# Economics of Beekeeping in Ondo State, Nigeria: A Panacea for Youth Unemployment

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**Abstract**
This paper examined the economics of beekeeping in Ondo State, Nigeria, as a panacea for youth unemployment. Specifically, the study determined the profitability and identified factors influencing the number of bee products produced. Multi-stage sampling procedure was employed for the selection of fifty (50) respondents. Data were collected with the use of structured questionnaire. Descriptive statistics such as frequency counts and percentages were used to describe the data while Gross margin analysis was used to determine the profitability of the enterprise. Results showed that male respondents (80%) were more involved in beekeeping with a mean age of 48 years and experience of 5 years. The gross margin of beekeeping was ₦174,199.10 ($481) per cycle with a net revenue of ₦164,653.21 ($454) per cycle and return on investment was ₦2.09 ($0.006). Results showed that household size, number of colonies, age and education had a positive and significant influence on the number of bee products produced while marketing channels and cost of transportation had a negative impact on the dependent variable. Based on the findings, it was concluded that beekeeping is a profitable venture. Therefore, policy that will promote youth involvement in apiary should be encouraged by the agricultural stakeholders as this could be a leverage for reducing unemployment among youths in Nigeria.
**Keywords**: Beekeeping, profitability, hives, Nigeria.
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## INTRODUCTION

Bees offer a huge potential with little investments. As an agricultural enterprise, beekeeping does not require land ownership and it can start with equipment and tools that can be sourced locally. Interestingly, skills and knowledge required for beekeeping enterprise are found within the immediate environment. Honey produces by bees is highly rich in sugar and other compounds. It contains fructose (38.0%), glucose (31.0%), sucrose (1.0%) and water (17.0%) (Erguder *et al*., 2008). Honey also contains healing properties against bacteria, ulcer and inflammatory agents (Fiorani *et al*., 2006). Bee products which include honey, pollen, propolis, beewax, royal jelly and venom are seen by many to have curative properties even though others suggest the contrary as a result of a lack of critical scientific scrutiny on bee products (FA0, 2009). Bee products have many economic values such as beeswax, pollen, propolis and royal jelly and they are regarded as valuable ingredients in candle making, cosmetic, textile, medicine, and varnish and polish production (FAO, 2011).

Beekeeping provides socio-economic and environmental services to rural farmers. This is because, it generates employment and income as well as pollinates farm crops. Therefore, bees are of great assets in ecological and horticultural management because it conserves the natural flora and thus increases crops yield. In addition to providing socio-economic and ecological services, bees provide honey for cultural services such as naming and marriage ceremonies (Food and Agriculture Organization FAO, 2009).

It is environmentally-friendly with low cost of production compared with the other types of agriculture. Honey is an important ingredient in confectionary and pharmaceutical industries (Okpokiri *et al.*, 2015). The demand for honey has increased over the years because of its numerous health benefits and contributions to human dietary and welfare (FAO, 2011).

Nigeria is an agrarian country endowed with a total land area of 910,770km$^2$. Nigeria ecological zones can best be described as both forest and savannah. In addition, Nigeria's environment is prosperous for the rearing of beekeeping. Despite all these favourable climatic conditions, opportunities and cost comparative advantages associated with beekeeping are yet to be fully tapped. Consequently, production of honey products is comparatively low. Nigeria produces less than 10% out of 400,000 tons of honey demanded by its populace annually (The Technical Centre for Agricultural and Rural Cooperation CTA, 2020). The United Nation's report shows that Nigeria spent about $US4,660,501 million on the importation of honey between 1996 and 2017 to close the short fall (See Fig 1).

There are many challenges facing production of honey in Nigeria. Some of the problems identified in the previous studies include slash and burn practices, use of chemicals, increased urbanization and industrialization as population grows, increase in the price of modern beekeeping technologies, deforestation, lack of skilled manpower and training institutions and climate change (Ayalew, 2001; Edassan, 2002; Schweiger *et al*., 2010).

