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Impact Of The German Agency For International Cooperation And Intervention Programs On Sustainable Agribusiness Development In Nigeria

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Abstract

General Background: Sustainable agribusiness development has become a major priority for improving food security, productivity, competitiveness, climateresilience, and rural economic growth. **Specific Background:** In Nigeria, the German Agency for International Cooperation (GIZ) has implemented intervention programmes focusing on capacity-building, value-chain training, agricultural innovation, and market-linkage support to address persistent agribusiness challenges. **Knowledge Gap:** Despite thescale of theseinterventions, limited empirical evidence exists regarding their direct contribution to sustainable agribusiness development in Nigeria. **Aims:** This study evaluated the contribution of GIZ intervention programmes to sustainable agribusiness development, with particular emphasis on capacity-building, value-chain training, agricultural innovation, and market-linkage support. **Results:** Using survey and documentary research designs, data were collected from agribusiness stakeholders, farmers, cooperative leaders, and extension officers. Findings revealed that capacity-building and value-chain training significantly improved sustainable agribusiness productivity (p=0.000), while agricultural innovation and market-linkage support significantly increased agribusiness competitiveness (p=0.000). The regression model explained 61.0% of the variation in sustainable agribusiness development. **Novelty:** The study provides direct empirical evidence linking GIZ-specific intervention programmes with sustainable agribusiness outcomes in Nigeria. **Implications:** The findings support the expansion of capacity-building initiatives, innovation support, market-linkage mechanisms, and climate-smart agricultural interventions as strategies for promoting sustainable agribusiness development and agricultural transformation in Nigeria.

Keywords: Agribusiness Development, Capacity Building, Agricultural Innovation, Market Linkage Support, Sustainable Agriculture

Key Findings Highlights

Capacity-building activities strengthened productivity among agribusiness beneficiaries.

Innovation-oriented interventions supported stronger competitive performance.

Development cooperation initiatives contributed to long-term agricultural transformation.

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Introduction

Globally, sustainable agribusiness development has become a major policy concern because agriculture remains central to food security, employment creation, poverty reduction, climate resilience, and rural industrialisation [1]. In recent times, development partners have increasingly shifted from traditional aid delivery to integrated intervention programmes that combine technical assistance, innovation transfer, value-chain strengthening, market linkages, digital agriculture, climate-smart practices, and entrepreneurship development [2]. Regionally, Sub-Saharan Africa continues to experience weak agricultural productivity, post-harvest losses, limited access to finance, poor extension systems, climate shocks, and low value addition, making international development cooperation important for agribusiness transformation [3]. Nationally, Nigeria's agribusiness sector remains strategic to economic diversification, yet it is constrained by low mechanisation, poor rural infrastructure, insecurity, inadequate access to improved inputs, weak market systems, and limited adoption of climate-smart technologies [4].

In Nigeria, the German Agency for International Cooperation, commonly known as GIZ, has supported agricultural transformation through programmes such as the Green Innovation Centres for the Agriculture and Food Sector, Pro-Poor Growth and Promotion of Employment in Nigeria, Skills Development for Youth Employment, Sustainable Agricultural Systems and Policies, and Transformative Agricultural Systems for Rural Economic Development [5]. These interventions have focused on farmer training, value-chain development, youth employment, agribusiness enterprise strengthening, climate-smart agriculture, innovation transfer, and market systems development [6]. However, it has not been sufficiently proven whether GIZ intervention programmes have significantly improved sustainable agribusiness development in Nigeria. Despite the scope of these interventions, concerns have been raised regarding persistent low productivity, weak market access, fragmented agribusiness financing, poor post-harvest management, and limited sustainability of donor-supported agricultural projects [7].

Studies have shown that agricultural intervention programmes can enhance productivity, income, innovation adoption, and agribusiness competitiveness [8], [9]. Other studies also indicate that climate-smart agriculture, value-chain support, access to finance, and technology adoption improve agricultural sustainability and rural economic development [10], [11]. However, the available literature rarely connects GIZ-specific intervention programmes directly with sustainable agribusiness development outcomes in Nigeria. This lack of direct empirical grounding weakens the explanatory power of the literature on development cooperation and agribusiness sustainability. It is on this basis that this study examines the impact of the German Agency for International Cooperation and intervention programmes on sustainable agribusiness development in Nigeria.

