

ASSESSING PRODUCTION AND MARKETING STRATEGIES ADOPTED BY VEGETABLE FARMERS IN EBONYI STATE, NIGERIA.

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ABSTRACT

The study assessed production and marketing strategies adopted by vegetable farmers in Ebonyi State, Nigeria. Primary data collected from 240 vegetable farmers using structured questionnaire and interview schedules were analyzed using both descriptive and inferential statistics such as percentages, means, frequency tables, multiple regression and factor analysis. It was found that majority of the farmers (67%) were female while (33%) were males. A mean score ranking of farmers' production and marketing strategies revealed that most of the farmers adopted early planting ($\bar{x} = 2.84$), quality warranty ($\bar{x} = 2.89$), and incentive system ($\bar{x} = 2.85$) among others on production basis while on the basis of marketing, direct-to-consumer ($\bar{x} = 2.85$), word of mouth/relationship marketing ($\bar{x} = 2.84$), were adopted among others. Result of the multiple regression analysis showed an R^2 of 0.767 indicating that there was significant relationship between farmers socio-economic characteristics and their vegetable output as specified in the model. The result of factor analysis identified five critical factors in which production and marketing constraints were captured. These included institutional/infrastructural, financial, technical, environmental and social factors. Based on the findings the study recommended that farmers can improve on their production and marketing strategies through improved information systems, development of financial markets, promotion of market-based price and yield insurance scheme, to ensure that marginal farmers are able to benefit from these interventions as well as participate in the emerging systems.

Keywords: Assessing, production, marketing, strategies, vegetable farmers.

1.0. INTRODUCTION

A vegetable is an edible plant or part of a plant, but usually exclude seeds and most sweet fruits. This typically means the leaf, stem, or root of a plant. Vegetables (leafy and fruits) are widely cultivated in most parts of sub Sahara Africa, as a cheap and reliable source of protein, vitamins,

zinc and iron. They constitutes between 30% and 50% of iron and vitamins in resource poor diet, (Omale, 2013). Vegetables provide essential vitamins (A, B, C and D), minerals (Fe, Ca), fibers and others, for maintaining a good health.

Vegetable is one of the most varied and widely used foods in the world. From the various species to the tastes, vegetables are important spice commodity and are integral part of many cuisines. In the tropical, sub-tropical and temperate regions, more than 40 different kinds of vegetables belonging to different groups such as, solanaceous, cucurbitaceous, leguminous, cruciferous, root crops and leafy vegetables are being grown (Mohanty, Lepch and Kumar, 2013).

Vegetable production ranges from small farms producing few vegetables for family use and marketing to the highly organized and mechanized vegetable farms common in the advanced countries of Europe and North America (Whyne-Haemond, 2000; Tindall, 1999).

However, in Nigeria, smallholders dominate in both agriculture and vegetable production and across all production sectors, more than 80 percent of farms are less than two hectares and on the average, 0.6 hectares. Income from staple crops is inadequate, so famers supplement with off-farm and non-farm income, and increasingly grow high-value crops such as vegetables (Birtal and Joshi, 2007).

Major vegetables produced in Nigeria include, onion, tomatos, okra, pepper, amaranthus, carrot, melon, corchorus olitorus (ewedu), hibiscus sabdariff (zobo), adansomia digitata (baobab leaves), while most tropical vegetables and ornamentals will thrive in Nigeria. A combination of agro-ecological limitations and socio-economic considerations have lead to a short-listing and clustering of vegetables in the wild that is almost impossible to make obtainable in Nigeria (Fakayode, Rahji and Adeniyi, 2012).

Vegetable producers must not only make production decisions but also decisions about what marketing channels to use when selling their produce (Monsoon, Mainville and Kuminoff, 2008). Hence this work is designed to study the production and marketing strategies for vegetables in Ebonyi State with a view to assessing the production and marketing strategies adopted by vegetable farmers in the study areas.

The last few years have seen substantial revival of interest in determinants of economic growth in Africa especially Nigeria (Osho, 2007). Horticultural produce (vegetable) is cultivated in virtually all the agro-ecological zones in Nigeria. Despite this, the areas allocated to vegetables appears to be small, FAO (2005), estimated the locally produced vegetable for the year 2002 to be 0.10 million tones.

Vegetable production and consumption appear to have received increased attention among farmers and consumers in Nigeria within the past few years, probably due to increased awareness of the economic and nutritional importance of vegetables.

Although, more farmers seems to be going into vegetable production and marketing yet it is quite likely that demand for vegetables still exceeds the supply which manifests in price increases of the commodity over the years.

This study therefore, sought to assess the strategies adopted by farmers in the production and marketing of vegetables in Ebonyi State. There is equally indication that little or no systematic analysis has been done aimed at evaluating the profitability of vegetable production resulting from these strategies and identifying certain problem associated with the production and marketing of vegetable in the study area.

