Economics of beekeeping enterprise in Owerri West Local Government Area, Imo State, Nigeria

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Abstract

This study examined the economics of beekeeping enterprise in Owerri west Local Government area, Imo State, Nigeria. The specific objectives were to describe the socioeconomic characteristics of beekeepers, evaluate the cost and returns of beekeeping enterprises, determine the factors affecting the net returns of beekeeping enterprise and to identify the constraints faced by beekeepers. The major constraints faced by the beekeepers included: adulteration of products, inadequate credit facility, fear of bee stung, availability of tools and equipment, theft and vandalism, while the major problems militating against effective marketing of bee products include: inadequate information, transportation problem, inadequate packaging materials, high cost of products and adulteration of products. The net profit of beekeepers was evaluate the cost and returns of beekeeping enterprises and determine the factors affecting the net returns of beekeeping enterprise evaluate the cost and returns of beekeeping enterprises and determine the factors affecting the net returns of beekeeping enterprise ₦1,256.600.00 and the rate ROR was 1:1.05, showing that the enterprise was a profitable one. household size, Education level, contact with extension agents, number of hives, and depreciation were positive and significant at 5% and 10%, while gender and age were negatively significant at 10%. Beekeeping industry is very lucrative and profitable, therefore more awareness, provision of credit facility, provision of tools and equipment and better extension service should be made available by the government, agricultural development programmes and non-governmental organizations.

Keywords: Economics, Beekeeping, Beehives, Enterprise

Introduction

Agriculture provides primary means of employment for Nigerians, accounts for more than one-third of total Gross Domestic Product (GDP), ensures food security, alleviate poverty and reduce labour force wastage (World Bank, 2021). The agricultural share of the GDP stood at about 90% before independence in 1960 and further decreased to 56% between 1960 and 1969, then collapsed to about 40% (World Bank, 2021). Furthermore, the Food and Agricultural Organization, 2021 observed that the country's agricultural sector witnessed great decline in the fourth quarter of 2020. The report stated that, the sector's real GDP declined by 3.2% in Q4 of 2020 compared to the same period in 2019.This decline overtime is due to its

dwindling relevance relative to other sectors of economy, especially the commercial exploration of petroleum, thus leading to poor agricultural output in general and consequently, impoverishment of the persons whose livelihoods are dependent on agriculture. The search for sustainable forms of farming to complement the traditional farming is key to diversification and this will help improve biodiversity of our environment, hence the need for some Nigerians to embark on Beekeeping. Though not widely practiced in the country, bee keeping enterprise has over the years improved the living conditions and livelihood of many in the rural area. Despite the potentials for honey production due to excellent flora and fauna diversity, Ojeleye (2018), observed that commercial beekeeping was almost non-existent in Nigeria until recently. The country relied on imported honey to meet the growing demand for honey. Many families and rural dwellers were, scared of honey hunting because, of the scare of bee sting. Local production of honey solely rested on a few artisanal honey hunters and/or traditional bee farmers who employed traditional harvesting and processing techniques in their production processes. These traditional practices lead to low productivity and production of poor quality, low productivity with adulteration of the product. These products when consumed could lead to devastating health disorder. Although few studies have addressed different aspect of honey production in Nigeria, (Azeez *et al.*, 2022; Chinaka, 2018; Matana *et al.*, 2018; Ojeleye, 2018), there is seemingly paucity of published information on the cost and returns of beekeeping, factors that can affect the net returns of the enterprise, constraints faced by bee keepers in Imo state, hence the need for carrying out this research. This study seeks to; examine the socio-economic characteristics of beekeepers in Owerri West Local Government Area, evaluate the cost and returns of beekeeping enterprises in the study area, determine the factors affecting the net returns of beekeeping enterprise, identify the constraints faced by beekeepers in the study area, examine the problems militating against effective marketing of bee products in Owerri West Local Government Area of Imo state.

Materials and Methods

Study area

The study was carried out in Owerri West Local Government Area, Imo State located in the southeastern part of Nigeria. The study area lies within Latitude: 5^0 29' 1.07"N and Longitude: 7^0 01' 59.70" E (ADP, 2020).The headquarters of the LGA is in the town of Umuguma and the LGA is home to a number of towns and villages which include Nekede, Irete, Avu, Ndegwu, Amakohia, Ihiagwa, Obinze, and Okuku. The estimated population of Owerri west LGA is put at 312,088 inhabitants Notable landmarks in Owerri west LGA include the Federal Polytechnic Nekede, the Federal University of Technology Owerri and the Imo State Secretariat. Owerri west LGA occupies a total area

of 295 square kilometres and has an average temperature of 27 degrees centigrade. The LGA witnesses two distinct seasons which are the dry and the rainy seasons. The Annual rainfall varies from 1,900mm to 2,200mm. The hottest months are from January to March, and the mean annual temperature is 34°c, the influence of Harmattan last for about nine (9) weeks from late December to late February. The main staple crops planted in the state are yam, cassava, cocoyam, and maize, groundnut, melon, (ADP, 2019). Therefore Owerri West Local Government Area has a conducive climate and vegetation for beekeeping. According to ADP, (2019), the population of bee keepers in Owerri West Local Government Area is put at 98. Being a new area of investment, it is expected that, this population will increase over time.

