Socioeconomic Determinants of Crop Production Strategies Adopted by Organic Farmers in Onicha Local Government Area of Ebonyi State, Nigeria

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KEYWORDS

Crop production strategies, Socioeconomic determinants, Organic farming, Ordinary least square Regression.

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ABSTRACT

This paper assessed socioeconomic determinants of crop production strategies adopted by organic farmers in Onicha Local Government Area of Ebonyi State, Nigeria. Specifically, the study analyzed the effects of socioeconomic characteristics of the organic farmers on the type of crop production strategies adopted and determined constraints to organic farming in the study area. Multi-stage random and purposive sampling techniques were used to select the respondents. Primary data collected were analyzed using ordinary least square multiple regression and factor analysis. The null hypothesis was tested at 5% level of significance. Result showed a high value of R2 (87%) which signifies that the socioeconomic characteristics of the respondents had significant effects on the type of crop production strategies they adopted. The independent variables were positively signed and statistically significant at various levels; indicating positive relationship with the dependent variable. Four major constraints identified were: economic/institutional, social, financial and technological constraints. The study recommended that the respondents should be well trained in organic farming and its applications in order to ensure sustainable production of crops in the area.

INTRODUCTION

Organic agriculture is a technique of naturally producing quality crops, vegetables or animals without harming the environment, the people, the animals as well as other microorganisms that are living around (Singh, 2021; Orji, 2013). Organic farming practice is eco-friendly and works in agreement with nature (Ezeh, Enyigwe, Egwu, Eze, Agbom and Nwofoke, 2022). In organic farming, best traditional farming practices and techniques in combination with modern knowledge of science and technology are applied. Organic Farming emphasizes the use of renewable natural resources and their recycling (Ezeh *et al*, 2022). It eliminates the use of synthetic pesticides, growth hormones, antibiotics and gene manipulation in farming. Lampkin (2010) reported that organic farming systems rely on crop rotation, crop residues, animal manures, legumes, green manures, off-farm organic waste and aspects of biological pest control to maintain soil productivity and tilt, to supply plant nutrients and to control insects, weeds and other pest. Singh (2021) defines organic agriculture as the method which involves the cultivation of plants and rearing of animals in natural ways.

Crop production is becoming more widely recognized as a requirement for food security, nutrition and sustainability (Osuji *et al*, 2022; Osuafor *et al*, 2020). Crop producers are faced with a significant amount of crop uncertainty daily, hence diversification of crops serves as a major option to increasing and stabilizing income flow and also a source of employment (Osuafor *et al*, 2021). Farmers practice crop production diversification to maximize the use of land and other resources by planting varieties of food crops on their farmland (Ojo, Ojo, Odine and Ogaji, 2014). In several instances, diversification of cropping system and/or introduction of new cropping systems have been used to retain or to enhance the value of natural resources, principally land and water (Ojo *et al*, 2014; Saraswati *et al*, 2011). The past decades have been characterized by escalating public concern towards nutrition, health and food

safety issues. Consumers perceive relatively high risks associated with the consumption of conventionally grown produce compared with other public health hazards (Williams and Hammit, 2011). Therefore, it seems that the extensive use of chemicals and anti-biotic in inorganic food production technology has compelled the health conscious people to explore and support organic farming methods in agriculture.

In Nigeria, there seems to be a growing general interest in organic farming and crops over the past few years. This is demonstrated by the rising consumer demand for organic food crops and the number of publicly supported research and policy initiatives related to the production of organic foods. It is generally believed that organic farming with its reliance on natural inputs and labour could materially advance diversification of crop production (Mafimisebi *et al*, 2019).

There exist a dearth of knowledge on the socio-economic determinants of vegetable crop production strategies adopted by organic farmers in Onicha Local Government Area of Ebonyi State. Thus, this paper was designed to scientifically investigate socioeconomic determinants of crop production strategies adopted by organic farmers in Onicha Local Government Area of Ebonyi State.

Objectives of the Study

The broad objective of the study was to determine socioeconomic determinants of crop production strategies adopted by organic farmers in Onicha Local Government Area of Ebonyi State, Nigeria. The specific objectives were to:

i. examine the effects of the socioeconomic characteristics of the organic farmers on the type of crop production strategies adopted; and
ii. determine constraints to organic farming in the study area.

