

**TECHNICAL EFFICIENCY OF HONEY PRODUCTION IN IBIONO IBOM LOCAL GOVERNMENT
AREA OF AKWA IBOM STATE, NIGERIA.**

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ABSTRACT

This research work was carried out to analyze the technical efficiency of honey production in IbionoIbom L.G.A of AkwaIbom State, 72 respondents were randomly selected and interviewed by means of questionnaire. Data obtained in the course of the study were presented and analyzed using descriptive statistics to examine the socio-economic characteristics of the honey producers' multiple regression was used to analyze the factors affecting honey production and five points likert scale was used to perceive the technical efficient means of honey production. The finding showed that 50% of honey producers were educated, 60% owned high number of hives, 60% belonged to social groups, 68.1% of initial capital and 79.2% level of technological advancement. There was inadequate link between extension workers and honey producers. This study further revealed that level of technical efficiency will determine how honey producers will operate their honey business. However, there was a greater relationship between technical efficiency and the quality of honey producer. It was therefore recommended that the government should assist honey producers with adequate extension personnel, and modern technology innovation and transfer. It was recommended that extension services should be strengthened down to the rural areas, adequate extension personnel should be encouraged to invest in honey production to give it the needed popularity and information needed in honey production, and that government should ensure modern technology transferred should be at a minimize price towards improving honey production.

Keywords: Technical Efficiency, Honey Production, IbionoIbom of AkwaIbom State, Nigeria

INTRODUCTION

Beekeeping or modern apiculture is the science of rearing, breeding and managing honey bee colonies in artificial hives for economic benefits (Ikediobi, *et al.*, 2015). There are about 25 honey bee species of economic importance occurring in Europe, Middle East, Asia and Africa, but the most commonly utilized in Nigeria are *Apis mellifera* and *Apis mellifera adansonii*, (Extension Research Liaison Service, 2013).

According to Ikediobi *et al.*, (2015), beekeeping requires minimal start up investment and generally yields high income. In addition to the direct income

from bee products, beekeeping enterprise stimulates various sectors within a society such as: hive carpentry, honey trading, renting and hiring of bee colonies for pollination and other bee value addition. Beekeeping is emerging as a very successful agroforestry practice for rural people in less developed countries mainly due to its economic benefits from the products of the practice. Modern beekeeping can easily be embarked on because investment is low, it does not require large area of land and there is no need for daily care (Udofia and Edet, 2016).

Over the years, some improved techniques in beekeeping have been developed and adoption of improved technologies and improved management practices would greatly improve the yields and quality of honey. Efforts to increase level of adoption of beekeeping would however, require proper assessment of the adoption level of farmers and factors affecting the adoption. This will hopefully, attract the full participation of local and urban people in the development of beekeeping. The need for participation of people in development process has been stressed (Nyerere, 2008). Agroforestry involves people; its practices and systems are geared towards producing food, timber and environmental conservation, which in the end enhances economic development.

Honey production is the practice of rearing bee which combines the knowledge of the biology and behavior of the bees, with that of the surrounding environment, the use of sustainable equipment to produce honey and other bee hive products for the benefit of man. Most commonly found bee honey in AkwaIbom is the *Apis mellifera adansonii* which lives in colonies throughout the year. The demand for bee honey in AkwaIbom and Nigeria at large is on the increase but organized beekeeping as an enterprise is low. Beekeeping has been identified as a viable agroforestry practice that can alleviate poverty and sustain rural employment in Nigeria (Nwankwo and Inyang, 2014).

In addition, the technical and efficient management of bee involves routine and seasonal management which may results in high honey products. In recent times, modern beekeeping is becoming popular in AkwaIbom and Nigeria with the use of modern hives and beekeeping equipment such as smokers, bee dress with veil and gloves which marks it possible to work in the day rather than at night (Okon, 2014). Idinya and Ibekwe (2010) opines that the importance of beekeeping to the society is enormous, for

instance, they describe the Honey business enterprise is a means of empowering youths economically because of its advantages over other types of agroforestry enterprises. The enterprise needs relatively small investment capital and most of the equipment need for both traditional and modern beekeeping can be sourced locally. In beekeeping, the quality of land required is less important because hives are placed either on the ground or on the trees. Beekeeping does not compete with other enterprises for resources as bees use nectar and pollen grains from plants and honey is not only priced as food but as medicine for healing many ailments.

