Int. j. adv. multidisc. res. stud. 2023; 3(6):1194-1200

Received: 01-11-2023
Accepted: 10-12-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Efficiencies and Barriers in Participating in Cocoa's Farm Business School (FBS) in Nigeria

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Abstract

This study was designed to examine the efficiencies and barriers in participating in Farm Business School (FBS) among cocoa farmers in some selected states in Nigeria. Primary data was collected through direct personal interviews, and with the use of a well-structured questionnaire from 300 sampled cocoa farmers. The data analytical techniques employed in this study include descriptive statistics and Data Envelopment Analysis (DEA). The results from the descriptive statistics for participants and non-participants showed that majority of the farmers were relatively old given life expectancy in Nigeria as 52 years. Participants and non-participants in the study area had a mean age of 54 years. The cocoa farming is been dominated by male farmers. DEA analysis revealed that for constant return to scale technical efficiency (CSRTE), about 18% of the sampled cocoa farms were technically efficient for participants and 10% for non-participants while the remaining cocoa farms were technically inefficient. Considering the Variable Return to Scale TE (VRSTE) orientation, 66% and 48% of the cocoa farms in the sampled area were technically efficient for participants and non-participants respectively. The study further revealed that the farmers in the study area encountered a number of constraints during training and production process. For participants, high cost of transportation, ageing cocoa trees, climate change, and insufficient capital were their major constraints, while high incidence of pests and diseases, high prices of inputs, high cost of transportation, high cost of labour, insufficient working capital, ageing cocoa trees, and low producer prices has their major problems in production process of the non-participants. Based on the findings of the study, reducing FBS constraints in production process is important, training should be encouraged and sustainability of the program, as there is need for collaboration among NGOs to funding programmes and trainings.

Keywords: Barriers, Cocoa, Farm Business School, Efficiency, Participants, Nigeria

1. Introduction

Cocoa (*Theobroma cacao*) holds significant importance as one of Nigeria's key economic crops. In terms of production, Nigeria stands as the fourth-largest producer in Africa, following Cameroon, Ghana, and Côte d'Ivoire. On a global scale, however, Nigeria is positioned as the fifth-largest cocoa producer in the world (Shahbandeh, 2021; Afolayan, 2020) [31, 3]. With great potential to boost the nation's economy (Ogunyemi *et al*., 2022; Akinuli *et al*., 2023) [22, 5], provide jobs for young people, supply raw materials to businesses, and support farmers financially (Yahaya *et al*., 2023) [34], cocoa is one of Nigeria's major cash crops. It has also had a significant impact on the nation's exports and foreign exchange earnings. Though reports of poor output from cocoa production and a fall in the crop's economic significance in Nigeria are depressing, the crop still has the ability to propel agricultural growth in the country (Awoyemi and Aderinoye-Abdulwahab, 2019; Beckett, 2018; Shahbandeh, 2021; Kozicka *et al*., 2018; International Cocoa Organization's (ICCO), 2021) [6, 10, 31, 20, 19] for many years. This decline in a

vital export crop's yield is concerning since it jeopardises the agricultural sector's viability and prospects for the future.

Several approaches and techniques were used to improve the financial security and general well-being of smallholder farmers, which would ultimately lead to a rise in the productivity of cocoa production in Nigeria. Input subsidies and transfers, which involve both monetary and in-kind aid, as well as extension services and knowledge dissemination, are some examples of these schemes. Evaluation of the benefits of extension services is more difficult because of problems including attrition, information spillovers, and the difficulty of assessing knowledge over time. In contrast, the effects of input subsidies have been thoroughly studied (Owoeye *et al*., 2022) [30]. The effort to revive the cocoa sector necessitated the implementation of strategies to counteract the decrease in production. This led to the establishment of the Farmer Business School (FBS), which primarily focuses on enhancing the business acumen of small-scale farmers. The underlying belief is that for these farmers to embrace improved techniques and invest in agricultural production, they must view it as a business entity. Therefore, developing the business skills of farmers becomes essential. At the heart of FBS's 11 modules is the emphasis on income-oriented decision-making, grounded in the cost-benefit analysis of various technologies, coupled with strategic initiatives to broaden income sources (GIZ, 2015) [17]. In essence, the FBS taught farmers how to expand their production techniques and take part in activities that would increase their access to markets, technical services, financial support, supplies, and other resources. Consequently, the goal was to increase their income and, eventually, their level of living. The program's main objectives were to raise farmers' incomes in order to reduce poverty, boost productivity, and improve the nutritional status of agricultural households.