Statement of the Problem: This study examines the impact of the German Agency for International Cooperation and intervention programmes on sustainable agribusiness development in Nigeria. It was necessitated by persistent challenges in Nigeria's agribusiness sector, such as low productivity among smallholder farmers, inadequate access to modern agricultural innovations, weak value-chain coordination, poor market access, limited agro-processing capacity, climate vulnerability, and insufficient agribusiness financing. Although agriculture remains one of Nigeria's most important sectors, many farmers and agribusiness enterprises still operate at subsistence or semi-commercial levels, thereby limiting the sector's contribution to inclusive growth and sustainable development [4].

The study was conducted to ascertain the extent to which GIZ-supported capacity-building programmes and agricultural innovation support have improved sustainable agribusiness development in Nigeria. In an effort to address agribusiness-related challenges, GIZ introduced intervention strategies such as farmer training, value-chain upgrading, business development services, climate-smart agricultural practices, digital agricultural innovation, youth skills development, market linkages, and enterprise support [5], [6]. These strategies were introduced to address key determinants of sustainable agribusiness development, including productivity improvement, income growth, market competitiveness, enterprise resilience, environmental sustainability, and employment creation [8].

Recent evidence from GIZ agricultural programmes in Nigeria shows that intervention initiatives have targeted smallholder farmers, micro, small and medium enterprises, and agricultural value chains such as rice, cassava, potato, maize, cocoa, tomato, and dairy [5], [6]. Nevertheless, empirical evidence regarding the specific effect of GIZ intervention programmes on sustainable agribusiness development remains limited. The body of empirical literature on agricultural interventions and sustainable agribusiness development reveals positive outcomes, but many studies focus on general government policies, climate-smart agriculture, agricultural finance, or technology adoption without directly examining GIZ-supported programmes in Nigeria [9], [10], [11]. The statement of the problem therefore is to ascertain the extent to which GIZ intervention programmes have impacted sustainable agribusiness development in Nigeria.

2.0 Literature Review

GIZ Intervention Programmes: GIZ intervention programmes are defined as development cooperation initiatives implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit on behalf of the German Government and other partners to support sustainable development in partner countries [1]. Intervention programmes are described as coordinated sets of technical, institutional, financial, advisory, and capacity-building activities designed to address specific development problems [2]. Agricultural intervention programmes are the planned actions undertaken to improve agricultural productivity, farmer income, value-chain efficiency, food security, and rural livelihoods [3]. Development cooperation is a process whereby international partners support national institutions, private actors, and communities to achieve inclusive and sustainable development outcomes [1].

In Nigeria, GIZ intervention programmes are referred to as structured support mechanisms aimed at strengthening sustainable economic development, employment, agriculture, renewable energy, peace, migration, and governance [5]. The agricultural component includes training, innovation transfer, climate-smart practices, entrepreneurship support, digital advisory systems, and market-linkage facilitation [6]. From the summary of the above definitions, this study defines GIZ intervention programmes as coordinated development cooperation activities implemented to strengthen agricultural productivity, value-chain efficiency, innovation adoption, enterprise capacity, and market competitiveness among agribusiness actors in Nigeria.

Sustainable Agribusiness Development: Sustainable Agribusiness Development Is Defined As The Process Of Improving Agricultural Production, Processing, Marketing, And Enterprise Performance In Ways That Are Economically Viable, Socially Inclusive, And Environmentally Responsible [7]. It Is Described As The Transformation Of Agricultural Value Chains Through Innovation, Productivity Improvement, Market Access, Financial Inclusion, Climate Resilience, And Equitable Participation Of Farmers And Agribusiness Enterprises [8]. Agribusiness Development Is The Integration Of Farming, Input Supply, Processing, Logistics, Marketing, Finance, And Distribution Into Profitable And Competitive Agricultural Enterprises [9]. Sustainable Agriculture Is A Process Whereby Farming Systems Are Managed To Meet Present Food And Income Needs Without Compromising The Productive Capacity Of Future Generations [10].

