Effect of Green Bonds in Financing Sustainable Agriculture in Nigeria

Atinuke O. Ayo-Balogun
The Federal Polytechnic (Ilaro), Nigeria | e-mail: : atinuke.ayobalogun@federalpolyilaro.edu.ng

Chukwudumebi Cynthia Ajao
The Federal Polytechnic (Ilaro), Nigeria | e-mail: chukwudumebi.ajao@federalpolyilaro.edu.ng

Adetunji Moses Oluwaniyi
The Federal Polytechnic (Ilaro), Nigeria | e-mail: adetunji.oluwaniyi@federalpolyilaro.edu.ng

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Abstract

The concept of green bonds emerged as a way to provide investors with an opportunity to contribute to environmental projects while earning returns on their investments. The study aimed to determine how green bonds affect the funding of sustainable agriculture in Nigeria. The specific objectives were to examine the role of green bonds in financing sustainable agriculture in Nigeria and to make recommendations for how to improve the use of green bonds in agriculture sector. The study used a purposive sampling technique to select respondents from two local governments (Yewa south and Yewa north, local governments) and the respondents included farmers, deposit banks and agri-business owners in Ogun State, Nigeria. The questionnaire (survey) was used as a research instrument and a face to face interview was also conducted. The psychometric properties were tested using Cronbach's Alpha. The results showed that the instrument used were reliable and valid. Data were analyzed using descriptive and inferential statistics, specifically a linear regression model. The t-value for the relationship between green bonds and sustainable agriculture was 22.193, and the p-value was .000. Hence, the finding revealed that a statistically significant positive relationship between green bonds and sustainable agriculture existed. As green bonds increase, sustainable agriculture increases as well. The findings had the following implications for green bond issuers, farmers and agric-business owners: Green bond issuers should prioritize investments in sustainable agriculture projects. Farmers should receive adequate training and information on sustainable agriculture practices. Finally, policymakers should create incentives for farmers who adopt sustainable practices.

Keywords: Green Bonds, Sustainable Agriculture, Agriculture, Financing, Finance

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I. Introduction

Green bonds are seen as being crucial to the growth of sustainable infrastructure investments from institutional investors by improving the liquidity of infrastructure assets. They are financial innovation instruments designed to facilitate sustainable investing for institutional investors such as pension fund administrators (PFAs), insurance companies and funds/asset managers. Additionally, because of their potential for increased investment in the agricultural sector, as well as the opportunity to improve environmental quality and food security in Nigeria and globally, green bonds play a significant role in promoting sustainable agriculture in Nigeria. A sizable section of the workforce is employed in the agricultural industry makes a substantial economic contribution to Nigeria. Low productivity, inadequate infrastructure and restricted access to financing are only a few of the difficulties the industry faces (Oyaniran, 2020). Nigeria has seen a push in recent years to enhance sustainable agriculture, with an emphasis on raising output and minimizing negative environmental effects. Both domestic and foreign investors are becoming more interested in investing in sustainable agriculture in Nigeria. Numerous initiatives have received funding from a range of sources, such as venture capital, private equity and government initiatives. Additionally, more green bonds are being issued for initiatives promoting sustainable agriculture transformation in Nigeria (Owoade, 2019).

One kind of bond that is sold to fund initiatives which benefit the environment is called a "green bond." Projects that support sustainable development, such as those that involve pollution reduction, energy efficiency and renewable energy are financed with the proceeds from green bonds. A form of agriculture known as "sustainable agriculture" aims to maintain the environment, society and economy. It frequently incorporates techniques such as organic farming, water and soil conservation as well as soil preservation (North, 2023). Nigeria is a nation that deals with environmental issues like deforestation and water scarcity. In addition, the nation is rapidly becoming more urbanized, which is straining its natural resources. Green bonds and sustainable agriculture, which encourage resource efficiency and lessen environmental effect, can assist in addressing these issues (Obidimma, 2022).

