

Improving the Beehive Construction Competencies of Honey Bee Farmers for Poverty Reduction in South East Zone of Nigeria

Nwankwo, Clara Ukamaka (Ph.D)
nwankwoclarauk@yahoo.com

**Department of Technology and Vocational Education, Faculty of Education, Enugu
State University of Science and Technology (ESUT)**

Abstract

The study investigated beehive construction competencies of bee farmers for improving production efficiency for poverty reduction in South East Zone of Nigeria. Survey research design was adopted for the study which was carried in this Zone. The population for the study was 781 respondents, which comprised 590 Agricultural Extension Officers and 191 registered Bee Farmers in the Zone. A sample size of 474 respondents, comprising 372 Agricultural Extension Officers and 102 Bee Farmers was drawn using simple random sampling technique. The instrument used for data collection was a structured questionnaire developed by the researcher. The instrument was face validated by three (3) experts. A reliability coefficient of 0.76 was obtained using Cronbach Alpha. Two research questions and two null hypotheses guided the study. Mean with standard deviation was used to answer the research questions while one way analysis of variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance and at appropriate degree of freedom. The study found that the ten (10) competencies examined in the study regarding beehive construction were possessed at low extent and that the ten (10) strategies identified in the study were reliable enough for improving the bee farmers' competencies in this competency area investigated as indicated by their grand means of 1.82 and 3.08 respectively. The study also showed that bee farmers competencies improvement depend on the relevant and appropriate extension education adopted by the extension officers in delivering the extension package. Based on these findings, it was recommended that all the identified competencies and strategies for successful bee farming should be incorporated into the extension package for bee farmers on beehive construction competencies and delivered to them properly by extension officers.

Key words: *Improving, Competencies, Honey Bee Farmers, Poverty Reduction*

Introduction

Bees are flying insects closely related to wasps and ants. Robberts (2009) defined bees as monophyletic lineage within the super family "Apoidea", presently classified by unranked taxon named Anthrophila. Bees can be kept effectively and conveniently in a farmland close to a

stream or river at a distance of about 100 – 200 meters away from fertile sports of the farmland. The important thing is to have good pollen closebyfor bees to forage from. Marieke (2007) states that beekeeping does not require much labour, finance and that the skills can easily be learnt. Not minding that beekeeping does not require much to embark on, yet not many people are aware to the benefits we can get by keeping this

unique insect. Adesiji and Adegoke (2008) have observed that bee keeping is a neglected area of agriculture in a developing country like Nigeria. This neglect has no doubt contributed to the level of incompetency demonstrated by the few farmers who engage in it.

Competency in the view of Grove (2003) is a quality or state of being functionally adequate of having knowledge, skills or strength as for a particular duty or respect. According to Olaitan (2003) to be competent implies that an individual has acquired the knowledge, skills, attitudes and judgment which he requires in order to perform successfully at a specified proficiency level in a given work. In the context of this study, competency is the ability of the bee farmers to perform successfully in bee farming using required skills, knowledge and attitude. For bee farmers to perform successfully to reduce poverty and earn their living, there is need to improve bee farmers' level of competencies for beehive construction.

Beehives are shallow containers that can be closed and purposely made for attracting and arming bees for honey production. Different bee farmers use different types of beehive. In some areas people who have no hive raid the colony of bees in natural habits where they are discovered. Various types have been invented, developed and improved upon for many years in different countries based on the species and climate of such country to enhance the production efficiency of the bee farmers (Bidem, 1999). He further noted that there are many types of beehives, such as Kenya top beehive, Langstroth movable frame work hive and traditional hives. These hives are made to house bees for honey and other bee products. For bees to be domesticated, the beehive has to be

built in the standard dimension to house the bees for production of honey and other hives products. According to Adjara (1991) the choice of hive must be in relation to the available resources of the farmers, he further has the following as construction patterns of langstroth hive which are commonly used. Brood chamber with a fix bottom board and flight board, on top of which a bottomless brood chamber is placed. In the bottom board leave a ventilation hole of about 15 – 30cm covered with wire mesh. The brood chamber holds about 10 frames, which are kept separated at the correct comb distance by means of side bars, nails or staples. Honey super with 9 or 10 frames each placed on top of the brood chamber. For better ventilation, place 4 little blocks of wood 1cm high on the inside corners of the outer cover, for air to pass underneath. FAO (2009) states that an ideal hives are provided with thermo regulatory device as an equipment to modify bees surrounding normally during hot or cold weather respectively. Equally shade can also be provided to minimize energy exerted to fan or cluster for hot and cold weather period respectively. These competencies needed to be improved among the bee farmers to enable them to produce enough bee products that can reduce poverty.