In a broad sense, the study assessed the production and marketing strategies adopted by vegetable farmers in the study area, and specifically sought to:

- i. analyze the socio-economic characteristics of the farmers with a view to determining the effect of these characteristics on their outputs;
- ii. identify the production and marketing strategies adopted by the farmers in vegetable production in the study area;
- iii. evaluate the profitability of vegetable production in the study area, and
- iv. analyze the constraints militating against the various production and marketing strategies adopted by the farmers.

1.1. Research Methodology

The study was conducted in Ebonyi State in the South Eastern region of Nigeria. Ebonyi State is fundamentally an agrarian State, and has population of about 2,173,501 people, out of which about 85% are in the rural areas (NPC, 2006). Benue and Abia States bound the State on the North and South respectively and on the East and West by Cross River and Enugu States respectively. Geographically the State lies within latitude $7^{\circ} 30'$ and $8^{\circ} 30'N$ and longitude $5^{\circ} 40'$ and $6^{\circ} 45'E$, occupying an area of approximately 5,932km². The State comprises of thirteen Local Government Areas (LGAs) namely: Abakaliki, Afikpo North, Afikpo South, Ezza North, Ezza South, Ebonyi, Ishielu, Izzi, Ivo, Ikwo, Ohaukwu, Ohaozara, and Onicha. The rural population is predominantly farmers. The soil and weather condition of the area is well suited for agricultural production. The area shares a common seasonal experience with many other parts of Nigeria, characterized by rainy (or wet) and dry seasons. The mean maximum and minimum temperature are 32°C and 25°C respectively. The annual rainfall is 1600mm while the mean daily rainfall is over 150mm. The general vegetation consists of woodland savanna zone characterized

by mixture of savanna and semi-tropical forest. The soil is generally clay loam. Farming constitutes the predominant occupation of the rural populace.

1.2 Sampling Procedure

A combination of purposive and stratified random sampling procedures was adopted for the selection of respondents. First, the State was stratified along the existing agricultural zones of North, Central and South, based on the thirteen (13) Local Government Area structure. The next stage involved a purposive selection of two (2) LGAs from each of the three zones premised on the observed high level of agricultural and farming activities associated with the area.

The third stage involved random selection of two rural communities from the six (6) LGAs sampled, giving rise to 12 communities in the sample studied. Out of the 12 communities, a randomized selection of two villages/wards from each community was carried out to obtain 24 villages/wards studied. Finally, 10 farmers were randomly selected from the list of vegetable farmers provided by the State Agricultural Development Programme (ADP) farmers in the 24 villages, which resulted in the sample size of 240 farmers used in the study.

1.3 Data Collection

Primary data used for the study were obtained using structured questionnaire, interview schedule.. Data were collected on: the socio-economic variables of vegetable farmers; farmers' production and marketing strategies, input and output variables, and also on the constraints variables likely to, or militate against the effectiveness of production and marketing strategies adopted by farmers in the study area.

1.4 Data Analysis

Data relating to farmers' socio-economic characteristics were analyzed using descriptive statistics such as frequency and percentage distribution tables, mean, and cross tabulations. Gross margin analysis was used to analyze the profitability of vegetable production in the study area

Furthermore, inferential statistics such as multiple regression analysis and factor analysis were used to analyze the objectives on the effect of socio-economic attributes of farmers on their vegetable output, and constraints to effectiveness of production and marketing strategies respectively.

1.5 Model Specifications and Description of Variables

1.5.1. Multiple Regression Analysis on the Effect of Socio-economic Characteristics of Farmers on their Vegetable Production Output levels:

The implicit form of the stochastic multiple regression models were:

$$Y = f(X_1, X_2, X_3 \dots X_{10}) \dots \dots \dots (1.0)$$

Where Y = dependent variable (level of vegetable output), and X = independent variable, representing the socio-economic characteristics of the farmers.

The explicit function will be;

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + \dots \dots \dots a_{10}X_{10} + et \dots \dots \dots (1.1)$$

Where,

Y = level of vegetable production output (kg);

X₁ = Gender (dummy)

X₂ = Age (number of years);

X₃ = Marital status (dummy)

X₄ = level of Education (number of years spent in formal education)

X₅ = Farming experience (number of years engaged in vegetable farm Production);

X₆ = household size (number of persons in the household)

X₇ = Annual income (Naira value of income from all sources accruing to the household/year)

X₈ = farm size (number of hectares under vegetable production)

X₉ = extension contact (number of contacts with extension agents in a period of one year;

X₁₀ = major occupation (dummy)

a₀ = constant; a₁-a₁₀ = parameters to be determined, and et = error term.

