SOCIOECONOMIC FACTORS THAT INFLUENCE PERFORMANCE IN MAIZE VALUE CHAIN: A CASE STUDY OF COMMERCIAL AGRICULTURE DEVELOPMENT PROJECT (CADP) IN NIGERIA.

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ABSTRACT
This study determined the Socioeconomic factors that influence performance in maize value chain: A case study of Commercial Agriculture Development Project (CADP) in Nigeria. The specific objectives of the study were to: describe the socioeconomic characteristics of the commodity interest groups (CIGs) in the targeted value chain, & estimate the socioeconomic factors of the commodity interest groups that influence the production, processing and sales performance of the targeted value chain. A total sample of 360 different maize value chain actors as respondents, were drawn into the sample but the study found only 319 of the total responses valid and used for regression technique. A large proportion of the respondents were within the age range of 31-40years and were still physically active. The production, processing and sales performance model have F-Statistics of 10.06, 7.77 and 5.59 respectively, which is greater than the tabulated value at $p<0.05$ critical level. This shows that the three models have good fits and the included explanatory variables of each of the models actually accounted for the variations in the dependent variable, which are the production, processing and sales performance in maize value chain in Nigeria.
The Federal and State government should improve the infrastructural facilities especially the road networks to serve as an incentive to rural farmers to work harder to increase productivity, subsequently increasing income and reducing the length of time products take to get to the final consumers thereby reducing spoilage as well as wastage.
Keywords: Commercial Agriculture Development Project, Community Interest Group, Maize, Value Chain, Performance

INTRODUCTON

Agriculture is the backbone of the rural economy in Nigeria, generating about 30% of the Gross Domestic Product (GDP) and providing a significant source of employment for the country, especially the rural sector (Federal Ministry of Agriculture and Water Resources, 2007). Agricultural development has a key role to play in relation to poverty reduction, in the context of economic development and growth as a whole (FAO, 2015). A critical component of economic growth and development for agro-based economies is commercialization of agriculture (World Bank, 2008). Farmers are very slow in shifting to commercialization owing to some constraints. The farming and land tenure systems in Nigeria are negatively impacting on commercial agriculture and food security (Wiggins *et al.,* 2011). On the other hand, limited financing and decline in new investments hinder agricultural development (Earle, 2011).

The commercialization of maize production has been recognized as a viable solution for addressing the worldwide food crisis and alleviation of poverty. The intensive cultivation of crops like maize plays a crucial role in bolstering the economy of a country. In Nigeria, the increased production of maize has significantly elevated the income of smallholder farmers, establishing it as a vital local cash crop. Furthermore, the emphasis on intensive maize production is seen as an effective approach to alleviate hunger and address the challenges of global food insecurity. Alula *et.al.,* (2023) opined that maize, being a primary cereal crop, forms the backbone of the livelihoods for countless small-scale farmers across Africa. A food consumption survey carried out by International Institute of Tropical Agriculture (2014), showed that maize was the most often consumed staple, with 20% of the population eating it at least once a week. Nigeria is the 10th largest producer of maize in the world, and the largest maize producer in Africa, followed by South Africa (USAID, 2010). Maize serves a diverse range of purposes, catering to different needs depending on the user. In Nigeria, this versatile crop finds application as both a staple food, herbal medicine, and a valuable ingredient in livestock management. As a food source, maize can be prepared through boiling or roasting, transforming into a paste for consumption. Furthermore, various traditional uses of maize have been documented, with practices varying across localities and among different ethnic groups.

The Federal Government of Nigeria introduced the Commercial Agriculture Development Project (CADP) as an intervention program. Its primary objectives were to bolster agricultural production, empower farmers through easily obtainable loans, matching grants, thrift savings, ultimately leading to the betterment of farmers and citizens alike. Furthermore, the CADP aimed to promote economic growth by diversifying the non-oil sector and reducing the country's dependency on oil and gas. To fulfill its institutional and implementation

arrangements, the CADP emphasizes the importance of empowering farmers. This involves facilitating the formation of commodity interest groups (CIG) and commercial agriculture development associations (CADA) to support farmers' endeavors. These associations act as catalysts for promoting the long-term growth and sustainability of commercial agriculture within the participating states (CADP, 2012). The Project was implemented in five States of the Federation, namely Cross Rivers, Enugu, Kaduna, Kano and Lagos along eight value chains. The total number of direct beneficiaries is estimated at 50000 (that is 10 000 beneficiaries per State) over a period of five years (2009-2013), and revised till 2017.

