

BEE KEEPING AND RURAL LIVELIHOOD: CONSTRUCT OF A RESEARCH MODEL THROUGH LITERATURE REVIEW

PYN SHONGDOR L. NONGBRI

Assistant Professor, Department of Business Administration, St. Anthony's College, Shillong.

Abstract:

One of the socioeconomic pursuits that offer many small-scale farmers and other rural and non-rural people a stable means of livelihood is beekeeping. It is also an environmentally friendly, sustainable source of income. The goal of this paper is to create a research model that examines the connections between entrepreneurship and beekeeping, social impact, environmental impact, and economic development.

Keywords: Beekeeping, rural livelihood, entrepreneurship and economic development, social impact, environmental impact, and research model.

INTRODUCTION

Beekeeping is one of the socio-economic activities that benefits forests and the environment, in general, is beekeeping. Bees are crucial pollinators in many environments, maintaining the sustainability of those ecosystems. Agriculture has long understood the importance of bee pollination. Even backyard beekeepers notice a noticeable increase in the harvest of their gardens: larger and more abundant fruits, flowers, and vegetables. One particular mission in Meghalaya that has the potential to significantly contribute to the promotion of livelihoods, the creation of jobs, and the alleviation of poverty is beekeeping. With the Department of Commerce and Industries, the Apiculture Mission is being launched throughout the State in a convergent fashion. The Mission was created to inspire actions that integrate with Meghalaya's biophysical characteristics to improve locals' quality of life through gainful employment (Marngar & Lyngdoh, 2014).

Beekeeping is an activity that fits very well within pre-existing agricultural practices. The main source of livelihood of the people of Mawkynrew Block is farming and due to the extreme climate conditions for the food crop, people here tend to grow exclusively horticultural products like oranges, bananas, wild fruits, areca nuts, betel leaves, pineapple, bay leave and broomstick. (The last involves broomstick monoculture that wipes out plant species and leads to soil erosion). As a matter of fact, almost all the farmers in these villages rear bees, not as an alternative means of livelihood but merely as a hobby and for personal consumption. Since bee rearing is one of the best economic activities to supplement income in the study area, I feel that there is a need to encourage beekeepers to make this activity not only as a hobby or for self-consumption but also as one of the means of generating additional income by marketing the honey they produce. This study tries to investigate the socio-economic impact of beekeeping on rural livelihood and to highlight and understand the challenges faced by the beekeepers in the study area.

The main focus of this paper is to develop a research model on the relationship between entrepreneurship and economic development, social impact, environmental impact, and beekeeping through a relevant review of the literature. The contribution to the existing literature and the implications of the model developed in this paper may include:

- a. The development of a co-relationship between entrepreneurship and economic development, social impact, environmental impact, and beekeeping and
- b. The application of the model in further research studies which are having the similar variables discussed in this paper

METHODS

Aims of the study

The aim of the study is to construct a research model on the relationship between beekeeping, entrepreneurship and economic development, social impact, environmental impact, and rural livelihood.

Design and setting of the study

In order to fulfil the aim of the study, the conceptual framework and review of literature are important aspects of the paper. These are discussed in the following paragraphs:

CONCEPTUAL FRAMEWORK

Beekeeping

Beekeeping is an art and skill of maintaining the bees in modern movable frame hives for hobby or fascination, production of hive products (honey, beeswax, etc.) and for pollination services. Apiculture is synonym of the beekeeping. It has been derived from Latin word apiscultura. Apis means "bee" and cultura denotes "cultivation through education." It is a high profit enterprise. It can be taken up both as subsidiary industry as well as a whole time profession. Beekeeping has an edge over the other agro-based subsidiary enterprises as it involves low initial expenditure and does not need elaborate infrastructure. It does not interfere with other agricultural activities and provides handsome income. It plays a great role in agricultural diversification by producing various kinds of bee products and pollination of crop. We can manage some hive at our backyard. Thus, at any stage we may sell the honey and earn some amount for our livelihood.

Rural Livelihood

Strengthening livelihoods means helping people to become less vulnerable to poverty. This is achieved by helping them to gain greater access to a range of assets, and supporting their capacity to build these assets into successful livelihood activities. People who have limited cash or financial savings often have other assets or strengths - as opposed to needs - that can be mobilized. Chambers and Conway (1992) developed what is now the accepted definition of a livelihood: "A livelihood comprises the capabilities, assets and activities required for a means

of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."

