

CONSTRAINTS TO ADOPTION OF APIARY PRODUCTION TECHNOLOGIES AMONG FARMERS IN ABIA STATE, NIGERIA

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Abstract

Despite the potential benefits and by-products derived from bee farming, farmers' adoption of apiary technology packages are affected by many factors. This paper therefore analyzes farmers' constraints to apiary technology packages in Abia State, Nigeria. Simple random sampling technique was employed to select 60 bee farmers from the list of bee farmers obtained from Abia Agricultural Development Programme (ADP). A structured questionnaire was used to elicit information from the farmers. Descriptive statistics such as frequency counts, percentages and mean scores were employed for the analysis. Findings showed that majority (96.67%) of the farmers were males, having mean age of 38.59 years, (58.34%) acquired secondary education, with a mean farming experience of 10.2 years. Also, the farmers received bi-monthly extension contacts and owned a mean beehive of 8.5. Furthermore, the farmers were at the trial stage of apiary adoption, having adopted setting/location of beehive ($\bar{x}=3.71$), cleaning of beehive ($\bar{x}=3.48$) and baiting of beehive ($\bar{x}=3.30$) as smoking/supering, harvesting and processing of honey were not adopted. Environmental unfriendliness ($\bar{x}=2.61$), fear of bee stings ($\bar{x}=2.60$), lack of technical skills ($\bar{x}=2.56$), inadaptability of the technology ($\bar{x}=2.46$) and non durability of beehive ($\bar{x}=2.33$) were identified constraints to adoption of apiary technology packages. Policies aimed at farmers' access to extension education, cooperative formation and sensitization of gender roles in bee farming were advocated for effective adoption of apiary technologies.

Keywords: *Constraints, Adoption, Apiary, Production, Technologies*

Introduction

Beekeeping is the practice of bee rearing which combines the knowledge of the biology and behaviour of bees with that of the surrounding environment, and the use of sustainable equipment to produce honey and other bee hive products for the benefit of man (Lynn, 2003). The most commonly found honey bee in Nigeria is the *Apis mellifera dansonii* which lives in the colonies through the year. Other species of honey bees include *Apis Dorsata*, *A. l abonocer*, *A. mellifera*, *A. larnica* and *A. mellifera linguistica* (Marieke, 1991). The demand for bee honey in Nigeria is on the increase but organized bee keeping as an enterprise is low

(Eluagu and Nwali, 1999). Bee keeping has been identified as a viable agricultural practice option that can alleviate poverty and sustain rural employment in Nigeria. According to Onwubuya (2004), bee farming can be help alleviate poverty in their rural areas as it can be taken as a hobby, a social booster and can be practised by those who are not conventional farmers. Traditional bee keeping involves providing hives at a level of care for bees, while honey hunting involves collecting honey from wild bee combs (Chah *et al.*, 2013). Success in bee hive enterprise depends on a proper exercise of the knowledge of its installation and management practices. Good management of bees involves routine and seasonal management which results to high honey products (Michael, 2008). In recent times, modern beekeeping is becoming popular in Nigeria with the use of modern hives and beekeeping equipment such as smoker, bee dress, with veil and gloves which it possible to work in the day rather than at night (Okunlola, 2014).

However, since adoption 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 in congruously raised beyond the capability of the innovation. Frustration thereby results as the adopter experiences disappointment following which the innovation gets abandoned (AESON, 2011). Technology attributes and characteristics such as; complexity, compatibility, trialability, obeservability, adaptability, accessibility, divisibility, cost effectiveness tend to influence farmers' decision to adopting innovations (Nwaobiala, 2014a; Rogers, 1995).

