
The Effect of Green Finance on Agricultural Sustainability Performance in the Ashanti Region of Ghana

Daniel Ofori¹
¹LIGS University
HAWAII, USA

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Abstract

The aim was to examine the effect of green finance on agricultural sustainability performance in Ghana. The specific objectives the study sought to achieve include examining the effect of green finance on agricultural sustainability performance in the Ashanti Region of Ghana. A sample of four hundred (400) randomly chosen rural farmers was the subject of a cross-sectional quantitative study design. A systematic, closed-ended, five-point Likert scale was used in the questionnaire. Regression analysis was used to interpret the data. The results of the study showed that there is an adverse and no significant relationship between agricultural sustainability performance and green funding. Also, the study indicated that the rural farmers in Ghana are relatively weak and lack technical green support, which weakened their role in accessing green finance and adversely affected Ghana's agricultural sustainability performance. The rural farmers in Ghana are associated with high risks which are highly widespread, adversely affecting the green credit support for rural farmers' agricultural business and adversely affecting agricultural sustainability performance. According to the study, the Ghanaian government should focus heavily on policies that support green agriculture, boost funding for scientific and technological innovation, keep creating and introducing new green agricultural products and technologies, and work to make green agriculture more sustainable and competitive.

Keywords: agricultural, Ghana, green credit, green bond, green finance, green insurance, sustainability performance.

1. Introduction

Green financing is currently being promoted by stakeholders worldwide, including international organizations like the World Bank and the United Nations, thanks to the 2015 Paris Agreement and the UN's adoption of the Sustainable Development Goals. This indicates that the global consensus now includes green financing (Zhu & Zhang, 2023). Green financing has gained international recognition as a means of combating climate change and preserving biodiversity. The volume of global green finance has risen to \$540.6 billion, demonstrating that green finance has taken center stage on a worldwide scale (Mijs, 2017). Green finance refers to financial products and services that are designed to promote environmentally sustainable economic growth (UNEP FI 2021). The advancement of green finance is indispensable in attaining sustainable

development goals and addressing pressing environmental challenges (Zhang et al., 2022). This review critically examines the existing literature on the nexus between green finance and agricultural sustainability performance. The agricultural business in Ghana has become a significant part of the global food security system since the Ghanaian community is noted for its agricultural production of cocoa, timber, yam, millet, sorghum, and rice. It is therefore imperative for Ghana to promote a transformation in the agricultural economy without relying on green finance to reach a large quantity and high quality (Du & Lingxiao, 2023).

Green finance is thought to be crucial in advancing and directing green growth in Ghanaian rural agriculture within the framework of the country's agricultural environment. Financial institutions are now able to offer a variety of financial services, including green bonds, green funds, and credits, thanks to this important initiative. Utilizing this green money has the potential to support sustainable, eco-friendly, and green financial demands (Chen, 2021). Additionally, green finance has a significant ripple effect and supports the green growth of agribusiness (Xiao & Hu, 2023).

Previous research has examined the connection between agricultural sustainability performance and green financing, demonstrating that the topic merits a great deal of attention from those committed to building a more sustainable future (Zhou, Tang, & Zhang, 2020). Scholars have discerned that entities that employed green finances performed better regarding sustainability than those that did not (Fashli, Herdis, & Retty, 2019; Ringel & Mjekic 2023; Zhou, Tang, & Zhang, 2020). Another study discovered that green bond issuers typically outperform non-green bond issuers in terms of environmental performance (Liu et al., 2019). A study from Chinese listed economics identified that green finance can greatly enhance agricultural environmental performance (Xia, Yujia & Xu, 2023). The relationship between green finance and agricultural sustainability performance is significant, with research showing that agricultural business people who employ green finance techniques often perform better in terms of agricultural sustainability, therefore the ability to consider these factors when developing their sustainability strategies (Zheng & Siddik, 2021). Although academics and the literature have long addressed sustainability agricultural performance and green finance (Maroufkhani et al., 2019; Tan, Yan, & Dong, 2022), there is still a gap in the empirical literature that needs to be filled because of the conflicting findings on the topic. Green finance and agricultural sustainability performance are substantially correlated, according to studies by Ruiz, Arboleda, and Botero (2016); Cai et al. (2021); Li and Chen, 2020; and Ning and She (2019). On the topic, Ning and She (2019) disagreed in their opinions and findings. Ngo et al. (2021) and Zhao and Dang (2023) concluded that there is a negative relationship between agricultural sustainability performance and green finance.