Various outcomes are possible when apiculture forms part of people's livelihood strategies (Joshi, Ahmad, & Gurung, 2002; Hilmi et al., 2011). These outcomes include generating income and creating material goods (Chantawannakul, Petersen, & Wongsiri, 2004). Beekeeping may also be perceived as a "hobby" or as a "sideline activity" (Ahmad et al., 2010; Krantz, 2001; Masuku, 2013), and though these descriptions may often be true, a resilient livelihood—one that keeps people out of poverty—has been considered a priority by the government (Chazovachii et al., 2013). In this case, apiculture and the related trades can provide a valuable source of income to countless rural people. Rather than being viewed as a hobby, beekeeping could be regarded as an important occupation and component of rural life. In rural communities, where there are limited opportunities to earn incomes, small-scale beekeeping can contribute significantly to a secure livelihood. Beekeeping also provides honey as a source of food and improves the welfare of beekeepers due to its production as new sources of income (Baumgaertner et al., 2001). Traditional beekeeping is complementary to other farming activities, and it creates diverse socioeconomic benefits by reducing the risks associated with depending solely on conventional crops and animal production for one's income (Sunderlin et al., 2008). Although residents have mixed perceptions of what constitutes the overuse of resources, tropical rural community members strongly prefer to engage in practices that are sustainable (e.g., beekeeping), and so ensure that natural products will continue to be available in the future (Swierk, & Madigoskyc, 2014; Wunder, Angelsen, & Belcher, 2014).

Creating a Livelihood from Beekeeping

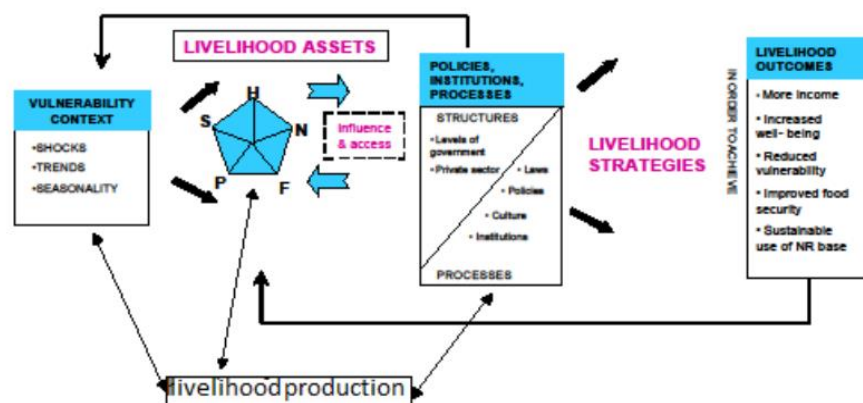
According to Chambers (1983), the skills, possessions, and activities that one engages in to support their livelihoods are their livelihoods. If a person is able to handle stress and shocks, they can live a sustainable existence. The ability to access various assets is essential to the livelihood of rural residents. All assets may be divided into one of five essential categories: human, physical, financial, social, and natural in order to allow analysis and consideration of people's various means of subsistence (DFID, 2002). One must consider their livelihood and all the various assets required, such as their abilities, physical resources, and social integration, in order to fully appreciate this. No one class of capital asset, such as finance, is sufficient in and of itself to support a living. Beekeeping improves human life in a number of ways. Lemessa (2007) asserts that utilising all five types of capital assets is necessary for successful beekeeping. In the case of beekeeping, natural capital includes bees, flowering plants, and water. Bees consume floral nectar and pollen, and the nectar eventually turns into honey. Plants that provide a habitat for nesting locations are also harvested for their gums and resins. A natural resource that can be found in the wild is bees. They gather ingredients for honey wherever they can, therefore wastelands, wild places, and even landmine areas have value for beekeeping. Therefore, beekeeping is a viable option for sustainable living in dry regions. It offers a fantastic bonus crop in addition to other crops but does not take their place of them.

