

## Article

# Youth Agricultural Entrepreneurship: Assessing the Impact of Agricultural Training Programmes on Performance

Dolapo Adeyanju <sup>1,2,\*</sup> , John Mburu <sup>2</sup> and Djana Mignouna <sup>1</sup> 

<sup>1</sup> International Institute of Tropical Agriculture, Department of Agricultural Economics, Cotonou 08 BP 0932, Benin; D.Mignouna@cgiar.org

<sup>2</sup> Department of Agricultural Economics, College of Agriculture and Veterinary Science, University of Nairobi, P.O. Box 29053-00625, Kangemi, Nairobi, Kenya; jmburu@yahoo.com

\* Correspondence: dolapo.yanju@gmail.com; Tel.: +234-806-801-7235

**Abstract:** Using the case of the Fadama Graduate Unemployed Youth and Women Support (GUYS) programme, this study investigated the impact of agricultural training programmes on youth agripreneurship performance in Nigeria. A total of 977 respondents comprising of 455 participants of the programme and 522 non-participants were sampled across three states in Nigeria. Data were collected using a well-structured questionnaire programmed on Open Data Kit (ODK). Data were analysed using the Endogenous Treatment Effect Regression (ETER) model. The probit model results revealed that participation in the programme was significantly influenced by age, years of formal education, marital status, current residence, employment type, and perception of training. The empirical analysis showed that after controlling for endogeneity, participation in the programme led to better performance which was measure in terms of average income from agripreneurship activities. These findings highlight the significance of training in improving the performance of young agripreneurs and suggest the need to encourage and out-scale programmes such as the Fadama GUYS, both in Nigeria and elsewhere in Africa as they can contribute to better performance of youth-owned agribusiness firms.

**Keywords:** youth; agripreneurship performance; agricultural programmes; agricultural training



**Citation:** Adeyanju, D.; Mburu, J.; Mignouna, D. Youth Agricultural Entrepreneurship: Assessing the Impact of Agricultural Training Programmes on Performance. *Sustainability* **2021**, *13*, 1697. <https://doi.org/10.3390/su13041697>

Academic Editor: María de la Cruz del Río-Rama  
Received: 18 January 2021  
Accepted: 30 January 2021  
Published: 4 February 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Africa has the best population structure in the world. According to the United Nations, over 35 percent of the African population is between 15 and 24 years old while 27 percent is between 25 and 35 years old [1]. The African Economic Outlook Report aggregated this and reports that between 60 and 70 percent of the population is between 18 and 35 years old, the age category regarded to as Youth [2]. While this could be an economic asset [3], majority of people (70 percent) in this age category lives in the rural areas, where they are faced with high poverty levels, food insecurity, critical cases of unemployment, and underemployment [4]. These ongoings have placed young people at the centre of a critical economic crisis which limits them in changing their social and economic status as well as their future prospect [5].

Nigeria is largely a youthful country with over 60 percent of the 200 million population between 18 and 35 years old [6]. However, youth unemployment is a serious economic challenge [7–10] and its consistent high rates over the last two to three decades has indicated the need for urgent policy- and programme-level interventions. One of the initiatives taken by the Federal Government of Nigeria to curb youth unemployment and its accordant undesirable outcomes is the inclusion of entrepreneurship studies in the curriculum of tertiary institutions [6,11], a strategy which aims to promote a shift from the conventional formal government provision of employment towards entrepreneurship.

In recent times, more deliberate efforts are being channelled towards agriculture as a potential sector which could generate sustainable employment for many Youth [12].

Because of this, the Nigerian Government and Development Partners have made several efforts to promote agripreneurship, a term defined as the profitable marriage between entrepreneurship and agriculture [13], among young people. These efforts are reflected in the several agricultural training programmes aimed at equipping young people with the necessary skills for agripreneurship [14]. The Fadama Graduate Unemployed Youths and Women Support (GUYS) programme, Livelihood Improvement Family Enterprise (LIFE) Programme, Youth Commercial Agriculture Development Programme (YCAD), and Youth Employment in Agriculture Programme (YEAP) are some of the practical evidence. Despite the potential benefits of these training interventions as discussed in Literature, there is a dearth of empirical evidence on what worked well or what did not [12], making it difficult to drive practical policymaking. This invariably calls for more research to measure the outcomes of programmes as they relate to youth performance and other economic outcomes.

It is also worth noting that a few studies have been conducted on youth entrepreneurship development in Nigeria. However, many of these studies are not sector-specific [8,15–18]. The few that focused on youth agripreneurship are not impact studies [19,20]. Furthermore, those that exist outside Nigeria are equally not sector-specific [21–26]. This generalization is likely to conceal important policy information to inform sectoral entrepreneurship. This study, therefore, intends to address this research gap by assessing the impact of agricultural training programmes on youth agripreneurship performance taking the Fadama programme as a case study. Further, the study identified some of the factors that influenced youth participation in the programme. Findings arising from this study will provide evidence which could inform practical policy on youth agripreneurship in Nigeria.

The rest of the paper is structured as follows. The next section presents an overview of the Fadama programme and a review of relevant literature. Section 3 presents the materials and methods, detailing the data, sampling procedure, and analytical tools. Section 4 presents the results, highlighting the determinants of youth participation in the Fadama programme and impact of the programme on youth agripreneurship performance. Section 5 presents the conclusions and recommendations based on evidence drawn from the study.