This empirical gap needs to be filled. This paper attempts to fill this gap and contributes to the existing body of knowledge by using powerful instruments like regression, to examine the link between green finance and agricultural sustainability performance in a sample of rural farmers in Ghana. To fill the research gaps, the study hypothesized that

H1: There is a positive significant relationship between green finance and agricultural sustainability performance.

The conclusion of the study may offer exclusive insight into the study's contribution to the theoretical and practical implications of the study. In terms of theory and research, the study will make a contribution by examining the practice path and development legislation of agricultural socialized services during the exploratory phase of green finance promotion, as well as by enhancing and upgrading the theoretical system of agri-business services. With Ghana's features, tend to create a philosophy of agricultural modernization and sustainable performance. Based on this, the study aims to add to the already prevailing body of knowledge by filling the gap in empirical literature relating to the subject matter.

In actuality, the findings will offer managerial and useful perspectives on how green finance affects Ghana's agricultural sustainability performance. With the sole goal of attaining sustainable agricultural development in Ghana, the results will take into account agricultural services to support the modernization of green agriculture, increase farmers' income and agricultural production efficiency, and boost competitiveness.

1.2 Statement of the Problem

Despite the interest in green finance and its effect on agricultural sustainability performance, there are limited prior studies on the rural farmers context specifically. Most of the prior research has focused on other sectors such as the manufacturing industry (Lee et al., 2022), renewable energy (Keeley, 2017), and financial service and oil and gas (Babajide et al., 2023; Amato, Veijonaho, & Toppinen, 2020). The unique features of the rural agric distribution firm sector have been overlooked in terms of empirical studies in which the concentration of the prior studies have focused on sectorial areas other than rural agric distribution. This has created an empirical gap that warrants further investigation (Gilchrist, Yu, & Zhong, 2021). Based on this, this study examines the effect of green finance on agricultural sustainability performance in the Ashanti region of Ghana.

1.3 Relevant Literature

1.3.1 Resource-based view by Jay B. Barney (1991)

The resource-based theory is an assumption that shows that firms tend to gain the upper hand or competitive edge over their competitors by way of unique resources or capabilities which is not easy for competitors to imitate (Ketokivi, 2016). This implies that firms need to ensure that they possess some distinctive resources that are challenging for others to imitate which tends to allow such firms to gain a competitive edge (Walker et al. 2015). In line with the study, the rural banks in the country have identified that green finance is the new mantra in which possession of such resources in the given community tends to give them a competitive advantage (Walker et al. 2015).

This shows that the rural farmer's adoption and implementation of green financing including; green bonds, green credit and green insurance helped ensure sustainable practices. The implication is that rural farmers have created resources that are difficult to imitate which gives them an edge over their competitors. Literature has argued that in line with the RBV theory which shows that people can achieve a competitive advantage by way of adopting green finance. Thus, the use of green finance is considered a unique resource that fits into the ideologies of RBV. Based on this, the ability to adapt and infuse the practices of green finance in their agricultural practices tends to enable rural farmers to achieve sustainable practices and performance. Therefore, the essence of the theory to the study is that farmers can enhance sustainability performance to gain an edge over their competitors by ensuring that there are unique resources used in dealing with such a situation which is known as green finance.