Despite the challenges facing honey production, it is still a viable enterprise to reduce unemployment among youth in Nigeria where the unemployment rate is increasing at alarming rate every year. According to the National Bureau of Statistics NBS (2020), the Nigeria's

unemployment rate as at Q2 2020 was 27.1%, up from 23.1% in Q3 2018. The unemployment rate among young people (15-34 years) was 34.9% while about 28.2% are underemployed for the same age range. Though, government at all levels has put in place several empowerment schemes in recent time to stem the tide of rising unemployment rate. Some of the policies and programmes created at the Federal level include Operation Feed the Nation, Back to Land, National Directorate of Employment, N-Power, Agricultural and Development Projects. At the State level with a particular reference to Ondo State, youth in agriculture and wealth creation were notable programmes establish to solve the problem of unemployment among youth. However, it is unfortunate that most of these programmes started and ended with the tenures of their initiators in Office. This is because the resources needed to sustainably continue such programmes were not available. To sustainably solve unemployment problems in Ondo State, beekeeping is a viable enterprise. This is because it does not require huge resources and the resources needed to start up the enterprise are locally available without specialized skills and knowledge.. It is, therefore, imperative to provide the necessary information on the number of bee products that can be possibly produced with economic values.

Several studies have been conducted on beekeeping over the years and across the globe. Some of these studies include Vural and Karaman (2010), Makri *et al*. (2015), Vaziritabar and Esmaeilzade (2016), Tizazu *et al*. (2017), Dia et al. (2018), Cevrimli and Sakarya (2019), Ijigbade *et al*. (2019), Tijani *et al*. (2011). However, none of these studies deliberately looked at how beekeeping enterprise could be used to reduce youth unemployment in Nigeria. This study therefore adds to the existing literature on beekeeping to investigate the economics of beekeeping enterprise in Nigeria with a view to identifying opportunities for improvement and mitigating the myriads of problems confronting the enterprise. Hence, this study was conducted to determine the profitability of beekeeping enterprise, examined factors that influenced bee products and identified constraints to beekeeping enterprise.

## METHODOLOGY

Study area/sampling design

This study was carried out in two (2) Local Government Areas (LGAs) in Ondo State namely Akure North and Akure South. The study area lies between latitude 7° 07′ and 7° 37′ N, of the equator and longitude 5° 06′ and 5° 38′ E, of the Greenish meridian. It covers about 991km² with a tropical climate of two distinct seasons that is the rainy season (April - October) and dry season (November - March) (National Popuplation Commission NPC, 2006). A multi-stage sampling procedure was used to select beekeepers in the study area. The first stage involved a purposive selection of Akure North and Akure South LGAs because the two LGAs have the highest number of beekeepers in the study area. In the second stage**,** two communities from Akure-North and three from Akure-South were randomly selected, thus making a total of five (5) communities selected. The communities selected included Ibule, Ita-Ogbolu, Iju Alafia, Oba-Ile, and Oda. In the third stage, ten (10) beekeepers were randomly selected from each of the community in the study area thereby giving a total number of fifty (50) beekeepers interviewed and used for the analysis.

**Data Analysis and Model Specification**

This study employed descriptive statistics, gross margin analysis and inferential

statistics to analyse the data collected from the field survey.

**Cost and returns Analysis**

Gross margin (GM) is the difference between the total revenue (TR) and the total variable cost (TVC) obtained from the sale of bee products. It is employed here to measure the profitability of beekeeping and it is expressed as follows:

$$GM_i = TR_i - TVC_i \quad (1)$$

Where, $GM_i$ = gross margin accrued to $i^{th}$ bee keeper,

$TR_i$ = Total revnue accrued to $i^{th}$ bee keeper

$TVC_i$ = Total variable cost incurred by $i^{th}$ bee keeper;

**Multiple Regression Analysis**

Following Gujarati (2003), this study postulated a production function with a number of bee products produced by the farmers as a function of the age of the respondent ($X_1$); gender ($X_2$); level of education ($X_3$); household size ($X_4$); Number of Colonies ($X_5$); Cost of materials (₦) ($X_6$); Cost of Transportation (₦) ($X_7$); and Marketing channels ($X_8$). The model was implicitly written as:

$$Y_{ij} = f(X_1, X_2, X_3, X_4, X_5 X_6 X_7, X_8 U_i) \quad (2)$$

$Y_{ij}$ = Number of bee products produced by $i^{th}$ bee keepers from jth farm

$\beta_\circ$ = intercept;

$\beta_{ij}$ = parameters to be estimated

$f$ = functional relationship

$X_{ij}$ = vector of explanatory variables influencing $i^{th}$ output

$\varepsilon_i$ = error term

The explicit functional form of equation 2 was stated as

$$Y_i = \beta_\circ + \beta_1 * AGE + \beta_2 * GENDER + \beta_3 * EDUC + \beta_4 * HHSIZE + \beta_5 * N\_COLONIES + \beta_6 * COST\_MATERIALS + \beta_7 * COST\_TRANSP + \beta_8 * MKT\_CHANNELS + \mu_i \quad (3)$$

**Description of variables, measurement and hypothesis**

Age of the respondents (AGE): The age of the respondent was measured in years as a continuous variable and hypothesized to be negative (-ve) because as farmer's age increases, we expect his efficiency to decline.