Bees are the only livestock capable of harvesting nectar and pollen without being in conflict with other species (Lamessa, 2007). The most crucial element of beekeeping is the protection of natural capital through plant pollination. When bees visit flowers, they are not only gathering food for the present but are also assuring future food plants through their pollinator actions. According to Veronica (2011), beekeeping complements a variety of other livelihood activities and the natural resources they employ, including forestry, agriculture, and conservation efforts. Pollination is the most economically significant benefit of beekeeping, albeit being impossible to measure. Bees that live with flowering plants and their offspring are dependent. It is obvious that beekeeping contributes to the preservation of natural capital. While it has historically been an integral aspect of village agriculture all over the world, it must be preserved as agricultural methods evolve. Many communities have historically possessed strong knowledge of bees, honey, and the production of other goods. According to the Ethiopian case study, women use by-products from beekeeping to create supplementary goods. In some African nations, women manage their Tej (honey wine) business (Belie, 2009). Many women produce and market honey beer. This has increased the amount of human capital in the society and helped the best projects identify and develop already-existing capabilities in order to ensure sustainability and sustainable development (Mathewos, Algaresh, & Gizaw, 2004). Physical capital includes developing infrastructure, such as roads, and constructing manufacturing tools that allow people to make a living from them. For beekeeping, people use equipment like hives. The initiative wouldn't succeed if there were no other sources of funding to support the beekeeping as a physical asset. The project must use locally produced materials in order to be successful. Additionally, it might aid locals in sustaining their way of life. The business can encourage a variety of social segments, including village traders, carpenters, trailors, container manufacturers, and sellers. One of the most helpful elements in the beekeeping equipment is the simple plastic. It must be highlighted that the growth of beekeeping depends on social networks and commercial integration. The network enables beekeepers to guarantee processing, marketing, and bee protection. Higher-level network access enables the business to connect with local, national, and international networks, learn about the market, discover training resources, and promote the industry and its potential.

The development of the beekeeping business is fundamentally dependent on the availability of financial resources. This would make product packaging and production successful. For beekeeping societies to operate collection centres, purchase goods from producers, and sell in bulk, credit facilities are required. Though having access to money may be crucial for a family, substantial financial assets are not required for beekeeping at the subsistence level. A good beekeeping project will work to ensure that all capital assets that are available are taken into consideration without relying on any that are not, according to Mathewos et al. (2004). For instance, too many initiatives have made it hard for beekeepers without financial resources to use the beeswax foundation used in frame hives, which must now be imported. The Beekeepers Association of Zimbabwe (BKAZ) (2002) states that beekeeping favours or is appropriate in locations with lush forests, tall trees, and crops that provide nectar. Because Chitanga village residents share these traits, beekeeping might be seen as a co-option. Beekeeping can fit in since it is environmentally friendly, despite the fact that some activities are restricted by the

government and its quasi-agencies because they are thought to be harmful to the environment. Additionally, it produces quick profits and needs little investment. Therefore, beekeeping can help farmers reduce poverty by gaining access to necessities and goods. However, because it is such an integral part of their life, the residents should recognise the advantages that might result from it.

Figure 1: Sustainable livelihood framework (Source: Ellis, 2000)



Serrat (2008) stated that the use of sustainable livelihood management is required through the adoption of a sustainable framework, suggesting that the sustainable livelihood framework is a crucial tool that encourages a more in-depth examination of how communities make a living. It complements other strategies like integrated rural development in a comprehensive way (Serrat, 2008). The institutional framework has an impact on the five forms of capital that are contained in the mediating processes. According to Scoones (2010), it is important to examine the type and upbringing of institutional and organisational structures in order to have a thorough reflection on how livelihoods develop. Three observations about poverty serve as the foundation for this new strategy (Krantz, 2001). First, reducing poverty does not always result from economic progress. The second realisation is that poverty is challenging to quantify. It involves a variety of additional issues, such as ill health, illiteracy, and feelings, in addition to low income. More people are beginning to understand that they are the ones who can describe the nature and extent of their severity. Therefore, they ought to play a bigger role in formulating initiatives and policies. Without public involvement, livelihood outcomes, according to Serrat (2008), cannot be achieved. Structures and processes alone cannot prevent vulnerability context; it also requires an awareness of people's contexts and how resources are used.