1.5.2. F-Statistic- used to establish whether socio-economic characteristics of the farmers influenced their output of vegetables.

F-test model:

$$F - cal = \frac{R^2(N-k)}{(1-R^2)(k-1)}$$

Where, R² = coefficient of multiple determination;

N = Sample size, and k = Number of variables.

1.5.3 Factor Analysis Model

Factor analysis model was used to identify the constraint factors militating against the production and marketing strategies adopted by farmers as follows:

$$X_{ij} = \varphi_{i1}F_{i1} + \varphi_{i2}F_{i2} + \varphi_{i3}F_{i3} + \cdots \varphi_{jm}F_{iK} + e_{ij}$$

Where;

X_{ij} = Observation on variable X_j for the i th sample number

F_{ik} = Score on factor F_k ($k = 1, 2, 3, \dots, m$)

$F_1 - F_m$ = Common factors

e_{ij} = The value on the residual variable E_j for the i th sample member

$\varphi_{ij} \dots \varphi_{ij}$ = Factor loadings (regression weights)

Only variable with constraints loading of 0.30 and above at 10% overlapping variance (Ashley, et al, 2006, Madukwe, 2004) was used in naming constraints.

2.0. RESULTS AND DISCUSSION

2.1. Socio-economic Characteristics of Vegetable Farmers in the Study Area.

Results of the analysis of the socio-economic data in Table 1 show, that most of the respondents (67%) were females, while 33% were males, implying that vegetable production was dominated by females in the study area. This result was not too surprising as vegetables have always been considered to be women crops. The study also corroborates the findings of Samantaray et al., (2009); Adebisi, et al., (2011) and Deji et al. (2012) all of which indicated that more women were found in vegetable production than men.

It was also found that about 67% of the sampled farmers fall within the age range of 31-50 years, while the mean age of all farmers was 36 years.

The implication of these findings is that most of the respondents were at their most economically active age and of course above school age. The result agrees with Fakoya, et al, (2006), who found that greater number of farmers involved in arable food crop cultivation in Ogun state were aged between 30-40 years. Their mean (\bar{x}) age varies with the findings of Onyenweaku and Nwuaru (2005) who established a higher average age for food crop farmers in Imo State, Nigeria, at 54.78 years, notwithstanding, the result agrees almost in totality with the findings of Ejembi et al., (2006) who reported that the mean age of Nigerian farmers was 36 years.

Table 1: Distribution of Farmers according to Socio-Economic Characteristics.

Variables	Category	Frequency	Percentage (%)	Mean (\bar{X})
Gender	Male	80	33	
	Female	160	67	
Age	≤ 20	20	8	36
	21-30	40	17	
	31-40	100	42	
	41-50	60	25	
	Above 51	20	8	
Marital status	Single	60	25	
	Married	120	50	
	Divorced	20	8	
	Widowed	40	17	
Level of Education	No formal Education	100	42	5
	Primary Education	60	25	
	Secondary Education	50	21	
	Tertiary Education	30	12	
House hold size	1-4	50	21	7
	5-8	140	58	
	9-12	40	17	
	Above 12	100	4	
Farming Experience	11-20	56	23	30
	21-30	110	46	
	31-40	50	21	
	41-50	24	7.5	
	Above 51	10	2.5	
Annual Income (₹ 000.00)	10-50	44	18	110,000
	60-100	60	25	
	110-150	100	42	
	160-200	20	8	
	Above 210	16	7	
Farm size	≤1ha	52	22	1.9
	1-2 ha	96	40	
	2-5 ha	74	31	

Extension Contacts	Low	112	47	
	Moderate	96	40	
	High	32	13	49.23

Source: Field Survey, 2015.

Result also show that 42% of the respondents had no formal education, while 25%, 21% and 12% had primary, secondary and tertiary education respectively. Their mean (\bar{x}) educational level was 5 years. This mean (\bar{x}) falls below that established by Onyenwaku and Nwaru (2005) who estimated an average years of formal education for food crop farmers at 10.5 years. Education has been shown to be a factor in the adoption of modern farm practices. It is generally considered an important variable that could enable farmers adopt new technology. A mean household size of 7 persons was established in the study however, the largest size of above 13 persons (4%) and the lowest of 1-4 persons (21%) were found in the sample. The result is in line with the findings of Ekwe (2004) who indicate that most farmers in Abia State had large households which readily provide labour, and Tsado, et al.(2013) who pointed out that larger family size could supply more labour to the farmers thus reducing cost of labour. It has been established that household's size has direct relationship with availability of family labour for agricultural production. The implication of this finding is that more family labour for vegetable production would be readily available since relatively large household size is an obvious advantage in terms of farm labour supply.