**Gender of respondent** (GENDER): This was hypothesized to be positively (+) related to the number of bee products produced because it is expected that male farmer will have more courage and financial resources to go into bee farming than women. Bee rearing can only be done by people who are brave enough because bees are often seen as aggressive social insect that stings. Although, not all bees sting. Gender is a discrete variable, such that male was coded as 1 and 0 otherwise.

**Level of education** (EDUC): This variable was expected to have a positive (+ve) association with the level of products produced. Educational level represents human capital captured by calculating the average years of completed schooling for each farmer. Production decision-making can be influenced by the level of education of household members. Farmers with a higher level of education were expected to adopt innovative technology on his apiary farm because literacy improves the ability to conceptualize information and make economically viable decisions. It was as number of years spent by respondent in schooling.

**Household size** (HHSIZE): It was measured as the number of household members living under the same roof. Household size was hypothesized in this study to have a positive (+ve) impact on the number of bee products produced. Large family size is expected to supply cheap family labour thereby decreasing the variable costs on beekeeping.

**Number of colonies** (N_COLONIES): The variable is continuous, hypothesized to have positive (+ve) relationship with the number of bee products produced in the study area because as number of colonies

increases, all things being equal, leads to increase in both quantity and farmer's income.

**Cost of materials** (COST_MATERIALS): The cost of materials is one of the variable cost incurred by beekeepers for producing and processing of honey. It is expected that a unit increase in the cost of material/equipment use in beekeeping, holding other factors constant will result in negative (-ve) relationship with the number of products produced as well as income of beekeeper. We therefore hypothesized that the coefficient of cost of materials would be negative in this study. Cost of materials in this study was measured in Nigeria currency (Naira)

**Cost of transportation** (COST_TRANSP): The cost of transportation is an additional financial burden when transport increases by a unit, the variable cost also increases as well. Hence, this variable was hypothesized to be negatively (-ve) signed with the number of honey products produced. Cost of transport was measured in naira (Nigeria currency) per kilometre.

**Marketing channels**

(MKT_CHANNELS): This variable was expected to be either positively or negatively (±) signed with the number of bee output produced because more marketing channels are expected to give wide range of choices which may lead to price differentiation. On the other hand, more channels can make it difficult for trade union in honey production to enforce agreed prices for their products thereby leading to low returns. There is no organized market for honey products in the study area so farmers sell products at own discretion. This variable is measured as the number of market channel used by a respondent to sell his/her products.

The parameter estimates of equation (3) were obtained using STATA version 14.

## RESULTS AND DISCISSION

**Socio-economic Characteristics of Respondents**

From Table 1, result revealed that majority (80.0%) of the respondents were male while (20.0%) of the respondents were female. This shows that males were more prominent in beekeeping than females. Married accounted for 82.0% of the respondents sampled while 18.0% of them were single. The finding concurs with the finding of Famuyide *et al*. (2014) that 79.4% of the bee farmers in Oyo State were married. Mean age was 48 years, thus implying that most of the respondents were still fairly young and productive. Most of the respondents (74.0%) had tertiary school education which implies that respondents will be highly receptive to the adoption of improved beekeeping technologies. The mean household size of the beekeepers was 4 persons. This figure is still in line with the national average household size of 4.5 in Nigeria. Over half (62.0%) of the respondents engaged in beekeeping as their main occupation and an average farming experience of respondents was 5 years.