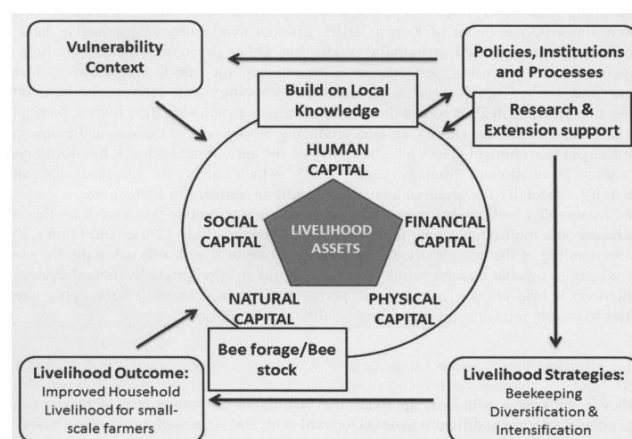
Livelihood theory (Thomas Carroll and Jim Kinsella)

It has been observed that beekeeping operations increase crop output and environmental preservation (Kerealen et al., 2009). The businesses have also piqued the interest of communal farmers, increasing engagement in rural communities. According to Mathewos et al. (2004), Africa has a favourable natural environment that honey bees can use as forages to produce honey. The production systems of beekeeping present challenges, which vary with agro-

ecological regions, cultural practises, socioeconomic circumstances, climate, and bee behaviour. Agrochemicals, a lack of morden hives, market issues, and disease prevalence are further causes (Kerealen et al., 2009). Although the framework for sustainable livelihoods aids in the identification of the capitals passed by humans and helps them with those they lack, it also aids in the reduction of poverty. The strategy, however, primarily addresses the problem of how to help and does not identify the poor. It also has a very basic understanding of how to begin and conclude initiatives. Additionally, a well-designed apiculture sector development policy in many countries today supports farmers and governments by providing modern bee hives at subsidised costs, thereby increasing the farmer's capacity (Kerealem et al., 2009).

Livelihoods thinking is a comprehensive strategy that emphasises the significance of people-centered transformation and people's access to various resources (Dorward et al., 2003). One can evaluate the contribution of a livelihood strategy, such as beekeeping in Kenya (Figure 2), to the total well-being of the household by using the livelihoods framework to examine livelihood strategies. By using this methodology, it is possible to identify five categories of household assets that are owned, controlled, claimed, or accessed by households and which, when mobilised, ultimately provide the basis for peoples' quality of life. In the case of Kenyan beekeeping farm households, these include physical assets like beehives and bee suits, financial assets like savings and credit, natural resource assets like bee stocks and bee flora, human assets (capital), including people's skills in farming and beekeeping, and social capital, which includes the networks, associations, and organisations that farmers can use to increase production or gain access to markets. Institutional arrangements and procedures including government policy initiatives, NGO development programmes, and private sector investment have an impact on realising the potential of these assets. The primary means of support for small-scale farming households in Kenya include migration, agricultural intensification, extensification, and diversification (Scoones 1998). On Kenyan small-scale farms, livelihood diversification and intensification through beekeeping are especially important.

Figure 2: Livelihoods framework applied to beekeeping by farm households in Kenya



REVIEW OF LITERATURE

Yap and Devlin (2015) opined that farmer also reported development advantages beyond increased income, like enhanced respect, better health, and healthier family relationships. Beekeeping's obvious benefits for individuals and society as a whole, its compatibility with the social norm of sharing, and the change agent's efforts to simplify the innovation and incorporate local farmers' expertise into training and extension activities are all credited with the successful diffusion. According to Marngar and Lyngdoh (2014) there is a demand for honey in the state; thus, it is necessary to encourage traditional beekeepers to embrace cutting-edge, scientific beekeeping techniques in order to boost honey production. The unemployed young must be encouraged to start a beekeeping business as a self-employment opportunity and a reliable source of income to raise their standard of living.

Chazovachii et al. (2013) determined the advantages of beekeeping, including the use of honey as food, income in the form of money, medications, the establishment of tourist attractions, and income-generating initiatives through the construction of hives and the cultivation of flowers and citrus fruits that draw bees. There developed a backward and forward connectivity of businesses. Beekeeping has been seen to increase the amount of livelihood activities in the area and provide jobs. This resulted in a diversification of livelihood possibilities and the transformation of rural areas through the use of local resources.

According to Chandolia (2020), the goal of the current study is to determine how Beekeeping (apiculture) affects farmers' incomes. Using the t-test, it was determined that farmers' incomes have significantly increased as a result of Beekeeping. In comparison to nonbeekeeping homes, Chanthayod et al. (2017) discovered that beekeeping households have a substantial marginally higher income. Beekeepers, meanwhile, expressed a strong interest in preserving forests. Chemical pesticide use, a lack of technology, and a number of other factors limit the sustainability of beekeeping. Thus, government organisations and environmental groups should encourage natural beekeeping in rural regions as a means of generating some cash and preserving the biodiversity of the area.