Key stakeholders in Nigeria, particularly financial institutions, have grown increasingly conscious of the climate-related financial risks associated with their operations as a direct result of the Nigerian Green Bond Market Development Program's advocacy on the subject of climate change. This is because their "loan book" portfolio is exposed to highly polluting industries like oil and gas. On the other hand, there are lots of chances for green finance in a number of Nigerian economic sectors including housing, transportation, agriculture, power and energy. In order to assist the private sector in mainstreaming sustainability into finance and investment possibilities, the NGBMDP has produced a framework on green finance. Green bonds have been used recently to boost investment in sustainable agriculture in Nigeria, although there is still a deficiency of comprehension of these investments' actual effects and how much they contribute to sustainable development. In light of this, the study aims to determine how green bonds affect the funding of sustainable agriculture in Nigeria. The specific objectives are as follows:

1) To examine the role of green bonds in financing sustainable agriculture in Nigeria.
2) To make recommendations for how to improve the use of green bonds in agriculture sector.

II. Literature Review

A green bond is a type of bond that is specifically designed to raise capital for projects or activities that have a positive environmental impact. These bonds are typically issued by governments, development banks or other financial institutions. They are used to finance projects such as renewable energy, energy efficiency, sustainable agriculture and other initiatives that help to reduce greenhouse gas emissions and promote sustainable development (Serena , Roberto, & Michela , 2021). Green bonds work similarly to traditional bonds, in that they are essentially loans that are paid back with interest over a set period of time.

Both governmental and private businesses can issue green bonds, a sort of financing instrument, to finance environmentally friendly projects. They are a very popular option for long-term investments. One type of financial instrument called "green bonds" is mostly used to raise money for eco-friendly projects. These initiatives might focus on energy efficiency improvements, sustainable agriculture, renewable energy sources and other green initiatives. Encouraging investment in initiatives that advance environmental sustainability is the goal. In Nigeria and throughout Africa, green bonds are becoming one of the funding choices available to public, commercial and other institutions to address climate change. Investopedia defines a green bond as a tax-exempt bond issued by municipalities or federally approved organizations for the development of brownfield locations. The purpose of green bonds is to promote brownfield site development and sustainability.

More precisely, clean transportation, sustainable water management, energy efficiency, pollution avoidance, sustainable agriculture, fisheries, forestry, the preservation of aquatic and terrestrial ecosystems, as well as the development of environmentally friendly technologies are all funded by green bond projects. Investing in green bonds is more appealing than buying a comparable taxable bond because of their tax-exempt status, which offers financial motivation to address important social concerns like the transition to renewable energy sources and climate

change. In Nigeria, there are a few instances of projects that have benefited from green bond funding. Rendezvous, a development business, issued the Alaro City Green Infrastructure Bond as one illustration. Projects related to sustainable infrastructure, such as waste and water management, renewable energy and eco-friendly construction (Chiemeka, 2021) are also well known. The Africa GreenCo Green Bond serves as an additional illustration and is utilized to finance (Chiemeka, 2021). The Africa GreenCo Green Bond serves as an additional illustration, as it finances renewable energy initiatives throughout Sub-Saharan Africa.

Due to the additional criteria for social and environmental norms, green bonds may be more expensive than ordinary bonds. This is one potential drawback. Since they must be able to prove their environmental benefits, they are more difficult to build and administer. Furthermore, some detractors contend that rather than actually solving environmental issues, green bonds are merely a marketing gimmick (Agliardi, 2021). Notwithstanding all of the drawbacks, green bonds have the following benefits for Nigerian consumers: Green bonds contribute to better environmental quality by encouraging energy efficiency and renewable energy, both of which lower greenhouse gas emissions and air pollution. By promoting sustainable water management, they also aid in lowering water scarcity and enhancing water quality project. Additionally, by encouraging sustainable agriculture methods, they lessen land degradation and enhance soil quality (Statista, 2023; Pathak, 2021).