Hypothesis

H_0: The socioeconomic characteristics of the organic farmers do not significantly influence the type of crop production strategies adopted.

METHODOLOGY

The study was carried out in Onicha Local government Area (L.G.A) of Ebonyi State. It is made up of 8 (eight) autonomous communities, namely: Onicha Igboeze, Igboeze Onicha, Ukawu, Isuokoma, Abaomege and Oshiri. The L.G.A has a land mass of approximately 559.62 sq.km and lies within latitude 6° 101 N and longitude 7.461 E and 8.151W (Ebonyi State Ministry of Land, Survey and Urban Planning, 2006). It has a population of 117,832 males and 118,777 females giving a total population of 236, 609 (NPC, 2006). In Ebonyi State, smallholder crop producers cultivate the majority of the crops such as rice, cassava, yam, potatoes, plantain, maize and vegetables (Onyeneke, Umeh and Onyeneke, 2023; Ezeh *et al*, 2019). Multi-stage sampling techniques was used for the selection of respondents for the study. Five (5) communities were randomly selected from Onicha L.G.A of Ebonyi State. Two (2) villages were randomly selected from each of the five (5) communities to make a total of 10 villages. Nine (9) farmers were randomly selected from each of the 10 selected villages to make a total of 90 respondents. Primary data were collected through the use of a well-structured questionnaire administered to the respondents. Objectives I and II were achieved using multiple regression analysis and principal component factor analysis respectively. The null hypothesis was tested at 5% level of significance with F-test.

Model Specification

Multiple Regression Analysis

$$Y = f(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9, x_{10}) \quad (1)$$

$$Y = a_0 + a_1 x_1 + a_2 x_2 + a_3 x_3 + a_4 x_4 + \ldots a_{10} x_{10} + et \quad (2)$$

Where:
Y = Crop production strategies used (Number)
X_1 = Sex (dummy: male = 1, female = 0)
X_2 = Age (years)
X_3 = Educational level (years)
X_4 = Marital status (dummy: married = 1, single = 2, widowed = 3)
X_5 = Farm size (hectare)
X_6 = Household size (Number)
X_7 = Annual income (Naira)
X_8 = Extension contact (Yes = 1, No = 0)
X_9 = Farming experience (Years)
X_{10} = Membership of cooperative society (Yes = 1, No = 0)
a_0 = Constant
$a_1 - a_{10}$ = Parameters
et = Error term

Principal Component Factor Analysis Model

The exploratory factor analysis techniques using the principal factor model with interactions and varimax rotation was adopted (Eze and Nwibo, 2014). Principal component factor analysis with varimax-rotation and factor loading of 0.50 was used. Variables with factor loading less than 0.50 and variables that loaded in more than one factor will be discarded following the study of Madukwe (2004). The principal component factor analysis model is stated thus:

$Y_1 = a11\ Vo_1 + a12\ Vo2 + *** + a_1n\ Von$ - - - - - - - (3)

$Y_2 = a21Vo_1 + a22\ Vo2 + *** + a_2nVon$ - - - - - - - (4)

$Y_3 = a31Vo_1 + a32\ Vo2 + *** + a_3nVon$ - - - - - - - (5)

$Yn = aniZ_1 + an2Vo2 + *** + anVon$ - - - - - - - (6)

RESULTS AND DISCUSSION

Effects of Socioeconomic Characteristics of Organic Farmers on the Type of crop Production Strategies Adopted by Farmers in Onicha L.G.A

The result is presented in Table 1. Result of multiple regression analysis in Table 1 shows that the coefficient of multiple determination (R^2) of the regression model was 0.867 (87%) indicating that about 87% variation in the dependent variable (crop production strategies adopted) was caused by combined effects of changes in the explanatory variables (socio-economic characteristics) of the farmers. The high value of R^2 (87%) signifies that the socioeconomic characteristics of the respondents had significant effects on the type of crop production strategies adopted. The coefficient of multiple determination (R^2) of 87% was in numerical value closely related to the adjusted R^2 (85%), while the overall standard error of estimated was (SEE = 0.38592). The statistical reliability of the estimates of regression co-efficient was established using standard errors from the estimates. Most of the explanatory variables were significant at 1%, 5% and 10% levels of significance. But, the overall significance of the regression was shown by (F-statistics = 34.960) and low value of Durbin –Watson Constant (DW = 1.186).