1.3.2 Empirical Review

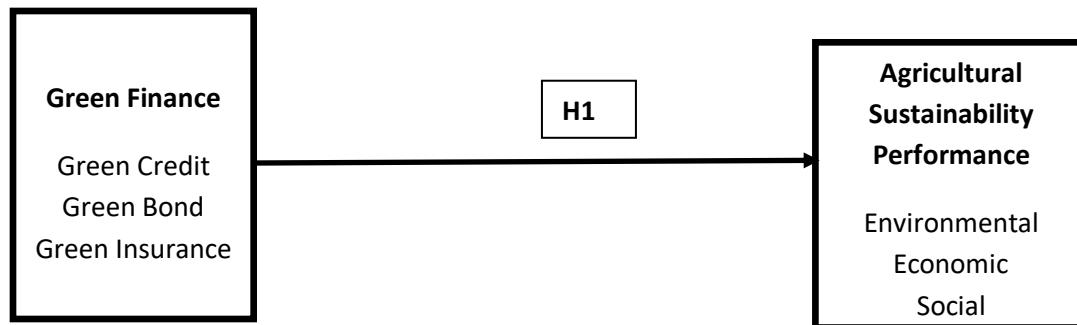
Meng, Wei, and Zhang (2019) looked into how green finance affected the sustainability of businesses. The study uses quantitative research in accordance with the goal. The study was conducted using a cross-sectional methodology. The study made certain that the sample was used to represent the findings. In light of this, the chosen participants were sampled using basic random sampling. A questionnaire was used as the instrument for data collection in this study. Regression analysis was used to examine the collected data. The findings showed a direct correlation between sustainability performance and green funding. This shows that the use of green finance contributed to better economic and environmental outcomes. Chang and Chen (2020) also looked at China's sustainability performance in relation to the degree of agricultural green development. The study uses quantitative research in accordance with the goal. The findings showed a direct correlation between agricultural sustainability performance and green funding. This shows that the use of green finance contributed to better economic and environmental outcomes. Furthermore, Zhang and Kui (2021) investigated the relationship between agricultural sustainability performance and green finance and discovered a direct association between the two.

The impact of green finance on agricultural sustainability was investigated by Xie and Shihua (2023). The investigation was conducted using quantitative research. The findings showed a direct correlation between agricultural sustainability performance and green funding. The relationship between sustainable performance and green financing was investigated by Shi and Shi (2022). The study uses quantitative research because of the nature of the goal. The findings showed a direct relationship between green finance and the sustainability of agribusiness. A study by Gao, Zhang, and Song (2019) used China to examine how green money affects environmental performance. The study uses quantitative research because of the nature of the goal. The outcome showed that green finance and businesses' environmental performance are directly related. This suggests that the use of green finance contributed to the promotion of more efficient sustainable practices, which in turn enhanced environmental performance.

1.4 Conceptual Framework and Hypotheses Development

This section of the study presents the conceptual framework in line with the theme of the study. Based on the conceptual framework as shown in Figure 1, green finance is represented as independent variable which is measured using bredd credit, green bonds and green insurance while the dependent variable depicts agricultural sustainability performance.

Figure 1: Conceptual Framework



Source: Researcher Own Construct, 2024

Effect of Green Finance on Agricultural Sustainability Performance

Previous research has demonstrated that green finance improves agricultural sustainability performance, which is consistent with the body of existing literature (Shi & Shi, 2022). According to research by Xie and Shihua (2023), green finance can successfully improve agricultural sustainability performance through a variety of green financial methods for a sensible allocation of resources. Through efficient green supervision and management responsibilities, farmers' application and utilization of green finance contributes to the advancement of agricultural green (Zhang & Zhang, 2022). To ensure that farmers invest in green production and assure agricultural sustainability and productivity of green finance, farmers' access to green finance must be focused on usage for agricultural green production and related context. Meng et al. (2019) provided evidence to support the claim in their research on sustainability performance and green finance. According to the studies, sustainability performance and green finance were directly correlated. In conclusion, the following hypothesis is based on the research study and discussion above:

H1: Green finance has a significant direct effect on agricultural sustainability performance.