However, there exists a critical need to assess the efficiencies and barriers encountered by stakeholders in participating in Cocoa FBS. Therefore, this study was to evaluate the efficiencies and barriers in participating in cocoa's FBS in Nigeria and specifically to estimate the summary statistics of the variables; to determine the efficiency scores of participants and non-participants; estimate the slacks and excess inputs and; to identify constraints to cocoa production in the area.

2. Materials and Methods

2.1 Study Area

Nigeria has a tropical climate with alternating seasons of rain and sun. The monthly average temperature normally ranges from 24°C (in December and January) to 30°C (in April). The annual average temperature is 26.9°C. The average yearly precipitation is 1,165.0 mm (World Bank, 2021; Olutumise, 2023a) [33, 26]. Nigeria has rain all year round, with April through October seeing the most precipitation and November to March seeing very little (World Bank, 2021) [33]. Globally, Nigeria is the fourth-largest producer of cocoa (Ukpe, 2022) [32]. Small-scale farmers oversee much of Nigeria's agricultural industry, despite the country having certain examples of large-scale crop farming. In the states where it is cultivated, the crop remains an essential source of nutrition for rural populations. The estimates provided by the Centre for Public Policy Alternatives indicate that cocoa is grown on about 800,000 hectares of land in Nigeria (CPPA), 2017) [11]. The bulk of cocoa growers, or over 300,000 of them, are located in the southwestern part of Nigeria and provide about 5% of the world's cocoa production (Centre for Public Policy Alternatives (CPPA), 2017) [11]. Nearly 380,000 metric tonnes of cocoa are produced annually in Nigeria, with the states of Osun, Ondo, and Cross River contributing over 68% of the total (Folarin, 2022) [16].

2.2 Data Collection

The study used a well-crafted questionnaire to gather data from primary sources. Open-ended and closed-ended questions were included in this survey, and in-person interviews with the participants provided the information.

2.3 Sample and Sampling Procedure

A multistage sampling technique was utilised to choose a representative sample of cocoa farmers within the study area. The three states (Ondo, Cross River and Osun) that produced the most cocoa (CPPA, 2017) [11] were purposively selected for the study. The second phase consisted of a random selection of nine communities engaged in cocoa production, with three communities chosen from each State. In the third stage, proportionate sampling was adopted to select the cocoa farmers who were participants of FBS. 10% of the 200 registered participants of FBS from each community of Ondo and Cross River States and 10% of the 100 registered participants of FBS from each community of Osun State were selected. The last stage employed a snowball sampling method to select 20 nonparticipants of FBS from the three communities of Ondo and Cross River States. In contrast, 10 were selected from each of the three communities of Osun State. This sums up to a total of three hundred (300) respondents (150 participants and 150 nonparticipants).

2.4 Data Analysis and Model Specifications

Descriptive statistics such as frequency tables, mean and standard deviation was used in presenting the barriers to productivity in this study while Data Envelopment Analysis (DEA) was used to compare the technical efficiency of participants and non- participants cocoa farmers in FBS.

DEA is a linear programming-based technique for measuring the performance efficiency of organizational units which are termed as Decision Making Units (DMUs). This technique aims to measure how efficiently a DMU uses the resources available to generate a set of outputs (Charnes *et al*., 1978) [12]. Mathematical development of DEA can be traced to Charnes *et al*. (1978) [12] who introduced their basic Charnes- Cooper-Rhodes model (CCR) model based on the works of Farrell (1957) [15] and others. Banker *et al*. (1984) [8] modified this model to account for variable returns to scale conditions, by adding a convexity constraint and introduced their Banker-Charnes- Cooper model (BCC) model. A group of similar organizations refers to a set of homogenous units known as decision making units (DMUs). An input-oriented BCC model is given for N decision making units, each producing M outputs by using K different inputs (Coelli *et al*., 1998) [13].