**Profitability of Beekeeping**

Table 2 shows the average cost and returns to beekeeping. The cost of packaging constituted a larger proportion (36.5%) of the total cost of production while the cost of straining cloth (0.50%) was the least. The depreciated cost of fixed inputs employed in bee farming was ₦34,520.89 accounting for 43.8% of the total cost of production. Over half of the total cost incurred went for total variable cost (TVC), (56.2%) in the beekeeping. The total cost of production was ₦78, 886.79 while total revenue (TR) generated was ₦ 243,540.00 with honey contributing ₦ 241,290.00 and bee wax contributing ₦ 2,250.00. The computed net

farm income was ₦164, 653.21 and this implies that beekeeping is profitable and has the potential of contributing immensely to the financial base of the farmers. The estimated net farm income is higher than the net farm income of ₦ 197, 334 obtained in a similar study by Babatunde et al. (2007) in Oyo state, and the net farm income of ₦ 8,973.74 reported by Tijani et al. (2011) in Chibok Local Government Area of Borno State. Furthermore, returns to naira invested computed was ₦2.09, which implies that for every one naira invested in bee farming in the study area, a profit of ₦1.09 is generated and this further showed that honey production is profitable.

**Factors influencing the Number of Bee Products Produced**

Results displayed in Table 3 presents the regression results for the factors affecting the number of bee products produced in the study area. All tests conducted were tenable. Four functional forms of linear, double-log, semi-log and exponential were estimated in order to select the best fit. Double-log production functional form was selected as the lead equation on the basis of economic, statistical and econometric criteria. The model R-squared was 0.947 with an adjusted R-squared of 93.0%, which implies that 93.0% of the total variations in number of products produced were explained by all the explanatory variables in the model, while the remaining 7.0% variation was due to error term. The F-value (53.75) was equally statistically significant at 1% level; indicating that all the explanatory variables jointly exerted a significant impact on the level of bee output produced. Result shows that the coefficients of age of beekeeper, level of education, household size and number of colonies had positive significant impact on bee products. The implication is that a unit increase in any of the variables will result in increase in the total revenue, all things being equal. All except education were statistically significant at 1% and 5% level of significance. The result here agrees with the findings of Tijani *et al.* (2011) that an increase in age and number of colonies increase beekeeper's income. The coefficient of marketing channels and cost of transportation were negatively signed with a significant influence on bee production at 1% and 5%, respectively. The negative coefficient of transportation and marketing channels indicates that a unit increase in these variables will exert a decrease in total revenue.

Therefore, age of beekeeper, level of education, household size, number of colonies, Cost of materials, transportation and marketing channels have decisive influence on the total revenue of the beekeeping farming. Hence, there is significant relationship between socio-economic characteristics of the respondents and total revenue from beekeeping farming.

**Constraints faced by respondents in the study area**

The distribution of respondents by constraints is displayed in Table 4. Most (68.0%) of the respondents indicated that the major challenges facing them was lack of improved technology while destruction of hives/theft was ranked second by the respondents in the study area. The present study agrees with the earlier study of Oluwatusin (2008) that poor access to improved technology by beekeepers was a major problem in Ekiti State. On the activities of thievery, 64% of the respondents identified theft and hives destruction as one of the challenges being faced in the area. This result concurs with the finding of Tijani et al. (2011) conducted on beekeeping in Chibok Local Government Area of Borno State, Nigeria. Other problems identified were as follows:

problem of marketing (36.0%); packaging (32.0%); shortage of bee forages (16.0%); pest and diseases (8.0%) while the least constraint was identified as climate change (2.0%).

## CONCLUSION

This paper examined the economics of beekeeping in Ondo State with a view to proffering solution to youth unemployment in the study area. In line with stated objective of the study, findings showed that majority of the respondents were male household heads. Married respondents dominated beekeeping than unmarried. Our study concluded that the beekeeper in the study area is still fairly young and fall within the productive age. The study found out that majority of beekeepers were educated, this strongly suggests that the farmers will be well-disposed to innovations.

The mean household size of the beekeepers per household is in line with the national average household size of 4.5 in Nigeria. The study concludes that majority of them are still new entrant based on average beekeeping experience of 5 years. The study also looked at the profitability of producing honey products from beekeeping. Cost and returns for bee farming revealed that honey enterprise is a profitable venture. Furthermore, the results also concluded that age of the respondent, level of education, household size and number of colonies were major determinants of the number of bee products produced. However, the negative relationship of cost of transportation and marketing channels are in line with economic theory. As identified in the study, beekeepers are faced with problems of lack of improved technology and destruction of hives by thieves in the study area.

