International Journal of Agriculture, Environment and Bioresearch

Vol. 10, No. 01; 2025

ISSN: 2456-8643

TECHNICAL EFFICIENCY OF MICRO – AGRO FEMALE HEADED HOUSEHOLD CASSAVA FARMERS IN AKWA IBOM STATE NIGERIA: A STOCHASTIC FRONTIER PRODUCTION FUNCTION MODEL APPROACH

[1]Anthony, I. Nwanneamaka KAINE, [2]John, Ofiaju ABOJEI and [3]Ifeoma, Abigail AJIE

[1]Department of Agricultural Economics and Extension, National Open University of Nigeria, Kaduna, Nigeria

[2]Department of Agricultural Economics and Agribusness Dennis Osadebay University, Anwai, Asaba, Nigeria

[3]Department of Library and Information Science, National Open University of Nigeria, Abuja

Corresponding Author: E-mail: akaine@noun.edu.ng , Telephone: 08038822372

https://doi.org/10.35410/IJAEB.2025.5960

ABSTRACT

The study examined the technical efficiency of micro – agro female headed household cassava farmers in Akwa Ibom State Nigeria using a Stochastic Frontier Production Function Model Approach. Structured questionnaire was used to obtain the primary source of data. Multi – stage random sampling technique was used to select the Local Government Areas, communities and the farmers that were used for the study. The result established that the farmers were relatively young, literacy level was high, household size was small and that cassava farming in the study was not gender specific. The result of the farm size obtained supported the conclusion that the crofters were micro – agro cassava farmers. The result of the technical efficiency estimate of the micro – agro female headed household cassava farmers showed that coefficients of farm size, expenditure on cassava stem and labour were positive significant determinants of technical efficiency. The coefficient of depreciation was inversely related to efficiency. Technical inefficiency result indicated that the coefficients of age and education were positive. Household size had a positive sign of coefficient. Farmers with longer years of farming experience were more technical efficient. Farm size had a negative coefficient. Based on the study of technical efficiency of the farmers, increasing the farm size, expenditure on cassava cuttings and labour will lead to increase in efficiency. A reduction in the use of the production resource (depreciation) was strongly advocated. Youths in the study area embracing cassava production, will increase efficiency with an upturn in production and output. A reduction in the use of labour cost as a productive resource was also necessary to reduce inefficiency.

Keywords: Technical efficiency, Female headed, Micro – agro, Cassava, Household, farmers and stochastic frontier production.

1. INTRODUCTION

The contribution of the agricultural sector to the economic growth and development of Nigeria has been documented. It has been reported that this is the only sector that not only contributed up to 60% of the total GDP of the economy and earned over 70% of the foreign exchange but provide the basic necessity of man (Kaine, *et al.*, 2024, Abojei *et al.*, 2023, Gbigbi, 2021 and Kaine and Ume, 2017). Agricultural production therefore is not gender specific.

Women participation in agricultural piroduction has been documented. They are involved in diverse agricultural enterprises. In cronp production, women are active in different activities ranging from pre – planting operations, planting operations up to post – planting and including post – harvest operations. Satyavathi *et al.*, (2010), reported that women are increasingly involved in agricultural production and productivity. The authors further stated that women are important in agriculture and economic development of Nigeria. The authors also stated that women are the physical driving power of the nation's economy and are essential for economic and sustainable development of any nation.

Researches has shown that cassava production in Nigeria is in the hands of micro agro farmers who are low resource based with females participating actively (Isitor *et al* 2017 and Ezebuiro, *et al.*, 2008) Cassava crop is very important in the provision of the much needed energy by man. It provides about 80% of the total energy intake of many Nigerians (Adewumi *et al.*, 2023 and Ani, 2017). Despite the significance of the crop, most people still regard it as a woman crop as they play very important role in its production, processing and marketing among others (Adewumi *et al.*, 2023 and Walker, *et al*., 2014)

Maligina *et al*., (2015) considered efficiency as the measurement of the methods used in changing a given amount of input to output. Attainment of efficiency is achieved by maximizing the use of scarce resources to produce a given amount product. It is the ability to obtain maximum output from an input vector. Maximum efficiency therefore is attained when in the course of production, it is not possible to reallocate resources without reducing the aggregate worth of output (Kumbhakar *et al*., 2001). To Ogundari, (2014) and Asogwa *et al* (2011), efficiency is regarded as the ratio of output to a given amount of input. On the other hand, technical inefficiency may arise when the output from a given mix of resources is less than the expected possible output. Alabi and Osifo (2005) opined that inefficiency in agriculture may be due to subsistence needs, socio – economic and demographic variables among others.

