timber and fuel, extraction of genetic material, tourism etc.), indirect use values (protection of watersheds and the storage of carbon etc.), option values and nonuse values (Pearce, 2001). Forests in Nigeria provide wood which is one of the major building materials and as a source of fuel in rural areas and urban areas as well and that they are the raw material for charcoal which is an alternative or refined source of fuel (Oriola, 2009). According to Adeniyi (2016), the forestry sector is very important to the country's economy as it ranks among the highest revenue and employment generating sectors while providing a resource base for many forest industries.

During the period of 1960 to early 1970, export of wood products and agricultural commodities provided more than 70% of the country's GDP (Ogunwusi, 2012). The increase in oil revenue reduced the exploits of the forestry subsector in Nigeria. Despite the challenges facing the forestry sector, it has however still contributed significantly to the Nigerian economy. Kalu and Okojie (2009) stated that the forestry sector has provided sources of employment opportunities for Nigeria with estimates of people engaged in forestry activities at 170000 in 1933, 360000 in 1947 and reaching 568000 in 1961 and these included management staff, the labour force in all forest based industries. He further that 80% of the rural population is engaged in agro – forestry and other agro – allied industries. Ehiagbanare (2007) showed that forests have contributed significantly to the economy of Edo State.

He stated that a total of 217 mills using wood as raw materials have been established in the state employing about 10000 workers which are separate from the number of workers on the government's payroll. He further mentioned that the Edo State government has gained revenue of over N250 million between 1991 and 2002. The export earnings from forestry grew at 4.1%, 8.0% and 28.8% from 1950 – 60, 1960 – 70 and 1970 – 80 respectively and from 2011 to 2015, Nigeria exported $400.2 million worth of timber, behind Cameroun and Gabon who exported $745.9 million and $474.7 million worth of timber respectively (Idumah and Awe, 2017). Timber exports have not only resulted in the foreign exchange earnings but also in socio – economic development.

Forests have also created a value – chain industry beginning from loggers to sawmill to carpenters and other wood manipulating enterprises. The forests have always have had a positive impact on the economy in Nigeria. However, the impacts of forests in recent years have been small and its contribution is the least among the subsectors of the agricultural sector. The forests and the forestry sector have the potential to be more productive if given more attention and more frameworks for development was put in place.

3. LITERATURE REVIEW

Ehiagbanare (2007) stated that the forest is defined as a tract of land dominated by trees. According to Ogunwusi (2012), among the factors that has led to the reduction of forest resources availability is the intensive exploitation of the resources. Almost all estimates in the

literature tend to agree that the Nigeria's forest estate is declining in size and perhaps quality. However, what seem to be inconsistent are the rates of decline and present size and quality of the country's forest (Adeniyi, 2016).

Most literature agrees on the positive roles of forests in promoting the growth and development of an economy. Forests provide employment opportunities for thousands of Nigerians (Kalu and Okojie, 2009). According to Oriola (2009), forests serve as a source of raw materials for many industries in Nigeria which include sawmills. Plywood, veneer, particle board, match factories and pulp and paper mills. Adejumo (2017) states that forest plantation play a vital role in the economic development of the state as they provide sources of livelihood for many of the rural poor. Emeghara (2012) further mentions that forestry plays a variety of vital roles in rural development through: provision of food and fodder, medicine, fuel wood, wood working, timber, game and wildlife, raw materials for industries and employment.

Development can be seen as the justifiable utilization of local resources for improved living condition of all and sundry in a community, state or nation (Oriola, 2009). Masoud (2014) defined economic growth as the growth per capita of the Gross Domestic Product (GDP).

Jaunky and Lundmark (2016) attempts to examine the forest product export – led growth hypothesis for 22 rich countries over the period of 1970 – 2011 and applied several time – series unit root tests, three generations of panel unit root and cointegration tests. Both series were found to be cointegrated at first difference after controlling for cross – sectional dependence. A panel causality test is conducted and a unidirectional causality from forest product exports to economic growth is found in the short-run and a bi-directional causality is uncovered in the long-run and a 1% rise in forest product exports causes a 0.022% and 0.002% rise in economic growth in the short-run and long-run respectively for the whole panel.