### Recommendations

Based on the findings in this study, the following recommendations are made:

- Policies and programme that will promote education of beekeepers towards accepting relevant technologies meant for beekeeping should be put in place by the governments.
- Government and private body are encouraged to provide financial aid that will enable beekeepers to increase the number of colonies for more output.
- Provision of infrastructure can help reduce the cost of transportation and materials.
- This study suggests that youth participation in beekeeping is necessary in order to close the gap between employed and unemployed.

## REFERENCE

Ayalew, K. (2001). Promotion of Beekeeping in Rural Sector of Ethiopia, Proceedings of the 3rd National Annual Conference of Ethiopian Beekeepers' Association (EBA), Addis Abbaba, Ethiopia, Pp 52-58.

Babatunde, R.O.I., Oorunsanya, E.O., Omotesho, O.A and Alao, B. I. (2007). Economics of Honey Production in Nigeria. Implications for Poverty Reduction and Rural Dev. Global Approaches to Extension Practice (GAEP). 3 (2): 23-2.

Cevrimli, M. B and Sakaoya, E (2019). Economic Analysis of Beekeeping Enterprises in Aegean Region Turkey. *Ankara University Vet. Fak Derg*, 66, 109-115. DOI: http://dx.doi.org/10.33988/auvfd.547464

Dia, Y. Z., On, J. I and Jongur, A. A. U.(2015) Economics of Beekeeping in Ganye Local Government Area of Adamawa State, Nigeria. *Greener Journal of Agricultural Sciences Vol.*8(7) pp145-154. DOI: 10.15580/GJAS.2018.7.071318096

Edessa, N (2002). Survey on Honey Production System in West Africa Shoa Zone (Unpublished). Holeta Bee Research Centre (HBRC), Ethiopia, p.15

Erguder B. I., Kilicoglu, S. S., Namuslu, M., Kilicoglu, B., Devrim, E., Kismet, K., Durak, I. (2008) Honey Prevents Hepatic Damage Induced by Obstruction of the Common Bile Duct. *World Journal of Gastroenterology* 14(23); 3729-3732

Famuyide, O. O., Adebayo, O. Owese, T., Azeez, F. A., Arabomen, O., Olugbire, O. O., Ojo, O. (2014) Economic Contributions of Honey Production as a Means of Livelihood Strategy in Oyo State. *International Journal of Science and Technology 3* (1)

FAO (2009) Bees and their role in forest livelihoods by N. Bradbear, Non-wood forest products No. 19 Rome. In FAO (2012) Beekeeping and Sustainable livelihoods Diversification booklet No. 1, Second Edition Pp 13

FAO, (2011). *Small Enterprise Development, Beekeeping for Selling Honey and Beeswax*, Rome.

Fiorani, M., Accorsi A., Blasa m., Diamantini G. and Piatti, E. (2006) Flavonoids from Italian Multi-flora Honey Reduce the Extracellular Ferricyanide in Human Red Blood Cells. *Journal of Agricultural and Food Chemistry*, 54: 8328-8334

Gujarati, D.N (2003) Basic of Econometrics Fourth Edition. Published by McGraw Hill/Irwin International, Upper Saddle River, New Jersey.

Ijigbade, J.O., Olutumise, A. I and Faniyi, E. O. (2019). Determinants of Profitability among Honey Marketers in Ondo state, Nigeria. *Journal of Agricultural, Extension and Rural Development*, Vol. 6(7), pp. 774-780.

Markri, P. Papanagiotou, P. and Papanagiotou, E. (2015) Efficiency and Economic Analysis of Greek Beekeeping Farms. *Bulgarian Journal of Agricultural Science* 21, No.3, 479-484

National Bureau of Statistics (2020) Nigeria Data Portal www.https://nigeria.opendataforafrica.org Access 14 September, 2020

National Population Commission (2006) Retrieved from http://www.nigerianstate.gov.ng

Ojo, S.O (2004). Improving Labour Productivity and Technical Efficiency in Food Crop Production. A Panacea for Poverty Reduction in Nigeria. *Food Agriculture and Environment* 2(2): 227-331

Okpokiri, C. I, Nwachukwu, I. N.and Onwusiribe, C. N. (2015) Determinants and Profitability of Honey Production in Ikwuano Local Government Area, Abia State, Nigeria, *Scientific Paper Series Management, Economic, Engineering in Agriculture and Rural Development* Vol. 15, issue paper 3 pp 211-216

Olarinde, L.O., Ajao, A.O and Okunola, S.O (2008). Determinants of Technical Efficiency in Bee keeping farms in Oyo state, Nigeria. A Stochastic production Frontier Approach. *Research Journal of*

*Agriculture and Biological Sciences.* 4 (1): 65-69.

