Original Research Article

Value Addition to Beans: The Case of Bean balls "akara" Production in Idemili South Local Government of Anambra State, Nigeria

ABSTRACT

The great need to help homemakers in Nigeria better appreciate and prepare cowpea bean balls as snacks for income generation and women empowerment in Idemili South Local Government Area of Anambra State, Nigeria informed this study. The study examined socio-economic characteristics of the bean balls producers, profitability of production, determinants of profit, reasons for starting the business and constraints to production of bean balls in the area. Multi-stage, purposive and random sampling techniques were used to select 50 respondents. Data were collected using structured questionnaire and analyzed by means of descriptive and inferential statistics. Findings on socio economic factors of the respondents gave mean age, education level and years of experience of 42.4years, 13.5years and 8.9 years respectively; majority (92%) of the respondents were females, majority (60%) married and most (70%) had household size of 4-6 persons. The enterprise proved profitable with monthly mean net income and net return on investment values of ₦75,990 and 0.39 respectively. Significant determinants of net production returns were gender, educational level and costs of inputs. Main reasons for starting the business were scarcity of job, profitable nature of the business, high demand and small start-up capital. Serious constraints to production of bean balls in the area were conjunctivitis due to emitted smoke, high and unstable price of raw materials and high cost of production. Policy measures such as bulk purchasing of beans, regulation of market prices of product, provision of infrastructures (water, electricity e. t. c.), use of cooking gas as source of heat would mitigate the problems, improve productivity, output and enterprise profitability.

Keywords: Value addition, women empowerment, Bean balls, Anambra State, Nigeria

1. Introduction

Bean can be defined as the edible nutritious seed of any of various erect or climbing plants (as of the genera *Phaseolus* and *Vigna*) of the legume family. Bean is a common name for large seeds of several genera of the flowering plant family *Fabaceae* (also known as *Leguminosae*) which are used for human or animal food. International Institute for Tropical Agriculture (IITA), 2009) reported that cowpea (*Vigna unguiculata)* is one of the most common varieties of beans; cowpea is a food and animal feed crop grown in the semi-arid tropics covering Africa, Asia, Europe, United States and Central and South America; the grains contain 25% protein, and several vitamins and minerals; the plant tolerates drought, performs well in a wide variety of soils, and being a legume replenishes low fertility soils when the roots are left to decay. It is grown mainly by small-scale farmers in developing regions where it is often cultivated

with other crops as it tolerates shade; it also grows and covers the ground quickly, preventing erosion. Cowpea's high protein content, its adaptability to different types of soil and intercropping systems, its resistance to drought, and its ability to improve soil fertility and prevent erosion makes it an important economic crop in many developing regions; all parts of the cowpea crop are used as all are rich in nutrients and fibre.

Value addition to an agricultural product involves the creation of form, place, time and possession utilities on the product in order to improve its quality, functionality and acceptability to the consumer (Ugwumba and Uzuegbunam, 2010). The process of value adding necessitates additional expenses but ensures higher monetary benefits to the operator. Okoh, Ugwumba and Elue (2008), stated that form utility is provided by processing, place utility is provided by transportation, time utility is provided by storage, and possession utility is provided by transfer of ownership to consumer. Value addition therefore provides consumers satisfaction in terms of utility in addition to enhancing the shelf life of the agricultural product. This, to a large extent minimizes waste and post-harvest losses (Ashaver, 2008).

Black-eyed cowpea is the type of bean used in the production of bean-ball "Akara" Black-eyed cowpea is cream colored but has a distinctive dark spot around the hilum. Akara is a deep-fat fried ball prepared from whipped cowpea paste, flavoured with pepper, onion and salt (Olapade, Ugokwe, Ozumba, Solomon, Olatunji and Adelaja, 2004). Whipping of the paste is usually done prior to the addition of other ingredients to incorporate air and enhance the formation of stable foam (Hung and McWatters 1990). Akara is the most common cowpea-based product in West Africa (Reber, 1983), which makes its contribution to diet particularly significant. Blending and whipping are important steps in processing of cowpea into akara. Akara is highly proteinous and nutritious, consumed by virtually everybody in Nigeria; taken as snacks to school by children and to work by adults; and consumed in the homes as breakfast. Ironically it is rarely produced in the homes, instead it is mostly produced and sold by the street vendors.