Farmers' literacy levels also influence their adoption and participation decision making in donor sponsored programmes (Nwaobiala, 2014b). Kola – Oladeji *et al.*, (2009) identified inadequate attention from extension agents in disseminating of agro – forestry practices especially beekeeping as a problem in adopting them by farmers. Udeh *et al.*, (2011) opined that at present, there is limited knowledge of the behaviour of tropical races of *Apia mellifera* which most bee farmers described as ferocious temperamental, apt to abandoning their hives any time, thus making beekeeping a dangerous and high risk venture and the consequence is lack of serious growth in the industry. Many studies on beekeeping

seem to provide information on farmers' personal socio-economic characteristics and its profitability as it affects bee farming, neglecting packages/components of the innovation.

In view of the stated problems, this study was designed to analyze constraints to adoption of apiary production technologies in Abia State, Nigeria.

The specific objectives of this study were to;

- describe selected socio-economic characteristics of apiary farmers in the study area.
- assess farmers' levels of adoption of apiary production technologies.
- ascertain constraints to apiary production technologies adoption in the study area.

Methodology

This study was conducted in the Abia State, which is among the states in the Niger Delta Regions of Nigeria. There are nine states within the Niger Delta Regions of Nigeria namely Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers States. Abia State is situated in the South – Eastern part of Nigeria and predominantly populated by the Igbos (Oye, 2002). Abia state lies between Longitudes $7^{\circ}23'$ and $8^{\circ}2'$ East of the Equator and Latitudes $4^{\circ}47'$ and $6^{\circ}12'$ North of the Greenwich Meridian. Abia state Agricultural Development Project is made up three agricultural zones namely; Aba, Umuahia and Ohafia.

These states are also known as programme areas of the programme. A list of apiary farmers was collected from Agricultural Development Project (ADP) which formed the sampling frame. Simple random sampling techniques was employed to select 20 bee farmers each from the three (3) zones to give a total of 60 apiary farmers. A structured questionnaire was used to elicit information from the farmers. Descriptive statistics such as frequency counts, percentages and mean scores were used to analyze objectives i, ii and iii.

The adoption of recommended apiary technology packages by bee farmers were determined using adoption score analysis. It was achieved using 7 - point Likert type scale of unaware (0), aware (1), interest (2), evaluation (3), trial (4), accept (5) and

reject (6). Farmers with adoption score of 3.0 and above were regarded as having reached average score of technology, that is, they are at evaluation stage, while farmers with adoption score of less than 3.0 where either at unaware, aware and interest stages (Nwaobiala, 2014a). The constraints to adoption of apiary production technologies constraints associated in adopting apiary technology packages among farmers was measured using a 8–item statement rated on a 3-point Likert type scale of very serious 3, moderately serious 2 and less serious.. Based on the obtained mid score decision rule, any mean score greater than or equal to 2.00 implied a constraint to adoption of the technology and below denotes no constraint.

Distribution of Socio economic Characteristics of Apiary Farmers

The socio-economic characteristics of respondents are shown in Table 1. The result reveals that majority (96.67%) the farmers were males while, 3.33 % were females. This result indicates that beekeeping in the study area is dominated by males. This is line with the findings of Okoye and Agwu, (2008) that beekeeping is traditionally gender-specific involving male members of the household. Another reason may be that female farmers perceiving beekeeping as a dangerous enterprise because of the fear of bee stings. The mean age of the respondents was 38.50 years, which implies that the farmers were in their productive ages. Also 58.34% of the farmers acquired secondary education with mean farming experience 10.2 years. Education has to do with the ability to acquire new knowledge and use relevant information of technologies (Jamilu *et al.*, 2014). Years of farming experience has shown to help farmers bear risk - averse technologies and make decision on the benefits accruing from it. The findings revealed that mean annual farm income of the apiary farmers was ₦175, 500.00, visited by extension agents bi-monthly and owned a mean of 8.5 hives. The implication of extension contact result could affect farmers' knowledge on modern bee farming management practices (Chah *et al.*, 2013).