2. Method

This part of the chapter presents the methodology and procedures adopted to conduct the study concerning the effect of green finance on agricultural sustainability performance.

2.1 Research Approach

In relation to the study's hypothesis, a quantitative research approach was used. The aforementioned strategy is justified by the fact that it contributes to the production of outcomes that are easily represented by statistics and figures. Additionally, it offers a means of expressing numerical data using hypothesis analysis. Once more, employing a questionnaire to collect a sizable data set from study participants is beneficial.

2.2 Participant Characteristics

The study participants were comprised of rural farmers in the Ashanti Reion of Ghana. This consists of 436,000 rural registered farmers in the Ashanti Rgion of Ghana (Ghana Statistical Service, 2024). The inclusion criteria involve rural farmers that strategically placed financial institutions whose proximity to clients that are into eco-green projects.

2.3 Sampling Procedures

The study's sample of rural farmers was chosen using simple random sampling. Every study participant has an equal probability of being represented because the entire sample that was collected satisfies the inclusion criteria. The study made sure that the rural banks that were sampled were efficiently separated into equal intervals. Accordingly, the study made certain that, during the selection procedure, each rural farmer was given a random number. In light of this, the study made sure that all accessible rural farmers who agreed to participate in the sampling procedure were identified until the required sample size was reached. The fact that at least rural farmers were participating in funding green agricultural initiatives nationwide served as justification for the sample selection. Because every element in the population has an equal probability of being represented, simple random sampling is justified as a method that guarantees the absence of biases in the selection processes

2.3.1 Sample Size, Power, and Precision

To represent the study's overall sample size, 400 randomly selected rural farmers were selected. Yamane formulas were used in the study to determine the sample size. Therefore, the population, which is mostly represented by N=436,000, and a margin of error of "e" =0.05 were used to arrive at the conclusion.

$$n = \frac{N}{(1+N(e)^2)}$$

$$n = \frac{436,000}{1+436,000(0.05)^2}$$

$$n = 400$$

2.3.2 Measures and Covariates

The study's instrument for gathering data was a questionnaire. The component of the aforementioned data instrument was chosen because it allows for the use of a large number of participants at a specific moment in time. As a result, the questions were created with the study's particular goals in mind. Closed-ended questions using a Likert scale were used for the survey. The questions are on a scale from 1 to 5.

Table 1: Variables Description and Measurement

Abbreviation	Variable	Measurement	Expected sign
SP	Agricultural Sustainability Performance (Dependent Variable)	This is measured by using environmental, economic and social sustainability measures.	
GF	Green Finance (Independent Variable)	This is measured using green credit, green bond and green insurance	+/-

Source: Filed Survey (2024)

The reliability and validity of the study were performed in line with the subject under discussion. The justification for conducting the said test is that it helps to provide consistency among the questions. The study ensured that tests involved Cronbach Alpha, factor loadings, composite reliability as well as content validity.

2.3.3 Research Design

Given the nature of the study's goal, a cross-sectional research design was used. The justification for this is that it facilitates data collection at a certain moment in time. Additionally, it makes it possible to gather data from a sizable study participant pool. Descriptive and explanatory research were also used in the study. While the explanatory study enables the study to quantify the cause and effect of the variables under discussion, the descriptive approach is justified as it helps assure an accurate and efficient description of the variables in the study.

2.3.4 Experimental Manipulations or Interventions

A model based on earlier research by (Zhu & Zhang, 2023; Han & Yang, 2023) was used to determine the impact of green finance on agricultural sustainability performance. The following model is estimated by the study.

$$ASP = \lambda_0 + \lambda_1 GC_i + \lambda_2 GB + \lambda_3 GI + e_i \quad (1)$$

Where:

ASP= Agricultural Sustainability Performance

GC = Green Credit

GB = Green Bond

GI = Green Insurance

$\lambda_0 = \text{constant of the model}$

$\lambda_1 + \lambda_2 + \lambda_3 = \text{coefficient of the model}$

$\varepsilon_t = \text{stochastic error term.}$

3. Results

This chapter presents the results of the study. The presentation of the results was in line with the theme of the study concerning the effect of green finance on agricultural sustainability performance.

