

SOCIO ECONOMIC ASSESSMENT OF GINGER PRODUCTION IN JABA LOCAL GOVERNMENT AREA OF KADUNA STATE

ABSTRACT

Ginger (*Zingiberofficinale* Roscoe) is an herbaceous perennial plant belonging to the Order Scitamineae and the family Zingiberaceae. It is used for both medicinal and culinary purposes. It is a root crop and a typical herb extensively grown across the world for its pungent aromatic underground stem and rhizome which make it an important export commodity in the world trade. Ginger's origin is not well established though it is generally thought to be native of Asia, where it was first cultivated. It was also cultivated in tropical regions of America. Ginger was introduced to Europe by Arab traders from India the first century AD. Ginger was introduced to Nigeria in 1927. The study was carried out to examine the socio economics of ginger production in Jaba Local Government Area of Kaduna State. The objectives of this study are to; identify the socio economic characteristic of ginger production, assess the extent of profitability of ginger production in the study area, and to determine the socio economic factors affecting the production of ginger. The data were obtained primarily by administering questionnaires to 60 farmers that were purposively selected from four wards, namely: Daddu, Samban, Nok, and sab-zuro. The data were analysed using descriptive statistics, multiple regression analysis gross margin and productivity. The result of the multiple regression shows that among 8 variables used in the analysis, only 3 variables significantly influenced ginger production:—Which are education, credit, and farm size. The gross margin was calculated to be ₦177,756.69 and a return to naira of ₦1.21 was realized. The major constraints militating against ginger production in the study area are inadequate input, poor transportation facilities, high cost of labour and inadequate credit. It is recommended that extension services are needed in the study area to educate the farmer on the use of agro chemicals, input and agro practices toward increase in production and there is need for farmer to form cooperatives groups to help them provide credit to their member in good time and substantial amount

Keywords: ginger, socio-economic, assessment, multiple regression, gross margin

Introduction

Ginger (*Zingiberofficinale* Roscoe) is an herbaceous perennial plant belonging to the Order Scitamineae and the family Zingiberaceae. It is used for both medicinal and culinary purposes (Erinle, 1989) it is a root crop and a typical herb extensively grown across the world for its pungent aromatic under-ground stem and rhizome which makes it an important export

commodity in world trade (NEPC, 1999; Erinle, 1989; Ajibade and Dauda, 2005). Ginger's origin is not well established though it is generally thought to be native of Asia, where it was first cultivated. It was also cultivated in tropical regions of America. Ginger was introduced to Europe by Arab traders from India the first century AD.

The Arab also took the plant from India to East Africa in the thirteenth century while the Portuguese took it to West Africa and other part of the tropics in the sixteenth century. Ginger was introduced to Nigeria in 1927. The Spice was known to Germany and France in the ninth century. The plant is now cultivated in different parts of Nigeria, though the major producing areas include Kaduna, Nassarawa, Sokoto, Zamfara, Akwalbom Oyo, Abia, and Lagos states although Southern Kaduna still remains the largest producers of fresh ginger in Nigeria in Kachia, Jabba, Jama'a and Kagarko Local government Areas (KADP, 2000; KADP, 2004; and Bernard, 2008). The varieties produced in Nigeria are 'TaffiGiwa' and 'Yatsunbiri' which is are higher in monoterpene and oil, giving a more pungent aroma and pungency.

Therefore it is usually preferred for the production of oils and oleoresins (KADP, 2000; ICT, 2007; Chukwu and Emehute, 2003). Subsequently Nigeria became a major exporter of ginger to United Kingdom, Germany, Spain, France, Saudi Arabia, United states of America among others. By 1959, 1582.8 tons were exported. This later declined significantly so that by 1984 only about 27 tons was exported (Annual abstract of statistics, (Erinle, 1989).

Information from the Nigerian trade showed that 846.7 tons of ginger valued at N2.24 million was were exported in 1986 as against 1650 tonnes valued at 2.28 British sterling in 1965. (Erinle, 1989)

The absence of scientific research to back up the efforts of the farmers was among the factors that limited increased production (Erinle, 1989). Nigeria are then ranked first in term of

percentage of total hectares of ginger under cultivation but her contribution to total World output is too low compared to other countries. This can be attributed to the fact that most of production is ~~done~~ undertaken by smallholders and traditional farmers with rudimentary production techniques and low yields. In addition, the small holders farmers are constrained by many problems like the farmers do not see it as a business enterprise, therefore are not adequately focused on profit maximizing motive (Federal Ministry of Agriculture, 1993 in Goni and Baba, 2007). Therefore (Emmanuel, 2008) opined that Nigeria has the potential to expand production in a medium to long term investment strategy that can develop into self-sufficient industry (FAO, 2010). Efficiency measurement is useful in determining the magnitude of the gain that could be achieved by adopting improved production technology. Efficiency in resource allocation has a far-reaching impact on the observed farm output level.

The presence of shortfall in efficiency mean that output can be increased without using additional conventional inputs and new technology. (Zhu, 2000; Tauer, 2001; Rahma, Ajayi and Gabriel, 2002; Armagan, 2008). Farmers possess the potential to achieve both technical and allocative efficiency in farm enterprises but inefficiency may arise due to a variety of factors some of which are beyond the control of the farmers (Ogunniyi, 2008 and Rahman *et al* 2002). In addition, inefficiency in production on the part of the farmers has variously been implicated as forces militating against ginger production. Factors such as technical knowledge constrained increased food supply, export and poverty reduction. This may be attributed to high inefficiencies because farmer lack access to information on efficiency and low literacy level limiting interpretation of such information to guide them in commercial production.

