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**THE EFFECT OF FARMER CHARACTERISTICS ON ENTREPRENEURIAL
BEHAVIOR OF BEEKEEPERS IN KIBWEZI WEST SUB COUNTY, MAKUENI
COUNTY**

MARGARET MBESA STRONG

95829

**Dissertation submitted in partial fulfillment for the award of the degree of Master of
Management in Agribusiness, Strathmore University**

October 2020



DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other university. To the best of my knowledge and belief, the research dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

Name: Margret Mbesa Strong

Registration Number: 95829

Signature.....

Date.....

SUPERVISOR APPROVAL

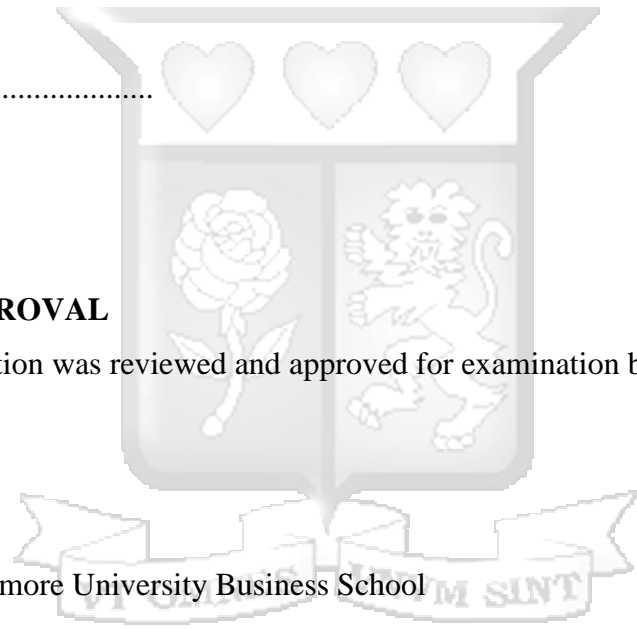
This research dissertation was reviewed and approved for examination by:

Dr. Simon Ndiritu

Senior lecturer, Strathmore University Business School

Date _____

Signature _____



ABSTRACT

Agriculture plays a major role in the Kenyan economy through its significant contribution to the GDP, a foreign currency earner, supplier of raw materials to the processing and manufacturing sector as well as contributing to the food security in the country. In addition, the sector supports rural livelihoods through farm entrepreneurship and farm-generated employment thereby alleviating poverty levels in the rural population. Beekeeping is an important form of farming especially in the ASAL regions of the country where there are frequent occurrences of crop failure. The beekeeping subsector in Kenya is unable to satisfy the growing demand of honey in local, regional and global markets, producing 25 per cent of the national potential. The study sought to focus on beekeeping farmers and investigated their entrepreneurial behaviour, in that despite the huge market opportunity to commercialize their farm enterprises, the farmers operate at a subsistence level. The study aimed at establishing the effect of farmer characteristics on entrepreneurial behavior among bee farmers in Kibwezi West sub-county, Kenya. The study's specific objective was to evaluate the effect of socio economics, psychological factors, group participation, and beekeeping management practices, on entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County, Makueni County. The study was guided by the human capital entrepreneurship theory and the McClelland's human motivation theory. The study applied descriptive research design. The study utilized purposive sampling technique to select 272 beekeepers from a target population of 816 beekeepers in Kibwezi West subcounty. Data was collected using a pretested questionnaire. The study realized a response rate of 83 per cent. The primary data collected was analyzed by applying descriptive and inferential statistical analysis utilizing SPSS statistical software. Data was presented using tables. Regression results indicated that age, education, number of beehives, psychological factors, and extension participation, had a positive and significant effect on entrepreneurial behaviour. Psychological factors and extension participation had high significant influence on entrepreneurial behaviour whereas age, education and number of beehives had a marginal effect. The beekeeping farmers were found to have moderate entrepreneurial behaviour. The study therefore recommends that entrepreneurship development programs targeting beekeepers should prioritize the enhancement of psychological motivation levels of beekeepers namely economic motivation and market orientation, through training and market linkages. In addition, more opportunities for extension participation should be provided, specifically through peer learning via farm visits and practical demonstration of beekeeping management practices – these factors were associated with higher farmer extension participation.

Keywords: farmer characteristics, entrepreneurship behaviour, beekeeping

DEDICATION

I dedicate this work to my husband James and my children Michelle and Jeremy, for supporting me emotionally and financially through the course of this study. Thank you for your patience and words of encouragement.



ACKNOWLEDGEMENTS

First and foremost, I wish to thank God Almighty for giving me the strength, knowledge, ability and opportunity to undertake this research study. I also wish to thank my supervisor Dr. Simon Ndiritu for his invaluable guidance and input during the course of writing this dissertation. Special thanks to Nyati syndicate group members, classmates, lecturers and the library staff for their support. I also thank my family and friends for their support, prayers and words of encouragement during the period of my studies.