Sampling procedure

A multistage random sampling technique was adopted to select the respondents for the study. Owerri West Local Government Area is made up of twelve (12) communities, which comprises forty-six (46) villages. Ten (10) communities with, greater number of beekeepers were purposively selected from the twelve (12) communities. In the second stage, three (3) villages were selected from each of the communities making a total of thirty (30) villages. Two (2) beekeepers were then selected from each of the thirty (30) villages, making it a total of sixty (60) beekeepers, used for the study.

Data Collection

Data for the research were sourced from both primary and secondary Sources. The primary data were collected using, well structured questionnaires which were administered to the respondents alongside interviews and personal observation.

Data analysis

Data were analyzed using descriptive statistics such as mean, percentage and frequency distribution. Production indices like, gross margin and net returns on enterprise were analyzed using budgetary analysis while the factors that affects the net returns of bee keepers were analyzed using the Ordinary least square technique.

The budgetary analysis for determining profitability and net returns on investment as stated by Tijani *et al.* (2018) is as follows;

Net returns (NR) = total revenue- total cost

TC = Total fixed cost (TFC) + Total variable cost (TVC)

Gross Margin = Total revenue (TR) -Total Variable Cost (TVC)

The factors affecting net returns of beekeepers were estimated using the ordinary least square regression analysis. . implicitly the model is specified as follows:

$Y=f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, e)$

Where;

Y= Net returns of beekeeping enterprise (N)
X_1 = Gender (dummy; male=0, female=1)
X_2 Age (years)
X_3 = Level of education (years of schooling)
X_4 = Marital status (d: married=1. Single=0)
X_5 = Household size (No. Of household)
X_6 Beekeeping experience (years in bee keeping business)
X_7 = Number of extension contacts (no. times they made contact with extension agents)

X_8 = Number of beehives owned (number)
X_9 = Depreciation on fixed assets (N)
e = Stochastic error term

The relationship between the endogenous and each of the exogenous variables was analyzed using the four functional forms; linear, semi log exponential and double log. Linear function

Linear function;

$Y=b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + e$

Where;

b_o = Constant term
b_1-b_9 =Coefficient estimate
Y= Net returns of beekeeping enterprise (N)
X_1 = Gender (dummy; male=0, female=1)
X_2 Age (years)
X_3 = Level of education (years of schooling)
X_4 = Marital status (d: married=1. Single=0)
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X_9 = Depreciation on fixed assets (N)
e = Stochastic error term

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Semi log function;

$Y = b_o + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_2 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + b_8\ln X_8 + b_9\ln X_9 + e$

Double log function;

$\text{Ln } y = b_o + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + b_8\ln X_8 + b_9\ln x_9\ e$

Exponential function;

$\text{Ln } y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + e$

Results and discussion

Socioeconomic characteristics of respondent

Table 1 shows the socio-economic characteristics bee keepers in the study area. Out of the sixty-six bee keepers selected for this study, 88.3% of the respondents were male, while 11.6% were female. This could be because men are in a better position to handle the risk and labour requirement associated with beekeeping (Ajana, 2018). Majority of the beekeepers (63.3%) fall within the age bracket of 20-40 years. Beekeepers within the age bracket of 41-60 were (30%) while the aged population, 61-80 years make up for 6.7% of the population. The implication of this age distribution is that beekeepers within the age limit of 20-40 years participate more in beekeeping because they are stronger and active to meet the labour requirement of bee farming (Ajana, 2020). With respect to marital status, 75% of the respondents were married, while 25% were single. This points to the fact that, majority of beekeepers in the study area were married. This high percentage of married beekeepers over single beekeepers indicate that, married people have a lot of responsibilities hence, the desire to engage in beekeeping which will serve as a source of extra income to cater for their families' needs (Ajana, 2018). Majority of the respondents (61.7%) had their family size within the 1-5 range. It is clear that majority of the respondents had fairly large family size, this may be due to the fact that more farm hands are needed to help in the labour requirements of the farm.