Poverty is the state of being deficient in social living. Akubueze (2002) expressed poverty as the lack of resources for reasonable and comfortable lives. In other words, poverty is when one cannot cater for the important basic needs of life that will better one's economic and social life. Poverty reduction was expressed by Olaitan and Ali (1997) as ways of raising the standard of living of people. Apiculture (bee production) can be a good source of poverty reduction, when the competencies

of the farmers are improved on beehive construction which is one of the important equipment for bee production of honey and other hive products.

Galesbury (2007) explained that improvement is an activity undertaken based on meeting the target proposal. In the view of Olaitan, Alaribe and Ome (2000), it is the process of making something better. With reference to this study, improvement connotes anticipated change that could occur by enhancing competencies of bee farmers for successful bee production to reduce poverty.

However, bee farmers in South East Zone are still unable to match supply with demand. This is because most of the bee farmers operating apiculture (bee production) appear to be technically incompetent in the relevant area highlighted to maximize production. Most labour is provided by casual workers and highly paid technicians who are usually invited as the need arises to offer technical advice which in most cases, is not to move the business to sustainable production level. This scenario has not paved way for improvement, hence the need to investigate ways of improving bee farmers competencies to ensure adequate production of honey and other hive products. These strategies identified by Adejara (1991) can be applied strictly for improved competencies acquisition in bee farming through extension officers. Extension officers are agriculturalists who have been exposed to training and retraining up programme and are competent in designing and implementing farmers' field training (Akubueze, 2002). Increase in honey and other hive productions can only be achieved when bee farmers are competent in beehive construction which arises through retraining from extension education programme, since education is

the foundation upon which workforce and human capacity are built (Okorie, 2000).

It was therefore, imperative that bee farming which since has been neglected, in spite of its potentials should be revived with emphasis on improvement of beehive construction competencies which is one of the most important basic equipment for effective and sufficient bee production through farm education approach as urgent and immediate strategy to remedy the problem of honey and other hive products deficiency in South East Zone of Nigeria for poverty reduction. Against this background, therefore, it becomes necessary to carry out a study on improving the beehive construction competencies of bee farmers for poverty reduction in South East Zone of Nigeria.

Specifically the study sought to determine:

1. The levels of competencies possessed by bee farmers in beehive construction.
2. Strategies for improving bee farmers' competencies in beehive construction.

Research Questions

The following research questions guided the study.

1. What are the levels of competencies possessed by bee farmers for beehive construction?
2. What are the strategies for improving beehive construction competencies of bee farmers?

Research Hypotheses

The following null hypotheses (Ho) were raised and tested at 0.05 level of significance for the study:

1. There is no significant difference in the mean responses of bee farmers in the sampled states of the South East Zone (Abia, Anambra, Ebonyi,

Enugu and Imo States) of Nigeria on the level of competencies possessed by bee farmers for beehive construction.

2. There is significant difference between the mean responses of extension officers in the sampled states of South East Zone of Nigeria on the strategies for improving bee farmers' competencies for beehive construction.

Method

The study adopted a survey research design. A survey research design in the view of Anyakoha (2009) uses questionnaire, interviews, observations, etc in order to determine the options, attitudes, preferences and perceptions of persons. The design was considered appropriate since the study obtained data from agricultural extension officers and bee farmers through the use of questionnaire.

The study was conducted in South East Zone of Nigeria comprising of five states namely – Abia, Anambra, Ebonyi, Enugu and Imo State. The choice of the South East Zone is necessitated primarily because the climate of these state favours apiculture business.

The population for the study was 781 respondents comprising 590 agricultural extension officers and 191 registered bee farmers in the South East Zone where this study was carried out. These data were based on the records with planning, monitoring and evaluation officers of Agricultural Development Programme (ADP) in South East States (2015). The sample size for the study was 474 respondents comprising 372 Extension officers and 102 bee farmers in the study area. Simple random sampling technique was used in selecting three states namely Anambra, Ebonyi and Enugu States out of

the five states in South East Zone of Nigeria. This was done through balloting.

A structured questionnaire consisting of 20 items was used to collect information from the respondents. The instrument was subjected to face validation by three experts one from the Department of Technology and Vocational Education, Enugu State University of Science and Technology (ESUT) Enugu and another one from Department of Vocational Teacher Education, University of Nigeria Nsukka and another from the Department of Agric Economic and Extension, NnamdiAzikiwe University Awka. The reliability of the instrument was established using Cronbach Alpha statistical tool. The reliability coefficient yielded 0.75.