I wish to also thank the Makueni County government and other stakeholders for their assistance throughout the research process. Lastly, I wish to thank all respondents who took their time to participate in the research as well as the research assistants who helped in data collection.



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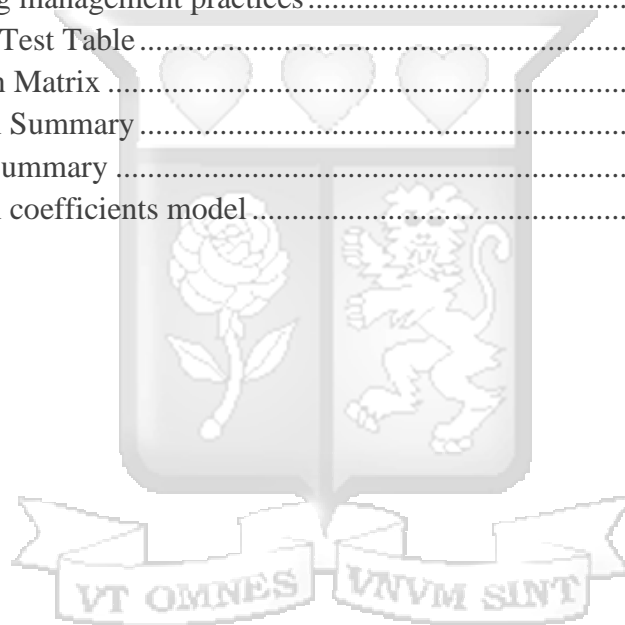
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ABBREVIATION AND ACRONYMNS

ASAL:	Arid and Semi-Arid Land
CIPD:	County Integrated Development Plan
FAO:	Food and Agricultural Organization of the United Nations
GDP:	Gross Domestic Product
GOK:	Government of Kenya
IPM:	Integrated Pest Management
KALRO:	Kenya Agricultural and Livestock Research Organization
KES:	Kenyan Shilling
KIPPRA:	Kenya Institute for Public Policy Research and Analysis
KTBH:	Kenya Top Bar Hive
MALF:	Ministry of Agriculture, Livestock and Fisheries
SSA:	Sub Saharan Africa
USD:	United States Dollar
WB:	Word Bank



DEFINATION OF TERMS

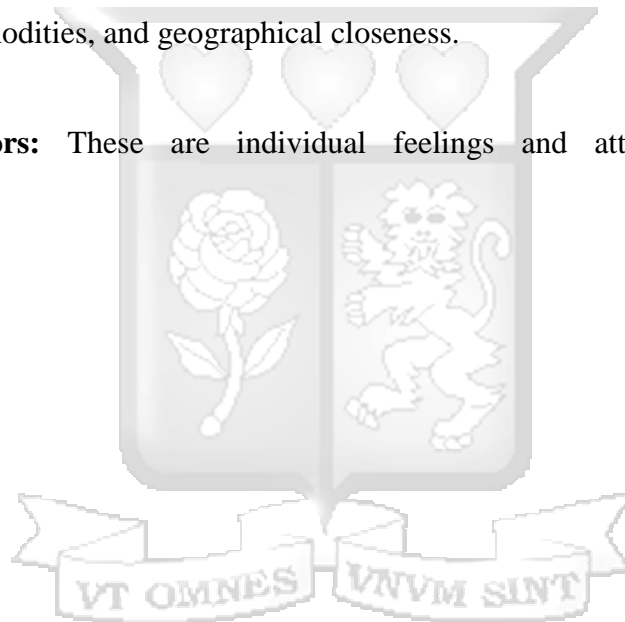
Apiary: This is the area in the farm where the beehives are kept.

Apiculture: This is another word for beekeeping. It is the management of bees in beehives in order to produce honey, beeswax, pollen and propolis.

Entrepreneurial Behaviour: This is human behaviour that is evident through identification of business opportunities and leveraging on these opportunities to start or grow a business enterprise.

Group Participation: Engagement of a farmer with other individuals on the basis of mutual interest, similar commodities, and geographical closeness.

Psychological Factors: These are individual feelings and attitudes towards farm entrepreneurship.



CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Contemporary issues such as changing consumer buying patterns, compliance with stringent environmental policies, climate change, adherence to product quality standards, supply chain management, food safety and sustainability have been postulated to impact on agricultural enterprises operations (Lans, Seuneke, Wageningen, & Klerkx, 2013). Farmer entrepreneurship has been acknowledged as remedy to agricultural challenges facing farmers. Mukasa, Nalmansi and Atim (2016) argued that the agricultural sector is endowed with numerous opportunities that farmers can exploit, however the ability of the farmers to exploit these opportunities is hampered by the failure to take risks, innovate and expand farm enterprises, therefore necessitating the need to improve the level of farmers' entrepreneurial capacity and acumen.