Fuad et al. (2019) concentrated on the fundamental ideas, abilities, and requirements for the growth of beekeeping entrepreneurship in Bangladesh, as well as the essential justifications for encouraging such development. This study provided an accurate picture of the challenges and potential for beekeeping business ventures in the Dinajpur region. In addition to enhancing beekeepers' practical expertise through training and forming beekeeper associations, institutional, entrepreneurship, and policy actions are required to improve this sector's performance. The study's main goal is to offer some strategies for developing beekeeping enterprise in order to increase the market for honey, preserve biodiversity, and finally receive a fair price.

Buyinza and Mubarik (2020) used a descriptive cross-sectional design, with a questionnaire as the main means of gathering data from 80 beekeepers in the villages of Odranga, Lukenene, Kobo, Ayuri, and Pamua. SPSS v23 was used to analyse the data. The results showed that the

biggest economic advantages of honey production included money, employment, food, pollination, and medication

Kumar et al. (2018) opined that beekeeping has shown to be a viable alternative source of income with the potential to offer smallholder farmers living in forested areas alternative income security. 500 beneficiaries from 16 villages were used as the analytic unit to determine whether farmer income increased annually. 470 beneficiaries were determined to have profited greatly from apiculture and to have established themselves through it.

Paji (2016) discovered that the majority of beekeepers had 2 to 8 years or more of experience in beekeeping, indicating that the majority of beekeepers had good experience in the field. Additionally, it was discovered that beekeeping increased the beekeepers' income and savings, which in turn enhanced the study area's residents' standard of living. Lowore (2020) demonstrate that the market's dependability and rising honey prices have improved the appeal of forest beekeeping. It was discovered that earnings are put toward farming, education, and other businesses as capital.

According to Syngkon (2017), this qualitative study's major objective was to investigate the challenges and future potential of beekeeping in Khatarshnong, Meghalaya, as this industry is more prevalent there than in other regions of the state. The development of the Khatarshnong people depends heavily on beekeeping. It is a fascinating hobby and a perfect, environmentally friendly, agro-based subsidiary business that gives farmers a primary and supplemental source of income. It offers rural residents, notably women and those without access to land, a stable source of income.

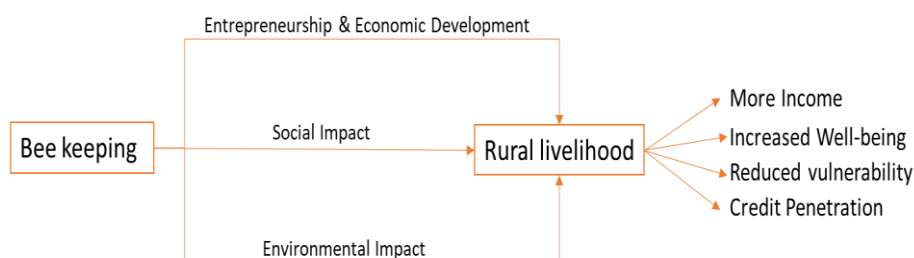
Ahikiriza et al. (2016) show that beekeeping was a primarily male occupation, and that farmers' diversification into beekeeping was motivated by livelihood resources like social, human, and financial capital. In comparison to the installed capacity of beehives, honey production was low. Honey production was influenced by variables such fodder availability, market information access, equipment sources, understanding of standard apiary management procedures, beekeeping experience, and market information access. According to Qaiser et al. (2013), there are several social and cultural hurdles that prevent women from participating in beekeeping management practises in the fields. Beekeeping enhanced keepers' income financially, however this ratio was relatively low in the targeted region. Gender-based training was required to ensure livelihood. The adoption of improved beehives was shown to be largely influenced by education and training in beekeeping. Beekeepers, middlemen, and industrial processors dominated the honey value chain. The biggest issues affecting honey producers were pests, a lack of equipment, low prices for bee products, and farm sprays. Due of high transportation expenses, low honey collection rates, and non-cash payments from customers, middlemen were restricted. Commercial processors have to deal with adulterated honey, pricey machinery, and erratic honey supplies. Therefore, efforts at commercialization should concentrate on specialised education that overcomes the value chain restrictions (Kalanzi et al., 2015).

According to Thomas and Tounkara (2020), local beekeepers will benefit from investing in modern beehive technology by having better working circumstances and producing more honey of higher quality and quantity, which will generate more money and, in turn, improve their living situations. Age, perception, and household size of respondents were the main predictors of apicultural practise for poverty reduction. As a result, purposeful extension and research support are needed to encourage use of contemporary beekeeping technology in order to increase yield, improve quality, and foster environmental sustainability as well as poverty reduction in apiculture.