It is certain that various studies have been conducted to examine different aspects of productivity and technical efficiency in cassava production, processing and utilization, but, it is not definite that studies have been carried out with veneration to technical efficiency of micro – agro female headed household cassava farmers in Akwa Ibom State Nigeria: A Stochastic Frontier Production Function Model Approach. It is against this background that this study was carried out to examine the socio – economic characteristics of micro – agro female headed household cassava farmers in the study area, determine the coefficients of efficiency of the farmers and establish production inefficiency among the farmers.

2. METHODOLOGY

2.1 Study area and Data Source

The study was conducted in Akwa Ibom State, South – South geo – ecological zone Nigeria. Akwa Ibom State has a total population of three million, nine hundred and two thousand and fifty one (3,902,051) people (National Population Commission (NPC) 2006). The male population was recorded to be one million, nine hundred and eighty three thousand, two hundred and two (1,983,202) while the female population was one million, nine hundred and eighteen thousand, eight hundred and forty. The total projected population figure of the state figure using a 3.2 percent growth rate as at 2021was six million, four hundred and seventy seven thousand four hundred and five (6,477,405) comprising of three million, two hundred and ninety two thousand, one hundred and fifteen (3,292,115) male and one million, nine hundred and eighteen thousand, eight hundred and forty nine (1,918,849) female.

Primary source of data was used to collect the data that was used for the study using a well-structured questionnaire. M ulti – stage random sampling approach was used to select the Local Government Areas, communities and farmers that were used for the study. The first stage

Vol. 10, No. 01; 2025

ISSN: 2456-8643

involved selection of Local Government Area. Ten (10) Local Government Areas were randomly selected and used for the study. Second stage involved the selection of communities. Four (4) communities were randomly selected from each of the selected Local Government Areas. Third stage involved selection of farmers. Six (6) farmers were randomly selected from each of the selected community and used for the study. A sample size of one hundred and twenty (120) farmers were randomly selected and used for the study. Descriptive statistics and Stochastic Frontier Production Function Model was used to determine the data obtained.

2.2 Model Specification

2.2.1 Stochastic Frontier Production Function Model

The empirical model of stochastic frontier production function that was used for the study was specified as

$InQ = a_0 + \beta_2 InX_{2ji} + \beta_3 InX_{3ji} + \beta_4 InX_{4ji} + \beta 5InX5ji + \beta_6 InX_{6ji} + \beta_7 InX_{7ji} + \beta_8 InX_{8ji} + \beta_9 InX_{0ji} + \beta_{10} InX_{10ji}$

The subscripts i refers to the i – th farmer

Where

Q = Total quantity of cassava produced (output) (kg)

X_1 = Farm size (ha)

X_2 = Expenditure on cassava cuttings (₦)

X_3 = Labour

X_4 = Capital – Depreciated value of implement (₦)

V_1 = A random error term independently and identically distributed with

Mean zero and $ðv^2$, intended to capture events beyond control of the farmers

U_i = Non-negative random variable called technical effects associated with technical inefficiency of the farmers involved. It is assumed to arise from a normal distribution with a mean variance $ðv^2$, which truncated at zero.

If U_i = O no allocative inefficiency occurs, the production lies on the Stochastic frontier

If $U_i > 0$, production lies below the frontier and is efficient.