In terms of education, 42 respondents (70%) had tertiary education. Going by the system of education in Nigeria, this implies that majority of the beekeepers are properly educated and literate enough to keep record and take good management

decisions. It also means that the practice of beekeeping is valued more among the literate who have come to understand the benefits of beekeeping and have been able to harness research information to boost productivity and profitability (Ubeh, 2019). Majority of the respondents (65%) own between 1-10 beehives, This relatively large number of beehives owned and controlled by beekeepers in the study area is because of the quest by bee keepers to collect large quantity of honey per cycle of collection. This is so because there is positive correlation between the number of bee hives owned by a beekeeper and the quantity of honey collected per cycle, this conforms to the to the findings by (Ubeh, 2011).In beekeeping enterprise, experience is highly needed for effective harnessing of honey from the bee hives. In the study area, 50 respondents (83.3%) had 1-10 years of experience in bee keeping. It is obvious from the results presented above that the majority of respondents are relatively knowledgeable in the act of beekeeping which will surely reflect on their output. With respect to access to Extension service, 46 respondents (76.6%) have access to extension service, this large number of respondents who have access to extension agents do so because beekeeping requires more of skilled labour and management to be able to manage the bees and their product to obtain the desired result (Ubeh, 2019).

Cost and Returns for Beekeeping Enterprise per plot of land, per cycle

Table 2 presents the estimated cost and returns per annum for a bee farmer using one plot of land (100M X 50M) for the activity in Imo State, Nigeria. Total revenue of ₦2,450,000.00 was realized, a cost of ₦1,193,400.00 was incurred per annum, a net farm income of ₦1,256.600.00 was realized. The rate of return in investment (ROR), was given as 1:1.05 implying that for every ₦1 invested in bee keeping per per annum, ₦1.5 kobo is realized. This point to the fact that beekeeping is a profitable venture. The gross ratio of this venture was 0.49. A gross ratio of 0.49 clearly shows that, for every #1 return realized from the investment, 49 kobo is re-invested into the business. Profit margin = (Total Revenue - Total cost/Total Revenue) X 100 = (₦2,450,000.00 - ₦1,193,400 / ₦2, 450, 000.00 = 51.29%. A profit margin of 51.29% indicates that 51.29% of revenue is retain as profit after covering all costs.

Factors affecting the net returns of beekeeping enterprise

Table 3 shows that the semi-log functional form provided the lead equation. The coefficient of multiple regression (R^2) was 0.740 implying that 74% of the variability on the factors affecting the net returns of bee keeping was accounted for by the explanatory variables in the model. household size, Education level, contact with extension agents, number of hives, and depreciation were positive and significant at 5% and 10%, while gender and age were negatively significant at 10%. A 10% increase in household size, education level,

contact with extension agents, number of hives and depreciation will lead to 0.86%, 0.78%, 7.52%, 0.44%, 0.7% increase in the returns on the revenue of bee keepers respectively. Gender and age a negative influence on honey bee production.

Problems militating against effective marketing of bee products

From Table 4, majority of the respondents (26.7%) had adulteration as their greatest challenge in marketing honey. Packaging materials, high cost of products on the side of the marketers, inadequate information with same number of respondents came immediately after adulteration as other basic challenges faced by honey marketers while, transportation and inadequate finance trailed those other problems. Adulteration topped the list of problems above. This is so because most marketers try to increase the quantity of honey by adding other external liquid to the original honey they bought to enable them make more money. This collaborates the opinion by Ubeh, 2011 who asserted that,the quest for more money brings about bad habits by some beekeepers who end up adulterating, thereby reducing their quality.

Identification of Constraints faced by Beekeepers in the study area

Table 5presents the various constraints faced by bee keepers in the study area. These challenges were also ranked based on the responses. 39 respondents (65.0%) indicated that they were constrained by inadequate facility and ranked 1st, 30 respondents ((50%) were constrained by fear of bee sting and ranked 2nd, abandonment of bee hives by bees recorded 36.7% and ranked 3rd, low yield recorded, 17 (28%)ranked 4th, theft/vandalism with 14 respondents (23.3%) ranked 5th, unavailability of tools/equipment 13 (21.7%) ranked 6th, pest and disease 13 (21.7%) ranked 7th, adulteration, 10 (16.7%) ranked 8th, product marketing, 9 (15%) ranked 9th , non colonization of bees, 8 (13.3%) ranked 10th, bush burning, 3 (5%) ranked 11th, poor storage facility, 2 (3.3%) ranked 12th, cost of production, 1 (1.7) ranked 13th. With the ranking presented above, the productivity of beekeepers can be increased if respondents are provided with credit facilities with low interest rate, security are beefed up around bee farms and beekeepers are given adequate training in the act of beekeeping and effective resource management.