## 2. Review of Literature

### 2.1. The Fadama GUYS Programme

The Fadama GUYS programme is a youth-focused intervention which was conducted in 2017. The programme was implemented under a tripartite agreement between the World Bank, Federal Government of Nigeria, and all participating state Governments. The four-week training focused on exposing young unemployed graduates between the ages of 18–35 years to new agribusiness ideas, thereby helping them to leverage their energy and motivation towards strengthening the drive for national economy diversification and achieving food security [27]. The training covered numerous agripreneurship components including, but not limited to, crop and livestock production, marketing, processing, and financial and risk management. It was conducted in 23 states across Nigeria including Abia, Adamawa, Akwa Ibom, Anambra, Bauchi, Bayelsa, Benue, Ebonyi, Ekiti, FCT, Jigawa, Katsina, Kebbi, Kogi, Niger, Ogun, Ondo, Osun, Oyo, Plateau, Sokoto, and Taraba States and a minimum of 300 unemployed young graduates were trained and supported with seed capital in each state.

### 2.2. Empirical Review of Relevant Literature

Many agricultural scholars have come to agree that agricultural entrepreneurship (agripreneurship) holds remarkable potentials to foster economic development by generating both direct and indirect employment for the local populace and contributing to food security and nutrition [13,28,29]. However, when the issue of ageing farmers is factored in, Addo [30] opined that successful and sustainable agripreneurship requires the active participation of young people, not only as producers but as active actors along the entire value chain. This is supported by Yami et al. [12] that agribusiness offers enormous

employment opportunities for young people. Despite this, young people, particularly graduates, show declining interest in agripreneurship based on the negative perception of agriculture as a low-income career choice [27]. Those who eventually engage in the sector also tend to struggle for survival for reasons relating, but not limited to lack of credit and mentors, little/no experience, limited technical know-how, and lack of access to training [27,31,32]. This foregoing and the potential of agriculture to crop many youths off the long unemployment queue have attracted the attention of policymakers to invest in youth agricultural training programmes such as the case study.

There are relatively few reports on the impact of agricultural training programmes, particularly as it relates to young people. A few have attributed training to better performance [24,33–36]. However, the general nature of these studies raise doubts on the extent to which they can inform sectoral policies, such as agriculture. For instance, Mayuran [36] assessed the “Impact of Entrepreneurship Training on the Performance of Small Enterprises in Jaffna District, Sri Lanka” and found a positive and significant relationship between training and firm performance. However, the conditions under which corporate firms’ operate are quite different from that of agriculture. Thus, their results are less likely to inform policy in the agricultural and other related sectors. Further, their main focus on business management skills ignores other components of entrepreneurship trainings which could influence performance.

Similarly, evidence generated by Ngoru [37], who identified some of the entrepreneurial factors which influence the performance of youth-owned enterprises in Kenya, showed that entrepreneurship training positively and significantly influenced performance. In addition, a majority of the youths agreed that training is essential for improved performance. Again, such general studies may not properly reflect sectoral entrepreneurship such as agripreneurship.

Krause et al. found that youth skills and knowledge improved as a result of training on entrepreneurship in Tanzania [38]. The case study approach of this study is similar to the current study. However, it will be interesting to know if the knowledge and skills translated into better performance in terms of higher income.

Cho and Honorati [39] assessed the relationship between income and entrepreneurship programmes based on a meta-analysis of 37 impact assessment studies. The authors found that generally, entrepreneurship programmes (which focus on training only or a combination of training and micro-finance) do not significantly impact income. This, however, was not an empirical study and therefore, calls for deeper investigation into the subject.

Contrary to the positive relationship found in Literature, Nsikak-Abasi measured the “Impact of Integrated Farmers Scheme on the Welfare of Rural Farmers in Akwa Ibom State, Nigeria”, based on a survey of 120 farmers and found that no significant difference between the welfare of the participants and non-participants after the scheme [40]. Cho and Honorati reviewed the “Effectiveness of Various Entrepreneurship Programmes in Developing Countries” and found that the programmes did not lead to business establishment or expansion which implies that skill acquisition through training may not lead to better performance [39].

It is worth noting that, unlike the current study, the majority of these studies focused on the household rather than on youths and are not sector-specific. One of the very few relevant studies on agripreneurship was conducted by Addo [30]. The study found that irrespective of youths’ educational background, young participants of agricultural programmes can actively participate in the agri-food industry compared to their counterparts. However, unlike the current study, the author used a content/thematic analysis approach and focused on influencing factors rather than impact.

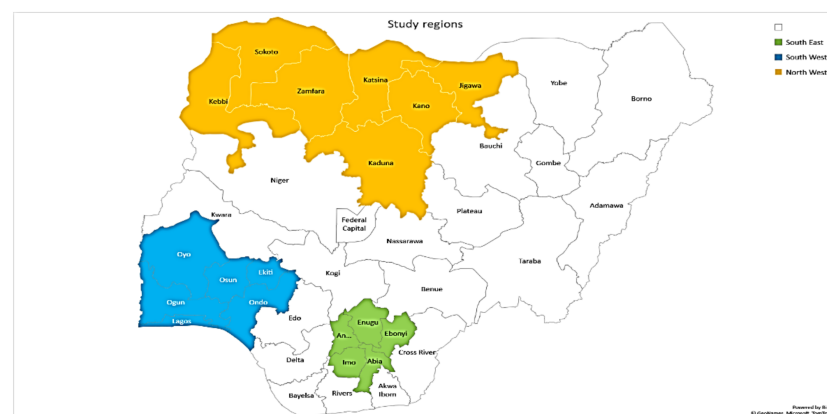
Overall, findings from the impacts of training programmes continue to vary from positive to negative influence and sometimes to no impacts. This could be attributed to the different approach taken and lack of specific case to validate results. This study, however, followed a case study approach which could generate practical evidence.