Kalu and Okojie (2009) address the economic contributions of forests in Nigeria from 1970 to 2011. Ordinary Least Squares (OLS) was used as the estimation technique with GDP was the dependant variables while the independent variables were forest product outputs, timber export, and price index of timber as well as inflation and exchange rate. After encountering problems of multicollinearity among the explanatory variables and a low R^2, a variable was dropped and afterwards R^2 was 0.834 indicating an explanatory power of 83.4% as well as significance of all explanatory variables. Timber export as an explanatory variable had a positive effect on GDP meeting the a priori expectation.

There are many theories that have been postulated to examine the determinants of economic growth and the transition mechanisms. Anyanwu (2014) identifies several factors affecting economic growth in Africa which include investment as mentioned by the neoclassical and endogenous growth models, government spending, openness to trade, human capital, political environment, population, institutional framework, commodity prices and credit to the private sector.

The inclusion of land and natural resources are captured in the works of Chambers and Guo (2009). Solow in his later paper (1974) includes exhaustible natural resources in his production. His production function however gave no special role to natural resources. The neoclassical economists have broadened the concept of land from the classical theory and as such land became subdivided among various sub – fields with the sub – fields having the common feature that they make land and environmental resources the central focus and base most of their methods on neoclassical assumptions.

4. MATERIALS AND METHODS

4. 1. Data Sources

Data for this study were obtained from secondary sources and covered 1990 to 2015. The data were sourced from the CBN Statistical Bulletin, NBS, World Development Indicators and other sources. Data was collected on annual growth rate on GDP per capita as the proxy for economy which is the dependent variable and other independent variables.

4. 2. Methodology

Macroeconomic theory has identified several factors that affect economic growth from the various schools of economics. In order to examine the empirical evidence of the effects of forests on economic growth, this study will adapt the model of Chambers and Guo (2009). The model specification for the study is given as follows:

$$GDP = f(K, L, FDI, INF, EXR, FOR, GOV)$$

Thus, the growth function becomes

$$GDP = \beta_0 + \beta_1 FOR + \beta_2 K + \beta_3 L + \beta_4 EXR + \beta_5 FDI + \beta_6 INF + \beta_7 GOV + \mu ....1$$

Using a log transformation of the dependent variable and major independent variable, the model becomes

$$LNGDP = \beta_0 + \beta_1 LNFOR + \beta_2 K + \beta_3 L + \beta_4 EXR + \beta_5 FDI + \beta_6 INF + \beta_7 GOV + \mu ....2$$

where: β_0 is the slope β_1, β_2, β_3, β_4, β_5, β_6, and β_7 are the coefficients of the variables respectively while μ is the error term.

GDP is the GDP per capita
FOR is the total forest area
K is capital which is measured using fixed gross capital formation as a percentage of GDP
L is labour which is measured using labour force participation rate is as a percentage of total population ages 15+
EXR is exchange rate
FDI is foreign direct investment net inflows as a percentage of GDP
INF is the inflation rate
GOV is government expenditure

The a priori expectations for the coefficients of the independent variables are:

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 < 0, \text{ and } \beta_7 > 0$$

4. 3. Empirical Analysis

This study employs the use of time series data which have been subjected to a stationarity test via the Augmented Dickey Fuller (ADF) technique. The results of the stationarity test are shown in the table below:

Table 1. Augmented Dickey Fuller (ADF) Test for Stationarity.

Variable	ADF Calculated Value At Levels	ADF Calculated Value At 1st Difference	Mckinnon Critical Value At 5%	Order of Integration
LNGDP	0.492047	-3.860019	-2.991878	I(1)
LNFOR	-	-11.05857	-3.004861	I(1)
EXR	-0.462686	-4.612505	-2.991878	I(1)
FDI	-2.345337	-5.416989	-2.991878	I(1)
GOV	-5.143143	-	-2.986225	I(0)
K	-1.297809	-4.471656	-2.998064	I(1)
INF	-9.031765	-	-3.020686	I(0)
L	-3.194744	-4.167276	-3.612199	I(1)

Source: Author's Computation from E Views 10 Software

From Table 1 above, the variables are stationary at different orders. GOV and INF are stationary at levels while LNFOR, EXR, FDI, LNGDP, L and K are stationary after first difference. A cointegration test is necessary to establish a long run relationship between the variables. Therefore, a Bounds cointegration test as proposed by Pesaran, Shin and Smith (2001) will be used since the variables are integrated of different orders.