$$\text{Efficiency} = \frac{\text{Weighted sum of outputs}}{\text{Weighted sum of inputs}} \quad (1)$$

Coelli (1995) [14], indicated that the DEA approach has two main advantages in estimating efficiency scores. First, it does not require the assumption of a functional form to specify the relationship between inputs and outputs. This implies that one can avoid unnecessary restrictions about functional form that can affect the analysis and distort efficiency measures. Second, it does not require the distributional assumption of the inefficiency term. According to Coelli *et al*. (1998) [13], the constant returns to scale (CRS) DEA model is only appropriate when the farm is operating at an optimal scale. But this is assumed to be impossible in a developing country like Nigeria due to many reasons like financial constraints, imperfect competition, and inadequate farm input etc. VRS DEA is more flexible and envelops the data in a tighter way than the CRS DEA. In order to accommodate this problem, Banker *et al*. (1984) [8] introduced the variable returns to scale (VRS) DEA model. Therefore, input oriented VRS model was used in this study to estimate the technical efficiency of cocoa farms in the study area. Following Coelli *et al*. (1998) [13], an input oriented variable return to scale DEA model for estimation of technical efficiency is specified as:
This model is given below:

$$\text{Min}_{\Theta}, \lambda\ \Theta \quad (2)$$

Subject to:

$$-yi + Y\lambda \geq 0 \quad (3)$$
$$\Theta\ xi - X\lambda \geq 0 \quad (4)$$
$$N1' \lambda = 1 \quad (5)$$

Where:
N = number of observation/sample size (300)
Θ = the input technical efficiency score having a value $0 \leq \Theta \leq 1$.
X = an input matrix for i^{th} farms.
y_i = quantity of cocoa output of ith farm (kg)
X_i = Labour (man-day)
X_2 = Farm size (ha)
X_3 = Fertilizer (kg)
X_4 = Agrochemical (litres)
Θ is a scalar,
N1' λ = 1 is the convexity constraint,
N1 is N x 1 vector of constants,
yi is output vector of the i^{th} DMU,
xi is input vector of the i^{th} DMU,
Y is output matrix,
X is input matrix

Due to the fact that VRS DEA is more flexible and envelops the data in a tighter way than the CRS DEA, the VRS TE score was used for measuring efficiency in this study.
Scale Efficiency was estimated following Ogundari and Ojo (2007) [21] and Ijigbade *et al*. (2023) [18] as:

$$SE_i = TE_{i,CRS}/TE_{i,VRS} \quad (6)$$

Where SE = 1 implies scale efficiency or CRS and SE < 1 indicates scale inefficiency.