Total production of ginger can be increased by increasing the yield, increasing the total hectares, improving the economics of production and stimulating demand for the commodity. Ginger

production in Nigeria today is laborious. Practically all operations are done manually. This has several implications as pointed out by Onwueme (1989), that it limits the hectares that each individual farmer can cultivate; production of the crop is unattractive and tedious; and production costs are relatively high due to the relative high cost of labour. He therefore concluded that improving the economics of production would involve; mechanization of all operation in ginger production, weed control by means of herbicides and setts (seed) multiplication. The objectives of this study are to identify the socio- characteristic of ginger production, assess the extent of profitability of ginger production in the study area, and to determine the socio-economic factors affecting the production of ginger.

The study Area

The study was conducted in Jaba local government area. It lies between latitude 9 N and longitude 8 E. in southern part of Kaduna State(Fig 1). (Kaduna State Ministry of Agriculture,2007) The local government shares boundaries with ZangoKataf local government area in the North, in the East by Jema'a local government area, in the West by Kachia local government area and in the South by Kagarko and Nassarawa State. (KADP, 2004)

The population of Kaduna State is 6,066,562, people according to 2006 Census and the population of Jaba is 61,000 people.(NPC, 2006) It has a land area of about 368 km²—the population of Kaduna state with a growth rate of 3.2% is 7,805,131 people in 2004

The local government area has twenty one (21) districts. Among them are Gumkparo, Samban, Ankung, AngwanRana, Daddu, KurminJatau, Fai, Fuge, Angwal, Chori, Sub-zero, Ngarsu, Ngarkatera, Nok. In consultation with Kaduna State Agricultural project (KADP) Office and District Head.

107 | The local Government area is in the Guinea Savannah with topography of 400_m_—600_m above
108 | sea level. The local Government is marked with two (2) distinct ~~season~~-Dry and Wet seasons.
109 | ~~w~~With a unimodal rainfall pattern of about 1000mm-1500mm annually. The dry season is
110 | between **October to March**. It has a temperature of about 28-32⁰C (Annual Abstract of Statistic,
111 | 1995). Jaba local government area is endowed with abundant natural resources such as hills,
112 | streams, natural grassland dam and economics trees. Crop grown in the area includes Sorghum,
113 | Millet, Maize, Yam, Rice, Cocoyam, Groundnut, Acha, Beans, Ginger, Cassava, Soya Bean,
114 | Sweet Potatoes, Beni-seed and Sugar cane. During the dry season, farmers in Jaba local
115 | government area are involved in the production of vegetables such as cabbage, spinach, tomatoes
116 | and pepper. Livestock produced in the area include pigs, goats, poultry and cattle (Shaibet *al*,
117 | 1997).

118 | The major Ethnic groups in the area are Kadara (Adara), Jaba (Ham), Kuturmi, Kaje (Bajju),
119 | Samban, Atyap, Gbagyi, and Hausa-Fulani, Chori, Duya. Majority of the inhabitants are
120 | Christians. The major occupation of the inhabitants of local government is farming. Majority of
121 | the farmers practices small scale Agriculture ~~who have~~with farm size ranging between 0.1-3ha.
122 | The soil type is clay-loam. The major occupation of the people includes s fishing, hunting,
123 | weaving, trading, and others.