Table 2. Bounds Cointegration Test.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0) Asymptotic: n = 1000	I(1)
F-statistic	48.19785	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9
Actual Sample Size	25		Finite Sample: n = 30	
		10%	2.277	3.498
		5%	2.73	4.163
		1%	3.864	5.694

Source: Author's Computation from E Views 10

From the results obtained in Table 2 above, the F-statistic value of 48.19785 is greater than the critical value for the upper bound (I(1)). Thus, the null hypothesis of no levels or long run relationship can be rejected at the 1%, 2.5%, 5% and 10% significance level. Therefore, it can be concluded that there exists a long run relationship among the variables under study. This also implies that the series can be combined in a linear fashion and even though there may be shocks in the short run, the series will converge in the long run.

Table 3. Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	45.78557	NA	0.001954	-3.435052	-3.038309	-3.341591
1	63.03099	20.38095*	0.000453*	-4.911908*	-4.465572*	-4.806765*
2	64.01231	1.070529	0.000464	-4.910210	-4.414281	-4.793384
3	64.17845	0.166143	0.000514	-4.834404	-4.288883	-4.705896
4	64.35204	0.157806	0.000573	-4.759276	-4.164162	-4.619085

Source: Author's Computation from E Views 10

From the above table, the lag order selected by the table is 1. Therefore, optimal criterion of 1 lag will be used when estimating the ECM Models.

Table 4. Error Correction Model Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.025034	0.094345	0.265344	0.7946
D(LNGDP(-1))	1.132436	0.371364	3.049393	0.0087
D(LNFOR(-1))	0.991296	2.316446	0.427938	0.6752
D(EXR(-1))	0.000775	0.000717	1.081393	0.2978
D(FDI(-1))	-0.004741	0.005245	-0.903897	0.3813
D(GOV(-1))	-0.000202	0.000103	-1.959735	0.0702
D(K(-1))	0.005856	0.006205	0.943768	0.3613
D(INF(-1))	0.000351	0.000837	0.419089	0.6815
D(L(-1))	-0.048666	0.257889	-0.188709	0.8530
ECM(-1)	-0.882506	0.472052	-1.869510	0.0826

|			
R-squared	0.492630	Mean dependent var	0.027275
Adjusted R-squared	0.166463	S.D. dependent var	0.056568
S.E. of regression	0.051645	Akaike info criterion	-2.794493
Sum squared resid	0.037342	Schwarz criterion	-2.303637
Log likelihood	43.53391	Hannan-Quinn criter.	-2.664268
F-statistic	1.510363	Durbin-Watson stat	1.809792
Prob (F-statistic)	0.235913		

Source: Author's Computation from E Views 10

From Table 4 above, the ECM value which is the speed of adjustment shows that 88% of the distortion in the current period will be corrected in the next period.
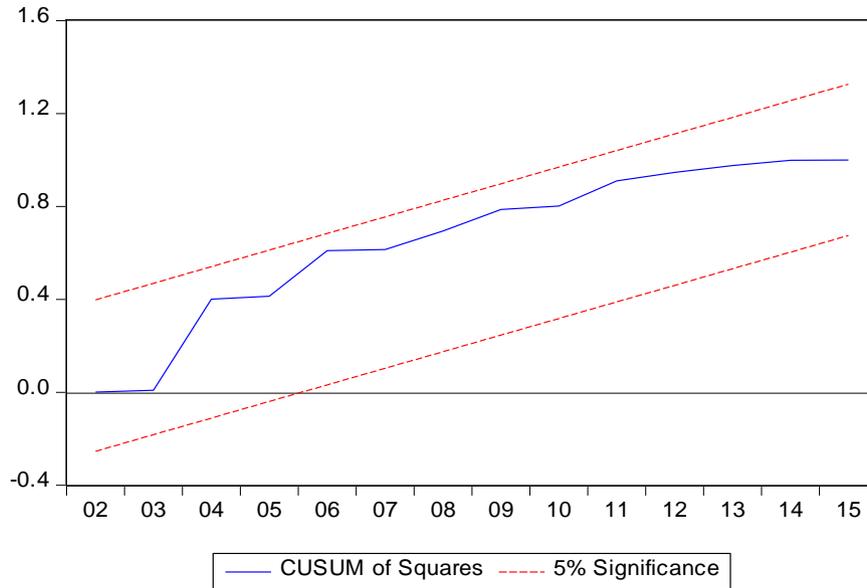
Table 5. Correlation Tests