3. Results and Discussion

3.1 Describe the Socioeconomics Characteristics of the Respondents

Table 1 presented the socioeconomic characteristics of the cocoa farmers in the area. It was revealed that the average age of the Farmers Business School (FBS) participants and non-participants was about 54 years. The average life expectancy in Nigeria is 52 years (World Fact Book, 2015; Olutumise and Ajibefun, 2019 [23]). This shows that majority of these farmers are too old. This might tend to affect their farming activities which may make them rely on hired labour. The result shows that participants and non-participants were majorly males with 80% and 84%, respectively. Sabo (2006) reported that women undertook 60.0 – 90.0% of the rural agricultural product processing and marketing, thereby providing more than two thirds of the workforce in agriculture. More energy-demanding tasks such as spraying of agro-chemicals, pruning, and harvesting of ripe cocoa pods were men tasks in the study area. In other words, it implies that cocoa farming is a male-dominated enterprise (Oseni *et al*., 2018) [29]. About 93.3% and 92% of participants and non-participants in the study area were married. The implication of this is that farmers in the study area are matured and can effectively take crucial decisions jointly with their spouses. This will also afford them the opportunity of getting family labour to be used on the farm (Oseni and Adams, 2013; Badamosi *et al*., 2023, Adegoroye *et al*., 2023) [28, 7, 34]. The results also indicated that majority (90.7%) of the FBS participants had at least primary school education while about 88.7% of the non-participants had at least primary school education. This implies that, cocoa farmers are literates and communication among them will be easier. They might be ready and willing to adopt innovation in cocoa production. This result is in agreement with Fregene *et al*. (2011) and Oseni *et al*. (2018) [29]. The participants and non-participants had a mean household size of 8.01 and 8.02 persons, respectively. A large family size is significant in the agricultural sector (Sule *et al*. 2002; Adegoroye *et al*., 2021), in terms of reducing the cost of hiring labour and thereby increasing profitability. The participants had an average of 29 years farming experience while non-participants had an average of 25 years of farming experience. However, Ohen *et al*. (2014) and Bankole *et al*. (2018) [9] opined that farmers with reasonable level of experience in farming have sound decision making. Farming experience among the group differ significantly, it was also found out that cocoa farmers in Cross river and Ondo state are more experienced in cocoa production practices than cocoa farmers in Osun state. GPS was used to identify the sizes of cocoa farms in the study area. The farm size of both participants and non-participants of FBS was small, but the participants still display a larger farm size than its counterpart. Participants and non-participants had a mean farm size of 2.16 and 1.81 ha respectively. Therefore, Adisa and Adeloye (2012) opined that most small cocoa farms might be connected with the land fragmentation caused by inheritance. The study also showed that Ondo state displayed a large farm size among the selected three states which is also similar to the findings of Ajayi and Olutumise (2018) [4] in Ondo State, Nigeria.

Table 1: Summary of the Socioeconomic Characteristic of the Respondents

Variable	FBS Participants	Non-participants
Age (years)		
Mean	54.33	54.03
Minimum	34	29
Maximum	74	75
Sex		
Male	80%	84%
Marital Status		
Married	93.4%	91.9%
Level of Education		
Educated	91.7%	81.7%
Mean	3.32	3.26
Household Size		
Mean	8.01	8.02
Minimum	1	3
Maximum	25	23
Farming Experience (Years)		
Mean	28.96	24.9
Minimum	10	2
Maximum	58	48
Farm Size (Hectares)		
Mean	2.16	1.81
Minimum	0.50	0.50
Maximum	15.00	8.00

3.2 Efficiencies of participating and non-participating cocoa farmers in FBS

3.2.1 Respondents CRSTE, VRSTE and Scale Efficiency Scores

Table 2: Result of Efficiency Scores by CRSTE, VRSTE and Scale Efficiency

Efficiency Scores	CRSTE (%)		VRSTE (%)		SE (%)	
	FBS	NFBS	FBS	NFBS	FBS	NFBS
<0.50	8.7	13.3	5.0	25.2	11.6	14.3
0.50 - 0.59	15.0	14.4	3.7	5.0	12.4	6.2
0.60 - 0.69	21.6	15.1	1.6	4.2	33.8	5.2
0.70 – 0.79	17.3	15.7	11.7	10.3	7.3	14.5
0.80 – 0.89	4.2	16.1	5.3	4.2	4.0	6.8
0.90 – 0.99	15.0	15.1	6.8	3.0	9.4	7.3
1.00	18.2	10.3	65.9	48.1	21.5	5.8
Mean	0.571	0.476	0.899	0.795	0.648	0.703
Min	0.12	0	0.03	0	0.07	0
Max	1.00	1.00	1.00	1.00	1.00	1.00

Note: CRSTE=Constant return to scale technical efficiency
VRSTE=Variable return to scale technical Efficiency
SE = Scale Efficiency
Source: Field Survey, 2020

Table 2 shows the results of the input-oriented DEA analysis of sampled cocoa farms in the study areas; it revealed that for Constant Return to Scale TE (CSRTE), about 18% of the sampled cocoa farms were technically efficient for participants in FBS and 10% for non-participants while the remaining cocoa farms were technically inefficient. Considering the Variable Return to Scale TE (VRSTE) orientation, 66% and 48% of the cocoa farms in the sampled area were technically efficient for participants and non-participants in FBS respectively. On the scale efficiency, about 21% and 6% of the sampled cocoa farms were scale efficient for participants and non-participants in FBS respectively while the remaining 79% and 94% were scale inefficient. The DEA output revealed that 18.2% and 10% of the sampled cocoa farms of participants were both technically and scale efficient, although the participants being more efficient. This means that those cocoa farms that fell into this category are operating at the most productive scale size (MPSS). For the inefficient farms, the causes of the inefficiency may either be that the farms are not taking advantage of the economies of scale (inappropriate scale) or are engaged in inefficient combination of inputs (misallocation of resources).