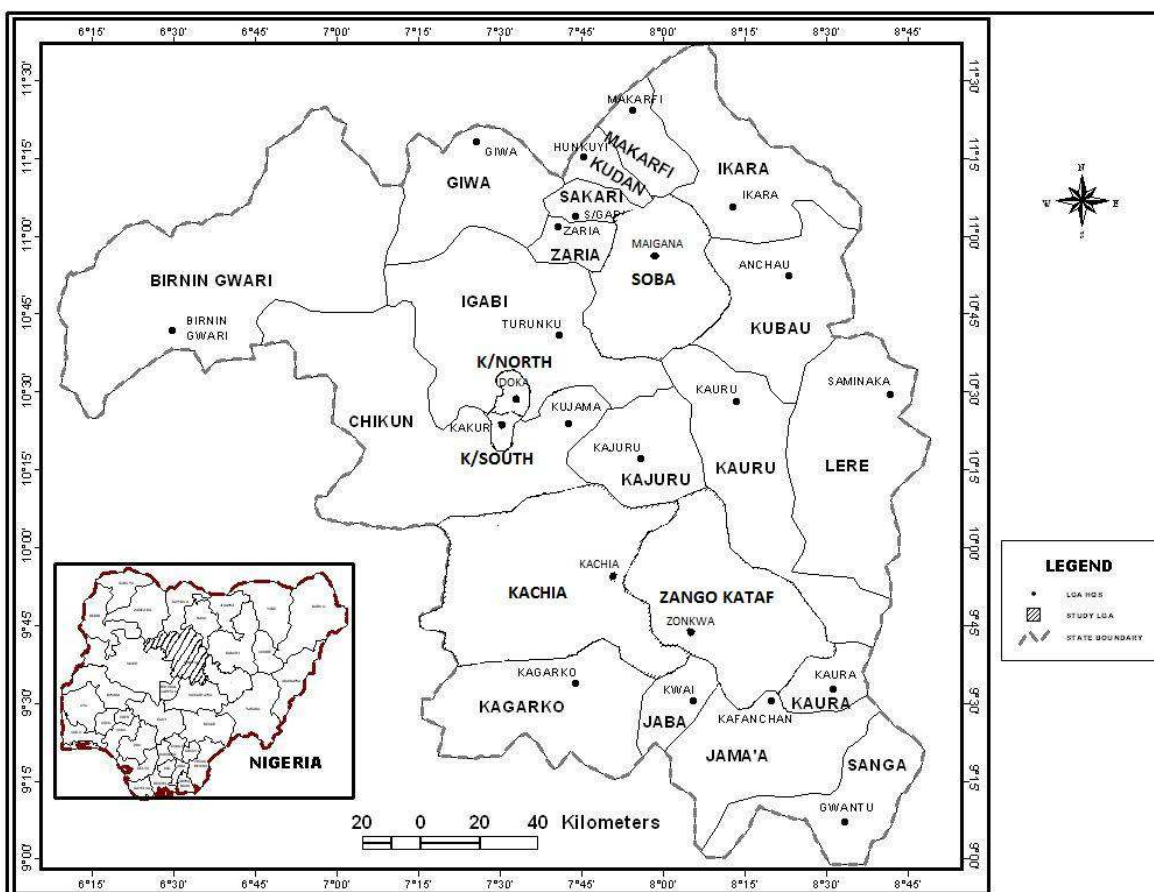


Figure 1: Administrative map of Kaduna state showing the 23 local government council

Methodology

Sampling technique and sample size

A combination of purposive and simple random sampling was employed in this study. Jaba local government area of Kaduna state was purposively selected based on prior knowledge that it is a ginger producing area. Respondents were selected from four districts which include: Daddu, Samban, Nok, and sub-zero because of the high intensity and concentration of ginger farmers in the area. (KADP, 2004) and they represent 50% of the districts in the local government area. Fifteen (15) farmers were randomly selected from each of the purposively selected districts to give a sample size of 60 respondents.

136

137 **Data Collection**

138 Primary data were collected for the study. The primary data were obtained through structured
139 questionnaires.

140 **Analytical Tools**

141 The analytical tools that were used in analysing the data are

142 i. Simple descriptive statistic

143 ii. Gross margin

144 iii. Productivity (Returns to Inputs)

145 iv. Inferential statistic in the form of simple linear regression

146 i. Simple descriptive statistics:- Simple descriptive statistics such as mean, percentages and
147 frequency distribution tables ~~was~~ were used in the analysis of data to achieve objectives
148 v

149 ii. Gross margin (GM):- Gross Margin such as gross farm income and total variable income
150 where used in the analysis of data to achieve objectives i and iii. This is given as

151 $GM = GI - TVC$

152 Where

153 GM = gross margin

154 GI = gross farm income

155 TVC = total variable income

156 iii. Productivity = $\frac{\text{value of goods/services}}{\text{cost of resources}}$ such as value of goods and services and cost of
157 resources **was** used in the analysis of data to achieve objectives ii.

158 iv. Inferential statistic will be used in the analysis of data to achieve objective iv

159 Multiple regression analysis

160 Inferential statistics particularly regression analysis was used. Regression is the measure of the
161 functional relationship between two or more variables that is-are the dependent and independent
162 variables (**Martyn, 2008**). The dependent variable (Y) shows the output of ginger and is simply a
163 variable that is dependent on an independent variable. While the independent variables (x) shows
164 the socio economic factors affecting the production of ginger by the farmers like age of farmers,
165 level of formal education, extension contact, output of each crop, method of acquiring plots,
166 access to credit, sources of information on the ginger seed, method of acquiring seeds.

167 The strength of the relationship and the rate of responds of the relationship will be determined
168 using the simple linear regression model.

169 Linear function; Linear regression assumes a linear relationship between the dependent and
170 independent variables. It is implicitly specified as;

171 $Y = f(x_1, x_2, x_3, \dots, x_n)$

172 Explicitly, the model for linear regression becomes;

173 $Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + e$

174

175 Where Y = **Yield of ginger (kg/ha)**

176 adopted = 0)

177 X_1 = Age of farmers (Number)

178 X_2 = Gender (Number)
 179 X_3 = marital status (Number)
 180 X_4 = Level of education (Years)
 181 X_5 = Household size (Number)
 182 X_6 = Years of farming experience (Years)
 183 X_7 = Forms of land tenancy (Number)
 184 X_8 = Availability to credit (actual amount in naira)
 185 X_n = the value of the other independent variables
 186 α = constant term
 187 e = error term
 188 $\beta_1 - \beta_8$ = Regression coefficient

189

190 **RESULTS AND DISCUSSION**

191 The results were analysed and discussed in line with the objectives of the study

192 **Socio-economic Characteristics of Ginger Farmers**

193 The socio-economics characteristics of ginger **Farmer** such as age, house hold size, occupation,
 194 educational level, years of ginger farming experience, credit, extension visit etc. were examined.

195

196 **Sex of Ginger Farmers**

197 The result presented in Table 1 showed that 83.3% of the respondents were males while the
 198 remaining 16.7% where females. From this result, it can be deduced that majority of the farmers
 199 are males which implies that fewer females take part in the production of ginger. This may be
 200 due to the fact that women major more in processing while production on the other hand requires
 201 a lot of energy and effort which most men are capable of handling. This is in line with the
 202 findings of Baiyegunhi and Fraser (2009) which indicated that domination of male in ginger
 203 production is due to high demands of time and effort ~~requires~~required to work in such
 204 enterprise.

Table1: Distribution of ginger farmer based on sex

Sex	Frequency	Percentage
Female	10	16.7
Male	50	83.3
Total	60	100.0

Marital Status of Ginger Farmer

The result in Table 2 shows that majority (85.0%) of the farmers are married. The single ones among the farmers are only 15.0%. The significance of marital status on agricultural production can be explained in terms of the supply of agricultural family labour. It is expected that family labour would be more available where the household heads are married since women and children are able to participate in crop production, processing and marketing.