A greater proportion (46%) of the respondents had 21-30 years of farming experience. Their mean farming experience was 30years. These findings imply that most of the respondents had been into farming for quite a long period of time. Long farming experience is an advantage for increase in farm productivity since it encourages rapid adoption of farm innovation. Farming experience is also a valuable asset in efficiency and utilization of farm productive resources.

According to result of the analysis majority (42%) of the respondent had annual income ranged between ₦110, 000- ₦150,000, while only 7% had annual income ranged between ₦210,000 and above. Their mean percentage annual income from vegetable production was ₦110, 000. The implication is that vegetable production had contributed significantly to the annual incomes of the vegetable growers in the area. It was evident that majority (40%) of the respondents had a total vegetable farm size of 1-2ha, while 22% had a total vegetable farm size of < 1ha. Only 1.9% had vegetable farm size of 2-5ha, while 7.5% had a vegetable farm size of >5ha. Their mean vegetable farm size was 1.9ha. This implies that vegetable production is still practiced at smallholder level, possibly due to resource constraints. This finding corroborated the finding of Obinne and Anyanwu (1991). The result slightly agree with that of Olayide et al (2002), who

reported that about (70%) of the population of farmers in Nigeria are small scale farmer cultivating 1.2 – 2.0 hectare. Moreover, 47% of the respondents had low and 40% had moderate extension agency contact. While only 13% of the respondents had high extension agency contact. Their mean (\bar{x}) was 49.23. This implies that majority of the respondents in the study area do not have sufficient information about improved vegetable production strategies and there are rare chance of getting the latest information leading to low adoption. Furthermore, almost half of the farmers (42%) in the area had farming as their primary occupation

2.2.0. Production and Marketing Strategies Adopted by Vegetable Farmers.

2.2.1. Production Strategies.

From Table 2 it was observed that early planting of vegetable crops (81.67%) is the most adopted strategy by vegetable farmers. This could be as result of trying to make it available in the market earlier enough before others in order to get higher prices and more profit. The implication of this finding is that there will be glut if majority adopt this same production strategy. Other strategies adopted by the farmers include: Quality warranty (75%) proximity to customers (73%), types of distribution network used (66%), incentive system (64%), cooperation ability (56%), scale effect (25%) social image (16%) and innovation ability (15%). This implies that the respondents were exposed to diverse production strategies in the area. Agricultural production is a complex process particularly for vegetable production. The vegetable production is a function of number of variables used in production process. The production of these vegetables depends on the natural environment, inputs used and their combinations as well as adopted management practices. Knowledge of the relative importance of the resource inputs influencing the production of these vegetables is very essential for the producers in introducing desirable changes in their operations at the micro level, and for policy makers for formulating plans for improvement in the productivity of these vegetables based on sound economic principles at the national level.

2.2.2 Marketing Strategies Adopted by Vegetable Marketers.

On the basis of marketing strategy Table 2 shows that word of mouth or relationship marketing strategies (80%) was mostly adopted by vegetable farmers in the study area. Other marketing strategies adopted by the farmers includes sorting, grading and standardization (75%), packaging (70%) demand and supply creation (58%) processing (25%) online/ internet marketing (16%). The implication of this finding was that vegetable farmers in the study area were involved in traditional method of marketing than the modern or improved marketing strategies. According to Lashari et al., (2003) private sector is dominant in the vegetable

marketing in Nigeria. Government has left the processing, domestic and international trade to the private sectors that use traditional methods of marketing.

Table 2: Distribution of Respondents according to Production and Marketing Strategies Adopted by Farmers

Strategies	Frequency	Percentage (%)
Production		
Early planting	196	81.67
Proximity to customers	176	73.33
Quality warranty	180	75.00
Social image	40	16.67
Type distribution network	160	66.67
Scale effects	60	25.00
Incentive system	154	64.17
Cooperation ability	136	56.67
Innovative ability	38	15.83
Marketing		
Online/internet marketing.	40	16.67
Offline marketing.	40	16.67
Relationship marketing.	194	80.83
Processing.	60	25.83
Sorting, grading and standardization.	180	75.00
Demand and supply creation.	140	58.33
Packaging.	170	70.83

Source: field survey, 2015

*Multiple responses recorded

2.3 Sources and Types of Fund used by Vegetable Farmers.

The result in Table 4 shows that the most relied sources of fund utilized for vegetable production in the study area was personal savings or equity fund. About 82% farmers apply personal savings in running their vegetable farm business.

Result also revealed that the next most patronized sources of farm finance were isusu groups and transfers and funds borrowed from relations and friends accounting for 38% and 25% respectively. About 23% and 13% of vegetable farmers sourced fund from local money – lenders and cooperatives respectively. Commercial and micro- finance, and rural development banks

account for 8%, 10% and 6% respectively while only 2% of the farmers sourced funds from Non-governmental organization NGO.

