DETERMINANTS OF HOMEGARDEN AGROFORESTRY PRODUCTION OUTPUT IN SOUTH-WESTERN REGION OF AKWA IBOM STATE, NIGERIA

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ABSTRACT

The study assessed the determinants of homegarden agroforestry production output in south-western region of Akwa Ibom State, Nigeria It specifically examined the socio-economic characteristics of homegarden farmers, examined the factors enhancing their productivity. Data for the study was obtained from 500 hundred respondents using a set of structured questionnaire. Data analysis was analysed using descriptive statistics and SPSS (1999). The F-statistics of 13.964 was highly significant at 1% ($P < 0.01$). Marital status had a positive coefficient (2.596318) and significance at 1% ($P< 0.01$). The coefficient for educational level had a positive value of 4.9536 and significant at 1% ($P < 0.01$). Seeds/cuttings coefficient showed a positive sign (1.226294) and significant at 1% ($P<0.01$) level. The coefficient for manure/fertilizer usage indicated a positive value of 2.27754 with a significant level of 1% ($P<0.01$). Homegarden size with a positive coefficient (33271.26) was significance at 1% ($P<0.01$). The coefficient (1.232636) of labour wage was significant at 1% ($P<0.01$) and has a positive relationship with homegarden production total revenue. Landownership structure had 44211.26 and was positively correlated with homegarden production total revenue and indicated a level of significant at 1% ($P<0.01$). It was observed that all the coefficient variables had positive relationship except Extension service that indicated a negative relationship (-1.103312) but significant at 1% ($P<0.01$). Findings of the study showed that the coefficient of multiple determinations (R^2) value was 0.863. This shows that all the regressors (explanatory variables) included in the model explained about 86.30% of the variations in total annual revenue among homegarden farmers in the area of study.

Key words: Determinant, homegarden, agroforestry, socio-economic, production output

INTRODUCTION

Several studies have been carried out in relation to the production of homegardens across the world. Land availability and size have been a major hindrance. In a study conducted by Nwosu (1981), using gross returns per hectare, the author was of the view that a gross return per hectare was used as parameter for profit. The author then concluded that gross margin of any enterprise is measured with respect to the size. In line with this report, Obasi *et al*., (2015) in a study on the determinants of net returns to agroforestry in the humid rainforest belt of Nigeria highlighted that one of the major determinants of net return was size of the agroforestry plot. In the same view, Ogwu *et al*., (2014) submitted that the size of homegardens in Iyanomo and Ogbekpan communities in Edo State showed 68% and 56% in both communities in terms of small sizes of homegardens.

In West Africa, the land for agroforestry system of agricultural activities is basically acquired through inheritance or by purchase. As a result of this, holders of capital who may wish to embark on this system are seldom able to acquire clear title to enough land for such operation, and this fact has had its influence on homegarden development. The capital input factors have a negative influence on farmers to embark on this system of agroforestry. Oni

(2015) studied the factors influencing farmers' willingness to engage in agroforestry practice in Ekiti State, Nigeria and pointed out that lack of funds, cost constraints, institutional constraints, etc were the major impediments affecting the farmers' willingness to embark on agroforestry. Igwe *et al*., (2014) examined the social and economic implications of homegarden system on the livelihood of farm households in Abia State, Nigeria. They revealed that 64% were household labour while 26% were mixed labour. This therefore has the services of paid labour if there were no anticipated benefits to the farming household.

Sale and Olujobi, (2014) conducted a study on farmers' perception of opportunities preferences and obstacles of growing multipurpose trees in farm land in Kogi State, Nigeria. The study revealed that land input, capital and labour inputs were the major obstacles that had significant impact on agroforestry output. A study on the constraints of production and sources of nutrients in homegardens of Akwa Ibom State, Nigeria by Udofia (2011a), suggested the constraints in the following order; lack of improved plant stock > Inadequate funds (Capital input) > prevalence of animal pests /diseases > land scarcity (land input), among others. Although the study overlooked the labour input, Zaman *et al*., (2010) and Kassa (2014) concluded that labour input should not be neglected as it plays a vital role in the production factors. Hence, the need to assessed and document the determinants of homegarden agroforestry production output in south-Western region of Akwa Ibom State, Nigeria