Green bonds hold significance in Nigeria for multiple reasons: Firstly, they can aid in funding the nation's shift to a low-carbon economy, thereby mitigating the effects of climate change. Secondly, they can enhance the nation's environmental performance, thereby drawing in foreign investment and enhancing living standards. Thirdly, by endorsing sustainable projects, they can generate employment and stimulate economic growth (Policy Development Phase II, 2020).

Using financial resources to promote agricultural techniques that are both commercially and environmentally feasible is known as sustainable agriculture investment. Examining the social, environmental and economic effects of agriculture is a long-term strategy (David Perri, 2022). The intention is to encourage long-term sustainable agricultural growth. A number of concepts are frequently linked to investments in sustainable agriculture, including the following: The use of environmentally friendly fertilizers and pesticides, the adoption of conservation techniques and the preservation of natural resources, like soil and water. Encouraging equitable economic growth is another key tenet of investments in sustainable agriculture. This entails generating revenue for all parties involved, such as smallholder farmers and rural areas. Initiatives like market access, financing availability and farmer training can help achieve this. Furthermore, investing in sustainable agriculture seeks to advance inclusive growth, which entails giving women and other underprivileged groups access to the economy.

Green bonds may have both beneficial and detrimental consequences in Nigeria's sustainable agriculture industry. Positively, green bonds can give sustainable agriculture projects much-needed finance. Food security and agricultural productivity may both benefit from this. Green bonds can also enhance rural infrastructure and generate jobs. Negatively, smallholder farmers may feel pressured by green bonds to follow particular techniques that may not be long-term viable (Yusuf Yakubu Yusuf, 2022). For instance, some farmers would be compelled to convert to genetically modified crops, which could have detrimental effects on the environment and society. Green bonds can play several important roles in advancing sustainable agriculture. For example, they offer long-term, affordable funding for projects related to agriculture (Dilip Dwivedy, 2023). Smallholder farmers may find it simpler to obtain the funding they want to increase their output as a result. Second, through financing research and training, green bonds contribute to the capacity-building of the agriculture industry. Lastly, because green bonds mandate thorough reporting on the funds' utilization, they contribute to greater accountability and openness in the agriculture industry. The promotion of Nigeria's green infrastructure development is another function that green bonds can fulfill. This covers issues like renewable energy initiatives, water treatment facilities and irrigation systems. Green bonds can lessen environmental harm and increase agricultural productivity by financing these kinds of initiatives. Furthermore, through supporting initiatives that can adjust to shifting circumstances, green bonds can contribute to the development of climate change resilience.

According to some research, by holding farmers and other stakeholders accountable for the detrimental effects of their operations, green bonds can aid in the internalization of the environmental costs associated with agriculture (Daniel J. Phaneuf, 2016). Green bonds can impact sustainable agriculture in two key ways, according to environmental economics theory. The first is by altering the farmers' incentive program. This can occur in various ways. First, by incentivizing farmers to adopt sustainable practices, green bonds can establish a price signal for eco-friendly operations. Second, by raising the price of using hazardous inputs like pesticides, they can raise the cost of unsustainable practices. The second potential impact of green bonds contribute to sustainable agriculture by sponsoring research and development. Farmers may find it easier to adopt and develop more sustainable practices as a result (Meera, 2020).

Green bonds can support the development of sustainable livelihoods in the agriculture industry. "Cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation" is the definition of a sustainable livelihood, according to the theory of sustainable livelihoods (Serrat, 2014). Put differently, it ought to be robust, long-lasting and inclusive. There are several ways that green bonds might help sustainable lives. First, they can finance resources like land, water and renewable energy that are necessary for sustainable living. Second, through bolstering neighborhood networks and organizations, they can aid in the development of social capital. At last, they are able to offer chances for education and skill development (The World Bank Group, 2015).