Gender (X_1) was positively signed. This implies that there is positive relationship existing between sex of the farmers and type of crop production strategies adopted. It means that there is no gender difference in the number of crop production strategies adopted by organic farmers in the area.

Age (X_2) bore positive sign and was statistically at 5% level of significant; showing positive relationship. This means that older farmers employed more crop production strategies than younger ones. This corresponds to the work of Umeh and Chukwu (2013b).

Education (X_3) had positive sign and was statistically significant at 1%. The high significance of education implies that it is an important factor in this regard. This is because educated farmers are understand and adopt technologies easily than illiterate farmers. This result corresponds with the findings Chukwu *et al.* (2016).

Marital status (X_4) was positively signed and also significant at 10% showing that both married and single organic farmers employed some crop production strategies in the area.

Furthermore, farm size (X_5) bore positive sign and was statistically significant at 5% level of significant; showing that the higher the farm, size the more the number of strategies adopted. This is true and conforms to the a priori expectations because farmers with more farm size will have enough space to undertake farming activities.

Household size (X_6) was positively signed, indicating positive relationship. This implies that increase in household size would lead to a corresponding increase in the number of crop production strategies adopted by the household. This conforms to Umeh and Chukwu (2013).

Also, annual income (X_7) had positive sign indicating that there was positive relationship. Thus, the higher the annual income of the respondents the higher the number of crop production strategies they would adopt.

Finally, extension contact (X_8) and farming experience (X_9) were positively signed and statistically significant at 5% level of significance revealing positive relationship with the dependent variable. But, membership of cooperative societies (X_{10}) bore positive sign and was statistically significant at 10%. The result is regressed below:

$$\mathbf{Y = -2.275 + 0.006x_1 + 0.014x_2 + 0.006x_3 + 0.478x_4 - 0.001x_5 + 0.023x_6 + 0.485x_7 + 0.005x_8 + 0.682x_9 + 0.234x_{10}}$$

(0.403)*(0.009)(0.011)*(0.008)***(0.054)*(0.000)**(0.019)**(0.090)* (0.024)***(0.786)** (0.543)***

Table 1: Multiple Regression Analysis on Effects of Socio-economic Characteristics of the Organic Farmers on the Type of Food Production Strategies Adopted.

Variable	Variable names	Estimated coefficients	Standard error	T-value
a_0	Constant	-2.275	0.403	(-5.643) *
X_1	Gender	0.014	0.011	(1.286) *
X_2	Age	0.006	0.009	(0.654) **
X_3	Educational level	0.005	0.008	(0.629) ***
X_4	Marital status	0.478	0.054	(8.813) *
X_5	Farm size	0.001	0.000	(1.608) **
X_6	Household size	0.023	0.019	(1.243) **
X_7	Annual income	0.485	0.090	(5.370) *
X_8	Extension contact	0.005	0.024	(0.207) ***
X_9	Farming experience	0.682	0.786	(0.867) **
X_{10}	Membership of cooperative society	0.234	0.543	(0.431) *
	R^2	0.867		
	Adjusted R^2	0.846		
	F-ratio	34.960		
	SEE	0.38592		
	DW	1.186		

Source: Field survey, 2022. *= Significant at 10%,**= Significant at 5%,***= Significant at 1%

Constraints to Organic Agriculture in the Study Area

Factor analysis was used to determine constraints to organic agriculture in the study area. Table 2 showed the varimax rotated component matrix on constraints militating against organic agriculture in the study area. From the field data collected, four (4) major constraints were extracted based on the responses of the respondents. Only variable with constraints loading of 0.40 and above at 10% overlapping variance (Ashley *et al*; 2006, Madukwe, 2004) were used in naming the constraints. Variable that loaded in more than one constraint were discarded while variables that have constraints loading of less than 0.40 were not used.