Conclusion

Results from this study revealed that beekeeping is a very lucrative business. The net profit of beekeepers given as ₦1,256.600.00 and the rate ROR was 1:1.05 per cycle (6 Months) from a plot of land is quite encouraging. The major constraints faced by the beekeepers include: adulteration of products, inadequate credit facility, fear of bee stung, unavailability of tools and equipment, theft and vandalism, while the major problems militating against effective marketing of bee products include: inadequate information, transportation problem, inadequate packaging materials, high cost of products and adulteration of products. Household size, Education level, contact with

extension agents, number of hives, and depreciation were positive and significant at 5% and 10%, while gender and age were negatively significant at 10%. Beekeeping industry is very lucrative and profitable.

Recommendations

Based on the findings of this study, there is need for government to provide single digit interest rate credit to beekeepers to enable them finance initial purchase of hives and other beekeeping equipment. In terms of research and development, provision of well equipped, up to date demonstration apiaries where beekeepers can be trained in management of hives and how to extract quality bee products should be put in place to enable them develop their skills. Deforestation and bush burning should be discouraged to enable the bees find habitable environment where they can cohabit and breed. Awareness should be created by extension Agents around our locality on the need to carry out massive planting of fruit trees which will provide pollen and nectar for the bees.

References

Agricultural Development Programme (ADP), (2019). Cropped Area Yield Survey, Planning, Monitoring and Evaluation, Department ADP Owerri, Imo State Nigeria.

Agricultural Development Programme (ADP), (2020). Cropped Area Yield Survey, Planning, Monitoring and Evaluation. Department ADP Owerri, Imo State Nigeria.

Ajana, T. (2018), Economic of Beekeeping. Project Work done in the Department of Agricultural Economics, Federal University of Technology Owerri. Imo State, Partial Fulfillmentfor the award ofBachelor of Science degree.

Azeez, F. A. & Ojo, O. B. (2022). Assessment of Honey Production as a means of Substainable Livelihood in Ibadan Metropolis. *Retrieved continental journal of agricultural economics, Vol. 6, No.1 Pp 20-27*

Chinaka, C. (2018). Beekeeping Technology for Nigeria Farmers. Extension Bulletin No.3, National Agricultural Extension and Research Liason Services, Ahmadu Bello University Saria, Nigeria. Pp. 22-29..

FAO (Food and Agriculture Organization) (2020). Publication year book, Rome.

Matana, B. M, Adesiji, G. S. & Adegoke, M. A. (2018). An Analysis of Activities of Bee Hunters and Beekeepers in Oyo State, Nigeria, *African journal of livestock extension.*

Ojeleye, B. (2018). Foundation of Beekeeping in the Tropics. Centre for Bee Research and Development (CEBRAD) press, Ibandan, Nigeria. P.225.

Tijani, B. A. Ala, A. L. Maikasuwa, M. A. & Ganawa, N. (2021). Economic Analysis of Beekeeping in Chibok Local Government Area of Borno State, *Nigerian. journal of basic and applied science 19(2): 285-292.*

Ubeh, E. O. (2011). Lecture Note on Beekeeping. Department of forestry and wildlife technology (FWT) Federal University of Technology, Owerri Imo State

Ubeh, E. O. & Nwajiuba C. (2018). Economics of Apiculture; A case study of FUTO Apiary. In Ekenyem, B. U. and Madubuike F. N. (2018), Issues in Tropical Science for Rural Development, Fergro Press, Pp 164-169.

World Bank (2021). Second National Fadama Development Project. Project Appraisal Document.

Table 1: Socioeconomic Characteristics of Respondent

Socioeconomic Characteristics	Frequency	Percentage
Gender		
Male	53	88.3
Female	7	11.6
Age		
20-40	38	63.3
41-60	18	30
61-80	4	6.7
Mean: *39 years*		
Marital Status		
Single	15	25
Married	45	75
Household size		
1-5	37	61.7
6-10	16	26.7
11-15	7	11.1
Mean household size: 6		
Educational level		
Non formal	2	3.3
Adult	2	3.3
Primary	2	3.3
Secondary	12	20
Tertiary	42	70
Number of beehives		
1-10	39	65
11-20	14	23.3
21-30	7	11.6
Mean: 10 hives		
Beekeeping Experience		
1-10	50	83.3
11-20	6	10.0
21-30	4	6.6
Mean: 8 years		
Access to Extension Agents		
Yes	46	76.6
No	14	23.3