3.1 Validity and Reliability

Table 2: Validity and Reliability Test

Construct	Items	Loading	AVE	CR	CA
	GC1	.881	.675	.902	.886
	GC2	.874			
	GC3	.785			
	GB1	.861			
	GB2	.790			
	GB3	.849			
	GI1	.776			
	GI2	.818			
	GI3	.766			
	ES1	.793	.698	.927	.913
	ES2	.749			
	ES3	.846			
	ES1	.832			
	ES2	.815			
	ES3	.768			
	SS1	.791			
	SS2	.848			
	SS3	.756			

Source: Field Data (2024)

Results pertaining to validity and reliability are displayed in Table 2. This means that the standard factor loadings should be higher than 0.50, which is the threshold suggestion, according to Hair et al. (2019). Accordingly, the results in Table 2 below showed that all of the loadings were above 0.50, falling inside the recommended threshold. Additionally, the results demonstrated the study structures' internal consistency using composite reliability and Cronbach's alpha. Therefore, the criterion for Cronbach's alpha and composite reliability, as proposed by Hair et al. (2019), is 0.7. Accordingly, the findings showed that the alpha rate for each of the research constructs was higher than 0.7. Since all of the standardized coefficients

were equal to or larger than 0.6, the study's measurement of the coefficient using the average variance extracted (AVE) was safe.

3.2 Discriminant Validity

It gauges how empirically different an indicator and its latent variables are from other indicators (Gaskin, 2016). Discriminant validity confirms each construct's unique identification and guarantees its distinctiveness. It is determined when a construct's square root of AVE exceeds its correlation with every other construct (Fornell and Larcker, 1981).

Table 3: Discriminant Validity

	Green Finance	Agricultural Sustainability Performance
Green Finance	0.835	
Agricultural Sustainability Performance	0.507	0.863

Source: Field Data (2024)

Note: Bold and Italics represent the square of AVE

Regression Analysis Concerning the Effect of Green Finance on Agricultural Sustainability Performance

Table 4: Regression Analysis

Construct	Agricultural Sustainability Performance
	Model 1
Main Effect	Beta (t-value)
Green Credit (GC)	-0.235(-1.867)
Green Bonds (GB)	-0.095(-1.540)
Green Insurance (GI)	-0.127(-1.775)
Model indices	
R	.502
R square	.413
Adjusted R Square	.396
ΔF	12.035
Sig.	.0761

Source: Field Data (2024)

*P < 0.05

As indicated in Table 4, the study examined how agricultural sustainability performance was impacted by green finance, or green credit. Regression study indicates that there is no significant indirect impact of green credit on agricultural sustainability performance ($\beta = -.235$, $t = -1.867$, $p > 0.05$). This suggests that the sustainability performance of rural agriculture is negatively correlated with the green finance of farmers in rural areas. Consequently, agricultural sustainability performance will decline in tandem with an increase in the green credit index. Furthermore, the performance of agricultural sustainability has changed by 23.5% in relation to green credit. Thus, the idea that green financing and agricultural sustainability performance are significantly positively correlated is disproved. The outcome contradicts Xie's (2024) assertion that agricultural sustainability is directly impacted by green finance.

As indicated in Table 4, the study examined how agricultural sustainability performance was impacted by green finance, or green bonds. Regression study indicates that there is no significant indirect impact of green bonds on agricultural sustainability performance ($\beta = -.095$, $t = -1.540$, $p > 0.05$). This suggests that the performance of rural agricultural sustainability is negatively correlated with the green bond of farmers in rural areas. Consequently, agricultural sustainability performance will decline in tandem with an increase in the green bond index. Additionally, the relative change in agricultural sustainability performance is 9.5% for green bonds. Thus, the idea that green financing and agricultural sustainability performance are significantly positively correlated is disproved. The outcome contradicts the assertion made by Zhao et al. (2024) that green money has a direct impact on agricultural sustainability.