Agricultural sector is the most important economic activity constituting about 70 percent of labour force in Nigeria (NBS, 2011). The country is generally endowed with abundant agricultural resources and yet the population is facing the problems of low productivity and food insecurity. This results from poor access to modern input and subsistence nature of the farming system. There are various agricultural projects initiated by the Nigerian government for the development of agriculture, but these projects focused only on continuing increases in production and/or productivity of food crops to meet increasing demand for food. They however neglected the value chain development and commercialization of these food crops. Value chain that is market-driven ensures proper integration of the key actors and resource distribution along the chain and mitigating waste of perishable products. Nigeria's agricultural sector suffers from a series of inter-related constraints. Key among these includes lack of infrastructure, appropriate technology, weak advisory services, post-harvest losses, poor access to markets and lack of finance. Commercial Agriculture Development Project (CADP) was aimed at improving agricultural production in Nigeria by supporting commercialization of agricultural production, processing and marketing outputs among small and medium-scale commercial farmers and agro-processors (CADP, 2012).

The broad objective of the study was to describe the socio-economic characteristics of the commodity interest groups in maize value chain and estimate the socioeconomic factors of the commodity interest groups that influence the production, processing and sales performance of the targeted value chain.

HYPOTHESIS OF THE STUDY

The null hypothesis tested states that the socioeconomic factors of commodity interest groups do not significantly influence the production, processing and sales performance of maize value chain in the area.

METHODOLOGY

The research was carried out in Nigeria, a country situated in West Africa along the Gulf of Guinea, covering a total area of 923,768 km2 (Ocean Data and Information Network for Africa, 2014). To the south, Nigeria is bordered by around 800 km of the Atlantic Ocean, while it shares its boundaries with the Republic of Benin to the west, the Republic of Niger to the north, and the Republic of Cameroon to the east (NBS, 2007). Nigeria's geographical coordinates range from Latitudes 4° to 14°N and Longitudes 2° to 15°E (World Fact Book, 2011).

As the most populous country in Africa, Nigeria is estimated to have around 160 million inhabitants, with an annual growth rate of 2.5 percent (World Bank, 2013). It features a southern coastline along the Gulf of Guinea and shares borders with Benin to the west, Cameroon to the southeast, Chad to the northeast, and Niger to the north. The country was formed through the amalgamation of the Northern and Southern protectorates, resulting in 36 states and the Federal Capital Territory, Abuja. These states are grouped into six geopolitical zones: North West, North East, North Central, South East, South-South, and South West (Federal Research Division, 2008).

The bulk of farming activity occurs during the rainy season, which lasts from May to November in the south and July to September in the north. Little farming takes place during the dry season, as it is labor intensive and costly for smallholder farmers to irrigate (USAID, 2016). Cassava, yam, cowpea, sorghum, rice, and maize are the major food staples produced in Nigeria.

The sample selection process utilized a multi-stage sampling technique. In the initial stage, three states were purposively chosen to participate in the study, namely, Enugu, Kaduna, and Kano. These states were selected with consideration of Nigeria's historical emergence from the Northern and Southern protectorates, and project locations within each protectorate were deliberately included in the study. Moreover, the study focused on the maize value chain, which is exclusively supported by CADP in these three states across the country. From the three states with a total of ten (10) agricultural zones, the second stage involved purposively selecting one (1) agricultural zone from each of the states participating in CADP. In the third stage, two (2) participating Local Government Areas (LGAs) were purposively selected from each of the previously chosen states. For the fourth stage, a total of ten (10) communities participating in the project were purposively selected, resulting in a total of sixty (60) communities. The final stage involved categorizing the beneficiaries into three groups: maize producers, processors and marketers. To ensure a representative sample, a stratified random sampling technique was employed, distributing a 50% share equitably among these various actors within the sample frame. A total of 360 maize value chain actors were drawn into the sample. The study found only 319 of the total

responses valid and used for the data analyses. Data collected for the study were analyzed using descriptive statistics such frequency distribution, percentages and mean. The socioeconomic factors of the commodity interest groups that influence the production, processing and sales performance of the targeted value chain was analyzed using multivariate regression technique. The hypothesis was realized from the results using F-statistics.