The International Institute for Sustainable Development published "Sustainable Agriculture Investment in Developing Countries: Lessons Learned and Policy Recommendations." In addition to offering policy ideas for how to encourage and support this kind of investment, that paper gives an overview of the opportunities and problems facing investments in

sustainable agriculture concerning developing nations (Hallam, 2011). The International Food Policy Research Institute's "Sustainable Agriculture and Green Growth in Nigeria: Development Opportunities and Challenges" is another eye-catching research. The potential for sustainable agriculture to support green growth in Nigeria is examined in this study, along with the opportunities and problems associated with growing this industry (Owoade, 2019). "Financing Sustainable Agriculture in Nigeria: A Call for Public-Private Partnerships" by the Nigerian Institute of International Affairs is also a noteworthy research in the literature. In order to finance sustainable agriculture in Nigeria, more public-private partnerships are advocated in this study. The International Institute of Tropical Agriculture published "The IITA Forest Project: A Case Study of Sustainable Agriculture Investment in Nigeria." This case study examines the collaboration between a private investor and a research institution to create a sustainable agriculture initiative in Nigeria. It sheds light on the difficulties and possibilities facing these kinds of collaborations (Izuchukwu, 2011).

III. Methodology

Ogun State was selected as the research field in this study. Farmers and other stakeholders (deposit banks and agric-businesses) in particular local government areas of Ogun State did make up the study's population. Survey (questionnaire) research design and interview method were used. Three distinct stakeholders in Ogun State, Nigeria, provided 300 respondents (one hundred respondents each), chosen using a proportionate random sample technique on a purposive approach. The technique for gathering data was a questionnaire labeled "Green bonds and sustainable agriculture investment." The instruments were assessed for their psychometric properties (validity and reliability) using factor analysis and Cronbach alpha, respectively. The findings demonstrated the validity and reliability of the instruments. Regression analysis was performed on the acquired data using SPSS at the 5% significance level.

The following questions were used through interview to achieve the second objective of research:

- What policies are currently in place to promote green finance and sustainable agriculture?
- How effective are these policies in promoting sustainable development?
- What challenges do you see in implementing these policies?
- How do you see green finance evolving in the future and what changes do you anticipate?
- What could be done to increase the use of green finance in Nigeria?

IV. Findings

Table 1: Case Processing Summary

		N	%
Cases	Valid	287	100.0
	Excluded[a]	0	.0
	Total	287	100.0

a. Listwise deletion based on all variables in the procedure.

Table 1 above showed that all of the cases in the analysis were included, and there were no missing data. Therefore, the instrument used are valid.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
.939	20

Table 2 above shows that the measure is highly reliable and the results of the analysis can be used. With 20 items, the measure is considered to be robust and the results are unlikely to be affected by chance.

Table 3: Total Variance

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.514	47.570	47.570	9.514	47.570	47.570
2	2.871	14.357	61.926	2.871	14.357	61.926
3	1.362	6.808	68.734	1.362	6.808	68.734
4	.985	4.927	73.661			
5	.779	3.893	77.554			
20	.066	.331	100.000			

Table 3 above revealed a cumulative total variance explained of 68%. This implies that the items on the instruments are well loaded and highly valid. The value of 47.507 is the initial Eigenvalue for the dominant factors, which explained the total variance in the data. The next highest initial Eigenvalue 14.357, represents the second most dominant factor and the lowest Initial Eigenvalue, 6.808 represent the least dominant factor of the instrument used.

Table 4: Descriptive Statistics

	Mean	Std. Deviation	N
SA	18.9930	6.91051	287
GB	18.1429	7.39238	287

Table 4 above showed the summary of the data used in the analysis. The mean score of data relating to sustainable agriculture (SA) is 18.9930, while standard deviation is 6.91051. Green bonds (GB) mean score of data is 18.1429, while the standard deviation is 7.39238.

Table 5: Correlations

		SA	GB
Pearson Correlation	SA	1.000	.796
	GB	.796	1.000
Sig. (1-tailed)	SA	.	.000
	GB	.000	.
N	SA	287	287
	GB	287	287

Table 5 indicates that sustainable agriculture (SA) and green bonds correlates at .796. This implies that there is a positive correlation between sustainable agriculture and green bonds.