Table 2: Distribution of ginger farmers based on marital status

Status	Frequency	Percentage
Married	51	85.0

Single	9	15.0
Total	60	100.0

220

221 Age of Ginger Farmers

222 Age is very important in agricultural production because it determines the physical strength of
 223 the farmer. Also the young people tend to withstand stress and put more time in various farming
 224 operations, this will likely result to an increase in output. The result in Table 3 shows that the
 225 highest category (31.7%) of ginger production falls within the range of 46-55 years and the
 226 lowest (5.0%) age range of the farmers are between the age of 18-25 years. It could be seen
 227 that majority of farmers are between 26-55 years and the mean age is 36. Therefore it could be
 228 said that (88%) middle-age people are more involved in ginger production in the study area than
 229 the elderly people. The result obtained is similar to the findings of Kantiok (2007), which state
 230 that majority of vegetable growers are below the age of fifty and therefore still in their active
 231 age. Agriculture is a very energy consuming occupation which can only be done by able men and
 232 this may be the reasons for the age distribution of the farmers. This agrees with the study of
 233 Udoh and Nyienakuma (2008), on socio economic characteristics and adoption trend of artisanal
 234 fishers in Akwalbom state who showed that farmers within the active age groups will be able to
 235 withstand stress and put more time into various farming operations. This will result in increased
 236 output.

237

238 Table 3: Distribution of ginger farmers based on age

Age	Frequency	Percentage
18-25 years	3	5.0
26-35 years	17	28.3

36-45 years	17	28.3
46-55 years	19	31.7
56 years and above	4	6.7
Total	60	100.0

Mean= 36 years

Distribution of ginger farmers based on household size

This result presented in Table 4.shows that majority (60%) of the respondents had 4-7 persons in their family. The farmers that had 20%had 1-3 members and another 20% had eight members and above. The family, size group of 1-3, 8 and above.This implies that farmers in the study might have advantage of family labour for farm operation if children could spend some time on farm. However, the implication of large household size is that it will increase household consumption expenditure which competes with production of limited financial resources within the household. According to Okoruwa and Ogundele (2006) higher family size does not necessarily translate to higher use of family labour because some of the young able men prefer other jobs than farming.

Table 4 Distribution of ginger farmers based on household size

Household size	Frequency	Percentage
1-3	12	20.0
4-7	36	60.0
8 and above	12	20.0
Total	60	100.0

Major Occupation of Ginger Farmers

The result presented in Table 5 shows that majority of the respondents major occupation is other occupation (70%) such as civil servant, pastors, traders, transporters ~~“e.tc.”~~etc. According to FAO (1999) employment in non-farm activities is essential for diversification of sources of farm household’s livelihood. It enables households to modernize their production by giving them an opportunity to apply the necessary input and reducing food shortage during the period of unexpected crop failures. The remaining (30%) had farming as major occupation

Table 5 Distribution of ginger farmers based on occupation

Occupation	Frequency	Percentage
Others	42	70.0
Farming	18	30.0
Total	60	100.0

Educational Level of Ginger Farmers

The level of education affects the type of decision farmers take in agricultural production and determines the level of opportunities available to improve livelihood strategies and managerial capacity in agricultural production. The result presented in Table 6 show that about 6% of ginger farmers had primary education, 25% had up secondary school level of education and about ~~of the respondents~~ 68.% of the farmer went to tertiary institution which is the highest percentage of the farmers interviewed. This indicate that all (100%) of the total population of the farmers had one form of formal education or the other. Illiteracy is believed to have negative implication on efficient use of productive resources and adoption of farm innovation. According to Mohammed-Lawalet *al.* (2009) ~~in their study found that~~ farmer’s level of education is expected to influences adoption agricultural innovations and decisions on various aspects of farming.

Table 6: Distribution of Ginger Farmers based on Educational level

Educational level	Frequency	Percentage
Primary level	4	5.7
Secondary level	15	25.0
Tertiary level	41	68.3
Total	60	100.0

275 Farming Experience of Ginger Farmer

276 Farming experience plays a significant role in agricultural production. It is expected that the
277 higher the farmer's experience the better will be the productive capacity of the farmer. The result
278 in Table 7 shows that majority (38.3%) of ginger production farmers had between 1-10 years of
279 experience in farming, about 30% had between 11-20 years' experience while 25.0%, 3.0%,
280 3.0% of the farmer had 21-30 years, 31-40 years and 41 years above years farming experience
281 respectively. The result indicates that a great proportion (62%) of the farmers had more than 10
282 year farming experience in ginger production. The implication of this is that the farmers are more
283 knowledgeable in the farming enterprise and can better combine factors of production that will
284 give result to higher yield to attain optimum resources utility.

285

286 Table 7: Distribution of ginger farmers based on Farming experience

Farming experience	Frequency	Percentage
1-10 years	23	38.3
11-20 years	18	30.0
21-30 years	15	25.0
31-40 years	2	3.3
41 years and above	2	3.3
Total	60	100.0

Access to Agricultural Extension Services of Ginger Farmers

The result presented in Table 8 shows that majority of the (61.7%) of the farmers had no access to agricultural extension services. The resultant effect of this can be wrong use of farm inputs such as fertilizers, chemicals, seeds “e.t.c” due to lack of extension on the usage of such inputs the absence of extension workers in the rural areas thus leading to low productivity of the farmers and hence, low income. The farmers that had access to extension were few (38.3%). This means that only the well to do or civil servants among the respondent have linked with the agricultural extension agents in the study area. According to Obwona (2000), extension services are very essential to the improvement of farm productivity and efficiency among farmers.