The socioeconomic factors of the commodity interest group that influence the production, processing and sales performance of maize value chain was estimated using the multivariate regression technique. The use of multivariate regression model becomes most suitable for isolating the factors that account for the variation in production, processing and sales performance of the respondents at the same time. This is because the cause and effect relationship among other determinants may not mutually exclusive as explanatory variable may have more than one effect on more than dependent variable. The multivariate regression model is stated as (Greene, 2012):

$Y_{1i}=f(x_1,x_2,x_3,x_4,x_5,x_6,x_7,x_8,e_1)$ Production node

$Y_{2i}=f(x_1,x_2,x_3,x_4,x_5,x_6,x_7,x_8,e_2)$ Processing node

$Y_{3i}=f(x_1,x_2,x_3,x_4,x_5,x_6,x_7,x_8,e_3)$ Sales node

Where,

$\boldsymbol{Y_{1i}}$ = Production of the ith actor in the chain (percent)
$\boldsymbol{Y_{2i}}$ = Processing of the ith actor in the chain (percent)
$\boldsymbol{Y_{3i}}$ = **S**ales of the ith actor in the chain (percent)
X_1= Age (years)
X_2= Household size (Number of persons)
X_3= Educational attainment (years)
X_4= Experience (years)
X_5= Marital status (Dummy variable 1=married; otherwise, 0)
X_6= Sex (dummy variable where Male = "1" otherwise "0")
X_7= Value added to maize product at different mode (Naira)
X_8= Amount disbursed (Naira)
$\mathbf{e}_1 - \mathbf{e}_3$= error terms.
It is apriori expected that **$X_2, X_3, X_4, X_5, X_6, X_7 > 0$; While X_1, and $X_8 < 0$**

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The socio-economic characteristics of the respondents is presented in Table 1.

Table 1: Distribution of Respondents According to Socio-economic Characteristics

Variables	Frequency	Percentage (%)	Mean
Age (Years)			
≤ 30	15	4.70	
31 – 40	130	40.75	
41 – 50	109	34.17	
51 – 60	48	15.05	41
> 60	17	5.33	
Education (years)			
0 (no formal education)	16	5.02	
Primary	40	12.54	
Secondary	143	44.83	
Tertiary	120	37.62	
Household Size			
1 – 5	100	31.35	
6 – 10	163	51.10	
11- 15	32	10.03	7
>15	24	7.52	
Marital Status			
Single	30	9.40	
Married	283	88.71	
Widowed	6	1.89	
Farming Experience (Years)			
1 – 10	80	25.08	
11 – 20	123	38.56	
21 – 30	81	25.39	
31 – 40	28	8.78	17
>40	7	2.19	
Sex			
Male	89	27.90	

Female	230	72.10

Source: Field Survey Data, 2022

From Table 1, 40.75% of the respondents were aged 31 – 40 years. The mean age of the respondents was 41years. This result agrees with the findings of Akadugu *et al*, (2012), Mbavi, (2013), Gizaki & Madukwe (2019) who stated that maize farmers are relatively young, active, in their productive age and would be able to carry out tedious operations such as land preparation, planting, weeding, harvesting and threshing of maize.

The table further revealed that a greater proportion (44.83%) of the respondents have formal education. This will help in their decision making process and adoption of innovations and technologies. Gizaki & Madukwe (2019) asserted that education plays a significant role in skill acquisition and technology transfer. It enhances technology adoption and the ability of farmers to plan and take risks.

The result also showed that 88.71% of the respondents are married, 9.40% are single and 1.89% of the respondents are widowed. This indicates that majority of the maize farmers in the study area are married and can get financial support from their spouses. This is in line with the findings of Obetta et. al, (2020) that a larger proportion of maize marketers who were married could access extra financial, physical and moral support from their spouses which could boost their capital.

Factors Affecting the production, processing and Sales Performance of Maize Value Chain in Nigeria

The multivariate analysis presented in Table 2 is the estimates of effect of some socio-economic and other factors of commodity interest groups on the production, processing and sales performance of maize value chain in Nigeria.