2.2.2 Inefficiency Model

The average level of technical efficiency measured by the mode of truncated normal distribution (ie U_i) is a function of socio – economic factors as shown in the equation below. $U_i = a_o + a_1 z_1 + a_2 z_2 + a_3 z_3 + a_4 z_4 + a_5 z_5$

Where U_i = Inefficiency function

Z_1 = Age of farmer (years)

Z_2 = Marital status

Z_3 = Education

Z_4 = Household size (number)

Z_5 = Years of farming experience (years)

Z_6 = Farm size (ha)

Z_7 = No of workers

Z_8= Labour cost (N)

a's, β's and Y's coefficients are unknown parameters which are expressed in term of

$d^2 = dv^2 + du^2 \quad y = du^2/ds^2$

Where the y - parameter has value between zero and one. The parameters of stochastic frontier production function model were obtained by Maximum Likelihood estimation model using the Computer Progra11: FRONTIER VERSION 3.1.

3. RESULTS AND DISCUSSION

3.1 Socio – Economic Characteristics of the Farmers

The socio – economic characteristics of the farmers was considered and determined. The result confirmed that the farmers were relatively young. One hundred and twelve (112) (93.34%) of the farmers were below the age of fifty (50) years. Young farmers were receptive to innovations, adoption of new technologies and economically viable (Udoh, 2005). Marital status examined revealed that sixty eight (68) (56.67%) of the farmers were married while fifty two (52) (34.33%) were not married. This implied that cassava farming was not gender specific. The household size estimated showed that seventy seven (77) (64.17%) had a household size range of 0 – 4. This indicated that household size was small. The variable educational attainment studied revealed that eighty one (81) (67.50%) of the farmers acquired one form of education or the other. On the other hand, thirty nine (39) (32.50%) had no formal education. It implied that literacy level of the farmers was high. A further analysis of the farming experience showed that one hundred and three (103) (90.23%) of the respondents had a farming experience of not less than ten (10) years. This implied that the farmers were well experienced in cassava farming enterprise. The result of the farm size determined showed that sixty five (65) (54.17%) of the farmers had a farm size range of 0 – 1 hectare, twenty nine (29) (24.17%), nineteen (19) (15.83%) and seven (7) (5.83%) had a firm size range of 2 -3, 4 – 5 and above 6 respectively. The result established that the respondents in the study area were micro – agro cassava farmers.

Table 1. Socio – economic characteristics of the farmers **∑n = 120**

Characteristics	Frequency	Percentage
Age (Categories)		
20 – 30	26	21.67
31 – 40	32	26.67
41 – 50	54	45.00
50 and above	08	6.67
Marital Status		
Married	68	56.67
Single	52	34.33
Household Size		
0 – 4	77	64.17
5 – 9	19	15.83
10 – 14	15	12.50
15 and above	09	7.50
Education attainment		
Informal	39	32.50
Formal	81	67.50
Farming Experience		
1 – 5	07	5.83
6 – 10	10	8.33

Vol. 10, No. 01; 2025

ISSN: 2456-8643

11 – 15	58	48.33
16 – 20	12	14.40
20 and above	33	27.50
Farm Size		
0 – 1	65	54.17
2 – 3	29	24.17
4 – 5	19	15.83
6 and above	07	5.83

Source: Computed from field survey, 2023

3.2 Technical Efficiency Estimation of Female Headed Household Cassava Farmers

Technical efficiency of the farmers was determined using the maximum likelihood estimate of the stochastic frontier production function. The sigma (0.23) obtained was statistically different from zero at 5% (critical t = 4.40) significance. This indicated goodness of fit and correctness of the specified assumption of composite error term. Gamma coefficient (0.05), was significant at 5% level of significance which indicated that about 5% variation in output resulted from inefficiency effects. This suggested that the unexplained variation was due to the relatively unimportant variables that were not included in the model. Alabi (2002) observed a similar result among male cocoa farmers in Oyo State, Nigeria.