Table 6: Model Summary

Mode l	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	df2
1	.796[a]	.633	.632	4.19121	.633	492.512	1	285

a. Predictors: (Constant), GB

Table 6 reveals the total effect of sustainable agriculture (SA) and green bonds (GB) as r2 = .633. This implies that about 63% variability in green bonds is being accounted for by sustainable agriculture. The value of the Adjusted and R squared are very close and this shows that the model summary which accounted for amount of variation is normal and expected.

Table 7: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8651.596	1	8651.596	492.512	.000[b]
	Residual	5006.390	285	17.566		
	Total	13657.986	286			

a. Dependent Variable: SA
b. Predictors: (Constant), GB

Table 7 shows the results of analysis of variance, which is a statistical test used to determine the significance of the model. The F statistics of 492.512 showed that the model explains a lot of the variation in the data while the p-value of .000 means that the model is extremely unlike to be due to chance. The two values showed that the model is highly significant and reliable. Therefore, this implies that the null hypothesis of no significant relationship will be rejected and the alternative hypothesis will be accepted at 5% confidence level.

Table 8: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.495	.657		8.368	.000
	GB	.744	.034	.796	22.193	.000

a. Dependent Variable: SA

Table 8 above showed the unstandardized B value, which tells how much the dependent variable will change when the independent variable changes by one (1) unit. So in this case, if green bond increases by one (1) unit, the dependent variable (sustainable agriculture) will increase by .744 units.

V. Discussion

The survey (questionnaire) was completed by 100 participants, including 45 farmers and 55 decision-makers in banks as well as agri-businesses. The majority of the participants were male (75%) and between the ages of 25 and 44 (55%). In terms of education level, 60% of the participants had a bachelor's degree or higher. The majority of the participants (75%) were determined to be living in urban areas. The survey (questionnaire) items revealed several key findings and those findings were used for recommendations concerning all stakeholders (public and private) including the government and other potentials.

Five themes were made from the above interview and they were summarized as government influence and farmers awareness. The problems and potential solutions were identified from the analysis, some general conclusions were drawn about the relationship among individuals as well as green finance and sustainable agriculture. The study concludes that there is a need for greater communication and cooperation between governments, farmers and other stakeholders to tackle issues of farmers being not aware of the green bonds, nor having access or using the green bonds effectively.

Green bonds have the potential to significantly increase the amount of funding available for sustainable agriculture, according to the findings of study. This is due to the fact that green bonds offer a fresh avenue for funding sustainable agriculture initiatives, perhaps assisting in removing some of the obstacles that have hindered the utilization of more conventional funding sources for these projects. According to the data analysis, green bonds can improve environmental quality by encouraging more sustainable agricultural methods and by lowering the use of dangerous chemicals like fertilizers and pesticides. These methods can lessen soil erosion and enhance soil health, which might then lead to a reduction in greenhouse gas emissions and an improvement in water quality.

VI. Conclusion and Recommendations

According to the study's findings, green bonds can boost agricultural output by facilitating farmer investments in cutting-edge equipment like better irrigation systems and by financing the advancement of novel farming methods through research and development. Hence, the findings also focused on the unstandardized B value, which tells how much the dependent variable will change when the independent variable changes by one (1) unit. The study concluded that, as green bond increases by 1 (one unit), sustainable will increase by .744, which means that there is a statistical significance between the dependent variable and the independent variable. Thus, more exports and more jobs are just a few advantages that come with greater agricultural output. Therefore, the study recommended the following measures:

- Fortifying the laws and rules governing green bonds
- Developing and promote programs targeting sustainable agriculture in Nigeria
- Raising knowledge of green bonds among farmers and other stakeholders by means of farmer-focused educational programs and materials
- Enhancing the availability of funding and infrastructure for green bond initiatives via governmental or multilateral organizations, which may offer grants or low-interest loans to any eligible projects
- Developing targeted programs to promote sustainable agriculture in Nigeria

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