MATERIALS AND METHOD

Study Area

The determinants of homegarden agroforestry production output in south-western region of Akwa Ibom State, Nigeria were carried out in Oruk Anam Local Government Area which lies between latitudes 4º49′ and 4º82′N and longitudes 7º39′ and 7º65′E (AKS, 1989). Oruk Anam is divided into nine clans, namely Inen, Obioakpa, Ibesit Nung Ikot, Nung Ikot, Nung Ita, Ndot, Ibesit, Abak Midim and Ekparikwa with a population of 171,839 (NPC, 2006).

Data Collection

A set of structured questionnaire, oral interview were used to elicit information from homegarden farmers after a reconnaissance survey in Oruk Anam Local Government Area.

Sampling Techniques

The study area was stratified into 9 sample units based on the existing clans. Thirty percent of the villages in each clan, from the nine (9) clans were selected. Ten homegardens were randomly selected from each of the selected villages for enumeration.

Method of Data Analysis

Regression analysis was used to determine the statistical relationship between homegarden farmers' socioeconomic variables, and farm related variables in the study area. The best Adjudged model was chosen based on high adjusted coefficient of determination (R), adjusted coefficient of determination (R^2_{adj}) lowest Standard Error of Estimate (SEE), highest F ratio (F) Gujarati, (2013) method of *a priori* expectation was used to predict the output of production in homegardens in the study area. Statistical analyses for regression were done using SPSS (1999).

Table 1: *A priori* expectation of variables

Dependent variables	Explanatory variables	Expected signs	Explanations of the relation with output
Input (Y)	Marital status (X_1)	+	Output was related to marital status. This implies that if the homegardens farmers are married, the tendency of more family members to take responsibility in catering for the garden was there to increase output
	Educational level (X_2)	+	This means that the more level of education attainment by the farmer, the greater the chances of adopting new innovations to boost homegarden output.

Extension service (X_3)	+	This variable indicate that the more extension agents visit and train the home gardeners with new innovations from research institute, the greater the garderner to improve in skills for a bumper output.
Seeds/ cuttings/ suckers (X_4)	+	Output relate positively to the amount spent on seeds/cuttings/suckers, this means that, the more the farmers purchase improved and good quality/ disease and pest resistance varieties from certified breeders or research institutes, the greater the possibility of having greater yield.
Homegarden size (X_5)	+	This variable indicates a positive and significant relationship. This simply means that, the larger the garden size, the more diverse varieties of plants and livestocks and this increase output.
Labour usage (X_6)	+	This has a positive relationship with output. The more labour applied in mandays, the more the output increase.
Manure/fertilizer usage (X_7)	+	The quantity of manure/fertilizer applied in homegardens, the more the increase in yield.
Land ownership structure (X_8)	+	The more the land is owned by the farmer instead of rentage, the more the possibilities of the farmers to grow more herbs, shrubs, climbers, trees palm and bamboo as well as livestock and thus increase output.

RESULTS

Determinant of Homegardens Production Output in the Study Area

The result of the determinant of homegardens' output in the study area is presented in Table 2. The coefficient of multiple determinations (R^2) value was 0.863 shows that all the regressors (explanatory variables) included in the model explained about 86.30% of the variations in total annual revenue among homegarden farmers in the area of study. The F-statistics of 13.964 was highly significant at 1% ($P < 0.01$). Marital status (X_1) had a positive coefficient (2.596318) and significance at 1% ($P< 0.01$). The coefficient for educational level (X_2) had a positive value of 4.9536 and significant at 1% ($P < 0.01$). Extension service (X_3) indicated a negative relationship (-1.103312) but significant at 1% ($P<0.01$). Seeds/cuttings coefficient (X_4) showed a positive sign (1.226294) and significant at 1% ($P<0.01$) level. The coefficient for manure/fertilizer (X_5) usage indicated a positive value of 2.27754 with a significant level of 1% ($P<0.01$). Homegarden size (X_6) with a positive coefficient (33271.26) and significance at 1% ($P<0.01$) conformed to *a priori* expectation. The coefficient (1.232636) of labour wage (X_7) is significant at 1% ($P<0.01$) and has a positive relationship with homegarden production total revenue. Landownership structure (X_8) coefficient of 44211.26 was positively correlated with homegarden production total revenue and indicated a level of significant at 1% ($P<0.01$).