Sustainable agribusiness is referred to as an enterprise-oriented agricultural system that promotes profitability, decent employment, food security, environmental protection, and resilience to climate shocks [11]. From the summary of the above definitions, this study defines sustainable agribusiness development as the process of strengthening agricultural enterprises, productivity, value addition, market competitiveness, resilience, and environmental sustainability through inclusive and innovation-driven agricultural systems.

Theoretical Framework: Theory of Change was adopted as the theoretical framework. The theory was popularised in development evaluation by Weiss, who argued that programmes should be assessed by linking activities, outputs, outcomes, assumptions, and long-term impacts [12]. The basic idea of the theory is that development interventions produce desired outcomes when programme inputs and activities are logically connected to expected changes in beneficiaries and institutions [12]. The theory believes that social and economic transformation does not occur automatically; rather, it occurs when interventions are properly designed, implemented, monitored, and adapted to local realities [13].

The basic assumptions of the theory are that if farmers and agribusiness enterprises receive training, improved technologies, business support, and market linkages, then they are likely to improve productivity, income, competitiveness, and resilience. Although the theory has been criticised for

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being linear, assumption-heavy, and sometimes weak in capturing complex political and institutional realities, it remains useful in evaluating donor-supported programmes [13]. This theory is relevant to the study because GIZ intervention programmes are expected to generate sustainable agribusiness outcomes through capacity-building, innovation support, market linkage, and value-chain development.

Ikuemonisan, Mafimisebi, Ajibefun, and Adenegan (2020) examined constraints, strategies and prospects of sustainable development of agribusiness entrepreneurship in Nigeria. The target or study population was agribusiness actors (farmers, processors and policy actors) in Nigeria. We collected data through interviews and focus group discussions from various stakeholders including government agencies and project consultants as well as a review of documentary sources. Data was analysed using a thematic analysis. A 2012 study revealed that capacity-building and value-chain support are key to sustaining agribusiness development in Nigeria. The research showed that Nigerian agribusiness is significantly constrained by poor infrastructure, weak finance, low technology adoption, lack of skills and policy inconsistency. The researchers called for strengthening agribusiness financing and skills, enforcing food safety, policy consistency and market transparency. Empirical Literatures: A study conducted by Ikuemonisan, Mafimisebi, Ajibefun, and Adenegan [14] examined challenges and strategies in Nigerian agribusiness entrepreneurship for sustainable development.

Ayejuyo et. al (2020) examined climate smart agricultural practices as a catalyst to achieve food security in Lagos State Nigeria. The study adopted survey research design, the population of the study consists of farmers and agricultural stakeholders in Lagos State. A combination of surveys and direct interviews was employed to collect the needed information. The main findings show that CSA practices improved food security outcomes. The GIZ agricultural innovation support includes climate-smart agricultural practices. The study urged that government support be provided for wider farmer training, extension services and climate-smart technology. Another study by Izuogu (2022) surveyed climate-smart agriculture practices among smallholder farmers in Nigeria. The study employed an empirical review design and utilized data from peer-reviewed journal articles and policy documents. Materials and methods In this paper conduct a systematic and rigorous analysis of the current literature on climate-smart agricultural practices among smallholder farmers in Nigeria. The study recommended support for climate-smart innovations and investment in extension systems and farmer training. It is relevant to the present research as it illustrates the potential of innovation support (e.g. the present study adopted a systematic review design, with a population comprising 50 peer-reviewed studies on climate-smart agriculture adoption from EBSCOhost, Scopus and Web of Science databases, which were analysed using systematic evidence synthesis. The study assessed the adoption and impact of climate-smart agriculture among smallholder maize farmers in Sub-Saharan Africa. Our results demonstrate that climate-smart agriculture interventions lead to improved productivity, income, adaptation and environmental outcomes, especially when coupled with finance, institutional support, extension and training. The evidence suggests that integrated policy support, inclusive agricultural innovation systems and farmer education are necessary. Insofar as innovation is the only way forward for agriculture, it is only part of the equation.

Mnukwa et al. (2023) shows that this innovation must go hand-in-hand with capacity-building and the presence of functioning market systems. Similar study by Mnukwa, Mutambara, and Chagwiza [17] assessed the adoption and impact of climate-smart agriculture among smallholder maize farmers in Sub-Saharan Africa. Similar study by Mnukwa, Mutambara, and Chagwiza [17] assessed the adoption and impact of climate-smart agriculture among smallholder maize farmers in Sub-Saharan Africa.