### 3. Materials and Methods

#### 3.1. Data and Sampling Procedure

This study uses youth survey data collected under the “Enhancing Capacity to Apply Research Evidence (CARE) in Policy for Youth Engagement in Agribusiness and Rural Economic Activities in Africa” project of the International Institute of Tropical Agriculture (IITA). The survey was conducted between January and March 2019. Specifically, quantitative data were collected on important variables which were grouped into different categories including Demographic Information, Entrepreneurship Training, and Livelihood. Data was also collected on socio-economic characteristics such as age, gender, education, and marital status.

A critical aspect of any credible impact assessment is a randomly selected sample. To achieve this, the study adopted a multistage stratified random sampling technique. Due to resource constraints, the states where the Fadama programme was conducted was divided into sub-groups based on the three major tribes in Nigeria. This gave three groups, out of which three states, namely Abia (SouthEast), Ekiti (SouthWest), and Kebbi (NorthWest) states were purposively selected. The choice of these states was based on the relatively high number of participants in the Fadama GUYS programme in 2017 and similarity of the states in terms of specific characteristic since the three states ranked high is agricultural activities (more than 70 percent of the population in all the states are engaged in agriculture). The aim of this was to ensure that the respondents are comparable to allow aggregation of results. In the second stage, the study population was divided into two strata: participants and non-participants. The third stage involves the random selection of youths from two sampling frames to make a sample size of 977 which was determined based on the error margin formula proposed by Bartlett et al. [41]. The first sampling frame, consisting of a complete list of youths who participated in the FGP in 2017, was used in gathering the treated group and a second sampling frame consisting of the list of community youths obtained from the local governments where the programme was conducted was used in gathering the control group. The random selection of both the treatment and control group was done using random numbers generated from Microsoft Excel. Figure 1 shows the three regions in which the survey was conducted.



**Figure 1.** Map of the Study Regions.

#### 3.2. Assessing the Impact of the Programme on Youth Agripreneurship Performance

Assessing the impact of programme participation on performance using non-experimental data is quite challenging, due to unobserved counterfactuals, which is what would have happened had a youth not participated is usually not observed, implying a problem of missing data. Past studies have employed propensity score matching (PSM) method and single equation binary models like the probit or logit models to assess the impact of interventions. For instance, Mutuku [42] used PSM method to assess the “Impact of World Food Programme’s Purchase for Progress Pilot (P4P) Project on Farm Incomes in Uasin

Gishu And Narok Counties, Kenya.” However, this method has been critically faulted in literature since it does not account for unobserved characteristics, thereby questioning the validity of the impact estimates. Similarly, using binary models such as logit does not account for endogeneity and leads to inconsistent estimates. From an econometric viewpoint, the issue of endogeneity that arises from self-selection bias poses a challenge in programme evaluation.

To address the issue of endogeneity, the current study employed the Endogenous Treatment Effect Regression (ETER) model to analyse the impact of programme participation on agripreneurship performance.

The ETER model was first brought into the limelight by Heckman [43]. Since participation in any programme may not be necessarily random (raising the issue of endogeneity), the model gives a robust result by allowing for specific correlation structure between the unobservable that affect the outcome variable and those that affect the treatment.

Past studies [44–47] have adopted ETER model to analyse the impact of interventions. It is recommended that to achieve accurate estimates, at least an instrumental variable should be included in the selection variable.

### 3.3. Model Specification: Endogenous Treatment Regression Model

The ETER model follows a two-step estimation procedure whose first stage estimates a binary model that represents the selection/treatment equation. The second stage estimates the Average Treatment Effect (ATE) of a linear regression which includes the endogenous binary-treatment variable. The selection/treatment equation is specified in Equation (1):

$$Z_i^* = \beta X_i + u_i \quad (1)$$

where  $Z_i$  is a binary variable that equals 1 if a youth has participated in the programme and 0 otherwise.

$\beta$  is the vector parameter to be estimated.

$X_i$  represents other covariates determining participation. These are defined in Table 1.

In this study, the first stage aims to obtain the inverse Mills’ ratios ( $\rho$ ) to correct for endogeneity in the estimates of agripreneurship performance. The first stage thus distinguished the participants from non-participants using a probit model. The decision to participate in the programme was measured as a dichotomous variable which assumes the value of 1 if a youth participated and 0 otherwise. From Equation (1), the reduced form participation equation was specified as expressed in Equation (2)

$$Z_i = \begin{cases} 1 & \text{if } Z_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

The second stage aims to obtain the predicted estimates of youth agripreneurship performance after correcting for endogeneity ( $\hat{Y}_i$ ). According to Jumbe and Angelsen [48], if the expected value of the disturbance term condition on participation is non-zero ( $\rho$ ), applying OLS directly to the outcome equation will generate an inconsistent estimate of the outcome variable. Thus, to address possible endogeneity problem, it becomes justifiable to use ETER for the analysis.