There is a growing consumption of honey and other bee products because of its high values in maintaining good health and in treatment of various diseases. With the current growth in domestic consumption of honey in AkwaIbom State, Nigeria coupled with mechanized agriculture in most part of Nigeria, the future of apicultural enterprise is very bright as the demand for honey and pollinators is bound to increase. It could provide food, nutritional, and livelihood security to the rural work force on an ecologically sustainable basis (Okporikiri *et al.*, 2015). However, production of honey business has evolved into a farming enterprise that involves the use of sophisticated and artificial techniques to keep honey bees for bee products such as honey, propolis, wax, bee venom and royal jelly. Beekeeping contributes significantly to securing sustainable livelihoods by assisting in transforming vulnerabilities into security. Honey business is usually carried out by small scale farmers, and it is particularly suitable for under-privileged, landless, low income, low resource individuals and groups. Apiculture production is an important agroforestry system which appears not popular among farmers in Nigeria, particularly in AkwaIbom State (Udofia and Edet, 2016). Regrettably, beekeeping as a commercial venture is still largely unexplored in AkwaIbom State and the State meets domestic demand for honey mostly by importation from other States or countries (Isong, 2007).

Honey business (apiculture) has been considered as a supplementary activity and traditionally managed, while it's potential as source of smallholder income has been underutilized for many years (Aku and Kareem, 2008). The supplementary role of Honey business to household economy had even been declining. Beekeeping activities in AkwaIbom mainly constrained by inability in the transformation, promotion, scaling up to rapid growth, lack of commercial beekeeping development and beekeeping technology, limited credit supply, quality issue, lack of market access and information transmissions. These related and interrelated problems limit the State from getting the potential benefit from the sub-sector (Idinya and Ibekwe, 2010). However, since the adoption of modern techniques in honey production is undertaken to satisfy certain projections or

expectations, it therefore implies that it is a means to an end, in most cases. Therefore, when the outcome or consequences of adoption does not meet with set goals, the dissonance which culminates is abandoned adoption. This often results when the hopes of the adoption have been congruously raised beyond the capability of the innovation. Frustration thereby results as the bee farmer experiences disappointment following which the innovation gets abandoned (Udofia and Edet, 2016). Technology attributes and characteristics such as; complexity, adaptability, compatibility, cost effectiveness tend to influence farmers' decision to adopting innovations (Nwaobiala, 2014).

The inherent problem of bee honey marketing could be traced to poor transportation and logistics, inefficient processing, packaging and handling of honey bee (Uduma and Udah, 2015). In addition, bee farmer's literacy levels influence their adoption and participation in decision making in development programmes. Furthermore, inadequate attention from extension agents in disseminating agroforestry practices especially beekeeping as a problem in adopting them by farmers. The apparent low output from agroforestry investment is largely due to poor application of research results as well as low rate of adoption of technologies by farmers. Low rate of adoption of beekeeping is therefore, likely to affect production of farmers. Udofia and Edet (2016) opined that there is need for proper apicultural management techniques if beekeeping is to have relevance to the poor farmers. Members of Beekeepers Association of IbionoIbom LGA of AkwaIbom State had received training in honey business and beekeeping from AKADEP (AkwaIbom Agricultural Development Programme), but no record shows if the people have adopted and applied the knowledge acquired. As a result, this study seeks to examine the effect of technical efficiency on the productivity of bee honey business in AkwaIbom State, Nigeria.

Objectives of the Study

The broad objective of the study is to examine the effect of technical efficiency on the productivity of Bee Honey business in IbionoIbom Local Government Area of AkwaIbom State, Nigeria. The specific objectives are to: describe the socio-economic characteristics of the respondents, examine the perceived technically efficient means of honey business in IbionoIbom Local Government Area of AkwaIbom State, determine factors affecting honeyproduction in IbionoIbom Local Government Area of AkwaIbom State, ascertain effect of technical efficiency on honey production in the study area, and ascertain the relationship between technical efficiency and quality of Honey produce in AkwaIbom State.