Table 4: Distribution of Farmers according to Sources and Type of fund used in Vegetable Production in the Area.

Source of fund	Frequency	Percentages (%)
Personal savings	196	82
Relations and friends	60	25
isusu groups	90	38
Local money tender	56	23
Cooperatives societies	30	13
Micro- finance bank	20	8
Commercial banks	24	10
Agricultural Banks	14	6
Non- governmental Organization (NGO)	06	2

Source: field survey, 2015.

*Multiple responses recorded.

The overall implication of the findings is that farmers relied more on informal than formal sources of fund for their vegetable production activities. Their inability to reasonably utilize formal sources may be due to their lack of awareness, inability to meet the demands of these sources or poor rating of farm business among credit administrator and financial organization or all of the above (Okpolu, 2011).

2.4 Mode of Land acquisition for Vegetable Farming.

Land as important resources in vegetable farming was considered in this section, in relation the mode in which farmers acquire this land in the study area. Table 6 revealed that majority of the land acquired by the vegetable respondents (43%) were rented while (23%) inherited their land, (16%) borrowed their land, (11%) made use of community land, and only (7%) purchased their land. The reason for this may be because vegetable take short period to mature and so the producer can afford to rent the land, cultivate it as well as relinquish it on demand by the owner.

Table 6. Distribution of Farmers' according to Mode of Land acquisition for Vegetable Production. (N = 240).

Mode of acquisition	Frequency	Percentages
Rented	104	43
Inherited	56	23
Purchased	16	7
Borrowed	38	16
Community land	26	11

Source: field survey, 2015.

2.5 Vegetable grown preferences in the area.

Entries in table 3 indicate that telferia (40%) was most cultivated by vegetable farmers in the area. This was followed by Okra (20%), Pepper (15%) Garden egg (10%), green vegetable (8%), Bitter leaf (5%) and tomatoes (2%). According to Ogungbaigbe (2001), Telferia Spp. Is the most prominent vegetable in the southern eastern zone of Nigeria but currently it is gradually becoming a vegetable of national reckoning.

Table 3: Distribution of Respondents based on Types of Vegetable Grown and preference.

Vegetable type	Frequency	Percentage(%)
Bitter leaf	16	5
Pepper	40	15
Telferia	64	40
Green vegetable	20	8
Okro	56	20
Tomatoes	8	2
Garden eggs	36	10

Source: field survey, 2015.

2.6 Management Practices prevalent in the Area.

The various production management practices predominant in the study area were discussed in this section. Entries in table 5 showed that weed control and pest management practices were majorly practiced by the farmers as they account for 30% both. While transplanting operations, irrigation system, mulches and staking account for 19, 17 and 4% respectively. The implication of the findings is that there would be increase in vegetable productivity in the area in the near future since all basic management practices are used by vegetable farmers.

Table 5: Distribution of the Farmers according to their various Management Practices used in Vegetable Farming in the Area.

Practices	Frequency	Percentage(%)
Weed control	60	25
Irrigation	40	17
Pest and disease control	60	25
Staking	10	4
Mulches	24	10
Transplanting	46	19

Source: Field survey, 2015

2.7 Effect of Scio-economic Characteristic of Farmers on Their Level Vegetable Output.

Result of Multiple Regression Analysis on the effect of socio-economic characteristics of farmers on their level vegetable output.

Result of multiple regression analysis on Table 7 show that the coefficient of multiple determination (R^2) of the regression model was 0.767 (77%) indicating that about 77% variation in the dependent variable (level of output) was caused by combined effects of changes in the explanatory variables (socio-economic characteristics) of the farmers. The remaining 23% of the variation in the dependent variable was caused by other relevant factors that affect socio-economic regression characteristics to the level of production output of vegetable, but were not included in the model. The high value of R^2 (77%) signifies that the socio-economic characteristics of the respondents have significant effects on the level of production output of vegetable in the study area. It is believed that the explanatory power of the chosen models were not exaggerated, since the R^2 (77%) were in numerical value closely related to the adjusted R^2 (75%). This was further confirmed by the values of the overall standard error of estimated (SEE = 0.38592) which constituted 23% of the total variation that was not explained. The statistical reliability of the estimates of regression co-efficient was established using standard errors from the estimates of the independent variables. The constant were less than half of the estimates showing their statistical reliability. Most of the explanatory variables were significant at 1%, 5% and 10% levels of significance as shown in Table 7. However, the overall significance of the regression was also confirmed by the f^* value calculated (F -statistics = 35.960). Since F -cal is greater than F -tab at 5% level of significance, the regression is statistically reliable. Also the value of Durbin –Watson constant ($DW = 2.186$) was low confirming that the forecasting power of the regression model was very high, since important variables were not omitted and this is statistically reliable because the value of the standard error of estimated (0.38592) was low. The co-efficient of gender (X_1) was positively signed. This implies that there is positive relationship

existing between gender of the farmer and the level of production output of vegetable. The coefficient of age (x_2) bore positive sign. This means that there is positive relationship existing between age and the level of production output of vegetable. This situation indicates that the older the farmers the more experience they accumulate on new techniques for vegetable production and storage hence, the a priori expectation was met.