Table 2: Regression analysis and determinants of homegarden production output in the study area

Variable	Linear	Semi – log	Double log	Exponential
Constant	12863.2	-82212.21	4.00456	9.03545
	(5.33)***	(-1.12)***	(1.43)***	(47.37)***
Marital Status	-473.7126	32860.11	2.596318	-0.0065252
	(-0.75)***	(1.55)***	(2.74)***	(-0.13)**
Educational Level	734.1924	76685.56	4.9536	0.0414646
	(0.97)***	(1.83)***	(3.42)***	(0.69)***
Extension Service	-1353.118	35721.26	-1.103321	-0.438139
	(-0.43)**	(1.97)***	(-1.59)***	(-0.18)**
Seeds/Cuttings	-0.1073102	24479.56	z1.226294	-0.0000269
	(-0.17)**	(1.59)***	(2.30)***	(-0.54)**
Manure/Fertilizer	10.76509	-38261.40	2.27754	0.003412
	(0.61)**	(-1.84)***	(3.12)***	(0.97)***
Homegarden Size	336.1002	-15008.81	33271.26	0.0004934
	(0.44)**	(-1.03)***	(1.96)***	(0.01)**
Labour	-90.27132	14997.48	1.232636	0.005615
	(-0.27)**	(1.82)***	(3.35)***	(0.21)**
Landownership	44271.26	-1946.247	44211.26	32942.11
	(1.86)***	(-0.75)**	(1.95)***	(1.54)***
R^2	0.782	0.761	0.863	0.724
Adjusted R	0.706	0.658	0.812	0.649
F – Stat	12.620***	12.430***	13.964***	11.840***

Note: Asterisks *, ** and *** represent significance level at 10%, 5% and 1% respectively. Figures in parenthesis represent the t – values. ++ = lead model
Source: Field data (2017)

Relationship between Homegarden Farmers, Socio-economic and Related Variables

This model aimed at describing the relationship between homegarden farmers' socioeconomic variables, and farm related variables in the study area. Double log production function was chosen as the lead equation on the basis of the *a priori* expectation for instance, the level of significance of the explanatory variables, the coefficient of multiple determination (R^2), appropriate theoretically expected signs and the overall significance of the regression equation as judged by the estimated f- statistical value were satisfactory.

The coefficient of multiple determination (R^2) value was high at 0.863. The high value shows that all the regressors (explanatory variables) included in the model explained about 86.30% of the variations in total annual revenue among homegarden farmers in the area of study. The f-statistics of 13.964 was highly significant at 1% ($p<0.01$) and indicated that the regressors included in the model had a positive relationship on the total annual revenue among homegarden farmers in the study area. Marital status (X_1) had positive coefficient (2.596318) significance at 1% ($p< .01$) level. The result is in line with *a priori* expectation. The positive sign signifies that homegarden farmers who are married could have the likelihood of adequate family farm labour that would lead to an increase in homegarden productivity. This observation is in consonance with the findings of Udofia (2011a) that married farmers provided adequate family labour in homegarden activities. This implies that an increase in family labour would lead to a corresponding increase in output.

The coefficient for educational level (X_2) had a positive value of 4.9536 and significant at 1% ($P < 0.01$). This implies that majority of homegarden farmers were educated and they adopted new innovations which increased their production output. This conforms to *a priori* expectation that, the more level of education attainment by homegarden farmer, the greater the chances of adopting new innovations to boost production. This study conforms to studies reported by Udofia (2011a) and Aworinde *et al*., (2013). Their study submitted that homegarden farmers who had attained some level of formal education will be able to understand, appreciate

and adopt scientific production techniques. This would further translate to increased total revenue of homegarden farmers in the area of study.