Table 1: Distribution of Selected Socio-economic Characteristics of Apiary Farmers in Abia State, Nigeria

Variables	Frequency	Percentage	Mean
Gender			
Male	54	96.67	
Female	6	3.33	
Age (years)			
26 – 35	6	10.00	
36 – 45	42	70.00	38.50 years
46 – 55	10	16.67	
56 - 65	2	3.33	
Education			
No Formal Education	3	5.00	
Primary School Education	20	33.33	
Secondary School Education	35	58.34	
Tertiary School Education	2	3.33	
Farm Experience (years)			
1 – 5	20	63.33	
6– 10	38	33.33	
11 – 15	1	1.67	10.2 years
15 – 20	1	1.67	
Annual Farm income (₦)			
50,000 – 100,000	6	10.00	
101,000 – 150,000	24	40.00	
151,000 – 200,000	30	50.00	₦175,500.00
Extension Contact			
None	6	10.00	
Weekly	11	18.33	
Fortnightly	9	15.00	
Monthly	10	16.67	
Bi- monthly	24	40.00	
Number of Beehives			
1 – 5	21	35.00	
6 – 10	28	46.67	8.5 hives
11 – 15	11	18.33	

Source: Field Survey Data, 2012

Levels of Adoption of Apiary Production Technology Packages among Farmers in Abia State, Nigeria

The distribution of farmers according to adoption of apiary technology components is shown in Table 2. It reveals that farmers adopted apiary technology packages such as, setting / location of hive ($\bar{x}=3.71$), cleaning of hive ($\bar{x}=3.48$) and baiting of bee hives ($\bar{x}=3.30$). technology components not adopted by the farmers were Smoking / supering/smoking of hive ($\bar{x}=2.90$), Harvesting of honey ($\bar{x}=1.90$) and Processing of honey ($\bar{x}=1.7$). The total mean adoption score for apiary technology was 2.91. This implies that the technology was at the Trial stage, since the adoption score fell between a range of between 2.50 and 2.99. The non adoption of apiary technology might be

attributed to farmers' perception that bee keeping is rigorous, selective in adapting to farmers environment and the fear of bee stings. This implies that the technology is at awareness state in both states studied. Kola – Oladeji *et al.*, (2009) identified inadequate attention from extension agents in disseminating of agro – forestry practices especially bee keeping as a problem in adopting them by farmers. Egeonu and Okoro (2005) asserted that the adoption of agro – forestry practices especially Apiary in Owerri Agricultural zone of Imo State over the years has not been encouraging. The mean adoption score of apiary technology packages was 2.91. This indicates that the technology was at the trial stage of adoption. Technologies such as smoking/supering, harvesting and processing of honey were not adopted.

Table 2: Distribution of Farmers According to Levels of Adoption of Apiary Technology Packages in Abia State, Nigeria

Apiary Technology Technology Packages	Unaware	Aware	Interest	Evaluation	Trial	Accept	Reject	Total	Mean Adoption Score
Setting / location of hive	3 (0)	3 (3)	5 (10)	12 (36)	15 (60)	18 (90)	4 (24)	223	3.71
Cleaning of hive	4 (0)	3 (3)	7 (14)	16 (48)	10 (40)	17 (85)	3 (18)	209	3.48
Baiting of hive	6 (0)	5 (5)	9 (18)	10 (30)	11 (44)	14 (70)	5 (30)	198	3.30
Smoking/supering of hive	10 (0)	6 (6)	12 (24)	11 (33)	8 (32)	4 (20)	9 (54)	167	2.78
Harvesting of honey	12 (0)	14 (14)	11 (22)	5 (15)	6 (24)	9 (45)	3 (18)	138	2.30
Processing of honey	14 (0)	17 (17)	9 (18)	6 (18)	8 (32)	3 (15)	3 (18)	118	1.96
Total Mean Adoption Score									174.8
Mean Adoption Score									2.91

Source: Field Survey, 2013

Decision Rule = Below 1.0= Unaware

1.0 – 1.49 – Aware

1.50 – 1.99 = Interest

2.0 – 2.49 = Evaluation

2.50 – 2.99 = Trial

3.0 and Above = Adoption

Figures in parentheses are Likert values multiplied by frequencies

Farmers' Constraints to Adoption of Apiary Technology Packages in Abia State, Nigeria