Table 2: Multivariate Estimates of CADP Actors' Socio-Economic Factors on the Production, Processing and Sales Performance in Maize Value Chain, Nigeria

	Parameter Estimates					
Variables	**Producers**		**Processors**		**Marketers**	
	Coefficient	**/t-value/**	**Coefficient**	**/t-value/**	**Coefficient**	**/t-value/**
Intercept	-142.749		-2.669684846		0.208***	
(Std. Errors)	(110.41)	-1.29288	(3.688835)	0.72372	0.072396	2.872471
Age	5.266**		0.200157356***		0.000691	
(Std. Errors)	(2.567)	2.051399	(0.07866)	2.544582	0.002135	0.323904
House hold Size	-8.16**		0.494514352**		-0.00228	
(Std. Errors)	(4.02)	-2.03631	(0.247746)	1.99605	0.002725	0.83768
Education	7.299**		-0.307896788		0.002101	
(Std. Errors)	(3.479)	2.09802	(0.170756)	1.80314	0.002832	0.741857
Farming Experience	-0.256		-0.014485774		0.000364	
(Std. Errors)	(1.54)	-0.16629	(0.065715)	0.22043	0.001577	0.230533
Marital status	53.175		-6.3772269***		-0.076***	
(Std. Errors)	(56.81)	0.935959	(1.21761)	5.23749	0.020889	3.65351
Sex	-58.51		1.839481334		-0.046***	2.27004
(Std. Errors)	(45.48)	1.28666	(1.10224)	1.668857	0.020211	
Value added	-5.6E-05		9.82371E-06		2.97E-08**	2.318295
(Std. Errors)	(0.000147)	0.37935	(1.03E-05)	0.954706	1.28E-08	
Amount Disbursed	0.000225***	3.991814	2.60282E-06**	2.344997	-1.1E-07**	2.39493
(Std. Errors)	(5.64E-05)		(1.11E-06)		4.75E-08	
	Functional /Diagnostic Statistics					
R-Square	0.537004		0.437341436		0.444136	
Adjusted R-Square	0.2408764		0.38107558		0.364727	
Standard Error	217.2391		4.69333644		0.075113	
F-Statistics	10.05716***		7.772767787***		5.59301***	
Observations	165		89		65	

Source: Field Survey 2022

The production, processing and sales performance model have F-Statistics of 10.06, 7.77 and 5.59 respectively, which is greater than the tabulated value at $p<0.05$ critical level. This shows that the three models have good fits and the included explanatory variables of each of the models actually accounted for the variations in the dependent variable, which are the production, processing and sales performance in maize value chain in Nigeria.

It can be seen from the result that the amount disbursed were not mutually exclusive and it is statistically significant across the production, processing and sales performances in the area. While the estimates showed a positive effect on production and processing performance, there is a negative but significant relation with sales performance. There is a marginal increase of 0.0002 and 2.60 $X10^{-6}$ units of production and processing performance respectively, but shows a marginal decrease of 1.10 X 10^{-7} with the sales performance in the area. Hence, as capital is disbursed, there is a significant increase in production and processing performance of maize while a decrease in sales performance is recorded in the study. The decreasing marketing performance of maize with the increase in amount disbursed suggests that there is an issue with logistics and distribution of maize around the country. The hike in cost of performing marketing services is seriously fingered in declining gross and marketing margin as Rust, Mooreman and Dickson (2002) observed that cost reduction perspective is quick approach to capital expansion in agribusiness.

Again, the actors' age which is also statistically significant at $p<0.05$ critical level with production and processing performance indicated a positive effect at 5.27 and 0.20 units respectively. Although it is positive with sales performance, it is not statistically significant, hence older actors along the chain can have significant capacity to increase their production and processing performances only. Production and processing performances, which is not better with young actors in the chain, may affect continuity of the activities along the chain in the long run. In the same way, the house hold size, which shows a negative but significant effect of 8.16 units with production performance, has a positive and significant effect of 0.49 units with processing performance in the area. This contrast with education, with a positive and significant effect of 7.299 units with production and does not show any significant effect with processing and sales performances of maize in the area. Education significantly increases the technicalities and skill of the interest groups just as household size reduces it. This is because the more the household size, there is more labour for processing but it forces down the performance of production probably due to the cost implication of the interaction of increased labour with other inputs does not increase the production performance in the area.