In a similar study, Shaibu [18] examined the influence of infrastructure on sustainable food production in Nigeria. The study adopted econometric research design and the population of the study consisted of Nigeria's agricultural sector data from 1960 to 2020. Data were obtained from the World Development Indicators and FAOSTAT and analyzed using time-series econometric techniques. The results showed that government expenditure on infrastructure is an important factor in explaining food production in Nigeria. The study also recommended improvements in rural infrastructure — roads, irrigation, storage facilities and energy access. Like the current study, it suggests that sustainable agribusiness development depends on more than training, requiring broader enabling market and infrastructure systems. Abolade, Lawal, Akanbi and Salami examined access to finance and sustainable agribusiness performance among smallholder farmers in Ogun State, Nigeria. The study adopted quantitative survey design.

In this study, a questionnaire was used to collect data. The study population was 37,200 agricultural smallholder farmers from which the sample size of 380 respondents was drawn using probability and simple random sampling techniques. Partial least squares structural equation modeling was used to analyze the data. Results showed that access to finance — formal or informal — was positively related to both food security and sustainable agribusiness performance, with good explanatory power. The study highlights the need for improved financial inclusion and the development of farmer-friendly financing policies and supportive agricultural credit institutions. GIZ decided to fund the study because for its work to enhance agribusiness competitiveness through market-linkage and enterprise support, access to finance must also be linked to its efforts. A study conducted by Abolade, Lawal, Akanbi, and Salami [19] examined access to finance and sustainable agribusiness performance among smallholder farmers in Ogun State, Nigeria. A study conducted by Abolade, Lawal, Akanbi, and Salami [19] examined access to finance and sustainable agribusiness performance among smallholder farmers in Ogun State, Nigeria. A study conducted by Abolade, Lawal, Akanbi, and Salami [19] examined access to finance and sustainable agribusiness performance among smallholder farmers in Ogun State, Nigeria.

Another study conducted by Sadiq [20] evaluated post-Buharinomics agriculture in Nigeria. The study adopted a policy review research design. The population comprised major agricultural programmes, including the Anchor Borrowers' Programme, Presidential Fertilizer Initiative, and Green Imperative. Data were collected from policy documents, agricultural reports, and secondary sources. Data were analysed using content analysis. The study revealed that agricultural programmes improved input access and mechanisation efforts but suffered from implementation gaps, elite capture, insecurity, and sustainability challenges. The study recommended transparent implementation, improved monitoring, and stronger farmer-level impact assessment. The study is relevant because it shows that agricultural interventions require sustainability mechanisms beyond programme launch.

Related study by Olayide [21] reviewed climate change impacts, agriculture, land use, and sustainable food systems in Nigeria. The study adopted a systematic literature review design. The population comprised peer-reviewed and policy studies on Nigeria's food systems. Data were collected from academic databases, development reports, and policy documents. Data were analysed through literature synthesis. The study revealed that climate change, land degradation, weak institutional support, and energy constraints undermine sustainable agriculture in Nigeria. The study recommended climate adaptation, sustainable land use, irrigation support, and inclusive innovation systems. This study supports the current research because GIZ programmes increasingly integrate climate resilience into agricultural transformation.

Similar study by Baumüller and colleagues [22] assessed innovations for sustainable food systems in Africa, with emphasis on agricultural innovation institutions and GIZ-led Green Innovation Centres. The study adopted a documentary and programme review design. The population comprised African agricultural innovation programmes and policy institutions. Data were collected from programme reports and development literature. Data were analysed using qualitative synthesis. The study revealed that innovation platforms, value-chain interventions, research partnerships, and farmer-oriented technologies contribute to food system transformation. The study recommended scaling agricultural innovation systems and strengthening links between research, farmers, markets, and development partners. The study is directly relevant because it connects GIZ-led innovation centres with sustainable food systems.

Study by Lasisi and colleagues [23] examined transforming agriculture as a panacea for sustainable economic development in Nigeria. The study adopted a review-based research design. The population comprised Nigerian agricultural policy and development literature. Data were collected from journal articles, policy documents, and reports. Data were analysed using content analysis. The study revealed that agricultural transformation can support diversification, employment, poverty reduction, and sustainable economic development. The study recommended consistent policy implementation, investment in technology, support for smallholder farmers, and stronger institutional coordination. The study relates to the present study because it confirms that agricultural transformation is central to sustainable development, but it does not specifically examine GIZ intervention programmes.