3.2.2 Respondents Input slacks and Number of Farms Using Excess Inputs

Table 3 shows the mean input slacks and excess input used. Since a slack indicates excess of an input, a farm can reduce its expenditure on an input by the amount of slack without reducing its output. Total labour for non-participants displayed a mean slack of approximately 40 man/day among 134 inefficient farms, farm size display a mean size of 1.43 ha among 132 inefficient farms for non-participants, fertilizer on the other hand displayed a mean slack of 32.43 kg and 256.49 kg among 31and 134 inefficient farms for participants and non-participants. This inefficient spending and over-use of resources may be due to the fact that some cocoa farmers still showed traditional behaviour in using agricultural inputs. For example, farmers still choose the amount of input in the use of agrochemicals, fertilizer application, estimating the quantity of land and labour required for production based on personal and ancient experiences rather than relying on prescriptions and FBS manual.

Table 3: Input slacks and Number of Farms Using Excess Inputs

Inputs	Number of Farms		Mean Slack	
	FBS	NFBS	FBS	NFBS
Labour (man/days)	0	134	0.00	40.909
Farm size (ha)	0	132	0.00	1.43
Fertilizer(kg)	31	134	32.432	256.490
Agrochemical (Liters)	52	134	0.986	1.988

Source: Field Survey, 2020

3.3 Barriers to the Cocoa Productivity in the Are

3.3.1 Constraints Encountered by the Participants in Training and Learning Process

Table 4 revealed FBS participants responses based on the problems they encountered during the training and learning process. The table showed that the farmers have constraints in terms of: insufficient capital, inadequate/insufficient training materials, lack of adequate information, language barrier, shortage of competent facilitator, and conflicts during trainings. Majority of the participants (62.7%) were faced with insufficient capital. This constitute a major problem because insufficient capital can defeat the purpose of the programme.

Table 4: Distribution of Participants According to the Constraints Encountered in Training and Learning Process

Constraints	Frequency	Percentage	Rank
Insufficient Capital	94	62.7%	1st
Lack of adequate information	19	12.7%	3rd
Inadequate/Insufficient training materials	13	8.7%	5th
Conflicts during training	22	14.7%	2nd
Shortage of competent facilitator	5	3.3%	6th
Language Barrier	18	12%	4th

***Multiple Responses**
Source: Field Survey, 2020

3.3.2 Identified Participants Constraints to Cocoa Production in the Study Area

Table 5 shows the various problems encountered by participants in cocoa production. Their main constraints include: high cost of transportation (66%), ageing cocoa trees (48.7%), climate change (46.7%), and insufficient capital (44.7%), while other problems such as high incidence of pests/disease, low producer prices, shortage of farm labour, high prices of inputs, and poor storage facilities were minor problems. This has resulted in some perceived effects such as: crop loss, increase cost of production, reduction in farm income and output.

Table 5: Distribution of Participants According to the Problems Encountered in Cocoa Production

Cocoa Production Problems	Frequency	Percentage	Rank
Ageing cocoa trees	73	48.7%	3rd
High cost of transportation	99	66.0%	1st
High incidence of pests and diseases	56	37.3%	6th
Climate change	70	46.7%	4th
Insufficient working capital	67	44.7%	5th
Poor storage facility	22	14.7%	10th
High price of inputs	34	22.7%	9th
Shortage of farm labour	41	27.3%	8th
Low producer prices	48	32%	7th
High cost of labour	83	55.3%	2nd
***Multiple Responses**			