Oluwatusin, F. M. (2008) Cost and Returns in Modern Beekeeping for Honey Production in Nigeria. *Pakistan Journal of Social Sciences*; 5: 310-315

Onwubuya, E.A, Ajani, E.N., Ugbaja, M.O and Nenna, M.G (2013). Using Honey production for Enhancing Household Income among Rural Communities of Nsukka Local Government Area, Enugu State. *Nigeria. Journal of Agricultural and Crop Research* 1(2): 17-23

Schweiger, J. C., Biesmeijer, B, R., Hickler, T., Hulme, P., Klotz, S., ……. Westphal, C. (2010).Multiple stressors on biotic interactions: How Climate Change and Alien Species Interact to Affect Pollination. *Biol. Rev*., 85, pp. 777-795

The Technical Centre for Agricultural and Rural Cooperation, CTA (2020). Bee Products, Properties, Processing and Marketing, Agrodok, Peace Corps, Washington DC.

Tijani, B.A., Ala, A.L., Maikasuwa, M. A and Ganawa, N. (2011). Economic analysis of bee keeping in Chibok Local Government Area, Borno State, Nigeria. *Nigerian Journal of Basic and Applied Sciences*, 19(2): 282-292.

Tizazu, T., Bosena. T., and lemma, Z. (2017). Determinants of Honey Market Supply: The Case of Shebedino District, Sidama Zone, Snnpr, Ethiopia. *Journal of Economic and Sustainable Development Vol.* 8 no. 19 pp. 2-10

United Nations Data (2017) Nigeria's Honey importation valued in US dollar, 1996 – 2017.

Vaziritabar, S. V. and Esmaeilzade E. M. (2016) Profitability and socio-economic analysis of beekeeping and honey production in Karaj State, Iran. *Journal of Entomology and Zoology studies* 4(4) 1341-1350

Vural, H, and Karaman, S. (2010) Socio-economic Analysis of Beekeeping and the Effects of Beehive Types on Honey. *African Journal of Agricultural Research* Vol. 5(22) pp. 3003-3008