THE CONSTRUCT OF A RESEARCH MODEL

Beekeeping increase the income of farmers and thereby reduce poverty by gaining access to necessities and goods. It also helps them to reduce stress and shocks and thereby decrease their vulnerability. The most crucial element of beekeeping is the protection of natural capital through plant pollination (Veronica, 2011). Beekeeping increased the amount of human capital in the society and helped to identify and develop already-existing capabilities in order to ensure sustainability and sustainable development (Mathewos, Algaresh & Gizaw, 2004). Beekeeping also enable residents to use locally produced materials and thus aid locals in sustaining their way of life. On small-scale farms, livelihood diversification and intensification through beekeeping are especially important (Scoones, 1998). For beekeepers to be successful, credit facilities are required and this has become one of the major drawbacks as most of the residents in the study areas are not link to banks/credit institutions or do not have any bank account. This will ultimately lead to the development of etrpeneur in the area of beekeeping on how to increase production, designing a marketing model to market the products and thereby sustain the livelihood of the rural people. It will also lead to the development of another important perspective, i.e. **credit penetration**- number of people being included in the financial system. Since examination of quantities can be skewed by a few large value transactions that may not accurately reflect the degree of financial inclusion, credit penetration focuses on the number of persons who are being included in the financial system rather than the amount of credit or deposit mobilised. Additionally, because people with low incomes have a higher chance of being denied credit, we propose that the number of small borrower accounts (SBAs) would be a better way to quantify credit penetration and gauge the level of financial consumption (Bhanot & Bapat, 2016). The following figure below (figure 3) illustrates the model of the research study.

Figure 3: Research model



Source: Developed by the researcher

Based on the said model, the following hypotheses are framed for those studies that might adopt the model.

H₀ 1: There is no creation of entrepreneurial activities through beekeeping.

H₀ 2: There is no correlation between rural livelihood and beekeeping.

H₀ 3: There is no economic development through beekeeping.

H₀ 4: There is no socio-economic impacts of beekeeping.

H₀ 5: There is no environmental impact of beekeeping.

CONCLUSION

This paper is only to develop a research model on the relationship between beekeeping, entrepreneurship and economic development, social impact, environmental impact and rural livelihood. Some relevant hypotheses were also framed based on the developed research model. Both the research model and hypotheses might be useful to study the relationship between the above-mentioned variables.

REFERENCES

- Ahmad, F., Gurung, M. B., Khan, S., & Partap, U. (2010). Honeybees, pollination and livelihoods. Mountain Development Resource Book for Afghanistan, 25–33. Retrieved from http://afghanag.ucdavis.edu/c_livestock/bees/Rep_Honeybees_Pollination_Livelihoods_Afghanistan_ICIM_OD.pdf
- Akratanakul, P. (1990). Beekeeping in Asia. FAO (Food and Agriculture Organisation of the United Nations), Agricultural Services.
- Ahikiriza, E. . e. al. (2016). Faculty of Bioscience Engineering Beekeeping as an alternative source of livelihood in Uganda. Journal Article, 22–38.
- Ajao, A. M., & Oladimeji, Y. U. (2013). Assessment of contribution of apicultural practices to household income and poverty alleviation in Kwara State, Nigeria. International Journal of Science and Nature, 4(4), 687–698. <http://www.scienceandnature.org>
- Bees for Development. (2000). ApiTrade Africa statement. www.beesfordevelopment.org.