The constraints encountered by apiary farmers in the study area are presented in Table 3. The result indicates that environmentally friendliness ($\bar{x}=2.61$) was a major constraints encountered by bee farmers in adopting apiary technologies. Bee hive installation requires mainly isolated areas far from residential buildings making routine check on the hives tedious. If a farmer decides to locate its hive in a neighbourhood, the bees might abscond due to noise leading to non colonization of the hive. Udeh *et al.*, (2011) opined that at present, there is limited knowledge of the behaviour of tropical races of *Apis mellifera* which most bee farmers described as ferocious temperamental, apt to abandoning their hives any time. Another constraints identified by bee farmers is the fear of bee stings ($\bar{x}=2.60$). This constraint is skewed to women perceiving beekeeping as male occupation, being dangerous and a high risk venture because of bee stings (Okoye and Agwu 2008). Technical skill/competence ($\bar{x}=2.56$) of the farmers in management of apiary enterprise was a problem. Inadequate extension visits by extension workers has hindered the adoption of these

technologies. This may be attributed to few in number with low extension agents to farmers' ratio. Ommani (2005) perceived that the present ratio of one extension worker to three thousand farmers (1:3,000) is inadequate for effective agricultural information dissemination. Adaptability of apiary technology ($\bar{x}=2.46$) also affects adoption of apiary technologies by the farmers. Bees are very selective on colonizing hives. Factors such as the type of bait used, type of wood used in constructing the hive, location of the hive and type of plants and flowers influences adaptation of beehives in a location (ADP Report, 2008). Finally the bee farmers ascribed that durability of beehive ($\bar{x}=2.33$) was a constraint. In Nigeria the common bee hives that are durable include; Kenyan top bar, Langstroth and East African long transitional top bar hives (Olagunju, 2000). This result agrees with Chah *et al.*, (2013) as they affirmed that 70% of bee farmers in Enugu state were not aware of the langstroth beehives installation method which has been found to be durable. Farmers using inferior beehives could result to early decay of the wood thereby affecting honey production and adoption.

Table 3: Distribution of Farmers According to Constraints in the Adoption of Apiary Technology Packages in Abia State, Nigeria

Constraint items	Very Serious	Moderately Serious	Less Serious	Total	Mean
Lack of Technical Skill/Competence	39 (117)	16 (32)	5 (58)	154	2.56*
Affordability of Technology	10 (30)	18 (36)	22 (22)	88	1.46
Environmentally Unfriendliness	41 (123)	15 (30)	4 (4)	157	2.61*
Inadaptability of Technology	38 (114)	12 (24)	10 (10)	148	2.46*
Complexity of Technology	19 (57)	15 (30)	26 (26)	113	1.88
Fear of Bee Stings	44 (132)	8 (16)	8 (8)	156	2.60*
Non Durability of Bee Hive	31 (95)	18 (16)	11 (11)	140	2.33*
Time Consuming	8 (24)	16 (32)	36 (36)	92	1.53

Source: *Field Survey, 2013*

Conclusion and Recommendations

The study has revealed that farmers adopted apiary technology packages such as setting/location of beehive, cleaning of beehive and baiting of beehive. Environmental unfriendliness, fear of bee stings, lack of technical skills, inadaptability of the technology and non durability of beehive were identified constraints to adoption of apiary technology packages. It is recommended that;

- Frequency of contacts/visits by extension should be increased. This will be achieved by beefing up extension agency such as ADP to improve technology dissemination..
- Access to education for the bee farmers is advocated to enhance the acceptance of any technology package transferred.
- Gender insensitivity on bee enterprise should be enlightened through campaign and sensitization considering the fact that it is a profit and poverty alleviation strategy.
- Formation of cooperative societies is advocated. This will encourage access to credit and farm inputs such as durable wooden hives, smokers, dress and other equipment.

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