MATERIALS AND METHODS

The study was conducted in IbionoIbom Local Government Area of Akwalbom State. Akwalbom State is located in the coastal South-South region of Nigeria. The region is popularly called the Niger Delta region or the oil rich region of Nigeria. The state is located between latitudes 4°32'N and 5°33'N north and longitudes 7°51'W and 8°25'W easts. It has a total land area of areas of 7,246km². It is bordered on the east by Cross River State, on the west by Rivers State and Abia State, and on the South by the Atlantic Ocean. Akwalbom State has a population of about 3,902,051 (NPC, 2006).

Honey is a natural resource that has received priority attention from farmers in IbionoIbom Local Government Area of Akwalbom State because of its economic importance to the people (Onyekuru, 2004).

The sample size of the study is seventy - tworespondents.The Study made use of multi-stage sampling technique. Firstly, out of the twelve wards in the local government area, six wards were randomly selected. Secondly, three villages were randomly selected from each of the selected wards given a total of eighteen villages, In the third stage, four honey farmers each were randomly selected from each of selected villages, given a total of seventy-two respondents.

Primary data only was used for the study. The data were collected through administration of questionnaire to respondents in the study area.

Objective (i) which is to examine the socio economic characteristic of the respondents in the study area were analyzed with descriptive statistic such as frequencies, means and percentages. Objective (ii) which is to examine theperceived technically efficient means of honey production business in IbionoIbom Local Government Area of Akwalbomwere actualized with 5 point likert scale. Objective (iii) which is to determine factors affecting honey production in IbionoIbom Local Government Area of Akwalbom State were actualized using multiple regression. Objective (iv) which is to determine the effect of technical efficiency on the honey production in the study area were analyzed with simple regression, while objective (v) which is to ascertain the relationship between technical efficiency and quality of Honey produce in Akwalbom State was analyzed with correlation coefficient.

Specifications of Models

Objective (iii) which is to determine the factors affecting honey production in IbionoIbom Local Government Area of Akwalbom State will analysed with multiple regression

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}) \dots 3.1$$

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + e_i \dots 3.2$$

Where;

Y = Honey production (quantity produced)

X₁= Knowledge of bee keeping (years)

X₂ = Pest and predators attack (quantity attacked)

X₃ = Extension services (number of visit)

X₄ = Level of education (years)

X₅ = Deforestation (yes = 1, no = 0)

X₆ = Labour cost (naira)

X₇ = Number of hives (number)

X₈ = Membership of social group (yes = 1; no = 0)

X₉= Initial capital (₦)

X₁₀= Level of technology advancement (years)

X₁₁= Poor post-harvest management (yes = 1, No = 0)

X₁₂ = Returns (₦)

b₀ = intercept

b₁-b₁₃ = parameter estimate.

e_i = error term

For objective (iv) which is to determine the effect of technical efficiency on honey production in the study area, it was analyzed with simple linear regression as follows:

$$Y = f(X_1) \dots 3.3$$

$$Y = b_0 + b_1X_1 + e_i \dots 3.4$$

Where;

Y = Honey production (quantity)

X₁= Technical efficiency ($\frac{\text{Totalinput}}{\text{Totaloutput}}$)

b₀ = intercept

b₁ = parameter estimate.

e_i = error term.

For objective (v) which is to ascertain the relationship between technical efficiency and quality of Honey produce in Akwalbom State, correlation coefficient used specified as:

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{(n \sum x^2 - (\sum x)^2) (\sum y^2 - (\sum y)^2)}} \dots 3.5$$

Where;

r = Correlation

y = Quality of Honey produce (kg)

x = technical efficiency of honey efficiency

($\frac{\text{Totalinput}}{\text{Totaloutput}}$)

n = number of respondents

RESULTS AND DISCUSSION

Socioeconomic Characteristics of bee honey producers in the study area

The socioeconomic characteristics of the respondents were studied under level of education, number of hives, membership of social groups, initial capital and level of technological advancement, and are shown in table 1.