Mean with standard deviation was used to analyze the research questions. For the determination of the degree of agreement of the respondent to each item the principles of lower and upper limits were applied. Any item statement that had a mean score of 3.50 and above was regarded as very high level and strongly agree, 2.50 – 3.49 as high level and agree, 1.50 – 2.49 low level and disagree and 1.00 – 1.49 very low level and strongly disagree.

However, the null hypotheses were tested using one way analysis of variance (ANOVA) at 0.05 level of significance at appropriate degree of freedom (df). ANOVA was considered appropriate for these hypotheses because the population was large and the group were more than two (Uzoagulu, 1998). The null hypotheses were rejected if the calculated value of ANOVA was either equal or greater than the critical ratio or tabulated value at appropriate degree of freedom (df) otherwise it was not rejected.

Results

The results are presented in table according to the research questions and hypotheses.

Research Question 1

What are the levels of competencies possessed by bee farmers for beehive

Competencies Possessed by Bee Farmers for Beehive Construction for Poverty Reduction

construction for poverty reduction in the sampled states of the South East Zone of Nigeria?

Table 1: Mean Ratings on the

Competencies possessed by bee farmers for beehive construction		Anambra State		Ebonyi State		Enugu State				
s/n	Questionnaire items	Bee Farmers		Bee Farmers		Bee Farmers		Grand Score		Dec
		\bar{x}	Sd	\bar{x}	Sd	\bar{x}	Sd	\bar{x}_g	Sd _g	
1	Ability to locate a bee site free from noise and fire	2.04	1.02	1.47	0.76	1.93	0.50	1.81	0.76	Low Level
2	Ability to locate the beehive near flowering zone	1.84	0.62	1.69	0.78	1.67	0.52	1.73	0.64	Low Level
3	Ability to collect bee loving wood and slate for preparing bee box	1.52	0.51	1.77	1.06	2.23	0.49	1.91	0.69	Low Level
4	Ability to guide the carpenter in construction of modern beehive	1.56	0.58	1.94	1.08	1.96	0.71	1.82	0.79	Low Level
5	Ability to introduce bee wax on the floor of the wooden box	1.76	0.66	1.75	0.95	1.87	0.73	1.79	0.78	Low Level
6	Ability to identify and select different baits used to attract the bees	1.80	0.71	1.72	0.81	1.73	0.62	1.75	0.71	Low Level
7	Ability to determine appropriate dimension for beehive	2.00	1.04	2.19	1.15	1.64	0.61	1.94	0.93	Low Level
8	Ability to place the beehive correctly on the beehive stand	2.20	0.91	1.91	1.06	1.73	0.75	1.95	0.91	Low Level
9	Ability to bait during the correct period /season between March and April	1.96	0.94	2.13	1.16	1.80	0.69	1.96	0.93	Low Level
10	Ability to position the beehive close to particular flowering trees to get the type of honey you want	1.64	0.57	1.91	1.09	1.82	0.72	1.52	0.79	Low Level
	Grand mean (\bar{x}_g)	1.78	0.75	1.87	1.01	1.82	0.66	1.82	0.79	Low Level

The results of the analysis on Table 1 show that bee farmers possess all the ten (10) beehive construction competencies contained in Table 1 at low level. This was revealed by the mean range between 1.52 and 1.96 three categories of the respondents as indicated in the grand column, with Sd range between 0.64 and 0.93. The grand mean of the respondents' responses for all the items is 1.82 which as well indicated low level possession of the required competencies. However, the closeness of the responses is revealed in the low

standard deviation of the entire items as shown by the grand Sd. Therefore, there is homogeneity in their responses. This implies that bee farmers' competencies still need improvement, since none of the competencies received mean rating at a very high or high level.

Hypothesis I

There is no significant difference between the mean response of bee farmers in the South East Zone on the competencies possessed for the beehive construction competencies of bee farmers in the South East Zone of Nigeria.

Table 2: The Summary of One-way Analysis of Variance (ANOVA) on the Mean Responses of Bee Farmers on the Level of Beehive Construction Competencies Possessed by Bee Farmers in the South East Zone of Nigeria.