As seen in Table 4, the study examined how agricultural sustainability performance was impacted by green finance, or green insurance. According to the regression study, there is no discernible indirect impact of green insurance on agricultural sustainability performance ($\beta = -.127$, $t = -1.775$, $p > 0.05$). This suggests that the performance of rural agricultural sustainability is negatively correlated with the green insurance of farmers in rural areas. Consequently, agricultural sustainability performance will decline in tandem with an increase in the green insurance index. Additionally, the relative change in agricultural sustainability performance for green bonds is 12.7%. Thus, the idea that green financing and agricultural sustainability performance are significantly positively correlated is disproved. The outcome contradicts the assertion made by Zhao et al. (2024) that green money has a direct impact on agricultural sustainability.

4. Discussion

The study revealed that the hypothesis is rejected which states that green finance has a direct significant effect on agricultural sustainability performance in Ghana. The result is consistent with the work by Gu and Hao (2024), which indicated that green finance impact directly on sustainability (Tong, 2024). The result implies that there are a lot of financial resources available to support the development of local rural agricultural businesses in Ghana. However, the rural farmers in Ghana are relatively weak and lack technical green support which made their role of accessing green finance weakened and hence adversely affected the agricultural sustainability performance in Ghana. The result contradicts the studies by Cui and Peng (2023) believed that

green finance promotes the improvement of green productivity. Also, the study revealed that financial institutions in Ghana are not strong in the provision of green credits to rural farmers based on their green development concepts and ideologies which are specialized in financing green agricultural businesses. The implication is that rural farmers in Ghana are associated with high risk which is highly widespread, hence adversely affecting the green credit support for rural farmers' agricultural business which adversely affects agricultural sustainability performance. The result conforms to the study by Ma et al., (2024) which indicates that green finance indirectly impacts agricultural sustainability performance.

Green finance provided to agricultural farmers as compared with traditional finance support, is more focused on green, low-carbon which contributes to environmental and economic sustainability. The study believed that the availability of funds needed for green agricultural development and businesses for the rural farmers can improve the financing efficiency and environmental protection which tends to promote the green transformation of traditional agricultural products in Ghana, realized improved agricultural sustainability performance. The study revealed that there is a huge difference that exists between urban farmers and rural farmers in Ghana. This is attributed to their regional agricultural production and the risk associated with them. This has proven to show the current support for green finance for agricultural production which is provided by financial institutions, insurance and securities exchange companies for rural farmers green agricultural is low which adversely affects agricultural sustainability performance. In comparison with other sectors in Ghana such as the manufacturing and service industry, oil and gas as well as energy service in Ghana, green credits, bonds and insurance for rural agricultural development are less. This has restricted the development of green rural agricultural sustainability performance and its general contribution towards economic growth.

The study came to the conclusion that local governments, financial institutions, and agricultural enterprises, as well as information asymmetry and other issues, still presented difficulties for Ghana's rural farmers' agricultural businesses using green finance in the form of green credit, bonds, and insurance. As a result, the nation must cooperate in order to improve collaboration, advance the creation and use of green finance, and attain sustainable green agricultural practices among Ghana's rural farmers. Accordingly, earlier research by Cheng et al. (2021) and Zhang et al. (2021) showed that achieving economic and environmental goals through the execution of core business operations, which include green finance practices, leads to sustainability performance.

4.1 Recommendations

The Ghanaian government should seek a comprehensive understanding of the importance of education as well as scientific and technological innovation, according to the research, in order to promote green agriculture. The government of Ghana should put a lot of effort into policies that promote green agriculture, increase funding for scientific and technological innovation, continue developing and launching new green agricultural technology and products, and endeavor to make green agriculture more competitive and sustainable.

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