Table8: Distribution of Ginger Production based on access to agricultural extension services

Access to extension services	Frequency	Percentage
No access agric extension	37	61.7
Had access to agric extension	23	38.3
Total	60	100.0

Amount of Credit Obtained by Ginger

The result in Table 9. shows that majority of the farmers (91.7) obtain less than ₦26,000 credit which means that they use much of their own personals savings for all the farming practices, while (1.7%) obtained about ₦26,000-50,000, while (1.7%) obtained ₦51,000;75,000 and (5.0%) obtained ₦76,000-100,000 credit. Credit is a very strong important factor that is needed to acquire or develop farm enterprise (Nmadu, 2011). Therefore credit plays a very pivotal role if the farmers are to improve their efficiency and operate on the frontier (Alamu, 2005; Ezeagu, 2006). According to the information gathered most of those that got credit are civil servants who have access to loans in their place of work.

Table 9. Distribution of ginger farmers based on the amount of credit obtained

Amount of credit services	Frequency	Percentage
less than 25,000	55	91.7
26,000-50,000	1	1.7
51,000-75,000	1	1.7
76,000-100,000	3	5.0
Total	60	100.0

310

311 **Average yield of Ginger**

312 The average [ginger](#) yield observed among the sample farmers was 1274.1 kg and the average
313 farm size was 1.19 hectare. The results conforms generally to earlier research in Nigeria e.g. Abu
314 (2009), Emmanuel (2008), Alibi and Aruna (2006), Alabi (2003), Olufe (1998), Rahman et al.,
315 (2002) and Alumu (2005) there for the calculated yield of ginger in the study area is 1044.4 kg
316 per hectare. This is far below worldwide yield of ginger as indicated by FAO 2008 in their report
317 which showed that worldwide yield of ginger was 3800kg/ha. In spite the level of profit realised
318 by the farmer more profit would be realised if the yield of ginger farmer in the study are higher
319 than what they realise presently.

320

321 **Socio Economic Factors affecting Ginger Production**

322 Linear regression model was used to identify factors affecting ginger production in the study
323 area. As the major focus of this study aims to assess the socio economic factors affecting ginger
324 production; yield of ginger is considered as the dependent variable of the model, while
325 independent variables were the socio-economic characteristic of the farmers.

326 The independent variable entered in the model were age, household size, occupation, farming
327 experience, credit, extension visit and farm size. Out of all these variables only age, credit and
328 farm size were found to significantly affect ginger production. Household size was found to have
329 a negative relationship with ginger production. This implies that as the household size increases
330 ginger production will decrease and it is contrary to apriority expectation. The expectation is that

the larger the household size the more free farm labour available to the farmer which will consequently increase the production of all things been equal.

Credit was found also to have a negative relation with ginger production. This implies that low access to credit will increase ginger production and it is contrary to apriori-apriority expectation.

Farm size was found to have a positive relation with ginger production. This implies that the more availability of farm land the more increase in ginger production which is not contrary to apriority expectation because of the positive relationship.

The R^2 value of 50.2 indicates that all the socio-economic variables included in the model explained 50.2% variability affect of ginger production in the study area while 49.8% of the variables do not affect ginger production in the study area.

Table 11: Estimates of linear Regression Model for Determinants of socio economic factors affecting ginger

Variables	Coefficients	Standard Error	Significance difference
Constant	294431.115	116934.652	.057
Age (x_1)	-1149.249	5614.013	.839
Household size (x_2)	-16827.804*	9496.258	.066
Occupation (x_3)	-1488.194	95640.856	.988
Education (x_4)	21325.681	76933.912	.783
Farming experience(x_5)	-4974.142	5841.874	.399
Credit (x_6)	-4.867*	2.551	.067
Extension contact(x_7)	17649.389	32762.042	.592
Farm size (x_8)	242765.662**	76094.995	.002
TC	-1.044	.358	.005

*, **, represents significant at less than 10%, and 5% respectively.

Negelkerte $R^2 = .502$

347 Cost and Returns (profitability) Analysis

348 Costs of production

349 Costs are generally of two types-fixed and variable. Fixed costs are those costs incurred on fixed
350 inputs which do not change as production changes. Variable costs are those costs that relate
351 directly to the level of production. In this study, only the variable costs were considered because
352 in traditional agriculture fixed cost is very negligible and usually ignored. The variable costs
353 considered in this study are costs incurred on inputs such as seeds, fertilizer, labour, pesticide,
354 mulching and other cost items.

355

356

357

358 Cost of seed

359 Ginger sett (seed) used by the farmer in the study area were mainly unimproved seeds taken from
360 the last harvest. Some obtained their seeds from the market; the cost of ginger production in the
361 study area is ₦32481 per hectare which constitute about 22% of the total cost of production.

362

363 Cost of mulching

364 The average cost for mulching incurred by the farmers amount to ₦10687 per hectare which
365 constitutes about 7.0% of the total cost of production.

366

367 Cost of labour

368 Labour cost consists of family and hired labour input. The family labour was computed on the
369 basis of opportunity cost principle in man-day. The wage rate varied according to the farm
370 operation to be performed. An average wage rate of ₦ 350 per man-day was used, giving the
371 average labour cost per hectare to be ₦67037. Constitute about 45% of the total cost of
372 production.

373 Cost of fertilizer

374 The average cost of fertilizer in the study is ₦30511 per hectare which constitute about 20.74%

375

376 Cost of chemical

The average cost of chemical used by the sampled ginger farmers was ₦5997.3 per hectare which constitute is about about 4.08%

Other variable cost

Other cost incurred on variable inputs such as sack, transportation were computed to be ₦403.01 per hectare which constitute 0.27%

Total variable cost

The summations of variable costs incurred on variable input in ginger production are the total variables costs. Table 12 revealed that the total variable cost in ginger production in the study area was ₦ 147113.31 per hectare.

