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Original Research Article

Attitudinal disposition of trained beekeepers to use of modern beekeeping technologies in Oyo state Nigeria

Abstract

Beekeeping is a lucrative livelihood activity of the rural dwellers because it offers a great potential for income generation, poverty alleviation, sustainable use of forest resources and diversifying the export base. This paper examined the attitude of trained beekeepers to use of modern beekeeping technologies in Oyo state, Nigeria. Multi-stage sampling was used to select 131 trained beekeepers. The data collected were analysed with the aid of descriptive statistics and inferential statistics tools such as Chi-square, Pearson product moment correlation and Analysis of variance. The results reveal that there is favourable attitude to use of modern beekeeping technologies. Beekeepers had high (54.2%) participation in training activities and are highly knowledgeable (61.8%) on the use of modern beekeeping technologies. Age (r= 0.373) marital status (χ^2 =6.155) and membership of beekeepers association (χ^2 =6.155) influenced their attitude to use of modern beekeeping technologies. Furthermore, knowledge (r= 0.491) of beekeepers determined attitude to use of modern beekeeping technologies also there was significant difference (F = 8.329) in attitude among beekeepers with respect to their LGAs. In line with this, it is recommended that NGOs and other financial institutions should give out credits enable beekeepers purchase modern beekeeping equipment.

***Keywords*: Attitude, Beekeepers, Beekeeping technologies, Modern, training**

INTRODUCTION

Beekeeping (or Apiculture), is the management of bees in a hive in such a way as to observe its developmental stages and manipulations (Ojeleye, 2003). Beekeeping is as old as any agricultural practice. It has been an alternative source of income to beekeepers especially in rural communities. According to NHB (2004), Beekeeping is one activity that is gaining interest among the citizens of Oyo State due to the suitability of the state's climate and vegetation, which is predominately a rainforest zone, with derived savannah towards the southern part, characterised by abundance of flowering plants which produce a lot of nectar which is used by bees to produce honey. However, it has been observed that most beekeepers in the state make use of traditional technologies, which led to poor quality of products and lower yield, making beekeeping less profitable. Hence, the Ministry of Agriculture harnessed the desire expressed by its citizens to engage in beekeeping by training them on modern beekeeping technologies. The training was organised from 19th-22nd April 2011, by the Department of Rural Development under the Oyo State Ministry of Agriculture, Natural Resources and Rural Development. It is therefore hoped that the knowledge acquired from participation in training will help beekeepers to develop favourable attitude towards the use of modern beekeeping technologies; as this is also expected to influence positively their use of modern beekeeping technologies in the study area.

It is in light of this that this paper assessed the attitude of trained beekeeper towards use of modern beekeeping technologies with particular highlight on beekeepers' demographics, participation in training and knowledge on use of modern beekeeping technologies. The hypothesis tested the relationship between beekeepers' knowledge on modern beekeeping technologies and attitude to use of modern while difference in attitude to use of beekeeping technologies was tested across the selected Local Government Areas.

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Materials and methods

The study was carried out in Oyo State of Nigeria. The population of the study is made up of the 394 participants trainedby the Department of Rural Development in Ministry of Agriculture, Natural Resources and Rural Development of Oyo State. Multi stage sampling techniques was used to select respondents. Oyo North and Oyo Central were purposively selected due to the larger number of participants in the training. Then a proportionate sample of 45% of the LGAs was selected, i.e. to get 5 and 6 LGAs from Oyo Central and Oyo North respectively. Finally 65% of the total trainees were sampled randomly to give a total of 131 beekeepers. A structured interview schedule was used to collect data from the 131 beekeepers.

Measurement of variables

Dependent variable

Attitude to use of modern beekeeping technologies

The information on attitude was obtained using a five-point-likert scale of strongly agree, agree, undecided, disagree and strongly disagree with scores of 1, 2,3,4,5 assigned respectively for positively worded attitude statement and the reverse for negatively worded statements. Attitude categories were obtained using the mean score to categorise into favourable (≥ mean) and un-favourable (< mean) attitude

Independent variable

Demographic questions: beekeepers were asked to indicate their personal characteristics which included age, gender, religion, marital status, household size and educational status.

Participation in training: A list of fifteen (15) activities done during training was given to respondents from which respondents were to indicate their level of involvement based on whether they were:very active = (2), slightly active = (1) and not at all = (0)involved**.** The mean scores were computed to rank items according to the level of participation by respondents from the greatest to the least in participation. The total mean scores were used to categorise respondents' participation level based on the deviation from the mean. Respondents with scores below the mean were categorised as having low participation while those with mean's score and above were categorised as having high participation in training of modern beekeeping technologies.