The IMR derived in the first stage was then included as an explanatory variable in the second stage as an endogeneity-correction term. This is because it is a standard for the second stage estimation to include at least one imposed exclusive restriction that is justifiable [49]. The statistical significance of the coefficient of the inverse Mills’ ratio ( $\rho$ ) implies the presence of endogeneity which necessitates the use of ETER.

The outcome equation is specified in Equation (3):

$$Y = \alpha K_i + \eta Z_i + \varepsilon_i \quad (3)$$

where  $Y$  is the outcome variable (Performance);  $K_i$  represents other covariates determining performance;  $Z_i$  as previously defined as an indicator of participation status;  $\alpha$  and  $\eta$  are vectors of parameters to be estimated; and  $\varepsilon_i$  is the error term.

The conditional mean of the outcome variable in Equation (3) is expressed as Equation (4):

$$E(Y_i/Z_i = 1) = \alpha K_i + E(\varepsilon_i/X_i, u_i) = \alpha K_i + E(\varepsilon_i/u_i) \quad (4)$$

Such that  $E(\varepsilon_i/u_i) \neq 0$

Further, the conditional expected value of the two error terms is specified as Equation (5):

$$E(\varepsilon_i/u_i) = E(\varepsilon_i/u_i \leq \beta X_i) = E(\sigma_\varepsilon \rho / u_i) = \rho \sigma_\varepsilon \phi(\beta X_i) / \Phi(\beta X_i) \quad (5)$$

where  $\Phi(\cdot)$  and  $\phi(\cdot)$  denotes the cumulative distribution functions and standard normal density, respectively.

The dependent variable of the selection equation is participation which denotes whether a youth participated in the programme or not. The dependent variable of the outcome equation is agripreneurship performance which is measured in terms of average income from agripreneurship activities. The explanatory variables constitute socio-economic and demographic factors selected based on past studies [30,50,51] and field observations during the survey. Description of the explanatory variables and their expected directions is presented in Table 1.

**Table 1.** Description of Variables in the Endogenous Treatment Effect Regression (ETER) Model.

Variable	Measurement	Expected Sign for Participation	Expected Sign for Agripreneurship Performance
Agripreneurship performance	Log of average income from agripreneurship activities		
Participation	Dummy (Participants = 1, Non-participants = 0)		+
Age	Age in years	+	+/-
Formal Education	Continuous (in Years)	-	+/-
Gender	Dummy (Male = 1, Female = 0)	+/-	+/-
Household Size	Continuous	+	+
Marital Status	Dummy (Married = 1, Otherwise = 0)	+	+/-
Residence	Dummy (Rural = 1, Not otherwise = 0)	+	+
Employment type	Dummy (Formal = 1, otherwise = 0)	-	-
Asset Index Score	Continuous	+	+
Perception of Training	Dummy (Positive = 1, otherwise = 0)	+	
Job Search	Dummy (Searching = 1, otherwise = 0)	-	-
Study status	Dummy (Studying = 1, otherwise = 0)	-	-

Note: +/- represents positive/negative correlation.

## 4. Results and Discussion

### 4.1. Results of the Endogenous Treatment Effect Regression (ETER) Model

The sample selection hypothesis and overall fit of the model were tested to justify the use of the ETER model over the standard binary model using STATA15. The estimated correlation coefficients between the two error terms in the outcome equation (performance) and treatment assignment (programme participation) is  $-0.524$  (Table 2). This indicates that the unobservable that affect the observed performance tends to occur with unobserv-

able that affect programme participation decision, suggesting that there is a relationship between participation and performance. Furthermore, the likelihood ratio test result shows statistically significant ( $p < 0.05$ ), showing a high explanatory capacity of the model. Thus, the null hypothesis of no correlation between the selection (participation) and outcome (performance) equations is rejected, implying that the choice of ETER is appropriate for the analysis.

**Table 2.** Results of the Endogenous Treatment Effect Regression Model.

Variables	Programme Selection Equation		Performance Outcome Equation	
	Coef.	S.E	Coef.	S.E
Age	0.072 ***	0.014	0.038 ***	0.009
Years of Formal Education	0.041 ***	0.015	−0.021 **	0.009
Gender	−0.128	0.099	0.026	0.055
Household Size	−0.011	0.014	0.013	0.008
Marital Status	0.336 ***	0.136	0.073	0.080
Residence (Rural = 1)	0.207 **	0.089	0.268 ***	0.051
Employment type (Formal = 1)	−0.802 ***	0.160	0.871	0.103
Asset Index Score	0.003	0.018	0.016 *	0.010
Perception of Training	0.339 ***	0.128		
Job Search	−0.009	0.093	−0.375 ***	0.051
Study status	−0.138	0.113	−0.077	0.065
Constant	−2.697 ***	0.429	8.636	0.245
Participation in Training (Yes = 1)			0.459 **	0.188

Rho = −0.524; LR test of independent. equations. (rho = 0): chi2(1) = 4.71 Prob > chi2 = 0.03

Source: Field survey results, 2019. Note:  $p > 0.1 = *$ ,  $p > 0.05 = **$ ,  $p > 0.01 = ***$ .

#### 4.1.1. Determinants of Youth Participation in the Programme

The results of the selection (participation) equation in Table 2 shows that out of the eleven variables hypothesized to influence participation, six were statistically significant. These include age, years of formal education, marital status, type of employment, current residence, and training perception.