Gross income

The gross return was calculated by multiplying the total yield of each respondent by the average unit price. This gave a gross income of ₦ 324670 per hectare.

Gross margin

The gross margin per hectare is the subtraction of the total variable cost from the gross income per hectare (gross return). Table 12 indicates that ginger farmers obtained a gross margin of ₦ 177756.69 per hectare which implies that ginger production in the study area is profitable

Return to naira

The average rate of return was obtained by dividing the gross income by the total variable cost. The average rate of return was calculated to be ₦2.21 implying that for every naira invested a profit of ₦1.21 was realised.

Table 12 Average cost and Return of ginger production

Variables	Cost ₦/ha	Percentage
(1) Gross income	324670	

(2) Variable input	32481	22.03
(a) Seed	10684	7.26
(b) Mulching	67037	45.57
(c) Labour	30511	20.74
(d) Fertilizer	5997.3	4.08
(e) Chemical	403.01	0.27
(f) Other	147113.31	100
(3) Total Variable Cost	177756.69	
(4) Gross Margin		
(5) Rate of Return (GI/TVC)	2.21	

404

405 Conclusion

406 The findings have shown that ginger production is a very profitable venture in the study area as
 407 the result indicated that the farmers made more than 100% profit after the production period.

408 Furthermore, it could be concluded that household size, credit and land are the socio-economic
 409 factors affecting ginger production in the study area.

410 References

- 411
- 412 Abu, O. (2009). *Econometric analysis of farm level technical efficiency in maize-based*
 413 *cropping enterprises in Kogi State*.M.Tech. Thesis Department of Agricultural
 414 Economics and Extension Technology, Federal university of technology Minna, Nigeria.
- 415
- 416 Adegboye MA (1998) Constraints to Effective Fertilizer Utilization by farmers in Ido local
 417 government

- Ado-odo/ Ota local government area of Ogun State. Ms Project. Agric Ext., Services. Agriculture and Forestry. University of Ibadan. pp. 48-49.
- Agricultural Development Project, Kaduna
- Aigner, D., Lovell, C.A.K., & Schmidt, P. (1992). Formulation and estimation of Stochastic Frontier production function models. *Journal of Econometrics*, 6, 21-37.
- Ajibade, L., Kandauda, Y. (2005). *Ginger Plant; Ginger Extension Pamphlet*. Bennard Ginger Company, Kafanchan, Nigeria.
- Alibi, R.A. and Aruna, M.A. (2006). Technical efficiency of family poultry production in Niger-Delta, Nigeria. *Journal of Central European Agriculture*. 6 (4), 531 – 538.
- and ginger production and processing for local industries and export; held at FatiMuasu Hall, National centre for women development, Abuja.
- area of Oyo State. Ms Project. Agricultural Extension Services. Agriculture and Forestry. University of Ibadan. p. 47.
- Bernard, A. (2008). Diseases, pest and other factors limiting ginger (*Zingiber officinale* Rose) production in River State. Being the text of a paper delivered during the Agricultural Product Development Strategy Workshop organized by Uptonville Foundation under the aegis of Rivers State Sustainable Development Agency (RSSDA). Retrieved from <http://uptonvilleoginstu.org/ginger.litm>
- Baiyegunhi, L.J.S and Fraser, G.C.H. (2009): Profitability in Ginger Production in three villages of Kaduna State
- Nigeria. *Journal of Applied Sciences Research*, 5 (10): 1685-1691 INSI
- Chukwu G.O., and Emehuite .J.K. (2003). Fertilizer efficiency and productivity of ginger on a hapilyariscol in southern Nigeria. In M. O. Akoroda (editor) *Root crops: the small processor and development of local food industries for market economy*. Ibadan Polytechnic venture, Ibadan, Nigeria.
- Dauda GK, Waziri MS (2006). Processing ginger into drinks and spices. *GidanWaya Journal of vocational and Technical Education.*, 6 (1): 211-219.
- Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University Zaria, Nigeria.
- edition London, Longman.
- Eluaga, L. S. and B.O. Uguwu (1989): “Trends in Ginger production and Marketing in Nigeria” proceedings of the first national ginger workshop Oct. 17 – 21 1988. NRCRI, Umudike, Nigeria. Shanks Int. Ltd. P. 147 -152
- Emmanuel, L. (2008). Technology and Ginger Farm Performance. Path of Production efficiencies Overtime, *Agriculture Economics Journal*, 2, 297-306.
- Erinle, I. D. (1989): “ An overview of research of ginger production in the northern state of Nigeria” Proceedings on the first national ginger workshop oct 17 – 21 1988. NRCRI, Umudike, Nigeria Shanks Int. Nig. Ltd. P8.
- Erinle, I.D. (1988). An Overview of Research on Ginger Productions in Northern State of Nigeria. *Proceedings of the First National Ginger Workshop*, Umudike, Nigeria, 89-93.

463 export. A paper presented a 3-day National Workshop on massive cassava and ginger
 464 production and processing for local industries and export; held at FatiMuasu Hall,
 465 National centre for women development, Abuja.

466 Ezeagu W (2006). Ginger export. A paper presented a 3-day National Workshop on
 467 massive cassava and ginger production and processing for local industries and
 468 export; held at FatiMuasu Hall, National centre for women development, Abuja.

469 Ezeagu W (2006). Ginger export. A paper presented a 3-day National Workshop on massive
 470 cassava

471 Ezeagu W. (2006). Ginger Export. A Paper Presented in a 3-day National Workshop on Massive
 472 Cassava and Ginger Production and Processing for Local Industries and Export held at
 473 FatiMuasu Hall, National Centre for Women Development, Abuja.