Marital status which is statistically significant ($p<0.05$) but has negative effect of 6.38 and 0.076 units respectively, with processing and sales performance is not significant with production performance even at $p<0.1$ critical level. Marriage responsibility reduces both sales and processing performance because of the divided attention these activities in the chain gets from the actors and this contrast with the findings of Rayasawath (2018) that marital responsibility could have an increased effect in performance of processing agricultural products. This is because of the ability to cope with new succession in agricultural work provided by family labour.

It could be seen from the result that value added to maize products can significantly enhance sales performance by 2.98 X 10^{-08} than both production and processing performances in the area. This implies that value addition to maize has a better attribute to maize marketing in the area than any other activities in maize value chain. Value addition is important in increasing satisfaction derived per unit quantity of maize sold in the area. This is consistent with Ehirim et al., (2019) who observed that with increased consumer satisfaction; marketing efficiency is achieved as sale performance stimulates further production. When consumers get more value for maize products bought in the market, sale increases and more maize is bought from the farmers thus increasing further production as farmers are sure of getting more value of their products as they go into further production.

Test of Hypothesis

The result of the hypothesis tested in this study is presented in Table 3 below. The Socioeconomic factors of commodity interest groups do not significantly influence production, processing and sales performance of maize value chain in Nigeria as shown in the hypothesis tested below

Table 3: Hypothesis Result

Hypothesis 1: F-Statistics of ANOVA Estimate in Multivariate Regression Result

Hypothesis 1	Actors/ Node	F-Statistics		Decision
		Tabulated	Calculated	
Socioeconomic factors of commodity interest groups do not significantly influence production, processing and sales performance of maize value chain in Nigeria	Production	2.639	10.057***	Null hypothesis rejected and the alternative hypothesis accepted
	Processing	2.639	7.773***	Null hypothesis rejected and the alternative hypothesis accepted
	Sales	2.639	5.593***	Null hypothesis rejected and the alternative hypothesis accepted

@ p<0.01 critical level

Source: Survey Result Analysis 2022

The result revealed that the tabulated F-statistics is less than the calculated F-statistics at $p<0.01$ critical level. The null hypothesis that the included socioeconomic factors of commodity interest groups

do not significantly influence on production, processing and sales performance of maize value chain in Nigeria is rejected and the alternative hypothesis that the included socioeconomic factors of commodity interest groups have significant influence on production, processing and sales performance of maize value chain in Nigeria is thus accepted in this study.

CONCLUSION AND RECOMMENDATIONS

Transportation of perishable (agricultural) products especially in the distribution of maize and its products around the country last for several days on the road due to bad and poor road network around the country. Hence, the unit price of these products continued to increase unabatedly because of the increasing marketing cost incurred. The younger interest group whose performance is not encouraging could be due to lack of interest in production and processing. Their decline in performance may continue if their skills are not improved by making production and processing an interesting activity in the chain. Value addition to maize has a better attribute to maize marketing in the area than any other activities in maize value chain. Value addition is important in increasing satisfaction derived per unit quantity of maize sold in the study area. The following recommendations were drawn from the study

1. To bolster farmers' productivity and income positively, the Federal and State government in alliance with the World bank should invest in similar programmes in the future.
2. The Federal and State government should improve the infrastructural facilities especially the road networks to serve as an incentive to rural farmers to work harder to increase productivity, subsequently increasing income and reducing the length of time products take to get to the final consumers thereby reducing spoilage as well as wastage.

REFERENCES

Akadugu, M.a., Guo, E., & Dadzie, S. K. (2012). Adoption of Modern Agricultural Production Technologies by Farm Households in Ghana. What Factors Influence their Decisions? *Journal of Biology, Agriculture and Healthcare* 2(3): pp. 12 – 20.

Alula, F., Gezahagn, G., Alemayehu, A., Abrham, B., John, W.R., Ermias, A., Zerihun, B., Philip, M.O, Teferi, D.Demissie & Dawit, S (2023) . Determinants of Maize Farmers Market Participation in Southern Ethiopia: Emphasis on Demographic, Socioeconomic and Institutional Factors. *Cogent Food & Agriculture*, Vol 9, 2023 – Issue 1

Commercial Agriculture Development Project (CADP, 2012). Commercial Agricultural Development Project. www.worldbank.cadpnigerin.org/documentation/project.html.