The coefficient of marital status (x_3) was positively signed. This indicates that there is positive relationship existing between output of vegetable and marital status of the famers. The coefficient of level of education attained (x_4) had positive sign. This implies that educational level and level of vegetable output of the farmers were positively related. Hence; the apriori expectation was met. This is because the higher the educational level of the farmer, the greater their propensity to comprehend relevant agricultural information on vegetable production strategies in the area. The coefficient of the household size (x_5) was negatively signed, indicating that there was negative relationship between household size and level of vegetable output. This results deviate from the a priori expectation that the larger the household size, the higher the labour force needed to produce more quantity of vegetable hence increased output in the area, the a prior expectation was not met. Furthermore, farming experience (X_6) bore positive sign. This implies that farmers with a lot of farming experience have adequate knowledge on correct application of improved techniques or strategies on vegetable production, thus a priori expectation was met. Also, farm size (x_7) was positively signed revealing that farm size had positive relationship to level of vegetable output in the area. This is because the higher the farm size of the farmers, the higher the production output of vegetable obtained in the study area. The coefficient of estimated annual income (X_8) had positive sign indicating that there was positive relationship between level of vegetable production output and the annual income of the farmers. This is because adequate output of vegetable generates higher annual income level that can motivate the farmers to invest and produce more. Thus, the a priori expectation was met. The coefficient of occupational status (x_9) bore positive sign. Indicating that occupational status of the farmers was positively related to the level of production output of vegetable, this result meet the a priori expectation that farmers who engage on other occupation acquire additional income, knowledge and experience that will help them to allocate farm resource efficiently. Finally extension contact (X_{10}) was, positively signed. This revealed that extension contact is positively related to level of vegetable output. This is so because extension contact improves the efficiency of resources allocation and management among vegetable farmers in the area. Thus the a priori expectation was met. The final estimated regression is as follows:

$$Y = -2.275 + 0.006X_1 + 0.014X_2 + 0.005X_3 + 0.478X_4 - 0.001X_5 + 0.023X_6 + 0.080X_7 + 0.485X_8 + 0.011X_9 + 0.005X_{10}$$

Table 7: Multiple Regression Analysis on the Effect of Socio-Economic Characteristics of the Farmers Vegetable Output.

Variable	Variable names	Estimated coefficients	Standard error	T-value	Level of significance
a ₀	Constant	-2.275	0.403	-5.643	*
X ₁	Gender	0.006	0.009	0.654	**
X ₂	Age	0.014	0.011	1.286	*
X ₃	Marital status	0.005	0.008	0.629	***
X ₄	Level of education	0.478	0.054	8.813	*
X ₅	Household size	-0.001	0.000	-1.608	**
X ₆	Farming experience	0.023	0.019	1.243	NS
X ₇	Farm size	0.080	0.125	-0.641	***
X ₈	Annual income	0.485	0.090	5.370	*
X ₉	Occupation	0.011	0.019	-0.549	NS
X ₁₀	Extension contact	0.005	0.024	0.207	***

Source: Field survey, 2015.

$R^2 = 0.767$

Adjusted $R^2 = 0.746$

F-ratio = 35.960

SEE = 0.38592

DW = 2.186

*= Significant at 1%

**= Significant at 5%

***= Significant at 10%

NS = Not significant

2.8 Cost and Returns of Vegetable.

Table 9 showed a total variable cost of ₦ 56250, ₦ 52415, ₦ 59420 and ₦ 56535 for telferia, pepper, okra and green vegetable respectively, per 0.5 hectare of each of the four vegetable crops studied. The variables considered were the average operating inputs and labour. Result on the revenue showed that the revenues from each of the vegetable crops per 0.5ha were telferia ₦ 90000, pepper ₦ 85200, okra ₦82000 and green vegetable ₦ 84300. Also, the fixed cost

considered were the depreciated fixed cost, of which telferia, pepper, okra and green vegetable had depreciated fixed cost of ₦ 6150, ₦ 6080, ₦ 6180 and ₦ 5820 respectively. The result also, showed that the gross margin for each of the four vegetable crops were telferia ₦ 33750, pepper ₦ 32785, ₦ 22580 and ₦ 27765.

Table 9: Gross Margin Analysis for Selected Vegetables produced in the Area per 0.5ha.