Source: Field Survey, 2020

3.3.3 Identified Non-Participants Constraints to Cocoa Production in the Study Area

Table 6 showed the various problems encountered by non-participants in their cocoa production. They were ranked in other of significance. According to Fatuase (2014), Olutumise (2020) [24], Olutumise (2022) [25] and Oparinde *et al*. (2023) [27], most of these constraints are associated with poverty and negligence in agricultural sector by the government. Their major constraints were: high incidence of pests and diseases, high prices of inputs, high cost of transportation, high cost of labour, insufficient working capital, ageing cocoa trees, and low producer prices. Poor storage facilities was the least of their problems, and was reported by 32%. In other words, non-participants are faced with greater challenges compared to their FBS counterpart. This has a detrimental consequence on the income and output of non-participating farmers. According to Oguntade *et al.* (2013), this is because the FBS had been trained to optimize the use of agrochemicals and to rely more on appropriate cultural practices like pruning of chupons and optimal shading level to control pests and diseases.

Table 6: Distribution of Non- Participants According to the Problem Encountered in Production Process

Cocoa Production Problems	Frequency	Percentage	Rank
Ageing cocoa trees	100	66.7%	8th
High cost of transportation	114	76%	4th
High incidence of pests and diseases	125	83.3%	1st
Climate change	107	71.3%	6th
Insufficient working capital	114	76%	4th
Poor storage facility	48	32%	10th
High price inputs	119	79.3%	2nd
Shortage of farm labour	105	70%	7th
Low producer prices	99	66%	9th
High cost of labour	118	78.7%	3rd
***Multiple Responses**			

Source: Field Survey, 2020

4. Conclusion

To increase efficiency among cocoa farmers, there is need to facilitate learning through specific knowledge and skills, and experiment learning framework. Thus, this study was designed to examine the efficiencies and barriers in participating in Farm Business School (FBS) among cocoa farmers in some selected states in Nigeria. Primary data was collected through direct personal interviews, and with the use of a well-structured questionnaire from 300 sampled cocoa farmers (participants and non-participants in Farmers Business School in the study area). The data analytical techniques employed in this study include descriptive statistics and Data Envelopment Analysis (DEA). The results from the descriptive statistics for participants and non-participants showed that majority of the farmers were relatively old given life expectancy in Nigeria as 52 years. Participants and non-participants in the study area had a mean age of 54 years. This might tend to reduce their effectiveness in carrying out their farming activities which may make them rely on hired labour. The cocoa farming is been dominated by male farmers. DEA analysis revealed that for constant return to scale technical efficiency (CSRTE), about 18% of the sampled cocoa farms were technically efficient for participants and 10% for non-participants while the remaining cocoa farms were technically inefficient. Considering the Variable Return to Scale TE (VRSTE) orientation, 66% and 48% of the cocoa farms in the sampled area were technically efficient for participants and non-participants respectively. The study further revealed that the farmers in the study area encountered a number of constraints during training and production process. For participants, high cost of transportation, ageing cocoa trees, climate change, and insufficient capital were their major constraints while other problems such as high incidence of pests/disease, low producer prices, shortage of farm labour, high prices of inputs, and poor storage facilities were minor problems in cocoa production. In the case of the non-participants they stated: high incidence of pests and diseases, high prices of inputs, high cost of transportation, high cost of labour, insufficient working capital, ageing cocoa trees, and low producer prices has their major problems in production process. It was however discovered that non-participants are faced with greater challenges in production process compared to their FBS counterpart. The result of the hypothesis showed that there is significant difference between the income of participants and non-participants of FBS at 1% level of significance in the study area. In line with the evidence resulting from the result from this study, it can be concluded that farmers still excess on the transportation and labour, and cocoa production is still in the hands of relatively aged farmers with more males involved in the production with majority having small farm sizes in the study area. The mean scale efficiency of the sample farms is relatively high and it could be concluded that inefficiencies are mostly due to improper input use and some level of inappropriate scale. The study also concluded that participants made more profit than the non-participants. Cocoa farming and production is threatened by high cost of transportation, ageing cocoa trees, climate change and insufficient capital. This has resulted in some perceived effects such as: crop loss, increase cost of production, reduction in farm income and output. Based on the findings of the study, it can be recommended that reducing FBS

constraints in production process is important, training should be encouraged and sustainability of the program, as there is need for collaboration among NGOs to funding programmes and trainings. Again, research institutes and other agencies of government should improve upon their services of creating awareness for cocoa farmers so as to encourage participation of more farmers in the training programme.