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.336142	Prob. F(1,13)	0.2685
Obs*R-squared	2.236823	Prob. Chi-Square(1)	0.1348

Source: Author's Computation from E Views 10
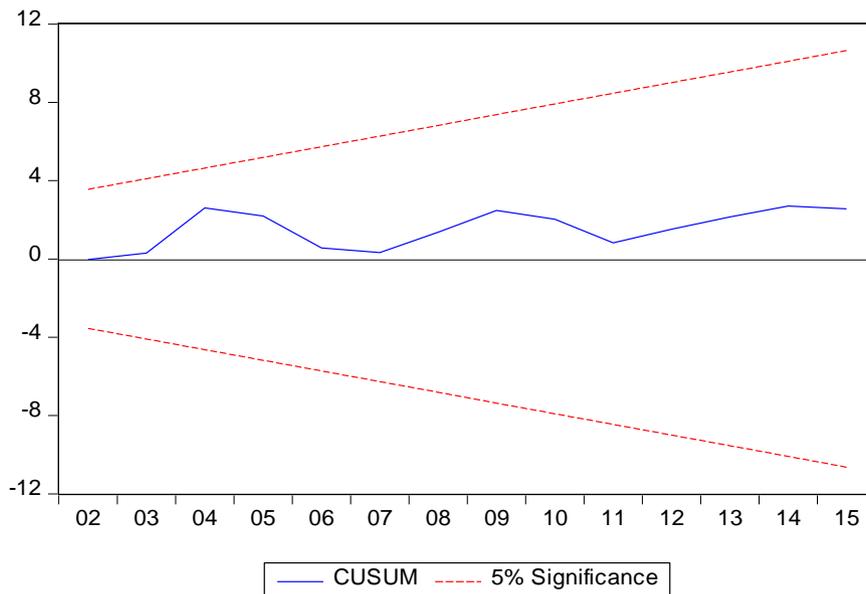
Figure 1. CUSUM Stability Test

Figure 2. CUSUM of Squares Stability Test

From Table 5 above, there is no serial correlation among the variables as the 0.2685 value is higher than the 5% probability value. Also, the CUSUM and CUSUM of squares values as indicated by Figure 1 and Figure 2 lie within the 5% significance boundary indicating model stability.

5. DISCUSSION OF RESULTS

From Table 4, the coefficients of the lagged values of LNGDP and GOV are significant at the 10% level while the coefficients of the lagged values of LNFOR, EXR, FDI, K, INF and L are not significant at the 10% level. Even though the coefficient of the lagged value of LNFOR was not significant, it followed the a priori expectation as it has a positive effect on LNGDP. The insignificant value of the coefficient may be as a result of the problems and challenges plaguing the sector which undermines the productivity of the sector. The coefficient of the lagged values of K and EXR also followed the a priori expectation even though it was not significant. The coefficients of the lagged values of FDI, GOV, INF and L did not follow the a priori expectations.

The coefficient of the Error Correction term indicates that 88% of the disequilibrium in the short run is offset in the next period. The ECM value is also significant at the 10% level which indicates that the variables are cointegrated and have a long run relationship.

6. CONCLUSIONS

Natural resources are supposed to have a positive and long run relationship with economic growth for any country including Nigeria. However, in the case of Nigeria, natural resources

including forests have not been able to achieve the desired level of impact. Therefore, the government and national planners need to step up their effort in order to increase the impact of forest resources on economic growth in Nigeria.

The Nigerian government needs to invest more in the forestry sector or collaborate with relevant international bodiesso as to aid data collection.This will improve research activities in the sector as well as make ensure the effectiveness of government policies and efforts. Also, government should discourage illegal felling of trees so as to reduce deforestation and ensure the continuous productivity of the sector. The Nigerian government should increase funding to the forestry sector to ensure that current efforts to improve the productivity of the sector are sustained and improved upon. Rural communities where many forests are located should also be developed so as to reduce the demand for forest products for energy. Rural communities should also be engaged on the importance of forests so as to discourage unsustainable use of forest resources.

Government should also make sure the forestry value chain is adequately developed so that the forest resources can move from raw materials to intermediate products and then to the finished products with ease to also ensure value addition. The importation of timber products from other countries should also be discouraged so that the domestic market can be well developed.Furthermore, government should also ensure the sustainable use of forest resources for development through ecotourism so that future generations can also enjoy the economic benefits of forest resources in Nigeria.

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