Socioeconomic analysis of beekeeping technologies in Kenya: A case study of Kitui County

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Abstract

A social economic study was conducted to assess the performance indices of frame hive beekeeping and the traditional technology of Kenya. The objectives were to describe the socioeconomic characteristics of beekeeping farmers, establish the factors that determine the choice of beekeeping technology in the study area and the constraints that affect the adoption of the entire beekeeping technology. Data were collected in four Locations of Kasaala, Mulundi, Waita and Kyuso of Kitui County, Kenya. Systematic random sampling was applied to a selected 30 households each in the four locations giving a total of 120 households. The results revealed that of the 120 respondents, 69% and 31% were males and females respectively, 77% were in the 18-55 years age bracket, 64% had attained at least primary level of education. The results further showed that 77% of the respondents were agro-pastoralists involved in crop and livestock production. About 58% regarded beekeeping as a major economic activity an indication that beekeeping was an important socio-economic undertaking in the area. The results further showed that a number of factors determined choice of beekeeping technology which included the cost, availability, management regime, productivity level and quality of hive products. The study had showed that there were a number of constraints that affected adoption of the entire beekeeping technology these included; recurrent drought, attack by pests and predators, low prices, insecurity and inadequate extension services. From the findings of the study, focused extension training should be provided to beekeepers to equip them with the necessary skills on bee management.

Keywords: Beekeeping technology, assess, performance, frame hive.

Introduction

Beekeeping also known as apiculture, is the act, science and or business of managing honey bees for the purpose of producing honey, beeswax and other bee products for consumption and industrial use. In the old days, the production of honey was a major industry in the African economy and as observed by (Nightingale, 1976), honey was a vital factor in African culture and was used in many ways as an article of trade.

Beekeeping supports millions of households in Sub-Sahara Africa (Gidey and Mekonen, 2010). Hive products have been used by mankind for centuries for example bee brood is traditionally eaten as a high protein food while beeswax is used in candle making. Other hive products are now used in the pharmaceutical and cosmetic industries. Propolis is now widely used in apitherapy for its anti- viral and bacterial properties. Pollen on the other hand has found its way to some health food outlets as a protein rich commodity (Paterson, 2006). Beekeeping provides pollinators, which enhance crop yield. It is estimated that one in every three bites of food we eat is as a result of pollination of plants in which bees play a very important part (Caroll, 2006). Statistics point out that, 60-90% of the world's flowering plants depend on insects for pollination (Buchamann and Nabhan, 1996).

The beekeeping industry contributes to the wider rural economy through trade (Paterson, 2006). Kigatiira, (1976) noted that the beekeeping industry in Kenya is worth millions of shillings and plays important role in the economy of arid areas. The livestock sub- sector in Kenya of which bees are part, contributes about 10% of Kenya's GDP. Beekeeping alone contributes about 1.89% of this amount (Muya, 2004).

Beekeeping requires very little financial or labor input. It is a flexible and gender friendly enterprise which does not compete for resources such as land with other agricultural activities. Beekeeping is possible in arid areas and places where other crops have failed (Bradbear, 2002).

However, majority of Kenyan beekeepers still use traditional systems of beekeeping that is simple fixed combs, mostly hollow log hives.

The effort to improve Kenyan apiculture began in 1967 through an Oxfam grant that funded their very first beekeeping development project. In 1970 the Kenyan government, along with financial and technical aid from the Canadian government established a new agriculture sector (The National Beekeeping Station) within the Kenyan Ministry of Agriculture. The new branch would pursue the development of Kenyan beekeeping through extension services, research development and the professional training of Kenyan beekeepers (Kigatiira, 1976). It is at this point in time that western beekeeping technology and knowledge was introduced to Kenyans. Current trends in development remain focused on the improvement of the hive technology and training as the first and foremost approach. The dominant trend in beekeeping development is the endorsement of improved hive technology, be it the Langsthroth or the Kenya Top Bar Hive (KTBH). However, the adoption and diffusion of beekeeping equipment is certainly not pursued without some significant degree of resistant and failure.

Objectives of the study

The overall objective of the study was to investigate the assessment of performance indices of frame hive beekeeping and the traditional technology in Kenya. The specific objectives were to describe socioeconomic characteristics of beekeeping farmers, establish the factors that determine the choice of beekeeping technology in the study area and the constraints that affect the adoption of the entire beekeeping technology.

Materials and methods

Study sites

The study was conducted in Kitui County, Kenya. The County is located between longitudes $37^0 50'$ and 39^0 $0'$ east and latitudes 0^0 $10'$ and 3^0 $0'$ south. The County borders Machakos and Makueni to the west, Embu and Tharaka- Nithi to the north, Tana River to the east and Taita- Taveta to the south. The County covers an area of approximately 20,402square kilometers including 6, 90.3Km2 occupied by uninhabited Tsavo National Park. The rural population is 1,012,709 which occupies 23020Km^2 of the County (KNBS, 2009 population census).