Factor 1 was considered and named institutional constraints due to the variable that loaded high under it. This high loading variable include reduced yield and income for a time (0.761), limited government support (0.543), output/marketing problems (0.809), shortage of biomass(0.732), non-availability of farm inputs (0.644), lack of appropriate agricultural policy (0.694), low production (0.532) and lack of quality standards for bio-manure (0.732). According to Dorward and Kydd (2015), businesses in rural areas are attributed to weak information on potential production type and innovations. Saxena (2018) further stated that producers are often in agricultural practices, but not in effective and efficient organic agricultural practice.

Also factors 2 was considered and named social constraints because of the factors that loaded high under it. These include: lack of knowledge and skill (0.856), accessing organic information is difficult (0.524) and lack of awareness (0.688).

Moreover, after critical consideration of the constraints, factor 3 was named financial constraints due to the factors that loaded high under it. These include: high input costs (0.415), lack of financial support (0.810), inability to meet the export demand (0.471) and lack of capital (0.915).

Finally, factor 4 was considered and named technological constraints due to the factors that loaded high under it which was inadequate supporting infrastructure (0.568).

Table 2: Varimax Rotated Component Matrix on Constraints to Organic Agriculture in the Study Area

	Variable names	Factor 1 Institutional Constraints	Factor 2 Social Constraints	Factor 3 Financial Constraints	Factor 4 Technological Constraints
Vo_1	Reduced yield and income for a time	0.761	-0.079	-0.547	-0.034
Vo_2	Limited government support	0.543	0.020	-0.736	0.035
Vo_3	Lack of knowledge and skill	0.018	0.856	-0.227	-0.130
Vo_4	Accessing organic information is difficult	0.013	0.524	-0.632	0.165
Vo_5	Lack of Awareness	-0.130	0.688	-0.240	0.048
Vo_6	Output/ Marketing Problems	0.809	-0.041	0.155	0.252
Vo_7	Shortage of Bio-mass	0.732	-0.324	0.357	0.268
Vo_8	Inadequate Supporting Infrastructure	0.311	0.258	0.374	0.568
Vo_9	High Input Costs	-0.938	0.067	0.415	-0.005
Vo_{10}	Non-availability of farm Inputs	0.644	-0.553	0.242	0.237
Vo_{11}	Lack of appropriate Agriculture Policy	0.694	-0.524	0.069	0.316
Vo_{12}	Lack of Financial Support	-0.026	-0.400	0.810	0.298
Vo_{13}	Low production	0.532	-0.706	-0.101	0.108
Vo_{14}	Inability to Meet the Export Demand	0.351	0.345	0.471	0.044
Vo_{15}	Lack of Quality Standards for Bio-manures	0.732	-0.324	0.357	0.268
Vo_{16}	Lack of capital	-0.938	0.067	0.915	-0.005
Vo_{17}	Marketing problems	0.631	0.582	0.374	0.568

Source: Field Survey, 2022.

Hypothesis Testing

Ho: The null hypothesis which state that the socio-economic characteristics of the organic agricultural farmers do not significantly influence the type of crop production strategies adopted by the farmers in the study area was tested using F-test at 5% level of significance and the result showed that F-cal = 34.960, F-tab = 2.02.

Decision Rule: If F-cal > F-tab reject null hypothesis, otherwise accept the alternative.

Since F-cal (34.960) > F-tab (2.02), the null hypothesis was rejected and the alternative accepted. This implies that the socioeconomic characteristics of the organic agricultural farmers significantly influence the type of crop production strategies adopted by the farmers in the study area.

CONCLUSION AND RECOMMENDATIONS

This study had shown that the socioeconomic factors regressed significantly influenced farmers' involvement in organic agricultural practices in the study area. From the forgoing, the socioeconomic characteristics of the respondents such as education should be enhanced to enable them participate more in organic farming, the identified constraints should be tackled by government and private individuals to facilitate organic farming; farmers should be motivated through credit facilities and series of training on technical-know-how in organic farming in order to ensure sustainable production of food crops.

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