Result of the coefficients of farm size (0.28), expenditure on cassava stem (0.04) and labour cost (0.69) were positive and significant determinants of technical efficiency farmers in the study area. This implied that increasing the variables will lead to a proportionate increase in the quantity of cassava produced. It also implied that an increase in any of these variables will lead to increase in the quantity of cassava produced. Specifically, the coefficient of farm size (0.28) indicated that the larger the farm, the higher the technical efficiency. It also implied that large farm size leads to efficient allocation of scarce resources, increased benefits of economies of scale and improved productivity. Increasing spending on quality of cassava will also enhance higher technical efficiency as a result proper pre planting and post planting management practices and higher yields. Coefficient of labour cost (0.69) indicated that labour inputs were important variables in improving technical efficiency. It also implied that that farms or farmers that invested more in labour were more technical efficient.

The positive coefficient of farm size obtained in this study was in consonance with the *a priori* expectation that the larger the farm size, the higher the output *ceteris paribus*. The affirmative correlation between the variables (farm size and labour cost) and output was inconsonance with that observed by Simpa *et al.,* (2014) among cassava farmers in Kogi State, Nigeria and Ehinmowo and Ojo (2014) among small scale cassava processors in South – West, Nigeria. Aminu *et al*., (2017), however reported an inverse relationship between labour cost and technical efficiency of cassava processors in Lagos State, Nigeria.

The coefficient of the variable depreciation (- 0.89) was negative but significant determinant of technical efficiency.. This implied an inverse relationship between the variable and output. It also implied that a 1% or unit increase in the variable will lead to a less than proportionate increase in output. Ume and Kaine (2021) observed a negative relation between capital (depreciation) and output of cassava. The negative sign of coefficient of depreciation obtained in this study was not in line with that obtained by Aminu *et al*., (2017), Dzever *et al* (2016), Ehinmowo and Ojo (2014) and Kaine, *et al*., (2009).

Vol. 10, No. 01; 2025

ISSN: 2456-8643

Table 2: Maximum Likelihood Estimate of Stochastic Frontier Production Function

Production Model	coefficient	standard-error	t-ratio
Variables			
Constant	11.29	1.02	11.08
Farm size	0.28	0.32	0.90
Cost of cassava cuttings (₦)	0.04	0.25	0.14
Labour cost	0.69	0.34	2.05
Depreciation cost	-0.89	0.34	-2.61
Sigma-squared	0.23	0.05	4.40
Gamma	0.05	0.06	0.90

Source: Computed from field survey, 2023
log likelihood function = -31.56

3.3 Technical Inefficiency Estimate of Female Headed Household Cassava Farmers

The production inefficiency effects among the female headed household cassava farmers were those specified in the model that were related to the socio – economic variables of the farmers. The estimated coefficient of age (0.00) was established to be positive and statistically significant at 5% level of significance. The positive sign implied a reduction in technical efficiency and thereby increasing technical inefficiency. It also implied that the older cassava farmers were more technical inefficient than the younger farmers. This result agreed with Kaine, (2020), Aminu *et al*., (2017) and Mohammed and Isgin (2016). However, it was not in consonance with the studies carried out by Dzever *et al*., (2016) and Ume and Kaine (2021).

The result of the coefficient of marital status (- 0.93) was established to be inversely related to technical inefficiency of the farmers. This implied that married farmers were more technical efficient that than those that are not married. Educational attainment was considered, determined and presented in Table 3. Coefficient of education was observed to be positive and significant at 5% level of significance. This implied that educated farmers were more technical inefficient. This result is in contrast with the *a priori* expectation and the findings of Chukwuji *et al.*, (2007). Household size was another important variable that was considered and examined. Coefficient of household size (0.03) was positive and significant at 5% level of significance. This implied that the technical inefficiency of the farmers increases as the household increases. It inferred that the larger household were more technical inefficient than the smaller households. It also obscure that a unit increase in the number of household size will lead to 0.03% increase in the level of technical inefficiency. A similar result was obtained by Ume and Kaine (2021), Aminu *et al*., (2017), Mohammed and Isgin (2016), Dzever *et al*., (2016) and Chukwuji *et al*., (2007). On the other hand, Yenibahit *et al* (2019) observed an indirect relation between household size and technical efficiency.