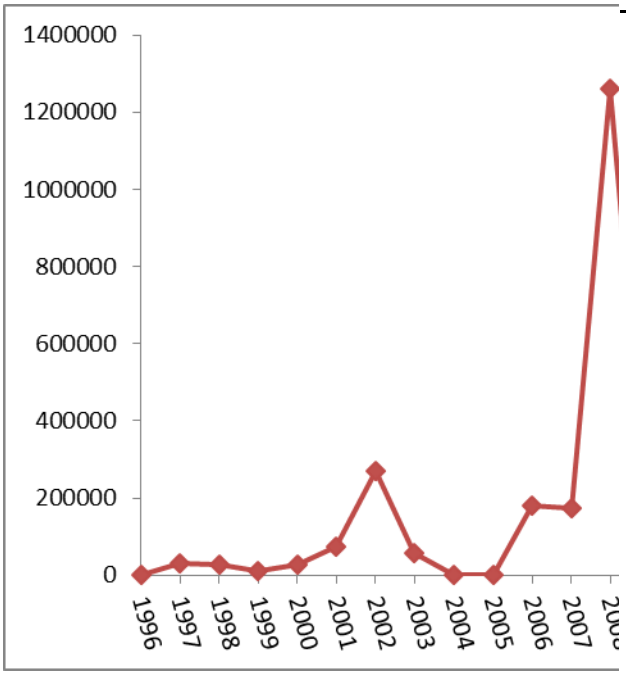


**Figure 1: Nigeria's Honey importation valued in US dollar, 1996 – 2017**
Source: United Nations Data, 2017.

**Table 1: Socio-economic Characteristics of bee keepers in the study area**

| Variables | Frequency (n = 50) | Percentage |
|---|---|---|
| **Gender** | | |
| Male | 40 | 80 |
| Female | 10 | 20 |
| **Marital Status** | | |
| Single | 9 | 18 |
| Married | 41 | 82 |
| **Age (years)** | | |
| <30 | 6 | 12 |
| 30-39 | 7 | 14 |
| 40-49 | 14 | 28 |
| 50-59 | 12 | 24 |
| ≥60 | 8 | 16 |
| **Educational status** | | |
| Primary education | 3 | 6 |
| Secondary education | 10 | 20 |
| OND/NCE | 22 | 44 |
| HND/BSC | 15 | 30 |
| Household Size | | |
| <5 | 35 | 70 |
| 5 – 10 | 14 | 28 |
| ≥ 11 | 1 | 2 |
| **Beekeeping primary occupation** | | |
| Yes | 31 | 62 |
| No | 19 | 38 |
| **Beekeeping experience** | | |
| < 5 | 19 | 38 |
| 5 – 10 | 14 | 28 |
| ≥ 11 | 17 | 34 |
| **Access to extension agent** | | |
| Yes | 3 | 6 |
| No | 47 | 94 |
| **Number of Hives** | | |
| <10 | 14 | 28 |
| 11 – 20 | 15 | 30 |
| 21 – 30 | 7 | 14 |
| >30 | 14 | 28 |

Source: Field survey, 2019

**Table 2: Cost and returns analysis of Beekeeping**

| Items | Mean(₦) | Percentage (%) |
|---|---|---|
| Depreciated Costs of Inputs | | |
| Bee hive | 7,210.20 | 9.14 |
| Land | 2,833.33 | 3.59 |
| Hive stand | 2,660.00 | 3.37 |
| Smoker | 3,896.83 | 4.94 |
| Honey extractor | 11,889.44 | 15.07 |
| Knife | 214.24 | 0.27 |
| Bee suit | 4,852.56 | 6.15 |
| Hive tool | 964.29 | 1.22 |
| Total Fixed Cost (TFC) | 34,520.89 | 43.76 |
| Variable input | | |
| Packaging | 13,951.06 | 17.68 |
| Labelling | 13,667.25 | 17.33 |
| Straining cloth | 397.44 | 0.50 |
| Baiting material | 3,600.40 | 4.56 |
| Labour | 9,842.17 | 12.48 |
| Transportation | 2,907.58 | 3.69 |
| Total Variable cost (TVC) | 44,365.90 | 56.24 |
| Total Cost (TC) = TFC + TVC | 78,886.79 | 100.00 |
| Honey sold | 241,290.00 | |

| | | | |
|---|---|---|---|
| Bee wax | 2,250.00 | | |
| Total Revenue (TR) | 243,540.00 | | |
| Gross margin = TR – TVC | 199,174.10 | | |
| Net revenue = TR – TC | 164,653.21 | | |
| ROI = NR/TC | 2.09 | | |
| %Profit = π/TC*100 | 208.72% | | |

*note: US$1= NGN360

**Source:** Field survey, 2019.

| | | | |
|---|---|---|---|
| disease | | | |
| Climate change | 02 | 2.0 | 7th |

*note multiple responses

Source field survey, 2019

**Table 3: Regression result for the factors affecting bee products**

| Variable | Coefficient | Standard error | t-ratio | p-value |
|---|---|---|---|---|
| Constant | 4.675 | 9.471 | 0.494 | 0.626 |
| AGE | 0.628** | 0.264 | 2.375 | 0.023 |
| GENDER | 2.501 | 2.915 | 0.858 | 0.399 |
| EDUC. | 34.915* | 20.476 | 1.705 | 0.096 |
| HHSIZE | 2.619*** | 0.523 | 5.006 | 0.000 |
| N_COLONIES | 0.903*** | 0.095 | 9.539 | 0.000 |
| COST_MATERIALS | 7.347E-05 | 0.000 | 0.537 | 0.596 |
| COST_TRANSP | -13.093** | 5.264 | -2.487 | 0.017 |
| MKT_ CHANNELS | -6.562*** | 1.579 | -4.156 | 0.000 |

**note**: *, **, *** means significant at 10%, 5% and 1% level, R = 0.973; $R^2$ = 0.947, Adj. $R^2$ = 0.930; F-value = 53.753***

**Source:** Field survey, 2019

**Table 4: Distribution of respondents by constraints**

| constraints | frequency | percentage | rank |
|---|---|---|---|
| Lack of improved beekeeping facilities | 34 | 68.0 | 1st |
| Destruction of hives/theft | 32 | 64.0 | 2nd |
| Marketing problem | 18 | 36.0 | 3rd |
| Packaging problem | 16 | 32.0 | 4th |
| Shortage of bee forages | 08 | 16.0 | 5th |
| Pest and | 04 | 8.0 | 6th |