From table 1, the result showed that 36 respondents representing 50.0% of sample size attended primary education level, 22 respondents representing 30.6% of sample size obtained secondary education while 14 respondents representing 19.4% attended tertiary education. This implies is that all the respondents in the study receive one form of formal education or the

other. It means that they were all educated and this favored honey production and in the adoption of advanced technological equipment. Ezekiel *et al.*, (2013) reported that education is essential in modern honey production practice and in adoption of new technology. Majority of the respondents representing 56.9% had below 11 hives, 30 respondents representing 41.7% had between 11-20 hives and 1 of the sample size representing 1.4% had 21 and above hives. This means the higher the hives the higher the productivity. This indicates that a farmer who has more hives, harvest more honey is not likely to add value but was take a step further and add value to a large percentage of that honey. The study showed that 31 respondents representing 43.1% were members of social group, while 41 respondents representing 56.9% were non-members. This implies that honey production does not required belonging to any social group. According to Iheanacho (2010). It contributes that individuals in groups are easily influenced by their associates than those in isolation. They get to exchange ideas and lean about the value of addition furthermore, member of farmers groups was in a better position to pull their resources

together and take advantage of economies of scale. 49 respondents representing 68.1% of sample size use initial capital of below N300,000, 22 respondents representing 36.6% had N300,000-600,000 initial capital, while only 1 respondent with the percentage of 1.4% had 600,000 and above to start up the honey business. This indicates that honey production does not require much capital. Amujuniet *al.* (2012) added that majority of the farmers would consider their initial capital at the household level before they decide to adopt new technology, the level of capital dictates the level of expenditure and adoption of new technology. The result further reveal that 57 respondents representing 79.2% sample size had high level of technology, 10 respondents representing 13.9% had average technological advancement, and 13 respondent representing 6.9% had low technological advancement, this means that honey production required high level of technological advancement. Udofia and Edet (2016) reported that low level of technology affected the quality of honey production thus honey producers' association should be empowered with improved technical equipment.

Table 1: Socio-economic distribution of respondents in the study area

Items	Frequency	Percentage
Level of Education		
Primary	36	50
Secondary	22	30.6
Tertiary	14	19.1
Number of Bee hives		
Below 11	41	56.9
11-20	41	41.1
20 and above	1	1.4
Membership of social group		
Member	31	43.1
Non member	41	56.9
Initial capital		
Below 300,000	49	68.1
300,000-600,000	21	30.6
Above 600,000	1	1.4
Level of technological advancement		
High	57	79.2
Average	10	13.9
Low	5	6.9
Total	72	100.0

Source: Survey data; 2017.

Technical efficient mean of honey production

In table 2, the total mean of 3.61 and grand mean of 3.61 were greater than the bench mark mean of 3.00 efficiency level. It means that the efficiency level of

honey producers in the study area was very high. The implication could be that without high technical efficiency level in honey production, the business will not be easily ran.

Table 2: Perceived efficiency levels

Perceived levels	Very high	High	Average	Very low	Low	Sum	Mean
Efficiency mean	10(5)	40(160)	8(24)	12(24)	2(2)	260	3.61
Total mean							3.61
Grand mean							3.61
Benchmark mean							3.00

Source: Survey data; 2017.

Figures in parenthesis are normal likert values multiplied by frequencies

Key: Mean > 3.00 implies high perception while mean < 3.00 implies low perception of efficiency level.

Factors affecting honey production in the study area

According to table 3, Lead equation was chosen based on the values of the R-square, R-adjusted and F-ratio. The exponential functional form was selected as the lead equation. The coefficient of extension services, level of education and technological level were the significant variables. Extension service was positively significant at 5% level of risk. It is observed that extension workers were recognized as a major source of information on farming and their contribution strengthened especially on the light of the foregoing discussion of knowledge and skill of honey production. This result agrees with Aderetiet *al.*, (2006) that majority of the farmers (at least 50%) rely on discussions and information however, the high literacy observed earlier enabled a relatively high proportion of honey producers to information from books. It was observed that all honey producers who participate in this study had attained formal education this accounted for the positive significant

of 5% level of education. This showed that honey production is undertaken by the educated which may stimulate their acceptance of improved adoptions of innovations. Famuyideet *al.*, 2014 revealed that the higher the educational status, the higher the productivity and better management. Technological level was negatively significant at 10% which reported that honey producers prepare more technical an innovation to improve their productivity at higher rate. The result agrees with Ajiao and Oladimeyi (2013) that people tends to be more willing to adopt new production methods in order to increase their output. This implies that the adoption of new innovations in honey production will increase production and productivity.