474 Ezeh, N. O. A. and G. N. Asumugha (1989): “The Nigeria Ginger Market: Structure, conduct
 475 and performance 1977-1986” proceedings of the first national ginger workshop Oct.
 476 19 – 21 1988. NRCRI, Umudike, Nigeria. Shanks Int. Nig. Ltd. P. 129 – 137

477 FAO, (2010). Production Quantity of Ginger in the World Total 1961-2009. Retrieved from
 478 www.fao.org/Mongabay.com/g/5000-World+++/T.

479 Farmers in Benue State Nigeria. J. Agric. Ext., 4: 74-48.

480 Farrel, M.J, (1957). The measurement of productivity efficiency. *Journal of Royal statistical*
 481 *society A120: 253-81*.

482 Federal Department of Agricultural Land Resources – FDALR (1990) Soil map of
 483 Nigeria. Kaduna zone.

484 Federal Ministry of Agriculture (1993) in Goni, M, S. Mohammed and ba Baba (2007). Analysis
 485 of Resource – Use Efficiency in Rice Production in the Lake Chad Borno State, Nigeria.
 486 *Journal of sustainable Development in Agriculture and Environment 3: 31 –37*.

487 Fertilizer efficiency and productivity of ginger on a haply acrisol in southern Nigeria. In
 488 Akoroda MO (edt.) Root crops: The small processor and development of local food
 489 industries for market economy. Ibadan, Nigeria, Polygraphic venture.

490

491 Food and Agricultural Organization (2004). Food and Agriculture Organization of the United
 492 nations, Database. FAOSTAT website, <http://faostats.fao.org>.

493 guide. Kaduna State, Agricultural Development Project, Kaduna.

494

495 FAO, (2010). Production Quantity of Ginger in the World Total 1961-2009. Retrieved from
 496 www.fao.org/Mongabay.com/g/5000-World+++/T.

497 Food and Agricultural Organization (FAO, 1999). *Farm Management Research for Small Farmer*
 498 *Development*. Food and Agricultural Organization of United Nations, Rome, pp.
 499 10-18.

500 KADP (Kaduna State Agricultural Development Project) (2000). *Production of ginger: an*
 501 *extension guide*. Kaduna State Agriculture Development Project, Kaduna.

502 KADP (Kaduna State Agricultural Development Project) (2004). Annual report. Kaduna State
 503 Agricultural Development Project, Kaduna.

- Kaduna State Agricultural Development Project – KAD P (2000) Production of ginger. An extension guide. Kaduna State, Agricultural Development Project, Kaduna. Kaduna State Agricultural Development Project – KAD P (2004) Annual report. Kaduna State, Agricultural Development Project, Kaduna.
- Kaduna State Agricultural Development Project – KADP (2000) Production of ginger. An extension
- Kaduna State Agricultural Development Project – KADP (2004) Annual report. Kaduna State, Kaduna State Ministry of Agriculture (2007). A Survey Report on Ginger Production. Kaduna State Agricultural Development Project, Zone IV, MOA, Kaduna 1- 10.
- Kantiok, B. (2007). *Economics of Ginger Production in Kaduna State, Nigeria*. MSc thesis, Martyn, S. (2008). *Measurement of Dependent and Independent Variable* retrieved sep 02, 2014 From Explorable.com; <https://explorable.com/dependent-variable>.
- Meadows, A. B. (1989) “Ginger processing for food and for industry” Federal Institute of Industrial research Oshodi. Proceeding on the First Ginger Workshop. Oct. 17 – 21 1988. NRCRI Umudike, Nigeria. Shanks Int. Nig. Ltd. P. 34 – 42.
- Mefoh NC (2006) Modern Methods of Ginger Production and Processing for Local Industries and Exports: *A paper presented During a 3-days National Workshop on Massive Cassava and Ginger Production and processing for Local Industries and Exports. Pp. 1-4.*
- Mefor NC (2006). Modern methods of ginger production and processing for local industries and Melinfonwu, A. A. and G. C. Orkwor (1989): “Weed management in Edible Ginger (*Zingiber officinale* Roscoe) “Proceedings on the First National Ginger Workshop. Oct. 17 – 21 1988. NRCRI, Umudike, Nigeria. Shanks Int. Nig. Ltd. P. 117
- Menta, Andrew U. (1987): “Effect of mulching and spacing on the Growth and yield of ginger” Unpublished M. Sc. Thesis, ABU Zaria.
- Muhammed-lawal, A., O.A. Omotesho and A. Falola 2009. Technical Efficiency of Youth participation in Agriculture Programme in Ondo State, Nigeria. *J. of Agric. Food and Env't.* 5(1): 20-26
- Nandi, J.A., (2011). Resource Use Efficiency Among Ginger Farmers In Kaduna State, Nigeria. *Journal of Agricultural Forestry and the Social Sciences (JOAFSS)*; 9(1), 110
- NEPC (Nigerian Export Promotion Council) (1999). Product Profile of Ginger. Nigerian Export Promotion Council B/K 312, Kumba St, Wuse, Zone 3, Abuja.
- Nishina WA, Gupta A, Arun S (1992). Ginger production in Asian – sub continent. New York, John
- Nmadu, J.N., J.O. Onu & L. Tanko (2011). Credit acquisition and utilization by farmers in Minna metropolis, Niger State, Nigeria, W.A. Hassan, U.B.