Earle, J. (2011). Constraints to agricultural development in Mexico. An Inaugural lecture. The Jagdeo Initiative, Mexico city: Mexico. 24 January 2011.

Ehirim, N.C., R.A. Okere & Ikheloa, E. (2019). Value Addition and Consumers' Satisfaction Compromise: A case of Raphia Wine Supply Chain in Imo state, Nigeria. *Advances in Social Sciences Research Journal* Vol. 6(7). 198-214

FAO **(**2015). The State of Food and Agriculture. Social protection and agriculture: breaking the cycle of rural poverty. Rome.

Federal Ministry of Agriculture and Water Resources (FMAWR, 2007). Environmental and Social Management Framework (ESMF) For The Commercial Agriculture Development Project (CADP). Draft, Final Report, E1789 v2.

Federal Research Division. Country Profile: Nigeria; (2008). Available: http://lcweb2locgov/frd/cs/profiles/Nigeriapdf

Gizaki, I. J., & Madukwe, M. C. (2019). Socioeconomic Impact of SG 2000 Quality Protein Maize (QPM) Technology Delivery on Beneficiaries in Bauchi and Gombe States. *European Scientific Journal* 15(3): 169 -198

Greene, W. H. (2003). Econometric analysis (5th ed.) New Jersey: Prentice Hall.

IITA (2014). Improving and Intensifying Cereal-Legume Systems in the Moist and Dry Savannas of West and Central Africa. International Institute of Agriculture Annual Report 2014. www.iita.org/c/.../get_file?uuid

Mbavi, J. J. (2013). An Assessment of the Effectiveness of the Sudan Savanna Taskforce Project in Adoption and Diffusion of Improved Cowpea Varieties in Selected Communities in Musawa Local Government Area of Katsina State. An M.Ed. Unpublished Thesis Submitted to the Department of Adult Education and Community Services, Faculty of Education, Bayero University Kano.

National Bureau of Statistics (2011). Socio-Economic Survey on Nigeria. First Quarter Report, NBS, Abuja.34-49

Obetta, A. E., Achike, A. I., Mukaila, R., & Taru, B. (2020). Economic Analysis of Marketing Margin of Banana and Plantain in Enugu State, Nigeria. *African Journal of Agricultural and Food Science*, Vol 3(4): pp. 52 – 62

Rayasawath, C. (2018). Factors Affecting the Household Succession in Agricultural Occupation in Nakhon Ratchasima Province, Thailand. *Agriculture 8(7): 109*

Rust, R.T., Moorman, C., Dickson, P.R. (2002). Getting Return on Quality: Revenue Expansion, Cost Reduction, or Both? *Journal of Marketing*, Vol 66, Issue 4

U.S. Agency for International Development (USAID, 2016). Nigeria Early Generation Seed Study: Country Report.Context Network and Sahel Capital. DAI Prime Cooperative Agreement No. AID-OAA-A-13-00085 for the U.S. Agency for International Development, Feed the Future: Building Capacity for African Agricultural Transformation (Africa LEAD II) Program.

U.S Agency for International Development (2010). Market Assessment and Baseline Study of Staple Foods, Country Report-Uganda. USAID.

Wiggins, S., Argwings-Kodhek, G., Leavy, J. &Poulton, C. (2011) "Small Farm Commercialization in Africa: Reviewing the Issues", Future Agricultures Consortium, Research Paper.

World Bank, F. & IFAD, (2008). Gender in agriculture: A sourcebook. Washington: World Bank.

World Bank (2013) 'Rwanda economic update maintaining momentum with a special focus on Rwanda's pathway out of poverty'. World Bank, available at http://documents.worldbank.org/curated/en/2013/05/17810159/rwanda-economic-updatemaintaining-momentum-special-focus-rwandas-pathwayout-poverty.

World Fact book (2011). Rank Order. Retrieved on April 22, 2017, from http://wwwciagov/library/publications/the-worldfactbook/rankorder/2147rank html