Knowledge of the respondents was measured by obtaining their responses on a 10-point knowledge statements using dichotomous response of Yes or No. The correct statement attracted a score of 1 while incorrect response attracted a score of 0. The highest score was obtained as 20 while the lowest score was 0. The mean score was obtained and used to categorise the respondents' knowledge level (High or Low) based on the deviation from the mean. Respondents with scores below the mean were categorised as having low knowledge while those with mean's score and above were categorised as having high knowledge of modern beekeeping technologies.

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Data collection and analyses

Data were collected by interview schedule to avoid misinterpretations and inaccurate responses and were analysed with the aid of descriptive statistical tools such as per cent, mean, frequency distribution, while the hypotheses were analysed using Pearson Product Moment Correlation (PPMC) and Chi-Square.

Results and discussion

Results showing beekeepers' demographics reveals the age distribution of the respondents ranged between 19 to 73 years, the mean age was 39.8±11. Majority (61.1%) of the respondent's age fell between the ages of 31-54 years, while only 10.2% were above 54 years of age. This implies that people of different ages both young and old could take to beekeeping based on their willingness and interest. This finding corroborates with (Ayansola, 2012) who found that age was not a restriction of involvement in beekeeping activity. The result reveals that males were 78.6% while females were 21.4%. This confirms the finding of (Babatunde. *et al*, 2007) that majority of beekeepers are males, this likely due to the notion that beekeeping is perceived as an hazardous occupation, since beekeepers are exposed to the risk of being stung by bees.
The household size ranged from 1 to 21 persons, with a mode household size category of 5-8 persons and a mean of 5± 4 persons. This implies respondents have large household size beekeeping, as most agricultural activity use family as source of labour.

Table 1:Demographic Frequencies of beekeepers (n= 131)

Variables	F	%	Mean
Age (years)			
< 30	36	27.5	
31-42	41	31.3	39.8 years
43-54	39	29.8	
55-66	13	9.9	
Above 66	2	1.5	
Sex			
Male	103	78.6	
Female	28	21.4	
Household size			
≤4	46	35.1	
5-8	74	36.5	5 persons
9-12	7	5.3	
>12	4	3.1	
Educational Status			
No formal education	2	1.5	
Quranic education	9	6.9	
Vocational education	14	10.7	
Primary education	10	7.6	
Secondary education	43	32.8	
Tertiary education	53	40.5	

Participation in Training on Modern Beekeeping Technologies

The result on Table 2 shows respondents participation in training on modern beekeeping technologies. It reveals that harvesting of bee products ranked highest in participation which

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might be because human beings prefer to participate in activities that are directly and economically beneficial to them than any other activity this supports the findings of Gamze et al. (2004) who reported that honey production plays a very important role as a source of increasing rural income in sustainable development. Furthermore, the study reveals that over half (54.2%) of the beekeepers had high participation in the training. This implies majority of the beekeepers actively participated in the activities in the training; it is therefore expected that beekeepers' high level of participation in training will lead to increased knowledge of modern beekeeping technologies.

Table 2: Frequency distribution of participation in Training (n= 131)

S/No	Activities participated during training	Very Active (f)	(%)	Slightly passive (f)	(%)	Not at all (f)	(%)
1	Identification of various modern hive	72	(55.0)	31	(23.7)	28	(21.4)
2	Site of an apiary	65	(49.6)	61	(46.6)	5	(3.8)
3	Harvesting of bee products	93	(71.0)	32	(24.4)	6	(4.6)
4	Use of extraction machine	87	(66.4)	21	(16.0)	23	(17.6)
5	Identification of bee products	49	(37.4)	71	(54.2)	11	(8.4)
6	Constructions of modern hives	45	(34.4)	34	(26.0)	52	(39.7)
7	Processing of bee products	57	(43.5)	58	(44.3)	16	(12.2)
8	Management of an apiary	64	(48.9)	58	(44.3)	9	(6.9)
9	Prevention of absconding	39	(29.8)	62	(47.3)	30	(22.9)
10	Setting of baits	86	(65.6)	36	(27.5)	9	(6.9)
11	Pest control	26	(19.8)	55	(42.0)	50	(38.2)
12	Record keeping	45	(34.4)	39	(29.8)	47	(35.9)
13	Use of kits	85	(64.9)	24	(18.3)	22	(16.8)
14	Production of beeswax	73	(55.7)	47	(35.7)	11	(8.4)
15	Maintenance of kits	72	(55.0)	37	(28.2)	22	(16.8)