- Bradbear, N. (2003). Beekeeping and sustainable livelihood. Agriculture supply system division. Rome: Food and Agricultural Organization. Bradbear, N. (2009). Bees and their Role in Forest Livelihood. Rome: Food and Agricultural Organization.
- Carroll, T., & Kinsella, J. (2013). Livelihood improvement and smallholder beekeeping in Kenya: the unrealised potential. *Development in Practice*, 23(3), 332–345. <https://doi.org/10.1080/09614524.2013.781123>
- Chandolia, S. (2020). Impact of bee farming on the income of farmers. 03(02), 157–162.
- Chanthayod, S., Zhang, W., & Chen, J. (2017). People's perceptions of the benefits of natural beekeeping and its positive outcomes for forest conservation: A case study in Northern Lao PDR. *Tropical Conservation Science*, 10. <https://doi.org/10.1177/1940082917697260>
- Chantawannakul, P., Petersen, S., & Wongsiri, S. (2004). Conservation of honeybee species in South East Asia: *Apis mellifera* or native bees? *Biodiversity*, 5, 25–28.
- Chazovachii, B., Chuma, M., Mushuku, A., Chirenje, L., Chitongo, L., & Mudyariwa, R. (2012). Livelihood Resilient Strategies through Beekeeping in Chitanga Village, Mwenezi District, Zimbabwe. *Sustainable Agriculture Research*, 2(1), 124. <https://doi.org/10.5539/sar.v2n1p124>
- Crane, E. E. (2013). *The world history of beekeeping and honey hunting*. Routledge.
- Daba, F. B., & Wolde, A. O. (2016). The significance of honey production for livelihood in Ethiopia. *Journal of Environment and Earth Science*, 6(4), 46–53.
- Das, T. K., Samajdar, T., & Marak, G. (2015). Quality Evaluation of Honey from Stingless Bee (*Trigona* sp) Reared by Garo Tribes in West Garo Hills of Meghalaya . *Journal of Krishi Vigyan*, 4(1), 91. <https://doi.org/10.5958/2349-4433.2015.00069.0>
- Famuyide, O., Adebayo, O., Owese, T., Azeez, F. A., Arabomen, O., Olugbire, O. O., ... Ojo, D. (2014). Economic contributions of honey production as a means of livelihood strategy in Oyo State. *International Journal of Science and Technology*, 3, 7–11.
- Farooq, A., Joshi, R. S., & Guring, M. (2007). *Farm children and agricultural productivity*: Kathmandu, Nepal: ICIMOD
- Fuad, M. A. F., Nurhasan, M., & Kayess, M. O. (2019). Potentials and Prospects of Beekeeping Entrepreneurship in Dinajpur Region: A Participatory Analysis. *Agricultural Research & Technology: Open Access Journal*, 21(5), 209–213. <https://doi.org/10.19080/ARTOAJ.2019.21.556178>
- Hilmi, M. (2012). *Beekeeping and sustainable livelihood*. Rome: Food and Agricultural Organization.
- Hilmi, M., Bradbear, N., & Mejia, D. (2011). *Beekeeping and sustainable livelihoods*. FAO. Retrieved from <http://www.fao.org/3/a-i2462e.pdf>
- Joshi, S. R., Ahmad, F., & Gurung, M. B. (2002). Retreating indigenous bee populations (*Apis cerana*) and livelihoods of Himalayan farmers. In *Sixth Asian apiculture association international conference*, Bangalore, India, Vol. 24. Retrieved from <http://www.icimod.org/?q=1509>
- Krantz, L. (2001). *The sustainable livelihood approach to poverty reduction*. SIDA. Division for Policy and Socio-Economic Analysis. Retrieved from <http://www.fao.org/3/a-av141e.pdf>
- Kumar, V., Sahu, N., & Dhruw, S. K. (2018). Beekeeping as a livelihood for rural people of district Dantewada. *International Journal of Research and Analytical Reviews*, Vol. 5(4); 2018.
- Lietaer, C. (2009). Impact of beekeeping on forest conservation, preservation of forest ecosystems and poverty reduction. In *XIII World Forestry Congress* (pp. 18–23). Argentina.
- Lowore, J. (2020). Understanding the Livelihood Implications of Reliable Honey Trade in the Miombo Woodlands in Zambia. *Frontiers in Forests and Global Change*, 3(March), 1–16.

<https://doi.org/10.3389/ffgc.2020.00028>

Malkamäki, A., Toppinen, A., & Kanninen, M. (2016). Impacts of land use and land use changes on the resilience of beekeeping in Uruguay. *Forest Policy and Economics*, 70, 113. doi:10.1016/j.forpol.2016.06.002

Martin Hilmi, N. B. and D. M. R. (1810). Beekeeping and sustainable livelihoods Beekeeping and sustainable.

Masuku, M. B. (2013). Socioeconomic analysis of beekeeping in Swaziland: A case study of the Manzini Region, Swaziland. *Journal of Development and Agricultural Economics*, 5, 236–241.