Topographically, the central part of the county is characterized by hilly ridges separated by wide, low lying areas and has slightly lower elevation of between 600m and 900m above sea level. To the eastern side of the county, the main relief feature is the Yatta plateau, which stretches from the north to the south between rivers Athi and Tana. The plateau is almost plain with wide shallow spaced valleys. The highest areas in the county are Kitui Central, Mutitu Hills and Yatta Plateau. Due to the high altitude these areas receive greater rainfall than other areas in the county and are also the productive areas. There are many seasonal rivers in the county. Only few rivers in the periphery of the county have perennial flows. The Tana River to the north separates Kitui from Embu and Tharaka- Nithi Counties and river Athi to the west and south- west separates the county from Machakos and Makueni Counties. River Tana has several tributaries draining the north portion of the county.

The County experiences two rainy seasons, with long rains in April and May and short rains in November to December. The dry periods are August to September and January to February. The amount of rainfall follows topographical features of the landscape. The hills such as Mumoni in Kitui Central and Mutitu in the western part of the County receive 500-1050 mm while the eastern and southern receive less than 500 mm. In general, most of the county experience less than 750 mm of rainfall in a year.

The maximum mean annual temperatures in the county vary between 14^0C and 18^0C in the eastern parts. The maximum mean annual temperature vary between 26^0C and 30^0C in western parts of the County and 30^0C and 34^0C in the eastern parts (GoK, Kitui District Development Plan, 1994- 1996).

Majority of the people in the County depend on agriculture and livestock related activities for their livelihood. The author established that 47% of the farmers keep goats, 16% keep sheep and about 65% keep bees using traditional log hives.

Four beekeeping sites in four Districts of the County (Kasaala Location in Ikutha district, Mulundi Location in Kitui Central district, Waita Location in Mwingi Central district and Kyuso Location in Kyuso district) were used to conduct a survey on assessing the performance of frame hive beekeeping technology.

Sampling procedure

The population of this study consisted of all farmers with at least one bee colony and was managing it independently. Due to enormity of this population, a sample size of 120 respondents was selected using purposive and simple random sampling techniques from the four study sites of Kasaal, Mulundi, Waita and Kyuso.

Collection of data

Primary data were collected from the respondents through formal interviews by administering questionnaires and on- spot field observations. In addition, a focus group discussion was conducted with a group of respondents from the four Locations where they dealt with pertinent issues concerning the performance of frame hive beekeeping technology.

Secondary data were available from various sources including books, thesis, reports, journals and official reports from relevant government departments. The collected data were analyzed using percentages and frequency distribution. The analysis was to assess the performance of frame hive beekeeping technology among beekeepers.