Extension service (X_3) indicated a negative relationship (-1.103312) but significant at 1% ($P<0.01$). This result implies that extension service had negative but with a significant effect on homegarden production. This means that extension services were not felt by homegarden farmers in the study area. On the contrary, this variable is in contrast with *a priori* expectation which indicated that the more extension agents visit and train the home gardeners with new innovations from research institute, the greater the gardener to improve in skills for a bumper output. This Result finding is in conflict with the study as reported by Obasi *et al*., (2015) who submitted that extension services had a positive relation which translates increase in production.

Seeds/cuttings coefficient (X_4) showed a positive sign (1.226294) and significant at 1% ($P<0.01$) level. Field survey revealed that improved and good quality/disease and pest resistance varieties of seeds/cuttings were the major imput in homegarden farming. The variable conformed to the *a priori* expectation which implies that an increase in the quality of seeds/cuttings purchased would result in an increase in the output hence total revenue of homegarden production.

The coefficient for manure/fertilizer (X_5) usage indicated a positive value of 2.27754 with a significant level of 1% ($P<0.01$). This implies that homegarden farmers in Oruk Anam LGA increased their crop yield through application of more organic manure/fertilizer. This thus conforms to a *priori* expectation that increase in manure/fertilizer usage in homegardens would increase its production. Interestingly this study agrees with studies conducted by Park *et al*. (1994), Prince and Gordon, (1999), Beetz, (2002), and Altieri, (2009) who reported that manure/fertilizer application induces higher level of soil organic matter in homegardens and also influences soil invertebrate communities positively thereby by boosting productivity. In their study, it was observed that homegardens in the study area gained more advantage than gardens away from home in terms of manure/fertilizer application. This is because kitchen waste, farmyard manure e.g. Poultry droppings, livestock dung, etc. were seen frequently as compared to distance gardens.

Homegarden size (X_6) with a positive coefficient (33271.26) had significance at 1% ($P<0.01$). The sign implied a positive correlation. This means that the size of homegardens in the study area was large with diverse varieties of plants and livestock and thus increased their output. This conformed to the *a priori* expectation which stated that an increase in homegarden size would lead to an increase in productions This finding agreed to the findings as reported by Ogwu *et al*., (2014), Igwe *et al*., (2014) which reported that homegarden size has a significance relationship with production. Hence, should be considered for the improvement of this system of agroforestry. The coefficient (1.232636) of labour wage (X_7) is significant at 1% ($P<0.01$) and has a positive relationship with homegarden production total revenue. This follows *a priori* expectation which specifies that, the more labour applied in mandays, the more increase in output. Field survey report showed that labour concentration was higher especially family labour in homegardens than gardens away from homes. This therefore implies that more attention is paid to homegardens which in turn yielded a positive output. The study report goes in consonant with Mendez *et al*., (2001) and Babalola (2008).

However, landownership structure (X_8) coefficient of 44211.26 was positively correlated with homegarden production total revenue and indicated a level of significant at 1% ($P<0.01$). This study is in agreement with the *a priori* expectation which state that, the more land owned by farmers instead of rentage, the more possibilities of the farmers to grow more perennial fruit trees, vegetables, shrubs, animals, etc and leading to increase output. According to field survey, the study observed that all the homegardens sampled in the area of study were owned by the farmers. This implies that, the money that could have been used for rentage have been diversified into some other forms of businesses to boost their income.

CONCLUSION AND RECOMMENDATION

Extension services were not felt by homegarden agroforestry farmers in south-western region of Akwa Ibom State, Nigeria. Extension service input should not be neglected as it plays a vital role in the production factors. Hence Akwa Ibom State Government should provide adequate technical and extension service to train the homegarden farmers with new innovations from Research Institute; this will motivate the farmers, improve their skills for adequate production of homegarden products and enhance the potential for a bumper production output to improve household economy.

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