As hypothesized, Age was positive and significant at  $p < 0.01$ . This implies that older youths are more likely to participate in the programme compared to the younger ones. This could be attributed to the inverse relationship between dependency and age in reality. As people grow older, they become less dependent on their parents for livelihood and tend to be more open to empowerment programmes such as the case study. This corroborates the finding of Nnadi and Akwiwu [52] who posits that people become more conscious of the importance of agriculture as a sustainable means of livelihood as they grow older.

Years of formal education was significant at 1 percent and positively related to participation. This was not expected but could be attributed to the long queue and unproductive struggle for white-collar jobs which drives young graduates to look for alternative employment (particularly in the agricultural sector) outside their professional career. It could also be attributed to the role of education in accessing timely information on such programmes through social media and other media. This agrees with the argument of Ayinde that higher levels of education facilitate access to information [53]. However, this is contrary to Sudarshanie who attributed the negative relationship between training and formal education to the preference of more educated people for wage employment [54].

As expected, marital status was positive and significant at five percent indicating that married youths are more likely to participate in the programme compared to their counterparts. This agrees with Ohene [55] who argues that married youths bear additional family responsibilities and therefore, may adopt any empowerment programme that could help them to have diversified income sources. This is also similar to the findings of other studies [52,56].

Employment type had a negative and significant influence on participation, implying that those in formal employment are less likely to participate in the programme. This

could be attributed to the strict schedule and less work flexibility associated with formal employment in Nigeria. Thus, those in formal employment may not have the luxury of time to participate in agricultural programmes.

Youths' perception of training programmes had a positive and significant influence on participation decision, implying that those who had positive perceptions are more likely to participate in the programme. As elaborated by Ohene [55], perception is a two-edged factor which could influence engagement decision either positively or otherwise, depending on its direction. Youths who perceive training as a means of acquiring skills and improving their capabilities will be more enthusiastic about agricultural training programmes compared to those who hold negative perceptions. This result corroborates the findings of Akudugu [57] who found that positive perception of farmers about loan application positively influences the demand for bank loans in Ghana.

#### 4.1.2. Impact of Programme Participation on Youth Agripreneurship Performance

In this estimation, the average treatment effect on treated youth (ATET) is the same as the average treatment effect (ATE) [44,46]. This implies that the average predicted outcome for the participants is similar to the average predicted outcome for the entire sample. After controlling for endogeneity, the model results show that participation positively contributed to youths' agripreneurship performance. Specifically, participation increased average income by 46 percent (Table 2).

The major factors that significantly affect youths' agripreneurship performance are also presented in Table 2. The years of formal education exhibits a negative influence on performance. The conversing influence of formal education on participation and performance shows that higher levels of education may facilitate participation but may not translate into better performance, implying that better performance is not dependent on the level of formal education. This result, however, calls for further investigation.

The positive and significant influence of Asset index on performance indicates that asset ownership improves youth agripreneurship performance. This is expected as asset ownership eliminates some of the major constraints faced by youth-owned enterprises and contributes to higher survival rates. Zezza et al. [58] reported a similar result which was attributed to the ability to successfully engage in agricultural output markets.

The location variable had a significant influence on performance. The positive direction implies that residency in rural area yields better agripreneurship performance. This could be because the bulk of agricultural activities take place in those areas and the cost of shuttling between cities and farm is automatically eliminated for rural dwellers.

The negative and significant relationship between job search and performance was anticipated. This is because job-seeking hours takes away from agricultural productive time. Thus, those who are actively searching for jobs will not perform as well as full-time agripreneurs.

## 5. Conclusions and Recommendation

With agriculture at the center of all potential strategies to reduce youth unemployment in Nigeria, the relevance of the Fadama programme to youth agripreneurship cannot be overemphasized. Its positive and significant impact on performance suggests the need for government and relevant stakeholders aiming to empower young people through agripreneurship to invest more in similar training/education programmes. Against the common one-time programmes, practical training institutes or incubation centres which focus mainly on training young people across different agribusiness fields could be established in different parts of the country. This will ensure programme sustainability as well as facilitate access to training. Further, collaborations between local partners and international donors should be encouraged.

Based on the findings of this study, age, years of formal education, marital status, residence, and perception of training positively and significantly influenced participation in the programme. Conversely, employment type had a negative influence on participation



decision, suggesting that those engaged in formal employment are less likely to participate in the programme. The positive influence of the perception variable calls for relevant strategies which could further help to improve the general outlook of agriculture as a profitable career option for young people. This is because youth perception of agricultural programmes will determine their level of participation, as shown in the logit results. Thus, to increase youth participation in agricultural programmes such as the case study, strategies to improve youths' perception of agriculture should be considered and implemented. This could include making agriculture look cool and more attractive to young people, changing the general outlook of agriculture as a low income-generating profession, and providing attractive incentives to young agripreneurs.

## 6. Limitation of the Study

To the best of our knowledge, this study is the first to empirically evaluate the impact of the Fadama GUYS programmes on youth agripreneurship performance in Nigeria. Despite this significant contribution, the study was not without limitation. Due to resource constraints, the study was limited to 3 states, out of the 23 states in which the program was implemented. These states only captured three of the geo-political zones in the country. A major downside that arises from this is the possibility of obtaining different results when more states are considered. Therefore, further studies that would capture more states is highly recommended.