Experience was another significant variable that was considered in this study. The coefficient (-0.02) was observed to be negative. The negative coefficient of experience implied that farmers with longer years of farming experience were more technical efficient. This is in line with the *a priori* expectation. The negative coefficient of experience obtained in this study is in agreement with the findings of Kaine, (2020) and Onumah *et al*., (2013) who studied the productivity and technical efficiency of cocoa productivity in Eastern Ghana.

Farm size obtained had a negative coefficient (- 0.30) sign indicating that farmers with smaller farm holdings were more technically efficient. The result is in consonance with the studies of

ISSN: 2456-8643

Sabasi and Shumway (2014) and Baduneko *et al*., (2006). Ume and Kaine (2021) and Mohammed and Isgin (2016) reported a direct relationship between farm size and technical efficiency. The coefficient of number of workers was determined to be negative. The inverse relationship between number of workers and technical efficiency indicated that farmers that employed fewer number of workers were more technical efficient. The result of the coefficient of labour cost (0.52) as presented in Table 3 was positive and significant at 5% level of significance. This implied that labour cost is positively related to technical inefficiency signifying that inefficiency increases with increase in labour cost.

Table 3: Technical Inefficiency Estimate of Female Headed Household Cassava Farmers

Inefficiency Model	coefficient	standard-error	t-ratio
Constant	1.00	0.44	2.27
Age	0.00	0.01	-0.04
Marital status	-0.93	0.38	-2.43
Education	0.25	0.11	2.27
Household size	0.03	0.05	0.56
Experience	-0.02	0.13	-0.18
Farm size	-0.30	0.18	-1.64
No of workers	-0.05	0.06	-0.76
Labour cost	0.52	0.28	1.84

Source: Computed from field survey, 2023

log likelihood function = -31.56

4. CONCLUSION AND RECOMMENDATION

The result established that the farmers were relatively young, well experienced in cassava production, literacy level was high, household size was small and that cassava farming in the study was not gender specific. The result of the farm size obtained supported the conclusion that the crofters were micro – agro cassava farmers.

The result of the technical efficiency estimate supported the conclusion of the findings that coefficient of farm size, expenditure on cassava stem and labour were positive significant determinants of technical efficiency. The determined coefficient of depreciation buoyed the inference that the variable was inversely related to efficiency.

Estimated result of technical inefficiency indicated that the coefficient of age was positive backing the conclusion that younger farmers were more technical efficient than the older farmers. The study revealed that the coefficient of education was positive implying that educated farmers were more technical inefficient than the less educated once. The result of the household size had a positive sign of coefficient. The implication was that farmers with larger household size were more technical inefficient.

The study confirmed that farmers with longer years of farming experience were more technical efficient. Coefficient of farm size was established to be negative indicating that inefficiency increases with increase in farm size. Labour cost was determined to be positive. The result implied that inefficiency increases with increase in cost of production.

Based on the study of technical efficiency of the farmers, increasing any of these variables (farm size, expenditure on cassava cuttings and labour) will lead to increase in efficiency with a subsequent increase in production. Since the coefficient of depreciation was inversely related to efficiency, increasing the variable therefore will lead to a less than proportionate increase in efficiency and output. A reduction in the use of this production resource was strongly advocated. With inefficiency result confirmed, younger farmers were more technical efficient. Youths in the study area embracing cassava production, will increase efficiency with an upturn in production and output. The multiplier effect(s) of this will be a reduction in rural urban migration of the youths as well as agricultural and economic development of the study area. Maintaining consistency in cassava farming over a longer period of time is a prerequisite for reducing inefficiency among the micro – agro female headed household cassava farmers in the study area. A reduction in the use of labour cost as a productive resource was also necessary to reduce inefficiency.

REFERENCE

Alabi, R. A, (2002): Economic Efficiency of cocoa – based agro forestry system in Oyo State, Nigeria. Ph.D Thesis, Department of Agricultural Economics and Extension, Federal University of Technology, Akure, Nigeria

Alabi, R. A and A. A Usifo, (2005): Population density and technical efficiency of cocoa – based agro forestry. Bowan *Journal of Agriculture*. 2 (2): 216 – 224.