5. References

1. Adegoroye A, Olutumise AI, Aturamu OA. Determinants of Food Security Status and Coping Strategies to Food Insecurity among Rural Crop Farming Households in Ondo State, Nigeria. European Journal of Nutrition & Food Safety. 2021; 13(7):39-50.
2. Adegoroye A, Olubunmi-Ajayi TS, Akinbola AE, Oguntuase DT. Socioeconomic and performance of agripreneurs: A case study of dried melon value chain in Owo local government of Ondo State, Nigeria. International Journal of Management & Entrepreneurship Research. 2023; 5(12):851-862.
3. Afolayan OS. Cocoa Production Pattern in Nigeria: The missing link in Regional Agro-Economic Development. Analele Universităţiidin Oradea, Seria Geografie. 2020; 30(1):88-96. Doi: https://doi.org/10.30892/auog.301110-815.
4. Ajayi CO, Olutumise AI. Determinants of Food Security and Technical Efficiency of Cassava Farmers in Ondo State, Nigeria. International Food and Agribusiness Management Review. 2018; 21(7):915-928.
5. Akinuli BO, Osagiede M, Adegoroye A, Mope C, Oluwatosin AO. The influence of Deposit money on agricultural financing in Nigeria. ISRG Journal of Economics, Business & Management. 2023; 11(2):10-17.
6. Awoyemi AO, Aderinoye-Abdulwahab SA. Assessment of the use of cocoa production management practices among Cocoa farmers in Ekiti State, Nigeria. Agro-Sci. J. Trop. Agric. Food, Environ. Ext. 2019; 18(2):37-41. Doi: https://doi.org/10.4314/as.v18i2.7.
7. Badamosi AP, Olutumise AI, Olukoya OP, Adegoroye A, Aturamu OA. Socioeconomic impacts of flooding and its coping strategies in Nigeria: Evidence from Dagiri community, Gwagwalada area council of Abuja. Natural Hazards Research, 2023. Doi: https://doi.org/10.1016/j.nhres.2023.09.010
8. Banker RD, Charnes A, Cooper WW. Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. Manage. Sci. 1984; 30(9):1078-1092.
9. Bankole AS, Ojo SO, Olutumise AI, Garba ID, Abdulqadir MI. Efficiency Evaluation of Small Holders Palm Oil Production in Edo State, Nigeria. Asian Journal of Agricultural Extension and Sociology. 2018; 24(4):1-9.
10. Beckett ST. The science of chocolate: Edition 3. Published by Royal Society of Chemistry, 2018.
11. Centre for Public Policy Alternatives (CPPA). Cocoa Production in Nigeria: A Literature Review. CPPA, 2017. https://cpparesearch.org/cocoa-production-in-nigeria/#_ftn4.
12. Charnes A, Cooper WW, Rhodes E. Measuring the Efficiency of Decision-Making Units. Eur. J. Oper. Res. 1978; 2:429-444.
13. Coelli TJ, Prasada Rao DS, Battese GE. An Introduction to Efficiency and Productivity Analysis, Kluwer Academic Publishers, Boston, 1998, p271.
14. Coelli TJ. A Guide to DEAP Version 2.1: A Data Envelopment Analysis (computer) Program CEPA Working Paper 96/08, Department of Econometrics, University of New England, Armidale, Australia, 1995.
15. Farrell MJ. The Measurement of Productive Efficiency, J. Royal Stat. Soc. Ser. A, 1957, 253-290.
16. Folarin A. Which State is the Largest Producer of Cocoa in Nigeria? Veggie Concept, 2022. https://veggieconcept.ng/which-state-is-the-largest-producer-of-cocoa-in-nigeria/.
17. GIZ. Experience WITH farmer business school approach in Africa. A report submitted to the Working Group Agribusiness and Food Security on 5th April, 2015, 2015.
18. Ijigbade JO, Olutumise AI, Toluwase SOW, Awoseyila F, Aturamu OA. Assessing the efficiency and profitability potentials of honey input supply: The case of South West Nigeria. Tropical Agriculture. 2023; 100(4):351-364. Doi: https://doi.org/10.37234/.
19. International Cocoa Organization's (ICCO). Revised forecasts for the 2020/21 cocoa year and revised estimates of world production, grindings, and stocks of cocoa beans for the 2019/20 cocoa year. Quarterly bulletin of Cocoa Statistics. 2021; 2(47). Retrieved on June 25, 2023.
20. Kozicka M, F Tacconi D. Horna, Gotor E. Forecasting cocoa yields for 2050. Bioversity International, Rome, Italy, 2018, p49.
21. Ogundari K, Ojo SO. An Examination of Technical, Economic and Allocative Efficiency of Small Farms: The Case Study of Cassava Farmers in Osun State of Nigeria. Bulgarian Journal of Agricultural Science. 2007; 13:185-195.
22. Ogunyemi AI, Olutumise AI, Adegoroye A. The extent of Vulnerability to Food Insecurity and Household Coping Strategies: Case of Yam Farmers in Ekiti State, Nigeria. Turkish Journal of Agriculture-Food Science and Technology. 2022; 10(10):1921-1928.
23. Olutumise AI, Ajibefun AI. Evaluation of Poverty Status and Time-Taken to Exit Poverty among Food Crop Farmers in Nigeria. Journal of Agricultural Faculty of Gaziosmanpasa University. 2019; 36(2):97-106.
24. Olutumise AI. Transportation System and Output Market Participation Nexus among Yam Producers in Southwest Region of Nigeria. Scientific Paper Series Management, Economic Engineering in Agriculture and Rural Development. 2020; 20(4):365-379.
25. Olutumise AI. Determinants of market participation and preference for production of pepper (Capsicum spp.) among farmers in southwest, Nigeria. Heliyon. 2022; 8(9):e10585.
26. Olutumise AI. Impact of credit on the climate adaptation utilization among food crop farmers in Southwest, Nigeria: Application of endogenous treatment Poisson regression model. Agricultural and Food Economics. 2023; 11(1):7.
27. Oparinde LO, Olutumise AI, Adegoroye A. Does Agroforestry Technology Adoption Affect Income Inequality among Arable Crop Farmers in Southwest,