Items	Unit	Mean Quantity				Mean Unit Price(₦)				Total Amount (₦)			
		Telferia	Pepper	okra	Green	Telferia	Pepper	okra	green	Telferia	pepper	Okra	Green
A. Variable cost (VC)													
Planting material	Kg	3	2	1.5	4	250	100	200	150	750	200	300	600
Rent on land	Ha	0.25	0.40	0.40	0.25	1200	1500	1550	1300	300	600	620	325
Fertilizer applied	Kg	50	25	50	50	60	30	60	60	3000	750	3000	3000
Organic manure	Kg	30	36	37	36	1200	1110	1130	1150	36000	39960	41810	41400
Insecticide applied	Litre	1	1.5	3	2	600	650	700	680	600	975	2100	1360
Transplanting/sowing	Manday	9	8	10	5	150	120	150	100	1350	960	1500	500
Nursery preparation	Manday	3	1	2	1.5	350	300	250	200	1050	300	500	300
Field cultivation	Manday	8	8	8	8	330	240	300	250	2640	1920	2400	2000
Irrigation water application	Manday	120	100	90	110	30	20	25	20	3600	2000	2250	2200
Weeding	Manday	8	7	5	4	120	100	110	130	960	700	550	520
Fertilizer application	Manday	2	1	2	1	300	250	200	150	600	250	400	150
Application of insecticides	Manday	1	1	1	1	600	620	590	580	600	620	590	580
Harvesting	Manday	16	15	20	16	105	100	90	105	1600	1500	1800	1680
Handling	Manday	16	16	16	16	200	105	100	120	3200	1680	1600	1920

and
transportati
on
**Total
Variable
Cost(TVC**

**56250 5241
5 59420 56535**

**B.
Depreciate
d
Fixed cost
(₦)**

Hoe	3	2	4	2	400	400	400	400	1200	800	1600	800
Cutlass	5	4	2	3	150	150	150	150	750	600	300	450
Watering can	2	1	3	3	200	200	200	200	400	200	600	600
Basket Wheel barrow	5	8	7	4	50	50	50	50	250	400	350	200
	1	1	1	1	3000	3000	3000	3000	3000	3000	3000	3000
Shovel	1	3	1	2	300	300	300	300	300	900	300	600
Empty bags	10	15	0	8	10	10	10	10	100	150	0	80
Knife	5	1	1	3	30	30	30	30	150	30	30	90
Total fixed cost(₦)									6150	6080	6180	5820

C. Total Revenue (₹)	90000	8520 0	82000	84300
D. Gross Margin (₹)	33750	3278 5	22580	27765
E. Profit (₹)	27600	2670 5	16400	21945

Similarly, the outcome of the variable cost to revenue interactions in Table 10, showed a profit margin of ₦ 27600 for telferia, ₦ 26705 for pepper, ₦ 16400 for okra and ₦ 21945 for green vegetable. These results imply that the four vegetable crops yielded positive returns or profit of which telferia gave the highest. This was followed by pepper, green vegetable and okra. The result agreed with those of Nworie and Agbaraevor (1997), who concluded that vegetable production was profitable. This also in cognizance with the findings of Omotesho et al. (2010) who found that vegetable production is profitable in Kwara State. It also agrees with the findings of Ike and Ugwumba (2011) who indicates that vegetable production is a profitable venture with the aid of gross margin analysis as proof.

2.9. Constraints Militating Against Production and Marketing Strategies Adopted by Vegetable Farmers in the Study Area.

Table 8 showed the varimax rotated constraints militating against production and marketing of vegetables in the study area. From the field data collected, five (5) major constraints were extracted based on the responses of the respondents. Only variable with constraints loading of 0.30 and above at 10% overlapping variance (Ashley, et al, 2006, Madukwu, 2004) were use in naming the constraints. Variable that loaded in more than one constraint were discarded while variables that have constraints loading of less than 0.30 were not used. Factor 1 was considered and named institutional/Infrastructural constraints due to the variable that loaded high under it. This high loading variable include v₀₁ inadequate transportation system (0.453), v₀₄ fluctuation in market price (0.993) v₀₈, access to improved varieties (0.981), v₀₁₁ lack of producers organization (0.710), and v₁₉, access to extension services (0.450). According to Dorward and Kydd (2005), businesses in rural areas are limited by weak information on potential market players, prices and innovations. Adeleke et al., (2010) stated that road systems are the most serious infrastructural bottleneck facing agricultural development.

Table 8: Varimax Rotated Component Matrix on Constraints, to Production and Marketing of Vegetable in the Study Area.