Gap in Literature: While the study by Ikuemonisan et al. [14] was on challenges and strategies in Nigerian agribusiness entrepreneurship, it differs

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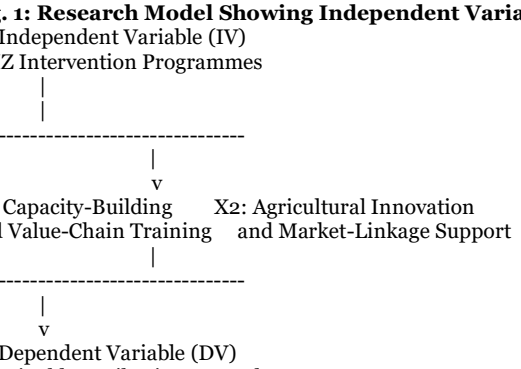
from the current study because it did not examine the impact of GIZ intervention programmes on sustainable agribusiness development. Ayejuyo et al. [15] focused on climate-smart agricultural practices and food security in Lagos State, while the present study focuses on GIZ capacity-building, agricultural innovation, and market-linkage support across selected Nigerian agribusiness value chains. Izuogu [16] reviewed climate-smart agriculture, but the study did not empirically connect donor-funded agricultural innovation support with agribusiness productivity and competitiveness. Mnukwa et al. [17] provided Sub-Saharan African evidence on climate-smart agriculture but was not Nigeria-specific in terms of GIZ interventions. Shaibu [18] examined infrastructure and food production using time-series data, whereas the present study adopts survey and documentary designs. Abolade et al. [19] focused on access to finance in Ogun State, but the present study examines capacity-building and agricultural innovation as GIZ intervention proxies. Sadiq [20] reviewed government agricultural policies but did not examine international development cooperation. Olayide [21] focused on climate change and food systems, while Baumüller et al. [22] addressed innovation systems in Africa. Lasisi et al. [23] reviewed agricultural transformation generally. Therefore, the current study fills the gap by directly linking GIZ intervention programmes to sustainable agribusiness development in Nigeria using two specific objectives, survey evidence, documentary data, and multiple regression analysis.

2.6 Research Model

Fig. 1: Research Model Showing Independent Variable, Proxies and Dependent Variable



Source: Adapted from Theory of Change by Weiss [12] and agricultural innovation systems literature [22].

The model explains the relationship between GIZ intervention programmes and sustainable agribusiness development in Nigeria. This model established an impact hypothesis that evaluated through quantitative evidence and statistical analysis. The introduction is therefore structured as follows: First, it briefly defines the dependent and independent variables, and the theory of change. The Theory of Change assumes that GIZ intervention inputs result in outputs (e.g. number of trained farmers, enterprises supported with improved technologies and strengthened value chains) which will lead to outcomes (e.g. agribusiness competitiveness and improved income).

Specifically, the capacity-building and value-chain training activities are expected to improve sustainable agribusiness productivity by increasing farmers' knowledge and strengthening their participation in agricultural value chains — for example, by reducing production inefficiencies through improved production practices, input use and post-harvest management. Similarly, agricultural innovation and market-linkage support will improve sustainable agribusiness competitiveness by supporting farmers and agribusiness enterprises to produce better quality products, meet market standards and reduce losses; respond to changing market and climate conditions; and access buyers, business partnerships and higher-value markets. A survey research design was used for the study. This is because it enabled the researcher to collect quantitative data from farmers, cooperative members, extension officers, agribusiness entrepreneurs and other agricultural development stakeholders who have knowledge of GIZ-related intervention programmes. Agricultural innovation and market-linkage support involve the introduction of improved agricultural technologies, climate-smart practices, digital advisory systems, processing innovations, quality standards, buyer connections, and business networking.

3.0 Methodology

The study used survey research design with documentary research design. The survey research design was used with documentary design. A documentary design has been applied because it allowed the researcher to access secondary information from the programme documents of GIZ, agricultural policy reports, journal articles and development reports. The addition of both designs was appropriate as it enabled triangulation and increased the validity and robustness of the programme-level impact.