Minja, G. S., & Nkumilwa, T. J. (2016). The Role Of Beekeeping On Forest Conservation And Poverty Alleviation In Moshi Rural District, Tanzania. *European Scientific Journal*, ESJ, 12(23), 366. <https://doi.org/10.19044/esj.2016.v12n23p366>

Mkamba, G. (2013). An Overview of Forest and Beekeeping Sub-sector : Achievements, Challenges and Priorities for Financial year. Tanzania: Ministry of Natural Resources and Tourism.

Monga, K., & Manocha, A. (2011). Adoption and constraints of beekeeping in district Panchkula (Haryana), India. *Livestock Research for Rural Development*, 23(5), 3

Mubarik, A., & Buyinza, M. (2020). Drivers of honey production and its effects on rural livelihoods in Odravu Sub-country, Yumbe district, Northern Uganda. *International Journal of Environmental & Agriculture Research*, Vol 6(2); 2020.

Munthali, S. M., & Mughogho, D. E. C. (1992). Economic incentives for conservation: beekeeping and Saturniidae caterpillar utilization by rural communities. *Biodiversity and Conservation*, 1(3), 143–154. <https://doi.org/10.1007/BF00695912>

Mwakatobe, A. R. (2001). The Status of Honey Trade – Domestic and International Markets. Arusha: Tanzania Wildlife Research Institute.

Mwakatobe, A. and Mlingwa, C. (2006). Tanzania-The status of Tanzanian honey Trade- Domestic and International Markets. Tanzania Wildlife Research Institute, Arusha, Tanzania, 0(27), 1–13.

Nielsen, A., & Chanhomphou, V. (2006). Needs and potential for rural youth development in Lao PDR. Food and Agriculture Organization of the United Nations Regional Office for Asia and The Pacific. Retrieved from <http://www.fao.org/docrep/009/ag106e/AG106E03.htm>

Oluwole. Assessment of traditional beekeeping for poverty alleviation in Patigi local government area of Kwara state, Nigeria. *International of science and Nature*, 4, 687–698.

Pettis, J. S., Johnson, J., & Dively, G. (2012). Pesticide exposure in honey bees results in increased levels of the gut pathogen *Nosema*. *Naturwissenschaften*, 99, 153–158.

Potts, S. G., Biesmeijer, J. C., Kremen, C., Neumann, P., Schweiger, O., & Kunin, W. E. (2010). Global pollinator declines: trends, impacts and drivers. *Trends in Ecology & Evolution*, 25, 345–353.

Qaiser, T., Ali, M., Taj, S., & Akmal, N. (2013). IMPACT ASSESSMENT OF BEEKEEPING IN SUSTAINABLE RURAL LIVELIHOOD Tabinda Qaiser, Murad Ali, Sajida Taj and Nadeem Akmal. *Journal of Social Sciences*, COES&RJ-JSS, 2(April). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2246417

Richards, K. W., & Kevan, P. G. (2002). Aspects of bee biodiversity, crop pollination, and conservation in Canada. In: P. Kevan, & F. V. L. Imperatriz (Eds.). *Pollinating bees—the conservation link between agriculture and nature* (pp. 77–94). Brasilia, Brazil: Ministry of Environment.

Rusch, N. (2020). Agave honey bee log hive: A response to pollinator stress and a move towards darwinian and natural methods of beekeeping. *Bee World*, 97(1), 2–5. doi: 10.1080/0005772X.2019.1681872.

Sub-country, O., Mubarik, A., & Buyinza, M. (2020). Drivers of honey production and its effects on rural livelihoods in. 2, 35–44.

Terry, S., & Ousseynou, N. (2004). Forest products, livelihoods and conservation. Case studies of NWFP system. *Journal of Science and Technology*, 2, 1–3.

Thomas, K. A., & Tounkara, S. Y. (2020). Apiculture and Poverty Reduction Nexus: Evidence From Rural Households in Sikasso Region of Mali. *Bee World*, 97(1), 10–16. <https://doi.org/10.1080/0005772x.2019.1692416>

URT. (1998). National Beekeeping Policy. Tanzania: United Republic of Tanzania.

Vercelli, M., Novelli, S., Ferrazzi, P., Lenthini, G., & Ferracini, C. (2021). A Qualitative Analysis of Beekeepers' Perceptions and Farm Honey Bees. *Insects*, 12(228), 1–11.

Yap, N. T., & Devlin, J. F. (2015). Beekeeping innovation for sustaining rural livelihoods. A success story. *International Journal of Innovation and Sustainable Development*, 9(2), 103–117. <https://doi.org/10.1504/IJISD.2015.068771>