Nigeria? A Gender Perspective. Sarhad Journal of Agriculture. 2023; 39(4):848-860.
28. Oseni JO, Adams AQ. Cost Benefit Analysis of Certified Cocoa Production in Ondo State, Nigeria. A 4th International Conference of the African Association of Agricultural Economist, Hammamet, Tunisia, 2013.
29. Oseni JO, Olutumise AI, Olutumise BO. Performance Evaluation of Cocoa Marketing in Osun State, Nigeria. Journal of Perspectives on Financing and Regional Development. 2018; 6(1):97-112.
30. Owoeye RS, Sekumade AB, Didunyemi Adekunle John, Falade MJ. Analysis of farmers' business school participation on cocoa productivity in Ondo State, Nigeria," International Journal of Agriculture and Environmental Research. Malwa International Journals Publication. 2022; 8(6).
31. Shahbandeh M. Cocoa bean production worldwide 2018/19 & 2020/21 by country, 2021. Retrieved from: https://www.statista.com/statistics/ 263855/cocoa-bean-production-worldwide-by-region/.
32. Ukpe W. FG forecasts cocoa production to rise to 500,000 tonnes annually by 2024. Nairametrics, 2022. https://nairametrics.com/2022/06/08/fg-forecasts-cocoa-production-to-rise-to-500000-tonnes-annually-by-2024/.
33. World Bank. World Bank Climate Change Knowledge Portal, 2021. Climateknowledgeportal.worldbank.org. https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-historical.
34. Yahaya A, John SA, Adegoroye A, Olorunfemi OA. Stock market liquidity and volatility on the Nigerian Exchange Limited (NGX). World Journal of Advanced Research and Reviews. 2023; 20(3):147-156.