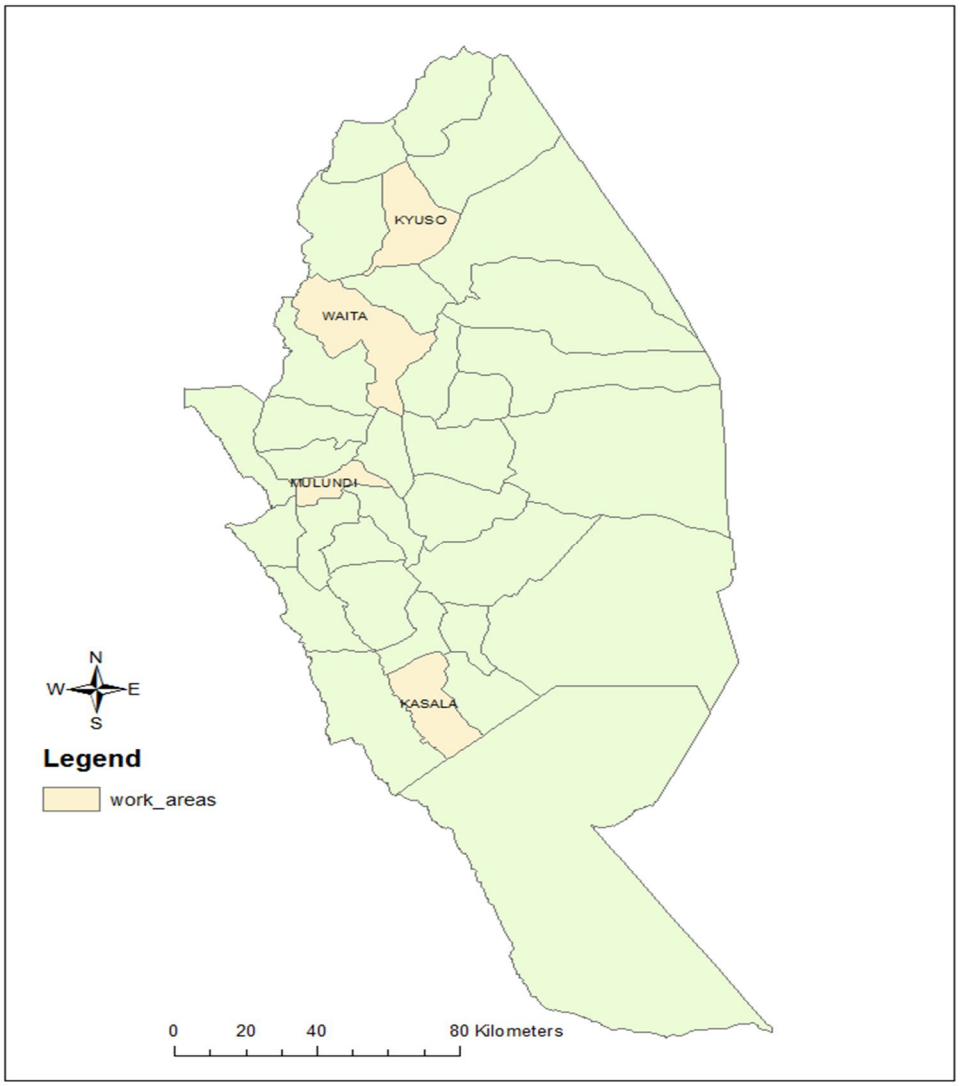

Figure 1: Map of Kitui County showing study sites, Kasala, Mulundi, Waita and Kyuso Locations in August 2012.

Results and Discussion

The study found out that 69 out of the 120 respondents representing 58% regarded beekeeping as a major activity. Of the 120 respondents, 69% and 31% were male and female respectively. On age, 77% were in 18-55 years category. Sixty four percent of the respondents had attained at least a primary level of education. Further the study revealed that most of respondents were agro-pastoralists with 75% involved in crop and livestock production. Majority of the respondents 77% owned between 1 and 9 acres of land. The household size was 5 people on average with 75% indicated working on their farms on a full time basis as their main occupation. Sixty one percent of the respondents were active members of self-help groups, with 50% and 41%representing men and women respectively. Table 1.1 summarizes some main socio economic characteristics of the sampled households.

Table 1: The number (n) and percentage distribution of age (years), education and occupation of respondents per location

	Kyuso	Kasaala	Waita	Mulundi	Total Frequency	Total Percent
Age(years)						
Below 18	3	0	0	0	3	3
18 – 35	12	3	5	6	26	22
36 – 45	5	10	16	7	38	32
46 – 55	2	6	7	13	28	23
56 and above	8	10	3	4	25	20
Education						
None	7	9	5	6	27	23
Primary	17	20	18	23	78	64
Secondary	5	0	3	1	9	8
Tertiary	1	0	5	0	6	5
Occupation						
Farming	9	29	22	30	90	75
Business/charcoal burner	7	0	3	0	10	8
Employment	7	0	0	0	7	6
Civil service	3	0	2	0	5	4
Others	4	0	4	0	8	7
Total	30	29	31	30	120	100

A majority of the respondents 41% owned between 5 and 9 acres. Those owning between 1 and 4 acres were 36% while only 23 % owned tracts of land larger than 10 acres. This analysis showed that land size was an important factor when it comes to the number of hives a farmer could keep as shown in table 2. (a). Table 2. (b) shows the total number of Traditional (T) and Langstroth (L) hives in each of the four locations. This table shows that farmers had more traditional hives in the

four Locations while the Langstroth were few and even absent in Kasaala. It also shows that kasaala had the largest number of 23 hives which were of the traditional type.

Table 2. (a): Effect of land size (acres) and the number of beekeeping at various locations

Land size (acres)	Kyuso	Kasaala	Waita	Mulundi	Total Frequency	Total Percent
1.0 – 4.0	5	5	4	11	25	36
5.0 - 9.0	8	15	4	1	28	41
10.0 and above	9	3	4	0	16	23
Total	22	23	12	12	69	100

Table 2. (b): The total number of Traditional (T) and Langstroth (L) hives in various locations

Land (Acres)	Kyuso		Kasaala		Waita		Mulundi		Total
	T	L	T	L	T	L	T	L	
1- 4	4	1	5	0	1	3	2	10	26
5- 9	6	2	15	0	4	1	0	1	29
10 and above	4	1	3	0	4	2	0	0	13
Total	14	4	23	0	9	6	2	11	68

The survey results showed that a total of 48 beekeepers representing 70% were members of Self Help Groups (SHG) and were traditional beekeepers while 21 beekeepers representing 30% were members of Self Help Groups and using Langstroth hives in the four Locations. This was an indication that being a member of a SHG does not influence the adoption of traditional beekeeping but it may have a significant influence on the adoption of modern beekeeping as shown in table 3. This is because modern beekeeping is usually introduced through groups as opposed to traditional beekeeping which is passed-on from one generation to the next along family lines as shown by the situation in Kasaala which was found to have large number of traditional hives and no modern Langstroth. Degu *et al.,* (2002) noted that membership to an association or group is an important factor in technology adoption. T he study results indicated that self-help groups were also involved in social and financial activities which help in building the capacity of their members.