The F-ratio was 5,407 while R^2 was 0.548 and R-adjusted was 0.447 meaning that 54.8 and 44.7 of the variability is the model were examined. The F-ratio was positively significant at 1% level of goodness of fit.

Table 3: Multiple regression of factors affecting honey production

Variables	Linear	Semi-log	Exponential+	Double-log
Constant	-52235.17 (-1.034)	-873779.156 (-5.978)***	10.411 (16.490)***	-6.6 (-482)
Knowledge	2913.349 (0.926)	1637.197 (0.942)	0.003 (0.082)	-0.88 (-0.580)
Pests and predators	2548.7789 (2.127)**	16767.656 (1.034)	0.022 (1.499)	-071 (- 499)
Extension service	8502.303 (1.704)*	4361.219 (0.261)	0.147 (2.349)**	0.175 (1.200)
Educational Level	7128.378 (2.477)**	23758.120 (1.654)*	0.064 (1.782)*	0.033 (0.261)
Deforestation	-6650.409 (-0.257)	-0.88 (-0.580)	-177 (-548)	1637.197 (0.942)
Labour cost	0.228 (1.311)	9887.228 (0.982)	2.293E.006 (1.052)	0.230 (0.028)
Number of Hives	2052.472 (0.807)	13416.646 (0.725)	0.007 (0.220)	-255 (-0.675)
Group membership	-18400.873 (-0.659)	-0.28 (-0.310)	-368 (-1.054)	-162 (-1.778)*
Initial capital	0.025 (0.320)	-737.397 (-0.071)	4.639E.007 (0.484)	-038 (-0.227)
Technological level	-5182.068 (-1.009)	2518.748 (0.131)	-170 (-2.647)***	0.88 (0.580)
Poor management	28439.874 (1.154)	-177 (-548)	-148 (0.0353)	1.033 (10.399)***
Returns	0.051 (1.154)	64509.603 (5.676)***	7.964E.007 (1.446)	0.832 (0.453)
R^2	0.559	0.708	0.548	0.654
R^{-2}	0.461	0.666	0.447	0.587
F-ratio	5.663***	16.742***	5.407***	4.183***

Source: Survey data; 2017.

Key = *, ** and *** = significant at 10.0%, 5.0% and 1.0% respectively.

Effect of technical efficiency on honey production in the study area

Technical efficiency has positive significant of 5% on honey production. This signifies high ability to manage scarce resources in the right proportion to produce a given maximum output. Coelliet al.(2011)

reported that output is increased by utilizing the given inputs efficiently.

The F-ratio was 5.326 while R^2 was 0.071 and R-adjusted was 0.057. The F-ratio was also significant at 1% level of goodness fit.

Table 4 Simple linear regression result on effect of technical efficiency on honey production.

Parameters	Coefficient	Standard deviation	T-value
Constant	59849.620	43015.504	1.391
Tech. Efficiency	26478.951	473.651	2.308**
R-Square	0.071		
R-Squared adjusted	0.057		
F-ratio	5.326***		

Source: Survey data; 2017.

Key: ** and *** significant at 5.0% and 1.0% respectively.

Relationship between technical efficiency and quality of honey produced

According to the regression result in table 5, there is a very high close and strong relationship between

technical efficiency and quality of honey produce at 72% rate. This means that high technical efficiency boost the quality of honey produced and vice versa.

Table 5 Correlation result on technical efficient and quality

	Product	Technical Efficient
Product	1.00	0.72
Technical	0.72	1.00

Source: Survey data, 2017.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the bee honey producers in the study area are all educated with many hives and highly technologically advanced and are highly technically efficient in honey production, and this affects the quality of honey they produce.

Since the bee honey producers in the area were highly technically advanced but were scarcely members of social groups, it is recommended that they fully participate in social groups so as to equally benefit from such groups.

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