**Author Contributions:** All authors have made substantial contributions to the research design, data collection, data analyses and drafting of the manuscript. The submitted version is checked and approved by all authors. All authors have read and agreed to the published version of the manuscript.

**Funding:** The research is funded by the International Fund for Agricultural Development (IFAD) under the grant 2000001374 "Enhancing Capacity to Apply Research Evidence (CARE) in Policy for Youth Engagement in Agribusiness and Rural Economic Activities in Africa" Project in the International Institute of Tropical Agriculture (IITA).

**Institutional Review Board Statement:** The study was conducted according to the guidelines of and approved by the International Institute of Tropical Agriculture (IITA).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available because this study has been excerpted from a broader study.

**Conflicts of Interest:** The authors confirm that there are no conflicts of interest.

## References

1. United Nations. World population ageing, 1950–2050. *Choice Rev. Online* **2002**, *40*, 40–1307. [CrossRef]
2. African Development Bank (AfDB); Organization for Economic Co-operation and Development (OECD); United Nations Development Program (UNDP). *African Economic Outlook 2017: Entrepreneurship and Industrialization*; OECD Publishing: Paris, France, 2017; p. 317.
3. Omoju, O.E.; Abraham, T.W. Youth bulge and demographic dividend in Nigeria. *Afr. Popul. Stud.* **2014**, *27*, 352–360. [CrossRef]
4. Food and Administration Organization. *The Future of Food and Agriculture: Trends and Challenges*; FAO: Rome, Italy, 2017.
5. Allen, A.; Howard, J.; Kondo, M.; Jamison, A.; Jayne, T.; Snyder, J.; Tschirley, D.; Yeboah, K.F. *AgriFood Youth Employment and Engagement Study*; Michigan State University: East Lansing, MI, USA, 2016.
6. Ogunmodede, A.M.; Ogunsanwo, M.O.; Manyong, V. Unlocking the potential of agribusiness in Africa through youth participation: An impact evaluation of N-power Agro Empowerment Program in Nigeria. *Sustainability* **2020**, *12*, 5737. [CrossRef]
7. Akande, T. *Youth Unemployment in Nigeria: A Situation Analysis*; Brookings Institution Press: Washington, DC, USA, 2014. Available online: <https://www.brookings.edu/blog/africa-in-focus/2014/09/23/youth-unemployment-in-nigeria-a-situation-analysis/> (accessed on 18 April 2019).
8. Chidiebere, O.-N.; Iloanya, K.; Udunze, U. Youth unemployment and entrepreneurship development: Challenges and prospects in Nigeria. *Kuwait Chapter Arab. J. Bus. Manag. Rev.* **2014**, *4*, 20–35. [CrossRef]
9. Muogbo, U.S.; John-Akamelu, C.R. Impact of entrepreneurial skills in reducing youth unemployment in Nigeria. *Eur. J. Bus. Econ. Account.* **2018**, *6*, 1–12.