The target population of the study is GIZ-supported farmers, agribusiness MSMEs, cooperative leaders, extension officers, and agricultural value-chain actors in selected Nigerian states. Farmers were relevant because they are direct beneficiaries of training, innovation, and productivity support. Agribusiness MSMEs were relevant because they participate in processing, marketing, aggregation, and value addition. Cooperative leaders were relevant because they coordinate farmer groups and market access. Extension officers were relevant because they support the transfer of improved technologies and climate-smart practices. Agricultural value-chain actors were relevant because they connect production with processing, distribution, and markets.

The estimated population for the study was 250,000 beneficiaries and agribusiness actors linked to GIZ-supported agricultural value-chain interventions in Nigeria [5]. The sample size was determined using Krejcie and Morgan's formula for determining sample size from a total population of 250,000. The population is greater than 500, so the sample size should be determined by using a 95% confidence level with a margin of error of 5%, which gives a sample size of 384 respondents. The population was divided into different groups using stratified sampling, namely, farmers, agribusiness MSMEs, cooperative leaders, extension officers and value-chain actors. Simple random sampling was subsequently employed to pick respondents in each of the strata. This was suitable as it provided representation of various category stakeholders with regard to the development of sustainable agribusiness.

The data were collected from the primary sources such as questionnaire responses and observation. Secondary data was obtained from GIZ project reports, agricultural policy documents, FAO reports, World Bank databases, journal articles, and publications from the Nigerian agricultural sector. The data collection techniques were used primary and secondary data collection techniques. The structured questionnaire administration was the main tool used, and documentary review was the second. The questionnaire was closed-ended, structured and used the five-point likert scale. In addition to the questionnaire responses, 15 participants were interviewed using structured and semi-structured in-depth interviews.

The study validity was content and face validity, which was checked by experts in public administration, agricultural development, and research methodology. Pilots test were provided to ensure reliability (Cronbach's Alpha). The minimum acceptable reliability coefficient was 0.70. The data were presented through descriptive statistic (frequency, mean and standard deviation), and was analysed by using inferential statistic. Multiple linear regressions was used to test the hypotheses at 5% level of significance. The Statistical Package for the Social Sciences (SPSS v.27) was used.

The multiple linear regression model is stated as:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e$

Where:

Y = Sustainable Agribusiness Development

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β_0 = Constant or intercept
β_1 and β_2 = Coefficients of the independent variables
X_1 = Capacity-building and value-chain training
X_2 = Agricultural innovation and market-linkage support
e = Error term

4.0 Result And Discussion

4.1 Data Presentation

Out of the 384 questionnaires distributed, 356 were filled and returned, representing a 92.7% response rate. The returned questionnaire was considered adequate for analysis because it exceeded the minimum acceptable response rate for social science survey research.

Table 1: Descriptive Analysis of Capacity-Building and Value-Chain Training

S/N	Statement	Mean	Std. Dev.	Decision
1	GIZ training programmes improved farmers' production knowledge.	4.21	0.641	Agreed
2	Value-chain training improved post-harvest handling among beneficiaries.	4.08	0.703	Agreed
3	Business development support improved agribusiness planning.	4.16	0.677	Agreed
4	Cooperative training improved collective marketing capacity.	3.94	0.812	Agreed
5	Training support improved sustainable agribusiness productivity.	4.25	0.632	Agreed

Source: Field Survey, 2026.

The mean values obtained from the respondents ranged from 3.94 to 4.25 with the standard deviations ranging from 0.632 to 0.812 respectively. This means that the respondents confirmed that GIZ capacity building and value-chain training had positively impacted their knowledge on production, post-harvest handling, business planning, cooperative marketing and productivity of sustainable agribusiness. The low standard deviation values indicate that the answers given were very similar to the average.

Table 2: Descriptive Analysis of Agricultural Innovation and Market-Linkage Support

S/N	Statement	Mean	Std. Dev.	Decision
1	GIZ innovation support improved adoption of improved agricultural practices.	4.18	0.694	Agreed
2	Climate-smart agricultural support improved resilience among farmers.	4.05	0.731	Agreed
3	Market-linkage support improved access to buyers.	4.11	0.716	Agreed
4	Digital and advisory support improved agribusiness decision-making.	3.89	0.844	Agreed
5	Innovation and market support improved agribusiness competitiveness.	4.22	0.659	Agreed

Source: Field Survey, 2026.