Table 3: Categorization of beekeepers' participation in training

Level of Participation	F	%	Min	Max	SD	Mean
Low	60	45.8	5.00	19.00	2.81	13.99
High	71	54.2				
Total	131	100				

Respondent's knowledge on modern beekeeping technologies

FAO (2005) describes common knowledge is held by all people, shared knowledge is by many and specialized knowledge is held by few people. The summary of trained beekeepers' knowledge on use of modern beekeeping technologies is as shown on Table 3. The grand mean of all the statements was 0.70. Respondents had high knowledge on; Oyo State is suitable for beekeeping because of its climatic and vegetative conditions are favourable to beekeeping (0.90); bees are social insect that can help in sustainable use of forest resources in Oyo State (0.90). Lizard as a major predator (0.89), bee colony constituents of the queen, the worker and the drone (0.87), absconding is migration of bees from hive in search of a new site due to severe predation and incessant disturbance (0.86). While respondents had low knowledge on: the optimum temperature in which bees perform (0.22) and honey absorbs water when exposed to the atmosphere (0.39). Generally respondents have high knowledge on more statements on modern beekeeping technologies.

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On the overall, the study reveals in Table 5 that majority 61.8% of the beekeepers are highly knowledgeable on modern beekeeping technologies (13.99± 2.81). This implies majority had a good knowledge on modern beekeeping technologies from the training; it is therefore expected that beekeepers high knowledge of modern beekeeping technologies will help them to develop favourable attitude towards use of modern beekeeping technologies.

Table 4: Beekeepers' knowledge on modern beekeeping technologies (n= 131)

No	Items	Correct (f) (%)	Incorrect (f) (%)	Mean	Rank
1	The manipulation of bee in a colony is referred to as Beekeeping	71 (54.2)	60 (45.8)	0.54	17
2	Besides honey, beekeeping also results in production of other hive products, which have high economic value both locally and internationally?	108 (82.4)	23 (17.6)	0.82	7
3	A bee colony consists of the queen, the worker and drone.	114 (87.0)	17 (13.0)	0.87	5
4	There are many queens in a colony	88 (67.2)	43 (32.8)	0.67	12
5	Bees always fly back to the place of their own hive, even if the hive has been moved.	105 (80.2)	26 (19.8)	0.80	8
6	Bees don't react to certain odour or smell.	68 (51.9)	63 (48.1)	0.52	18
7	The major types of modern hive are the langstroth, Kenya top bar and Tanzania top bar hive?	99 (75.6)	32 (24.4)	0.76	11
8	One importance of using the cover of the Kenya top bar is to protect the hive against rain	115 (87.8)	16 (12.2)	0.88	4
9	The apiary site must be in an area of flowering plants within radius of 1km	103 (78.6)	28 (21.4)	0.79	9
10	A waterlogged area is the best site for apiary.	84 (64.1)	47 (35.9)	0.64	15
11	It is wise to re- queen after two years	74 (56.5)	57 (43.5)	0.77	10
12	The brood in a hive refers to eggs, larvae and pupae.	88 (67.2)	43 (32.8)	0.67	12
13	When honey is exposed to air it releases moisture.	51 (38.9)	80 (61.1)	0.39	19
14	Lizard is one the major predators of bees	117 (89.3)	14 (10.7)	0.89	3
15	Oyo state is suitable for beekeeping because of its climatic and vegetative conditions are favourable	118 (90.1)	13 (9.9)	0.90	1
16	Absconding is migration of bees from hive in search of a new site due to severe predation and incessant disturbance	113 (86.3)	18 (13.7)	0.86	6
17	Beeswax is the best baiting material to use in colony establishment	83 (63.4)	48 (36.6)	0.63	16
18	Bees perform optimally temperatures between 20^{0c}-35^{oc}.	29 (22.1)	102 (77.9)	0.22	20
19	Modern beekeeping cannot be practised with other income generating activity	86 (65.6)	45 (34.4)	0.66	14
20	Bees are social insect that can help in sustainable use of forest resources in Oyo state	118 (90.1)	13 (9.9)	0.90	1

Grand mean: 0.70

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Table 5: beekeepers' level of knowledge acquired on modern beekeeping technologies