Abojei, J. O, Ume S. I and Kaine, A. I. N (2023). Determinant of adaptation strategies to climate change by cassava farmers in Anambra State, Nigeria. *Journal of Smart Agriculture and Extension Services*. 1 (1): 1 - 8

Adewumi, O. T., Ajala, A. O., Bamigboye, O. T., Fanu, A. T., & Oke, O. S, (2023): Assessment of the Utilization of Cassava Processing Technologies among Women Processors in Ekiti State, Nigeria. *Journal of Smart Agriculture and Extension Services* (JOSAE). 1(1): 18 – 27.

Aminu, F. O, H. O Rosulu, Toku, A. S. O, Dinyo, O. B and Akhigbe, E. C, (2017): Technical efficiency in value addition to cassava: A case of cassava – garri processing in Lagos State, Nigeria. *Journal of Agriculture and Sustainability*. 10 (1): 97 - 115

Ani, S. O., & Agbugba, I, (2017): Economics of marketing of cassava derivatives (Floor, Garri and Chips) in Uzo-Uwani Local Government Area, Enugu State. Delta Agriculturists, 9(1), 46-54

Asogwa, B. C, J. C Ihemeje, J. A. C Ezihe, (2011): Technical and allocative efficiency analysis of Nigeria rural farmers: Implication for poverty reduction. *Agricultural Journal*. 6(5): 243 – 251. https//doi.org/10.3923/aj.2011.234.251

Badunenko, O., M. Fritsch and A. Stephan, (2006): What determines the technical efficiency of a farm? The importance of industry, location and size. Jenaer Schriftenzur Wirtschafts wissenschaft. 33/2006.

Chukwuji, C.O., O. E Inoni and P. C Ike, (2007): Determinants of technical efficiency in garri processing in Delta State, Nigeria. *Journal of Central European Agriculture*. 8 (3): 327 – 336.

Dzever, D. D, Ayoola, J. B. Alakali, J, Ater, I. P, Sanni, L, Ngadi, M and Kok R, (2016): Technical Efficiency among small and medium scale entrepreneurs in high quality cassava flour in four geo – political zones of Nigeria. *European Journal of Physical Agricultural Sciences.* 4 (3): 52 – 58

Ehinmowo, O. O and Ojo, S. O, (2014) Analysis of Technical Efficiency of Cassava Processing Methods among Small Scale Processors in South – West, Nigeria. *American Journal of Rural Development*. 2 (2): 20 - 23

Ezebuiro, N.O, Chukwo, G.O, Okoye, B.C and Oboagis, I.C, (2000): Policy Issues and adoption of improved cassava varieties: Gender consideration in in Umuahia Zone of Abia State. In Proc.42nd Annual Conference of Agricultural Society of Nigeria held October 19 – 23 2008, at Ebonyi State University, Abakaliki, Nigeria. 1056 – 1059.

G bigbi, T. M (2021): Technical Efficiency and Profitability of Cassava Production in Delta State: A Stochastic Frontier Production Function Analysis. *Journal of Tekirdag Agricultural Faculty.* 18 (1): 21 – 31.

Isitor, S. U., Adeyonu, A.G and Aniegboka, U.N, (2017): An analysis of technical efficiency of Smallholder cassava farmers in Anambra State, Nigeria. *Applied Tropical Agriculture.* 22(2):10 - 15

Kaine, A.I.N, (2020): Determinants of technical inefficiency of cassava (fufu) processors in Delta North Agricultural Zone, Delta State, Nigeria: A Stochastic Frontier Production Function. *The Nigerian Journal of Agricultural and Forestry (NJAF).* 7(1): 47 – 57

Kaine, A. I. N, Ajie, I A and Abojei, J. O (2024): Socio – economic determinants of child labour among female headed household cassava farmers in some selected States of South – South, Nigeria: A Post Covid-19 Experience. *Green Journal of Agricultural Sciences* 14(2): 83 – 88

Kaine, A.I.N, Alabi, R.A and Ike, P.C. (2009): Technical and Allocative Efficiency of Akpu Producers in Delta State, Nigeria: A Stochastic Frontier Production Analysis. In I. Muhammed, U. B Kyiogwom, W.A Hassan, A. L Ala, A. Singh and S.D Dogondaji (eds). Proceedings of the 23rd Annual Conference of the Farm Management Association of Nigeria, Usmanu Danfodiyo University, Sokoto, Nigeria. 14th – 17th December, 2009. pp 713-718.