The mean values of the respondents ranged from 3.89 to 4.22, reflecting the respondents' agreement of the positive effect of GIZ innovation and market-linkage on the adoption of agricultural practices, climate resilience, access to buyers, business decision making, and agribusiness competitiveness. The values of the standard deviations indicate moderate consistency in the responses, indicating that the majority of respondents had a similar perception on the usefulness of innovation and market-linkage support.

Table 3: Descriptive Analysis of Sustainable Agribusiness Development

S/N	Statement	Mean	Std. Dev.	Decision
1	Beneficiaries experienced improvement in agricultural productivity.	4.19	0.682	Agreed
2	Agribusiness income improved after programme participation.	4.03	0.776	Agreed
3	Market competitiveness improved among supported agribusinesses.	4.10	0.704	Agreed
4	Supported enterprises became more resilient to production shocks.	3.91	0.819	Agreed
5	GIZ-supported interventions enhanced sustainable agribusiness development.	4.24	0.621	Agreed

Source: Field Survey, 2026.

The respondents' data were used to determine the mean values of the data for each item of the sustainable agribusiness development, which were all positive. This means that respondents believed there was an increase in the productivity, income, competitiveness, resilience and overall sustainability of the agribusinesses of the beneficiaries. From the results, it can be concluded that GIZ intervention programmes had a positive impact on sustainable agribusiness development in Nigeria.

4.2 Regression Analysis

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.781	0.610	0.608	0.391	1.842

a. Predictors: Capacity-building and value-chain training; Agricultural innovation and market-linkage support.
b. Dependent Variable: Sustainable agribusiness development.

The model revealed that the sustainable agribusiness development could be well correlated with the predictors as 0.781. About 61.0% of the variance in sustainable agribusiness development is explained by the model. The adjusted R Square is 0.608, indicating a good model fit, and the Durbin-Watson statistic is 1.842, indicating no serious autocorrelation in the residuals.

Table 5: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	84.627	2	42.314	276.921	0.000
Residual	53.927	353	0.153		
Total	138.554	355			

a. Dependent Variable: Sustainable agribusiness development.

b. Predictors: Capacity-building and value-chain training; Agricultural innovation and market-linkage support.

The overall ANOVA model is statistically significant, with a regression sum of squares value of 84.627, df of 2, mean square value of 42.314, F value of 276.921, and significance value of 0.000. Since the p-value is less than 0.05, the model is statistically significant and suitable for testing the hypotheses.

Table 6: Coefficients

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.

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	B		Beta		
Constant	0.642	0.173	—	3.711	0.000
Capacity-building and value-chain training	0.413	0.051	0.426	8.098	0.000
Agricultural innovation and market-linkage support	0.367	0.048	0.401	7.646	0.000

a. Dependent Variable: Sustainable agribusiness development.

Unstandardized coefficient is 0.642, standard error is 0.173, t-value is 3.711 and the p-value is 0.000. Hypothesis one's result indicates that the capacity-building and value-chain training is 0.413 with a standard error of 0.051. The standardized beta coefficient is 0.426, the t value is 8.098 and the p value is statistically significant at 0.000. The null hypothesis is thus rejected since the p value calculated is 0.000 and is less than estimated p value of 0.05. The findings showed that there is strong relationship between GIZ capacity building programmes and training programmes on value chain and sustainable agribusiness productivity in Nigeria.

Hypothesis two is supported by the result that agricultural innovation and market-linkage support is 0.367, which has a standard error of 0.048. The standardized beta coefficient is 0.401, t-value is 7.646 and statistically significant p-value is 0.000. The null hypothesis is thus rejected since the p-value calculated is lower than the estimated p value of 0.05. The findings showed that agricultural innovation (AI) is significantly related to market linkage support (MLS) and sustainable agribusiness competitiveness (SAC) in Nigeria.