Source of variation	Df	Sum of Squares (SS)	Mean of Squares (MS)	F-cal	F-ratio	Sig	Dec
Between groups	2	3.52	1.76				
				5.68	3.00	S	S
Within groups	471	145.82	0.31				
Total	473	134.83					

*S – significant**NS – not significant*

The opinion of bee farmers in South East Zone on beehive construction competencies possessed by bee farmers were compared using one way analysis of variance (ANOVA) and the summary of the results is presented on Table 2 above. From the analysis, it can be seen from Table 2 that the calculated F-value (F-cal) is 5.68 while the critical value of F (F-value) is 3.00. Since the computed value 5.68 is greater

than the critical value of 3.00, the null hypothesis is rejected, because the F-ratio is considered significant at 0.05 level of significance. The differences in their responses emanated from the fact that most bee farmers are theoretically inclined hence this variation in their responses.

Table 3: Mean Rating of Extension Officers on the Strategies for Improving Beehive Construction Competencies of Bee Farmers for Poverty Reduction in South East Zone of Nigeria

Competencies possessed by bee farmers for beehive construction		Anambra State		Ebonyi State		Enugu State		Grand Score		Dec
Questionnaire items		Extension Officers		Extension Officers		Extension Officers				
		\bar{x}	Sd	\bar{x}	Sd	\bar{x}	Sd	\bar{x}_g	Sd _g	
11	Conducting bee farm visit by bee experts with emphasis on location of bee sites free from noise	3.55	0.83	3.35	0.86	3.79	0.61	3.56	0.77	Strongly Agree
12	Guiding the bee farmers by experts in locating flowering zone	3.35	0.70	3.03	0.73	3.26	0.60	3.21	0.67	Agree
13	Conducting group lecture on appropriate wood and slate for preparing beehive	3.16	0.91	2.87	0.82	2.97	0.69	3.00	0.81	Agree
14	Conducting method demonstration on how to construct beehive by extension agents	3.24	0.82	2.57	1.11	2.90	0.94	2.90	0.96	Agree
15	Drilling bee farmers on how to introduce bee wax on the floor of the wooden beehive	3.25	0.74	2.79	1.17	2.89	0.88	2.98	0.93	Agree
16	Conducting Seminars by the experts with emphasis on the right bait to be put in a beehive	3.15	0.92	2.70	0.94	2.93	0.90	2.93	0.92	Agree
17	Training bee farmers by the experts on how to rub old brown comb pieces to beehive	3.18	0.91	3.05	0.93	3.02	0.83	3.08	0.89	Agree

18	Organizing workshop/ seminars by the experts on how to capture queen from natural swarm	3.14	0.82	2.89	1.10	2.95	0.90	2.99	0.94	Agree
19	Training bee farmers by the experts on how to place queen under a beehive	3.25	0.79	3.17	0.95	3.14	0.77	3.19	0.84	Agree
20	Assigning beehive construction project to bee farmers with close supervision to maintain right dimension	3.24	0.78	2.65	0.99	2.98	0.84	2.96	0.87	Agree
Grand Mean (\bar{x}_g)		3.25	0.83	2.91	1.01	3.08	0.84	3.08	0.86	Agree

The result presented in table 3 on strategies for improving beehive construction competencies of bee farmers shows that the mean responses of the extension officers in the states sampled had the mean responses ranging from 3.14 – 3.55, 2.57 – 3.35 and 2.89 – 3.79 respectively. All these mean ranges falls within the weighted mean value of agree response. Furthermore, the grand mean of the respondents in the same sampled states, (Anambra, Ebonyi and Enugu States) range between 2.90 and 3.56 which indicates agree to all the strategies investigated for improving the bee farmers' competencies in

beehive construction. The standard deviation which range from 0.67 – 0.96 indicates uniformity in their responses. This implies that the ten (10) strategies identified in this section were viable enough to improve the beehive construction competencies of the bee farmers in the South East Zone of Nigeria.

Hypothesis 2

There is no significant difference between the mean response of extension officers on the strategies for improving the beehive construction competencies of bee farmers in the South East Zone of Nigeria

Table 4: The Summary of One-way ANOVA on the Mean Responses of Extension Officers on the Strategies for Improving Beehive Construction Competencies of Bee Farmers in the South East Zone of Nigeria

Source of variation	df	Sum of Squares (SS)	Mean of Squares (MS)	F-cal	F-ratio	Sig	Dec
Between groups	2	50.7	25.35	4.70	3.00	S	S
Within groups	471	252.97	0.54				
Total	473	258.97					
<i>S – significant</i>		<i>NS – not significant</i>					

The result of the analysis regarding the strategies for improving beehive construction competencies of bee farmers as presented in Table 4 shows that the F-calculated ratio is 4.70 while the F-tab (F-critical) is 3.00. Therefore, the null hypothesis of no difference is rejected. Since the calculated F-ratio is greater than the critical value at 0.05 levels of

significance and at appropriate degree of freedom. This implies that significant difference exists in the mean responses of the respondents in the sampled states of South East Zone of Nigeria on the strategies for improving the beehive construction competencies of bee farmers in the area.