548 Njoke J. E. (1989); “Some policy consideration on the marketing of Ginger in Nigeria”.
 549 Proceedings of the first Ginger Workshop, Oct. 17 – 21, 1988.NRCRI.U mudike,
 550 Nigeria. Shanks Int. Nig. Ltd. P. 117
 551 Njoku BO (1989). Influence of Nitrogen, Phosporus and Potassium on the performance of ginger
 552 at three locations. Annual report.Umudike, root Crop Research institute
 553 Nnodu, E. C. and P. A. Okwuowule (1989): “ Storage of Fresh ginger Rhizome” Proceedings
 554 of the First National Ginger Workshop. Oct. 17 – 21 1988. NRCRI.Umudike,Nigeria.
 555 Shanks Int. Nig. Ltd. P. 117
 556 NRCRI Umudike, Nigeria. Shanks Int. Nig. Ltd. P. 16 – 20
 557
 558 National Population Commission (NPC, 2006) Federal Republic of Nigeria.*Official Gazette*. No.
 559 24, : 94.
 560 Udoh, A.J. and M.G. Nyienakuma, 2008. Examining socioeconomic characteristics and adoption
 561 trend of artisanal fishers of Akwalbom
 562 State in West Africa.*J. Agri. Soc. Sci.*, 4: 141–46
 563 Ogunniyi, L.T. (2008). Profit Efficiency Among Cocoa Yam Production in Osun State, Nigeria,
 564 *International Journal of Agricultural Economics and Rural Development* 1(1), 38-46.
 565 Obwona M (2000). *Determinants of technical efficiency differentials amongst small and medium*
 566 *scale farmers in Uganda: A case of tobacco growers*. A final report presented at AERC
 567 bi-annual workshop at Grand Requency Hotel, Nairobi, Kenya.
 568
 569 Ogundale, O.O. and V.O. Okoruwa (2006): Structure of farm cost in upland rice production: A
 570 comparative analysis of small and large farms in some selected local government areas of
 571 Kaduna State Nigeria. *The Ogun Journal of Agricultural Science*.Vol 4. pp. 22-31.
 572 Ojo MA, sJibowa AA (2008) Socio-economic Characteristics Influencing Role Performance
 573 of Rural Community Power Actors in Agricultural Extension Delivery System in Osun
 574 State, Nigeria: *Journal of Agric and Rural Development.*, 2: 27-40. Swaziland
 575 Printing and Publishing Company Limited Mbabane, H100 Swaziland.
 576 Olukosi, J.O. and Patrick O. Erhabor (1988): Introduction of Farm Management Economics.
 577 Agitab. Zaria P. 77 - 78
 578 Onazi OC (1973) Comparative Analysis of the Training Needs of Potential Agricultural
 579 Extension Workers and Principal Problems of Extension in the Northern States of
 580 Nigeria. An Unpublished Ph.D. Dissertation, Kansas State University, Manhattan,
 581 Kansas.
 582 Onweme, I. C. (1989): “Towards increased production and export of Export of ginger in
 583 Nigeria” Proceedings on the First National Ginger Workshop. Oct. 17 – 21, 1988,
 584 Orkwor, G. C., O. B. Arene, J. C. Okonkwo and U. L. A. Oparah, (1989)” “ Studies agronomic
 585 Orojobi JO, Damisa MA (2007). Assessment of Agrochemical Input Application on
 586 Smallholder Farms in Kaduna State Nigeria. *Nigeria Journal Rural Economic*
 587 *and.Society.*, 456- 61.
 588 Pelagia Research Library Chukwu GO, Emehuite JK U (2003).

- practices in ginger (*Zingiberofficinale* Roscoe): Production in Northern Guinea Savannah and rainforest zone of Nigeria.” Proceeding of the First National Ginger Workshop.Oct. 17 -21 1988. NRCRI, Umudike, Nigeria Shanks Int. Nig. Ltd. P. 43 – 80
- Rahman, S.A., Ajayi, F.A. & Gabriel, J. (2002).Technical Efficiency in Sorghum-based Cropping Systems in Soba Area of Kaduna State. *Nigeria Journal of Research in Service and Management* 3(1), 100-104.
- Sambo, Bonake E. (1992): “Effects of plant density, Rowa spacing and sett size on growth yield and quality of ginger” Unpublished, M.Sc. Thesis ABU, Zaria.
- Sanders J, Shapiro B, Ramaswamy S. (1995).The Economics of Agricultural Technology in Semi- Arid Sub- Saharan Africa. Baltimore, Maryland. USA, Johns Hopkins University Press. Pp. 27-36
- Shamah, J. L. (2009) Boosting Agriculture: A fresh Approach in Kaduna State. Newscope: A publication of Kaduna State Government.20, pp. 70.
- three locations. Annual report.Umudike, Root Crop Research Institute.
- Tologbonse EB, Adekunle OA (2000). Adoption of cowpea protection recommendations by rural
- Verman SKO, Sighn Jain, Borchia MP (2004) “Protective effect of Ginger (*Zingiberofficinale* Rose) on Experimental Biology 4; 736-738.
- Voh JP (1984) Farm Technology Adoption Among Farmers in Gusau Agricultural Development Project Villages. *Journal Issues in Development* vol., 1:26-32
- Willey and Sons.
- Yakubu Y (2007). Briefs on Ginger Processing: *Proceeding of the National Workshop on Ginger Promotion, Processing, Utilization and Marketing in Nigeria. Held on the 12th - 17th* November, 2007 at the Kaduna State Agricultural Development Programme
- (KADP) Skill Development Center, Kafanchan, Kaduna State. pp. 30-32.
- Zaria, Federal Ministry of Agriculture and Rural Development.
- Zhu, J., (2000).Multi-Factor performance measure model with an application to fortune 500 companies. *European Journal of Operational Research*, 123, 105-124.
- Zomo, Christopheer B and Joy BalaDogo (1992): “Marketing of ginger in Kachiya Local government area of Kaduna State” Unpublished HND thesis College of Agriculture ABU, Zaria.