In spite of the abundant documented high nutrient content and health benefits of beans, many people still go to so much length to avoid beans consumption for so many reasons which include; high cost of beans, very long cooking/preparation time, high fuel/energy (for cooking) requirements, lack of proper storage/preservation facilities, consumers also tire of monotonous flavor, thus the need for this study; to identify the socio-economic characteristics of the producers; profitability status of the enterprise; determinants of profitability; producer's reason for starting the business and constraints to production of bean balls in the study area.

2. Research methodology

2.1 Description of the study area

This study was carried out in Idemili South Local Government Area of Anambra State, Nigeria. It is one of the 21 Local Government Areas (L.G.A) of the state. It covers a total land area of about 139,000 km^2 and has a population of about 206,816 persons living within this area. The people of Idemili South are predominantly farmers of various crops and livestock and traders. They also engage in the production and marketing of cowpea value-added products such as bean balls, "moi-moi",etc. Bean balls production is common and popular among female citizens of the seven town communities in the area. It seems to be one of the desired food items in the area, especially for breakfast.

2.2 Sampling techniques and data collection instruments

All the producers of bean balls in the study area constituted the study's population. Simple random sampling technique was used for the selection; five communities were selected out of the seven communities that make up the L.G.A; two villages were selected from each of the five communities to arrive at 10 villages and finally, five bean balls producers were selected from each of the selected villages to arrive at a sample size of 50 producers for the study.

A set of structured and pretest questionnaires were used for the study. Data were collected on the socio-economic characteristics of the producers such as gender, age of producers, marital status, experience, level of education and size of family. Information on reasons for starting up the business was also collected. Additional data were collected on revenue and cost variables as well as constraints to bean balls production. Descriptive statistical such as means, percentages, flow chart and frequencies were used to achieve objective (i) socio economic characteristics of bean ball producers, objective (v) producers reasons for starting the business and objective (vi) constraints to bean ball production, Objective (iii), profitability was achieved by the use of budgetary method and finally objective (iv), determinant of net production returns was achieved by means of Ordinary least squares (O.L.S) regression

2.3 The empirical model

The empiric budgetary technique model deployed for profitability assessment for the producers is given as:-

VA / NI / Profit =

Where:

NPR = Net production returns;

Σ =Sum;

$P_{yj}Y_j$ = Price x quantity of respondent's output = Total revenue (TR);

$P_{xij}X_{ij}$ = Prices x quantities of respondent's variable inputs = total variable cost (TVC);

F_{ij}= Depreciation of equipment, annual rent for store, interest in loan, e.t.c. of respondent = Total fixed cost (TFC);
TC = Total cost = TVC + TFC; and
NROI = Net return on investment = NPR/TC.

The multiple regression model employed to examine the influence of socio-economic factors of bean ball producers on net production income is implicitly defined as:
PDR = f (AGE, EDU, EXP, HOS, GEN, MAS, COI, QTP, SOB, POB, e)
Where:
PDR = Production returns (₦);
AGE = Age (years);
EDU = Level of education (years);
EXP = Experience (years in the business);
HOS =Household size (number);
GEN = Gender (dummy: male = 1; female =2);
MAS = Marital status (dummy: married = 1; otherwise = 2);
COI = Cost of inputs (₦);
QTP = Quantity produced (kg);
POB = Price of balls (dummy: ₦50 balls = 1; ₦10 balls = 2); and
e: Stochastic error term.
The regression model was fitted with the data and tried in four functional forms (linear, exponential, semi log, and double log) and output of the form with the best result in terms of economic, statistical and econometric criteria was chosen as the lead equation. The explicit versions of the functional forms are given as:

Linear: $NFI= \beta_0+ \beta_1AGE + \beta_2EDU + \beta_3EXP + \beta_4HOS + \beta_5GEN + \beta_6MAS + \beta_7COI + \beta_8QTP + \beta_{10}POB+ e$
Exponential: $\ln NFI= \beta_0 + \beta_1AGE + \beta_2EDU + \beta_3EXP + \beta_4HOS + \beta_5GEN + \beta_6MAS + \beta_7COI + \beta_8QTP + \beta_{10}POB + e$
Semi-log: $NFI= \beta_0 + \beta_1\ln AGE + \beta_2\ln EDU + \beta_3\ln EXP + \beta_4\ln HOS + \beta_5\ln GEN + \beta_6\ln MAS + \beta_7\ln COI + \beta_8\ln QTP + \beta_{10}\ln POB+ e$
Double-log: $\ln NFI= \beta_0 + \beta_1\ln AGE + \beta_2\ln EDU + \beta_3\ln EXP + \beta_4\ln HOS + \beta_5\ln GEN + \beta_6\ln MAS + \beta_7\ln COI + \beta_8\ln QTP + \beta_{10}\ln POB + e$