Level of knowledge	F	%	Min	Max	SD	Mean
Low	50	38.2	5.00	19.00	2.81	13.99
High	81	61.8				
Total	131	100				

Beekeepers' attitude towards use of modern beekeeping technologies

Attitude of beekeepers towards modern beekeeping technologies is a very important phenomenon to take into consideration for sustainable adoption of modern beekeeping technologies. The summary of respondents attitude towards use of modern beekeeping technologies is as shown on Table 6 The grand mean of all the statements was 3.76. Respondents had favourable attitude towards some of the following statements; the use of bee suit, hat, and veil reduces bee's stings during inspection and harvesting (4.57), the use of modern hive like the Kenya top bar and langstroth hive makes harvesting easier. (4.36), bee products from modern beekeeping technologies are more healthier compared to bee products from traditional method (4.24), record keeping as a modern beekeeping technologies ensures the profitable beekeeping enterprise (4.18), use of modern beekeeping technologies produces higher yield of bee products compared to traditional method (4.12). While the respondents were unfavourable towards some statements such as; biodiversity conservation is of great relevance in use of modern beekeeping technologies (3.17), predators cannot be controlled using modern beekeeping technologies (3.28), modern beekeeping technologies increases the rate of absconding (3.37), and the use of modern beekeeping technologies is too expensive compared to the profit. (3.21), this implies that respondents have favourable attitude towards the use of most area of modern beekeeping technologies.

Furthermore, the study reveals in Table 6 that majority (52.7%) had favourable attitude to use of modern beekeeping technologies, while (47.3%) had unfavourable attitude (75.2 ± 8.28). This implies that beekeeper's attitude must have being influenced by the knowledge acquired from training. This corroborates with Tolera (2019) Who found that there was positive attitude towards watershed integrated beekeeping and honey production.

Table 6: Beekeepers' attitude to use of modern beekeeping technologies (n= 131)

	Attitudinal statements	S A F (%)	A F (%)	U F (%)	D F (%)	SD F (%)	Mean
1.	Use of modern beekeeping technologies produces higher yield of bee products	84 (64.1)	21(16.0)	5 (3.8)	0 (0.0)	21(16.0)	4.12
2.	The use of modern hive like the Kenya top bar and langstroth	59(45)	62(47.3)	8 (6.1)	2 (1.5)	0 (0.0)	4.36
3.	Modern beekeeping technologies increases the rate of absconding.	27(20.6)	18(13.7)	9(6.9)	34(26.0)	43(32.8)	3.37
4.	In Modern beekeeping technologies there are special consideration in selection	39(29.8)	74(56.5)	9(6.9)	4(3.1)	5(3.8)	4.05
5.	Modern beekeeping technologies equipment are too complex for my use	10(7.6)	21(16.0)	16(12.2)	70(53.4)	14(20.7)	3.44
6.	Bee products from modern beekeeping technologies are more healthier	60(45.8)	52(39.7)	12(9.2)	5 (3.8)	2(1.5)	4.24

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7.	Equipment used in Modern beekeeping technologies are available	54(41.2)	29(22.1)	17(13.0)	25(19.1)	6(4.6)	3.70
8.	The use of Modern beekeeping technologies is too expensive	17(13.0)	18(13.7)	29(22.1)	55(42.0)	12(9.2)	3.21
9.	Harvesting of comb when it in brooding stage is detrimental to the	45(34.4)	44(33.6)	27(20.6)	10(7.6)	5(3.8)	3.87
10.	Traditional beekeeping is profitable even without record keeping.	10(7.6)	26(19.8)	18(13.7)	39(29.8)	38(29.0)	3.53
11.	Biodiversity conservation is of great relevance	15(11.5)	44(33.6)	42(32.1)	44(33.6)	22(16.8)	3.17
12.	It is a waste of time and resources using bee-suit, hat, veil and hand gloves.	18(13.7)	14(10.7)	3(2.3)	35(26.7)	61(46.6)	3.82
13.	Swarming tendency can be detected and reduced	28(21.4)	56(42.7)	30(22.9)	12 (9.2)	5(3.8)	3.69
14.	Predators cannot be controlled	17(13.0)	29(22.1)	14(10.7)	43(32.8)	28(21.4)	3.28
15.	Traditional beekeeping is still more profitable	7(5.3)	13(9.9)	20(15.3)	41(31.3)	30(38.2)	3.87
16.	There is loss of biodiversity in the of traditional beekeeping technologies.	17(13.0)	46(35.1)	28(21.4)	29(22.1)	11(8.4)	3.22
17.	Higher yield bee products are produced by use of traditional method.	10(7.6)	23(17.6)	24(18.3)	43(32.8)	31(23.7)	3.47
18.	Harvesting of brood makes the honey ferment within a short time.	41(31.3)	68(51.9)	8(6.1)	9 (6.9)	5(3.8)	4
19.	The use of bee suit, hat, and veil reduces bee's stings	76(58.0)	53(40.5)	2(1.5)	0 (0.0)	0 (0.0)	4.57
20.	Record keeping as a modern beekeeping technologies ensures the profitability	48(36.6)	58(44.3)	25(19.1)	0 (0.0)	0 (0.0)	4.18