10. Ogundele, O.J.K.; Akingbade, W.A.; Akinlabi, H.B. Entrepreneurship training and education as strategic tools for poverty alleviation in Nigeria. *Am. Int. J. Contemp. Res.* **2012**, *2*, 148–156.
11. Olorundare, A.S.; Kayode, D.J. Entrepreneurship education in Nigerian universities: A tool for national transformation. *Asia Pac. J. Educ. Educ.* **2014**, *29*, 155–175.
12. Yami, M.; Feleke, S.; Abdoulaye, T.; Alene, A.D.; Bamba, Z.; Manyong, V. African rural youth engagement in agribusiness: Achievements, limitations, and lessons. *Sustainability* **2019**, *11*, 185. [[CrossRef](#)]
13. Bairwa, S.L.; Lakra, K.; Kushwaha, S.; Meena, L.K.; Kumar, P. Agriprenurship development as a tool to upliftment of agriculture. *Int. J. Sci. Res. Publ.* **2014**, *4*, 1–4.
14. Awogbenle, A.C.; Iwuamadi, K.C. Youth unemployment: Entrepreneurship development programme as an intervention mechanism. *Afr. J. Bus. Manag.* **2010**, *4*, 831–835.
15. Egbefo, D.O.; Abe, M.O. Entrepreneurship education: A vital instrument for youth empowerment, industrial development and consolidation of national integration in Nigeria. *Afr. Res. Rev.* **2017**, *11*, 28. [[CrossRef](#)]
16. Ojo, L.B.; Abayomi, A.A.; Odozi, A.F. Entrepreneurship education: A viable tool for youth empowerment in Nigeria. *Acad. J. Interdiscip. Stud.* **2014**, *3*, 11. [[CrossRef](#)]
17. Okolie, U.C.; Elom, E.N.; Ituma, A.; Opara, P.N.; Ukwu, N.J.; Inyiaagu, E.E.; Ndem, J. Influence of entrepreneurship education on students attaining business development awareness and skills acquisition in Nigeria. *IOSR J. Res. Method Educ. (IOSRJRME)* **2014**, *4*, 37–44. [[CrossRef](#)]
18. Asogwa, O.S.; Dim, E.-M. Entrepreneurship development and unemployment reduction in Nigeria. *Int. J. Bus. Manag. Rev.* **2016**, *4*, 27–43.
19. Adesina, T.K.; Eforuoku, F. Determinants of participation in youth-in-agriculture programme in Ondo State, Nigeria. *J. Agric. Ext.* **2017**, *21*, 80–94. [[CrossRef](#)]
20. Chikezie, N.P.; Omokore, D.F.; Akpoko, J.G.; Chikaire, J. Factors Influencing rural youth adoption of cassava recommended production practices in Onu-Imo local government area of Imo State, Nigeria. *Greener J. Agric. Sci.* **2017**, *2*, 259–268.
21. Kurtz, J.; Kalbe, M.; Langefors, Å.; Mayer, I.; Milinski, M.; Hasselquist, D. An Experimental test of the immunocompetence handicap hypothesis in a teleost fish: 11-ketotestosterone suppresses innate immunity in three-spined sticklebacks. *Am. Nat.* **2007**, *170*, 509–519. [[CrossRef](#)]
22. Ismail, Z. The Impact of Entrepreneurship Training Programmes. Knowledge, Evidence and Learning for Development Report. 2018. Available online: [https://assets.publishing.service.gov.uk/media/5bae3b8040f0b62dbb6c7eef/Impact\\_of\\_\\_Entrepreneurship\\_training\\_\\_programmes.pdf](https://assets.publishing.service.gov.uk/media/5bae3b8040f0b62dbb6c7eef/Impact_of__Entrepreneurship_training__programmes.pdf) (accessed on 12 August 2019).
23. Maigida, J.F.; Saba, T.M.; Namkere, J.U. Entrepreneurial skills in technical vocational education and training as a strategic approach for achieving youth empowerment in Nigeria. *Int. J. Humanit. Soc. Sci.* **2013**, *3*, 303–310. Available online: [www.ijhssnet.com](http://www.ijhssnet.com) (accessed on 13 September 2019).
24. Mohamed, N.A.; Ali Sheikh, A.Y. The influence of entrepreneurship training and financial grant on youth-owned enterprises in Somalia. *Eur. J. Bus. Manag.* **2017**, *9*, 6–16.
25. Musengi-Ajulu, S. What Do We Know About the Entrepreneurial Intentions of the Youth in South Africa? Preliminary Results of a Pilot Study. University of Johannesburg, South Africa. 2008. Available online: [https://www.uj.ac.za/faculties/humanities/Department-of-Social-Work/Documents/DG\\_MusengiAjulu.pdf](https://www.uj.ac.za/faculties/humanities/Department-of-Social-Work/Documents/DG_MusengiAjulu.pdf) (accessed on 10 July 2019).
26. Valerio, A.; Parton, B.; Robb, A. *Entrepreneurship Education and Training Programs around the World: Dimensions for Success*; World Bank: Washington, DC, USA, 2014. Available online: <https://openknowledge.worldbank.org/handle/10986/18031> (accessed on 10 July 2019).
27. Adeyanju, D.F.; Mburu, J.; Mignouna, D. Impact of agricultural programs on youth engagement in agribusiness in Nigeria: A case study. *J. Agric. Sci.* **2020**, *12*, 145. [[CrossRef](#)]
28. Mujuru, J.T.R. Entrepreneurial agriculture for human development: A case study of Dotito irrigation scheme, Mt Darwin. *Int. J. Humanit. Soc. Sci.* **2014**, *4*, 121–131.
29. Rajaei, Y.; Yaghoubi, J.; Donyaei, H. Assessing effective factors in development of entrepreneurship in agricultural cooperatives of Zanjan province. *Procedia Soc. Behav. Sci.* **2011**, *15*, 1521–1525. [[CrossRef](#)]
30. Addo, L.K. Factors influencing agriprenurship and their role in agriprenurship performance among young graduate agriprenurs. *Int. J. Environ. Agric. Biotechnol.* **2018**, *3*, 2051–2066. [[CrossRef](#)]
31. Katrodia, A.; Sibanda, R. Challenges experienced by young entrepreneurs entering the small and medium enterprise sector (SME) in Rajkot region, Gujarat-India. *Acad. Entrep. J.* **2018**, *24*, 1–14.
32. Fayolle, A.; Gailly, B. The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *J. Small Bus. Manag.* **2015**, *53*, 75–93. [[CrossRef](#)]
33. Karanja, B.N. *Influence of Entrepreneurial Training on Performance of Youth Enterprises: A Case of Stryde Project in Nyeri County, Kenya*; University of Nairobi: Nairobi, Kenya, 2014.
34. Kithae, P.P.; Maganjo, R.; Kavinda, L. Impact of entrepreneurship training on performance of micro and small enterprises (MSES) in Kenya: A case study of Embu municipality. *Int. J. Bus. Manag. Rev.* **2013**, *1*, 1–17.
35. Kwena, H.K. *Influence of Lifeskill Training and Mentorship on Youth Empowerment: A Case of Lepta Community Programme for Youth in Mathare Slum, Nairobi, Kenya*; University of Nairobi: Nairobi, Kenya, 2017.
36. Mayuran, L. Impact of entrepreneurship training on performance of small enterprises in Jaffna district. *Glob. J. Commer. Manag. Perspective* **2016**, *5*, 1–6.