3. Results and Discussion

3.1 Socio-economic characteristics of bean ball producers

The socio-economic factors of the producers, as summarized in Table1, showed that bean ball production was dominated by women (92%). A mean age of 43 years with minimum of 18 years and maximum of 60 years were recorded. A maximum formal educational attainment of 18 years, minimum of zero year and mean of 9 years were also computed for the producers. On the average, the producers acquired production experience of 13.5 years with the least and most experienced marketers gaining years of

experience of 1year and 35 years respectively. Majority (60%) of the respondents were married with a mean average family size of 5 person. The result implied that most of the producers were young, educated and experienced women who had marital responsibilities at home. The result corroborates Onuk *et al* (2014); Ugwumba *et al.*(2014); and Gyang & Ojoko (2012), that production of bean ball and other convenience food were dominated by young, energetic, educated, experienced female producers.

Table 1: Socio- economic characteristics of bean balls producers (N=50)

Variables	Percentage	Mean
Gender		
Male	8.0	
Female	92.0	
Age		
18-20	4.0	
21-30	10.0	
31-40	32.0	42.4
41-50	22.0	
Above 50	32.0	
Marital status		
Married	60.0	
Single	14.0	
Widow	26.0	
Production Experience		
1-10	50.0	
11-20	26.0	13.5
21-30	18.0	
31 and above	6.0	
Educational Level		
Primary (1-6)	26.0	
Secondary (7-12)	60.0	8.8
Tertiary (13-18)	14.0	
Household size		
1-3	6.0	
4-6	70.0	5.7
7-10	24.0	

Source: Field survey, 2018.

3.2 Cost and returns of bean ball production

The estimated monthly profitability of bean ball producers is shown in Table 2. The result showed that the total variable cost incurred was ₦28,575,305 and constituted 98.8% of the total cost. A total revenue of ₦13,428,120 was realized by the producers after spending ₦9,628,610 to make a profit of ₦3,799,510. A mean net incomes, return on investment and net return on investment figures of ₦75,990; 1.39 & 0.39 were made. The net return on investment figures implies that the producers realized 0.39kobo on every 100 kobo expended on the enterprise in a month and the result proved the

enterprise profitable. This result agrees with the study carried out by Ugwumba and Uzuegbunam (2010) on Soymilk production from Soyabeans in Awka Agricultural zone in Anambra State, Nigeria as it attest to higher profitability status of value addition to agricultural products.

Table 2: Estimated cost and returns of bean balls production (n=50)

Variable	Total amount (₦)
Total Revenue (TR)	13,428,120
Total Variable cost (TVC)	9,521,230
Total fixed cost (TFC)	108,380
Total cost (TC)	9,628,610
Gross Margin (GM)= (TR-TVC)	3,906,890
Net income (NI) = TR-TC	3,799,510
Mean net income= NI/n	75,990.2
Return on investment (ROI= TR/TC)	1.39
Net return on investment= (NROI=NI/TC)	0.39

Source: Field survey, 2018.

3.3 Determinants of net production returns

Table 3 indicates the output of the four functional forms (linear, exponential, semi-log, and double-log) of the regression model on estimated determinants of net production returns for bean ball producers. The MINITAB Statistical software was used to run the regression. As shown in the table, the output of exponential form produced the best result in terms of numbers, signs and sizes of the parameter estimates and was chosen as the lead equation. The R^2 value of 72.3% indicated that 72.3% of variations in net production returns realized by the producers was attributed to variations in the independent variables while the remaining 27.7% were due to random disturbance. The F-statistic value was statistically significant, an indication that the independent variables collectively exerted significant influence on the net production return and that the model was a good fit for the data.

Out of the nine exogenous variables in the model, only three variables (gender, educational level and cost of inputs) exerted significant influences on net production returns. The coefficient of gender was negative and statistically significant at 5% level. This result is in agreement with the *apriori* expectations and implied that female producers were more likely to perform better in the business and realize more net production return than the male producers. Educational level had positive and significant relationship with net production return at 10% probability level in accordance with *apriori* expectations. Cost of inputs was positive and had statistically significant influence on net production return at 1.0% probability level in accordance

with *apriori* expectations. This implies that the higher the amount spent by a producer to increase production, the higher quantity returns expected from the business.