Grand mean: 3.761

SA: Strongly agree A: Agree U: Undecided D: Disagree SD: Strongly disagree

Table 7: beekeepers' level of attitude towards the use level of respondents

Attitude to use	Frequency	%	Min	Max	SD	Mean
Unfavourable	62	47.3	54	98	8.28	75.20
Favourable	69	52.7				
Total	**131**	**100**				

The study determined whether or not significant relationship existed between age, household size, sex, level of production, marital status, educational status of beekeepers and the attitude to use of modern beekeeping technologies. The Pearson Product Moment Correlation (PPMC) results show that age has a significant relationship with attitude to use of modern beekeeping technologies in the study area. That is the older the farmer the more favourable attitude they have towards use of modern beekeeping technologies. This

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contradicts the findings of Ogunyemi, (2005) who established there is an indirect relationship between age and attitude to adoption of agricultural technology. However no significant relationship was established between beekeepers household size and attitude to use of modern beekeeping technologies. This implies that beekeepers' attitude to use of modern beekeeping technologies was not influenced by the size of their households.

The analysis for the relationship between sex, membership of beekeepers association, marital status and educational status is presented in Table 8. The result reveals that household size (r= 0.128), Sex ($\chi 2$ =1.927) and educational status (χ^2=5.189) had no significant relationship with beekeepers' attitude to use of modern beekeeping technologies. The study further reveals that age (r= 0.373) marital status (χ^2 =6.155) and membership of beekeepers association (χ^2 =6.155) influenced their attitude to use of modern beekeeping technologies. This is expected since the beekeeping association help in dissemination of information about the training and use of modern beekeeping technologies.

Table 8: Inferential test of beekeepers' selected demographics
Pearson Product Moment Correlation (PPMC) results

Variables	R	χ^2	df	CC	P	Decision
Age	0.373				0.000	S
Household size	0.128				0.148	NS
Chi-Square results						
Sex	…	1.927	1	0.120	0.165	NS
Beekeeping ass.	…	6.155	1	0.212	0.013	S
Marital status	…	6.155	1	0.212	0.013	S
Educational status	…	5.189	5	0.195	0.393	NS

Where S = significant and NS = Not significant

According to Sangotegbe (2011) who posited that knowledge of the problems and potential benefits of taking action is an important determinant of attitude to use of agricultural technologies. The study reveals that at 0.05 level of significance, the level of knowledge of beekeepers in the study area significantly and directly influenced (**r**= 0.491, p =0.000) the attitude to use of modern beekeeping technologies in the study area. This means, the higher the knowledge of modern beekeeping technologies, the more favourable the attitude to use of modern beekeeping technologies.

Table 9: Relationship between farmers' knowledge and attitude

Variables	R	P	Decision
Knowledge	0.491	0.000	S

This hypothesis is out to test if there is a significant difference in attitude towards use of modern beekeeping technologies among beekeepers' in the various local government area of Oyo state. Test was at 0.05 level of significance; the result shows that there is significant difference in attitude to use of modern beekeeping technologies among beekeepers in various local government area (F = 8.329). This implies that there is difference in attitude to use of modern beekeeping technologies among beekeepers with respect to their Local Government Areas.

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Table 10: ANOVA of beekeepers' attitude to use of modern beekeeping technologies

Variable	Mean	d f	F-value	p-value	Decision
LGAs	364.75	10	8.33	0.000	Significant

Conclusions and recommendations

From the foregoing, it can be concluded that there is favourable attitude to use of modern beekeeping technologies among trained beekeepers in Oyo State. Beekeepers had high participation in training activities and are high knowledgeable on the use of modern beekeeping technologies. In line with this the study recommends that Non-Governments Organisations, Government and banks should give out loans to beekeepers so they can enlarge their enterprise and purchase modern beekeeping equipment

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