Kaine, A. I. N and Ume, S.I (2017): Food Insecurity and Coping Strategies among Female Headed Households in Anambra State, Nigeria. In Ogunje, J.O, Onyeneke, R. U., and Osakwe, I.I (eds). Proceeding of the First International Conference on Food Security and Hidden Hunger, Federal University, Nduf-Alike, Ikwo, Ebony State, Nigeria. October 8- 11, 201 pp 160-167

Kumbhakar and Lovell, (2000): Stochastic Frontier Analysis Cambidge, Cambridge University Press, pp 224

Maligina, N. G., Masuku, M. B, and M. O Raufu, (2015): Comparative analysis of technical efficiencies of smallholder vegetable farmers with and without credit access in Swazil and the case of the Hhohho region. *International Journal of Sustainable Agricultural Research.* 2 (4): 133 – 145. https://doi.org/10.18488/journal.70/2015.2.4/70.4.133.145

Mohammed M. Abdul – Kareem and Taner Isgin, (2016): Technical efficiency of cassava production in savannah zone of Northern Ghana: Stochastic Frontier Analysis. *Journal of Biology, Agriculture and Healthcare* 6 (20): 62 – 72.

Ogundari, K, (2014): The paradigm of agricultural efficiency and its implication on food security in Africa: What does meta – analysis reveal? World Development 64, 690 702.https://doi.org/10.1016/j.worlddev.2014.07.005

Onumah, J. A., R. M. Al – Hassan, and E. E. Onumah, (2013): Productivity and technical efficiency of cocoa production in Eastern Ghana. Journal of Economics and Sustainable Development 4 (4): 109 – 118.

Sabasi, D and R. C. Shumway, (2014): Selected paper prepared for presentation at the Agricultural and Applied Economics Association, (AAEA) Annual Meeting, Minneapolis, Minnesota, M. N, July 27 – 29 2014.

Satyavathi, D., Muna .G. and Verner, M, 2010, Economic Impacts of Professional training in Informal Sector: The Case Study of the Labour Force Training Programme in Cote d'voire. World

Simpa, J. O, Nmadu, J. N and Okino, A, (2014): Technical Efficiency of Small Holder Cassava Farmers in Selected Local Government Areas in Kogi State, Nigeria. Production *Agriculture and Technology Journal (PAT)*. 10 (1): 74 – 92

Udoh, E. J, (2005): Technical inefficiency in vegetable farms of Humid Region: An analysis of dry season by urban women in South – South Zone, Nigeria. *Journal of Agriculture, Social Scientist*. 1 80 – 85.

Ume, S. I. and Kaine, A. I. N, (2021): Technical Efficiencies of TMS Cassava Varieties by Farmers in Ebonyi State, Nigeria *AKSU Journal of Agriculture and Food Science* 5(3):141 - 159, 2021.

Yenibahit, N., I. Abunyuwah and Ahiale, E. D, (2019): Measurement of economic efficiency of irrigated tomato production in the Upper East Region of Ghana: A data envelopment analysis approach. J. Devt., Agric. Econs., 11 (9): 34 – 67

ACKNOWLEDGEMENT

The funding of this research work "Technical efficiency of micro – agro female headed household cassava farmers in Akwa Ibom State Nigeria: A Stochastic Frontier Production Function Model Approach" was fully sponsored by the Tertiary Education Trust Fund (TETFund). Much appreciation to this great institution for their kind gesture. The contributions of Professor Onemolease E. A and Ojie, A. I of Department of Agricultural Economics and Extension Ambrose Alli University, Ekpoma and Department of Economics, Delta State University, Abraka respectively, the enumerators as well as other scientist are acknowledged.