37. Ngoru, M. *Entrepreneurial Factors Influencing Performance of Youth Enterprises in Mathare Sub County, Kenya*; United States International University—Africa: Nairobi, Kenya, 2017.
38. Krause, B.L.; McCarthy, A.S.; Chapman, D. Fuelling financial literacy: Estimating the impact of youth entrepreneurship training in Tanzania. *J. Dev. Eff.* **2015**, *8*, 234–256. [[CrossRef](#)]
39. Cho, Y.; Honorati, M. Entrepreneurship programs in developing countries: A meta regression analysis. *Labour Econ.* **2014**, *28*, 110–130. [[CrossRef](#)]
40. Nsikak-Abasi, E.A. Improving welfare of rural farmers through Youth Empowerment Programme. *Int. J. Adv. Agric. Environ. Eng.* **2017**, *4*, 217–220.
41. Bartlett, J.E.; Kotrlík, J.W.; Higgins, C.C. Organizational Research: Determining Appropriate Sample Size in Survey Research. *Inf. Technol. Learn. Perform. J.* **2001**, *19*, 43–50.
42. Mutuku, M.J. *Impact of World Food Programme's Purchase for Progress Pilot Project on Farm Incomes in Uasin Gishu and Narok Counties, Kenya*; University of Nairobi: Nairobi, Kenya, 2014.
43. Heckman, J.J. The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. In *Annals of Econometrics and Social Measurement*; National Bureau of Economic Research: Cambridge, MA, USA, 1976; Volume 5, pp. 475–492. Available online: <http://ideas.repec.org/h/nbr/nberch/10491.html> (accessed on 17 June 2018).
44. Ogunniyi, A.; Bolarin, O.; Oyewale, A.; Kehinde, O. Impact of irrigation technology use on crop yield, crop income and household food security in Nigeria: A treatment effect approach. *AIMS Agric. Food* **2018**, *3*, 154–171. [[CrossRef](#)]
45. Balde, B.S.; Diawara, M.; Rossignoli, C.M.; Gasparatos, A. Smallholder-based oil palm and rubber production in the forest region of Guinea: An exploratory analysis of household food security outcomes. *Agriculture* **2019**, *9*, 41. [[CrossRef](#)]
46. Izuchukwu, O.C. Improved rice technology adoption and household welfare in Nigeria. *J. Rural. Probl.* **2019**, *55*, 63–70. [[CrossRef](#)]
47. Mekonnen, T. *Productivity and Household Welfare Impact of Technology Adoption: Micro-Level Evidence from Rural Ethiopia*; MERIT Working Papers 2017-007; Economic and Social Research Institute on Innovation and Technology (MERIT), United Nations University: Maastricht, The Netherlands, 2017.
48. Jumbe, C.B.L.; Angelsen, A. Forest dependence and participation in CPR management: Empirical evidence from forest co-management in Malawi. *Ecol. Econ.* **2007**, *62*, 661–672. [[CrossRef](#)]
49. Burke, W.J.; Myers, R.J.; Jayne, T.S. A triple-hurdle model of production and market participation in Kenya's dairy market. *Am. J. Agric. Econ.* **2014**, *97*, 1227–1246. [[CrossRef](#)]
50. Barau, A.A.; Adesiji, G.B. Socioeconomic determinants influencing the willingness of agriculture undergraduates to participate in agripreneurship in Northwest Nigeria. *Int. J. Agric. Manag. Dev.* **2018**, *8*, 25–34.
51. Nwibo, S.U.; Mbam, B.N.; Biam, C.K. Determinants of agripreneurship among the rural households of Ishielu Local Government Area of Ebonyi State. *J. Biol. Agric. Healthc.* **2016**, *6*, 3–10.
52. Nnadi, F.; Akwiwu, C. Determinants of youths' participation in rural agriculture in Imo State, Nigeria. *J. Appl. Sci.* **2008**, *8*, 328–333. [[CrossRef](#)]
53. Ayinde, J.O.; Olarewaju, B.E.; Aribifo, D.L. Perception of youths on government agricultural development programmes in Osun State, Nigeria. In *Scientific Papers; Management, Economic Engineering in Agriculture and Rural Development*; University of Agricultural Sciences and Veterinary Medicine Bucharest Romania: Bucharest, Romania, 2016; Volume 16, p. 3.
54. Sudarshanie, S.D.P. Factors Affecting Youth Participation and Satisfaction in Occupation Related to Agriculture. Master's Thesis, University of Moratuwa, Moratuwa, Sri Lanka, 2015.
55. Ohene, V.F. *Determinants of Farmers' Participation in the Youth-in-Agriculture Programme in the Eastern Region of Ghana*; University of Ghana: Accra, Ghana, 2013.
56. Muhammad-Lawal, A.; Omotesho, O.A.; Falola, A. Technical efficiency of youth participation in agriculture: A case study of the youth-in-agriculture. *Niger. J. Agric. Food Environ.* **2015**, *5*, 20–26.
57. Akudugu, M.A. Estimation of the determinants of credit demand by farmers and supply by rural banks in Ghana's upper East region. *Asian J. Agric. Rural Dev.* **2012**, *2*, 189–200.
58. Zezza, A.; Winters, P.; Davis, B.; Carletto, C.; Covarrubias, K.; Quiñones, E.J.; Stamoulis, K.; Karfakis, T.; Tasciotti, L.; Di Giuseppe, S.; et al. Rural household access to assets and agrarian institutions: A cross country comparison. *SSRN Electron. J.* **2007**. [[CrossRef](#)]