4.3 Discussion

Finding of hypothesis one indicated that the t-value of 8.098 and p-value of 0.000 were lower than the estimated threshold of 0.05. The result shows that GIZ capacity-building and value-chain training programmes significantly influenced sustainable agribusiness productivity in Nigeria. This finding aligns with Ikuemonisan et al. [14], who revealed that human capacity enhancement, business support, quality control, and market transparency are important strategies for sustainable agribusiness development. The finding also agrees with Ayejuyo et al. [15], who found that farmer training and climate-smart agricultural practices improved productivity and food security outcomes. The finding is supported by the Theory of Change [12], which argues that programme inputs such as training, technical assistance, and capacity-building can produce measurable development outcomes when properly implemented.

The finding of hypothesis two showed that the t-value of 7.646 and p-value of 0.000 were below the expected threshold of 0.05. This outcome suggests that the support provided by GIZ in agricultural innovation and market-linkage had a significant impact on the competitiveness of sustainable agribusiness in Nigeria. This result aligns with the research by Izuogu [16], who identified that enhancements in crop varieties, diversification, nutrient management, and digital advisory services play a role in sustainable agricultural growth. Similarly, Baumüller et al. [22] demonstrated that agricultural innovation systems and Green Innovation Centres led by GIZ contributed to transforming food systems in Africa. Additionally, Mnukwa et al. [17] found that combining innovation adoption with farmer education, financial assistance, extension services, and institutional collaboration enhances effectiveness. Therefore, GIZ intervention initiatives are crucial for the progress of sustainable agribusiness as they facilitate the connection of farmers and agribusiness enterprises with necessary skills, innovations, and markets.

5.0 Conclusion And Recommendations

To the best of the author's knowledge, this study has contributed to knowledge and filled a gap in the literature by shifting attention from general agricultural policy interventions in Nigeria to GIZ agricultural development programmes. The study also provides empirical evidence on the relationship between GIZ intervention programmes and sustainable agribusiness development in Nigeria. They provide evidence that development cooperation inputs like capacity-building, value-chain training, innovation support and market linkages are able to achieve agribusiness outcomes. They show how GIZ intervention programmes remain vital development cooperation instruments to increase agricultural productivity, innovation adoption, and market access and enterprise resilience in the region and for driving sustainable agribusiness development in Nigeria. Therefore, the two objectives of the study were achieved. The study indicates that the GIZ capacity-building and value-chain training programmes significantly increased sustainable agri-business productivity in Nigeria, while the GIZ agricultural innovation and market-linkage support significantly increased sustainable agri-business competitiveness.

The study concludes with recommendations for GIZ and its partners to elevate agricultural innovation and market-linkage interventions, including promoting climate-smart technologies, digital advisory platforms, buyer connections and quality standards, and inclusive agribusiness financing.

Contribution to Knowledge

Recommendations for GIZ and Nigerian agricultural institutions to expand capacity-building and value-chain training programmes to reach more smallholder farmers, cooperatives, processors and agribusiness MSMEs. Farmers, agribusiness entrepreneurs, cooperative organizations, government agencies, and development partners are expected to find the findings helpful. Their findings indicate that donor-funded agricultural programs should go beyond providing production inputs to integrate innovation, training, enterprise support, market systems and climate resilience.

The study also demonstrates ways in which GIZ-supported interventions can be sustainable through strengthening local institutions to take over programme activities after exiting of donor funding.

Limitations of the Study

The study encountered the following limitations:

1. One limitation was access to complete beneficiary-level data across all GIZ-supported agricultural intervention locations in Nigeria. This was mitigated through the use of available programme documents and survey responses.
2. Another limitation was the difficulty of reaching some rural respondents due to distance and insecurity. This was mitigated through cooperative leaders and extension contacts.
3. Another limitation was possible response bias from beneficiaries. This was mitigated through anonymity, confidentiality, and neutral questionnaire wording.

Ethical Principles for the Guiding Social Science Research

Respondents were informed of the purpose of the study, and that the information they provided would be used only for educational purposes. They also all volunteered to participate and could stop at any time. No names or other identifying characteristics of the respondents (such as addresses or telephone numbers) were revealed. The questionnaire did not ask for sensitive information. We also made clear that any responses would be aggregated and never used punitively. None of the data we have presented is falsified or plagiarized. All secondary sources were properly acknowledged using IEEE citations and references," they wrote. The study complied with ethical principles guiding social science research. The study complied with ethical principles guiding social science research..

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