Table 3: Influence of socio-economic factors of the respondents on net production income

Predictor	Linear	Exp.	Semi-log	Double-log
Constant	32169	4.8081	-8754	1.282
	(0.36)	(15.93)	(-2.16)	(1.20)
GEN	-33449	-0.1925	-8158	-0.5315
	(-1.23)	(-2.10)**	(-0.68)	(-1.61)
AGE	-2389	-0.0041	-8511	-0.2129
	(-1.18)	(-1.03)	(-0.62)	(-0.2129)
MAS	-1.1110	-0.0097	-4636	-0.0670
	(-0.70)	(-0.18)	(-0.68)	(-0.34)
EDU	3469	0.0139	4303	0.2142
	(1.40)	(1.67)***	(-0.68)	(0.79)
EXP	2858	0.0057	5038	0.0831
	(1.95)***	(1.16)	(1.00)	(0.57)
COI	0.4837	0.000014	1813	0.4833
	(2.98)*	(2.54) **	(1.95)**	(1.78)***
HHS	-6962	-0.023	-4367	-0.1917
	(-1.45)	(-1.41)	(0.58)	(0.87)
POB	26330	-0.0134	9098	0.0471
	(1.11)	(-0.17)	(0.81)	(0.14)
QTP	55.1	0.00048	43310	0.4349
	(0.55)	(1.40)	(0.55)	(1.89)***
R^2	68.7%	72.3%	48.8%	63.9%
R^2 (Adjusted)	61.6%	66.0%	33.6%	55.8%
F-statistics	9.74	11.58	3.76	7.86
D-W Statistics	1.88	1.97	1.77	1.66

Source: Survey data, 2018. Note: Figure in ( ) are t-ratios. D-W stat = Durbin-Watson Statistic.

3.4 Producers' Reasons for Starting the business

Table 4 shows producers' reasons for starting the business. Findings from table indicated that lack of job (M= 2.7), profitability of the business (M=2.6), high demand of bean balls in the area (M=2.54) and small capital startup (M=2.51) as the major reasons why the producers starts up the business. The rest were considered minor reasons for starting up the business.

Table 4: Producer's reasons for starting the business

Reasons	Percentage	Mean	Rank
Lack of job	22	2.7	1st
Profitability of the business	20	2.6	2nd
High Demand	16	2.54	3rd
Small startup capital	14	2.51	4th
Easy entry into the business	12	1.96	5th
Availabilityof raw material	10	1.94	6th
Easy to produce and market	6	1.76	7th

Source: Field Survey, 2018

3.5 Constraints to the production of bean balls

The bean balls production in the area was constrained by factors which are shown in Table 5. Findings indicated that the problems include: conjunctivitis due to the emitting of smoke (M= 2.7), high and unstable price of raw materials (M= 2.52) and high cost of production (M= 2.50) ranked highest and were perceived as the most serious constraints to the business. The problems of drudgery in production (M= 1.9), Power failure (M= 1.7), Inadequate storage facilities (M= 1.6), Losses due to fast deterioration (M= 1.6), Insufficient capital (M= 1.4), Poor sales (M= 1.4).

Table 5: Constraints to the production of bean ball

Reasons	percentage	mean	rank
Conjunctivitis due to the emitting of smoke	28	2.70	1st
High and unstable price of raw materials	20	2.52	2nd
High cost of production	14	2.50	3rd
Drudgery in production	10	1.9	4th
Power failure	8	1.7	5th
Inadequate storage facilities	6	1.6	6th
Loss due to deterioration of product	6	1.6	6th

Poor sales	4	1.4	7th
Insufficient capital	4	1.4	7th

Source: Field Survey, 2018.

4. Conclusion and Recommendations

The bean ball production proved to be a profitable enterprise in the study area. Nevertheless, the efficiency and profitability would be improved if the constraints identified by the study are addressed as it will encourage many more people especially young, active and viable individuals, to venture into the enterprise.

The producer should make use of source of heat that emits little or no smoke such as gas cooker and kerosene stove for the safety of their health and eyes. Rehabilitation and construction of access and feeder roads within the study area and formation of cooperative groups by the producers in order to regulate market prices of products and improve access to government and other non-governmental credit facilities will sustainably enhance the producers profit and livelihood.

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