Source: *Field Survey data (2023)*

Table 2: Estimated Cost and returns of Bee keeping per plot

Items	Description	Amount ₦
Revenue		
Sale of honey	350 liters @ ₦7,000.00/Liter	2,450,000.00
Total Revenue		**2,450,000.00**
Variable input		
Transportation (production/marketing)	lump sum	350,000.00
Hired labor (production/marketing)	20 man-day @ ₦3,000.00	60,000.00
Fuel (lump sum)	For powering the stainless presser	120,000.00
Bottles/labels (50cl)	500 bottles/label@ ₦300/bottle	150,000.00
Papers	550 papers @ ₦120/paper	66, 000.00
Other variable cost		276,000.00
Total variable cost		**956,000.00**
Fixed input		
Beehives -	18 @ ₦8,000	144,000.00
Smoker	1 @ ₦10,000.00	10,000.00
Hive Stand	18 @ ₦1,167.00	21,006.00
Veil/hat	3 @ ₦1,000.00	3,000.00
Bee suit	3 @ ₦7,000.00	21,000.00
Cutlass/knife	1 @ ₦3,500.00	3,500.00
Bucket/container	10 @ ₦2,000.00	20,000
Bee brush	3 @ ₦300.00	900.00
Stainless presser	1 @ ₦14,000.00	14,000.00
Total Fixed Cost		**237,406.00**
Total Cost		**1,193,406.00**
Gross margin		**1,494,000.00**
Net margin		**1,256,600.00**
Profit Margin		**51.29**
ROR(net income/total cost)		**1:1.05**

Source: Field Survey data (2023)

Table 3: Factors affecting the net returns of beekeeping enterprise

Explanatory variable	Linear function	Exponential function	Semi log function	Double log function
Constant	49790.984	91479.534	12.044	14.678
	(5.717)	(2.863)	(21.659)	(6.909)
Gender X_1	-10359.866	-12812.303	-0.815	-0.807
	(-2.331)**	(-2.628)*	(-2.873)*	(-2.490)*
Age X_2	-786.205	-37023.211	-0.069	-2.993
	(-5.754)*	(-5.978)*	(-7.942)*	(-7.269)*
Level of education X_3	-982.616	-9957.953	-0.078	-0.740
	(-2.942)*	(-2.447)*	(3.665)*	(-2.737)*
Marital status X_4	225.057	1758.969	-0.171	-0.099
	(0.058)	(0.441)	(-0.693)	(-0.373)
Household size X_5	739.931	8209.951	0.086	0.471
	(1.160)	(0.821)	(2.104)**	(1.570)
Beekeeping experience X_6	109.548	677.376	0.003	0.177
	(3.153)*	(2.303)**	(0.123)	(0.909)
Extension contacts X_7	8.945	457.498	0.752	0.846
	(0.002)	(0.113)	(2.914)*	(3.140)*
Number of beehives owned X_8	-538.558	-3511.314	-0.044	-0.222
	(-2.436)*	(-1.894)**	(3.093)*	(-1.800)**
Depreciation on fixed asset X_9	2.672	8734.369	0.070	0.792
	(2.751)*	(2.235)**	(3.431)*	(3.049)*
f-ratio	12.997	11.233	15.806	12.705
R^2	0.601	0.678	0.740	0.504
N	60	60	60	60
Standard error	10532.19121	10896.08378	0.67248	0.72432

Source: Computer analysis data (2023)

Table 4: Problems militating against effective marketing of bee products

Constraint	Frequency	Percentage (%)	Ranking
Adulteration	16	26.7	1st
Packaging Material	14	23.3	2nd
High Cost of Products	14	23.3	3rd
Inadequate information	14	23.3	4th
Transportation	12	20.0	5th
Inadequate Finance	12	20.0	6th

Source: Field Survey data (2023)

Table 5: List of Constraints faced by Beekeepers in the study area

Constraint	Frequency	Percentage (%)	Ranking
Inadequate credit facility	39	65.0	1st
Fear of bee sting	30	50	2nd
Abandonment of bees	22	36.7	3rd
Low yield	17	28.3	4th
Theft/vandalism	14	23.3	5th
Unavailability of tools and equipment	13	21.7	6th
Pests and Diseases	13	21.7	7th
Adulteration	10	16.7	8th
Product marketing	9	15.0	9th
Non colonization of bees	8	13.3	10th
Bush burning	3	5	11th
Poor storage facility	2	3.3	12th
Cost of production	1	1.7	13th

Source: Field Survey data (2023) *Multiple response (n=60)