Variable names	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Institutional/ Infrastructural Constraints	Financial Constraints	Technical Constraints	Environmental constraints	Social Constraint
V0 ₁ Inadequate transportation system.	0.453	0.011	-0.026	-0.555	-0.075
V0 ₂ Inadequate storage facilities					
V0 ₃ lack of finance	-0.083	0.028	0.604	-0.104	0.297
V0 ₄ fluctuation in market price	-0.034 0.993	0.925 -0.070	0.209 0.039	-0.602 0.413	-0.140 -0.225
V0 ₅ seasonality in production	0.006	-0.968	0.009	0.491	-0.055
V0 ₆ Access to equipment.	-0.045 0.063	0.054	0.973	0.045	-0.056
V0 ₇ Access to production resources		-0.053	0.437	-0.019	-0.056
V0 ₈ Access to improved varieties	0.981	-0.068	0.230	0.254	-0.218
V0 ₉ Access to good marketing environment	0.068	0.030	0.096	0.802	-0.563
V0 ₁₀ speculative activities of middlemen	-0.165	0.046	0.156	-0.256	0.461
V0 ₁₁ lack of producers organization	0.710	-0.042	0.189	0.051	0.017
V0 ₁₂ forced marketable surplus	0.061	0.502	0.099	0.297	-0.060
V0 ₁₃ pest and disease damage	-0.151	0.182	0.152	0.550	0.278
V0 ₁₄ inadequate availability of land	-0.253	-0.239	-0.038	0.814	-0.063
V0 ₁₅ religion and belief system	0.052	0.165	0.033	0.087	0.820
V0 ₁₆ educational status of the farmers	0.137	-0.028	-0.143	0.097	0.816
V0 ₁₇ prevailing farming system	0.150	-0.030	-0.076	0.840	0.620
V0 ₁₈ cost of labour inputs	0.006	0.968	0.009	-0.049	-0.055

V0 ₁₉	Access to extension service	0.450	0.054	0.073	0.045	-0.056
V0 ₂₀	farm production technology	0.063	-0.053	0.943	-0.019	-0.056
V0 ₂₁	production practices used by the farmers	0.083	0.037	-0.076	0.901	0.009

Also factors 2 was considered and named financial constraints because of the factors that loaded high under it. These include: V₀₃ lack of finance (0.925), v₀₁₂ forced marketable surplus (0.502) and V₀₁₈ cost of labour inputs (0.968). According to Newton (2013), insurance could be used as collateral for loans and it also enforces farmers to improve on farming standards for them to be eligible for payments on incurring losses.

Moreover, after critical consideration of the constraints, factor 3 was named technical constraints due to the factors that loaded high under it. These include: V₀₂ inadequate storage facilities. (0.604), v₀₆ access to equipment (0.973) v₀₇, access to production resources (0.437) and v₂₀ farm production technologies (0.943). Cong et al., (2006) stated that due to the lack of storage facilities, farmers tend to use traditional techniques which cause humidity to produce high loss and reduce quality of produce for small-scale farmers.

Furthermore, factor 4 was considered and named environmental constraints due to the factors that loaded high in it. These are v₀₅ seasonality in production (0.491) V₀₉ access to good marketing environment (0.802), v₀₁₃ pest and disease damage (0.550) v₀₁₄ inadequate availability of land (0.814) v₀₁₇ prevailing farming system (0.840) and v₀₂₁ production practices used by the farmers (0.901). Finally factor 5 was considered and named social constraints due to the factors that loaded high under it. These include V₀₁₀ speculative activities of the middle men (0.461), V₀₁₅ religion and belief systems (0.820) and v₀₁₆ educational status of the famers (0.816).

In conclusion, five major constraints that militate against production and marketing of vegetables in Ebonyi state were institutional/Infrastructural constraints, financial constraints, technical constraints, environmental constraints and social constraints.

3.0. CONCLUSION AND RECOMMENDATIONS

3.1. Conclusion

The study has established that most farmers adopted production and marketing strategies that target quality and availability of the commodity at the scarcity period in other to attract higher prices and make marketing much easier and profitable. It could also be concluded that vegetable production and marketing were more of women's preoccupation and that institutional, social,

economic, technical, environmental factors play major role in constraining vegetable production and marketing in the area.

3.2. Recommendations.

Based on the findings of the study the following recommendations were made:

Education is directly related to farmer's capacity and ability to increase productivity and also enhance their ability to understand and evaluate new production technologies. However majority (50%) of the farmers had no formal education. This calls for more concerted effort from the government to device a means that will permanently control this problem. Women constitute the majority in vegetable production in the area; large farm size should be made available to women by the community through land reforms and legislation in order to boost vegetable production in the area. Farmers should explore source of off season non-farm employment to supplement their farm income. The house hold access to information sources such as extension services, trainings, access to media etc should be given due attention by the farmers to increase likelihood of production and marketing of vegetables. Finally, Government should give serious consideration to the promotion of vegetable production and marketing as it has the potential of providing employment opportunities; by improving production technology in irrigation practices.

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