Discussion of Results

From the study, it was found that the ten (10) competencies examined for beehive construction operations for improved production were possessed by the bee farmers in the South East Zone at low level. The null hypothesis tested indicated that there was significant difference in the opinion of bee farmers in this zone regarding beehive construction competencies possessed by bee farmers in the South East Zone of Nigeria. This finding was in line with the findings of Idenyi and Owo (2013) in a study carried out on enhancing management competencies of honey bee farmers for sustainable production in Ebonyi State, where they found that the fifteen (15) competencies examined were possessed at low level by bee farmers to permit efficient production capacity in honey beekeeping. The findings also agree with Attified (2000) that appropriate wood materials should be selected in construction of beehive like wood that are wasp-proof, resistance to the rotting effect of sun and rain, and such wood should be reduced to parts, to form box following a given specification to represent a long strot beehive. Further, Peterson (2006) noted that bee farmers needed to possess bee keeping skills at very high extent for optimum efficiency in the industry. In another study Bojawa (1998) identified ten (10) skills in beehive construction needed by bee farmers for efficiency in the business. Hasan and Suleiman (2009) carried out a study titled Socio-economic analysis of beekeeping and the effects on beehive type on honey production. They found that improved beehive should be provided to bee farmers by the government through extension officers that should education these bee farmers on the use of beehive. This implies

that the competencies possession levels of the bee farmers were not adequate enough to move the bee industry to sustainable level, hence the bee farmers needed effective education toward improving their capacity to cope with the high demand of bee products.

The findings in Table 3 which emphasized on strategies for improving bee farmers' competencies for beehive construction showed that the ten (10) strategies identified such as constructing bee farm visit by experts with emphasis on location of bee sites free from noise, guiding the bee farmers by experts in locating flowering zone, conducting group lecture on appropriate wood and slate for constructing beehive, conducting method demonstration on how to construct beehive by extension officers, etc, were viable enough for improving bee farmers' competencies in beehive construction in the South East Zone of Nigeria. The null hypothesis was rejected because significant difference exists in the mean responses of the respondents in South East Zone of Nigeria. This finding was consonance with findings of Adjara (1991), who found that work experience, education in schools, workshops/seminars, involving bee farmers in day to day practices of rearing bees for honey, organizing and implementing, re-training programme from time to time were strategies for enhancing bee farmers' performance in beehive construction. It was established that the low honey production in Nigeria could be attributed to inadequate competencies possessed by bee farmers, inadequate performance skills, knowledge and work attitudes in beehive construction and they needed to be improved using appropriate extension education techniques. These extension education techniques identified by Idenyi (2013) in

strategies for enhancing productivity of reserved agro-forest in Nigeria where he examined field demonstration, study tour, project technique, farm visitation, modified lecture and discussion approach as required extension education technique for teaching forest practices in Nigeria. This implies that all the items in the table were viable enough to improve bee farmers' competencies in beehive construction.

Conclusion

The bee farmers did not possess adequate competencies needed for honey and other hive products production to move the apiculture industry to sustainable level, for this reason many bee farmers operated with few hives while other folded, hence, needed to be awakened for the sake of creative employment and poverty reduction. This could be done by utilizing the strategies identified in this study with respect to research question 2 of this study, since they were found to have the potential enough in improving the bee farmers' competencies in honey and other hive products production. Furthermore, this study made the contribution to wealth of knowledge in the competencies possessed by bee farmers and the strategies for improving their competencies as shown in the summary of the findings.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. All identified competencies and strategies for successful bee farming should be incorporated into the extension package for bee farmers on beehive construction competencies and delivered to them properly by extension officers.

2. The South East States through the Ministry of Education/Curriculum Planners should provide schools with modern bee farming equipment (beehive) as materials for Agricultural science and Animal Husbandry teachers to teach and instruct students (would be farmers).
3. Extension officers should encourage bee farmers to develop competencies in bee farming especially beehive construction competencies by involving them through learning by doing, not utilizing only casual workers alone.
4. Extension officers should be given opportunity to upgrade their knowledge and skills in beehive construction from time to time through in-service training, seminars and workshops.
5. The government should grant financial credits to bee farmers in kinds, in form of inputs or soft loans to enable the bee farmers to procure this important equipment for honey production.

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