Table 3: Membership of Self-Help Groups and beekeeping technology per study site

Hive technology	Kyuso	Kasaala	Waita	Mulundi	Total Frequency	Total Percent
Traditional hives	14	23	9	2	48	70
Langstroth	4	0	6	11	21	30
Total	18	23	15	13	69	100

Most of the households sampled were male-headed (75%) with (25%) female-headed. These results indicated that a larger proportion of beekeepers were among the male-headed households compared to the female-headed households. This may be attributed to the cultural norms among the local community where beekeeping is still strongly regarded as a man's job, and more so among the traditional beekeepers.

Almost all the beekeepers visited indicated that they had not accessed extension services in the previous one year. The lack of access for extension could have probably contributed towards lack of adoption of modern beekeeping technology.

About 4% of the beekeepers had received credit for beekeeping activities in the previous one year. This is a clear indication that lack of credit could be one of the constraints to the adoption of modern beekeeping technology in the area. Table 4 shows the number of farmers who had access to credit for beekeeping per study site

Table 4: The number of farmers who had access to credit on beekeeping per study site

Hive technology	Kyuso	Kasaala	Waita	Mulundi	Total Frequency	Total Percent
Traditional	2	0	1	0	3	100
Langstroth	0	0	0	0	0	0
Total	2	0	1	0	3	100

Marketing plays an important role in agricultural production and adoption of technology (Mwanthi, 2009). Lack of market or low prices may act as a disincentive towards the adoption of technology. Results of this study showed that the main market outlet for honey was the middle-men accounting for 53%. While the remaining 47% were local consumers and deliveries to the local refinery, tables 5 shows the number of farmers who had access to market in the four locations for traditional and Langstroth technologies.

Table 5: The number of farmers who had access to market in the four locations for traditional and Langstroth technologies

Market type	Kyuso		Kasaala		Waita		Mulundi		Total	Percent
	T	L	T	L	T	L	T	L		
Local consumer	9	1	2	0	6	2	1	1	22	46
Middle men	0	0	23	0	1	1	1	0	26	54
Total	9	1	25	0	7	3	2	1	48	100

T= Traditional,
L= Langstroth(Modern)

Among the sampled beekeepers, only 14% had received some training in bee management in the previous one year. Of those who had been trained, 5% were adopters of traditional technology while the majority (8%) had adopted modern technology. The figures in table 6 show the number of farmers who had received some training on beekeeping in the various locations. The beekeepers in modern technology received training as part of the package from the NGOs who supplied them with the hives in their beekeeping projects. These results suggest that acquisition of technical skills and knowledge on bee farming were likely to influence the adoption of modern beekeeping technology.

Table 6: Number of beekeepers who had received training on bee keeping per study site

Hive technology	Kyuso	Kasaala	Waita	Mulundi	Total	Percent
Traditional	2	0	1	1	4	57
Langstroth	1	0	1	1	3	43
Total	3	0	2	2	7	100

The results obtained from this study showed that 65% of the beekeepers used traditional technology while 35% were in modern technology. Among the adopters of modern technology, 48% and 4% used langstroth and KTBH respectively. Respondents gave varied reasons why they preferred particular type of technology, for traditional beekeeping, 29% of beekeepers cited affordability and availability as the main advantage, 18% cited environmentally friendly, 15% gave ease of construction and 9% cited low maintenance cost of the hives. The study revealed that 59% were practicing modern beekeeping with 20% cited ease of colony inspection, 17% gave ease to access and monitor and 15% reported improved quality of the products as the reasons for choosing this technology.

Conclusion and Recommendations

The findings of the survey indicated that adoption of improved technology of beekeeping was low as majority of the beekeepers preferred old- age traditional technology which often led to low quality products.

Beekeeping being an important livestock enterprise among the agro pastoral households in the study area has showed a notable decline in productivity attributed to recurrent drought, deforestation and inefficiency in the allocation and utilization of resources by farmers. In view of the study findings, there is need to enhance extension services through practical on farm demonstrations. Conservation programs should be undertaken for preserving and propagating trees that flower during critical months in addition to developing water resources. This would enhance the survival of bees during dearth periods. The infrastructure supporting production, processing and marketing of hive products should be developed.

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