Agriculture is the main driver of overall growth in many nations in Sub Saharan Africa (SSA) and plays a key role in poverty reduction and food security (Afenyo, 2012). The author argued that sustainable poverty alleviation is dependent on sustained economic growth, which cannot flourish in noncompetitive industries, consequently implying that agriculture must become competitive to enable small scale farming to successfully tackle poverty and food security in SSA. Benjamin (2018) further asserted that in Africa, entrepreneurship has the potential to unlock opportunities in agribusiness and spur economic growth and development in the continent. According to Kamara, Conteh, Rhodes, and Cooke (2019) small-holder farmers in Africa are uninformed and unaware on ways in which they can address complex demands of business in agriculture; this is illustrated by the existence of over 80 per cent of farmers practicing subsistence farming – an indicator of lack of skills and resources to participate in commercialized agriculture.

The centrality of the agricultural sector as an important driver towards the achievement of Kenya's economic, social and environmental goals cannot be underestimated. The sector contributed 31.5 per cent to the national Gross Domestic Product (GDP) and in addition it provided 75 per cent of total employment in Kenya, representing the largest employer in the country (KNBS, 2018). Due to the high level of employment and its role as being a major source of livelihood in rural areas, agriculture is a key contributor to poverty reduction in Kenya. A World Bank report confirmed that households that exclusively engaged in

agricultural related activities contributed 31.4 per cent to poverty reduction in the rural areas which signifies the importance of the sector as the main source of income for both poor and non-poor households in rural communities (WB, 2019).

Beekeeping plays a significant role in sustainable agriculture where it promotes sustainable livelihoods through income generation for marginal and smallholder farmers together with other actors along the value chain (Raj & Jhariya, 2017). In Kenya the promotion of beekeeping has been advocated among marginalized rural communities who do not have access to good soils and inputs as a livelihood diversification strategy for small scale farmers (Carroll & Kinsella, 2013). However majority of farmers remain as marginal entrepreneurs due to low risk orientation, innovation and lack of a desire to grow their farms (Mukasa et al., 2016). It is for this reason that the current study sought to determine the effect of farmers characteristics on entrepreneurial behaviour of beekeepers; as alluded earlier by Kamara et al. (2019) sustainable livelihoods for small scale farmers are linked to embracing a commercially oriented form of farming and moving away from subsistence farming.

1.1.1 Entrepreneurial Behaviour

Entrepreneurial behaviour is “the study of human behaviour involved in identifying and exploiting opportunities through creating and developing new ventures as well as exploring and creating opportunities while in the process of emerging organizations” (Bird & Schjoedt, 2009). The entrepreneurship process necessitates the demonstration of distinct behavioural characteristics by entrepreneurs. Entrepreneurial behaviour is therefore noted as a display of specific characteristics that incorporate initiation of a new business and its subsequent successful management ((Muhammad & Junaid, 2016) .

Constructs that constitute an entrepreneurial behaviour have been identified in existing literature as need of achievement, internal locus of control, risk tolerance, proactivity, creativity and innovation, emotional intelligence, passion for entrepreneurship, planning and entrepreneurial alertness (Rauch & Frese, 2009; Frese & Gielnik, 2014). Nandapurkar (1982) measured entrepreneurial behaviour characteristics of small holder farmers by innovation, farm decision making, knowledge of farming enterprise, information seeking, risk taking, ability to coordinate, leadership ability, assistance of management services, cosmopolitaness and achievement motivation.

Chaudhari., Hirevenkanagoudar, Hanchinal and Mokashi (2007) further examined the entrepreneurial behaviour characteristics of farmers and advanced the characteristics developed by Nandapurkar (1982) by replacing certain characteristics specifically, knowledge of farming enterprise, leadership ability, assistance of management services with planning ability and self-confidence characteristics. Subsequent studies investigating the entrepreneurial behaviour of farmers have adopted most of the characteristics outlined by the study. Entrepreneurship behaviour has been operationalized as a composite skill, derived from the combination of several qualities and traits (Chaurasiya, Maratha, & Badodiya, 2017) (Lawrence & Ganguli, 2012; Mehta & Sonawane, 2012; Boruah, Borua, Deka, Borah, & Gossaigaon, 2015; Wanyonyi & Bwisa, 2015; Chaurasiya, Maratha, & Badodiya, 2017; Benjamin, 2018; Wanole, 2018).

Innovativeness has been cited by Stephency and Vengatesan (2018) as the manner in which an individual is willing to change and try new ideas. In the current study innovativeness measured the extent to which a farmer adopts new practice or technology in order to improve the farm operations. Risk orientation has been established to be the level of comfort or discomfort an individual faces when encountering uncertain benefits or losses (Ehrlich & Maestas, 2010). Risk orientation component in the current study measured the degree to which an entrepreneur is willing to allocate business resources to acquire recommended technologies as well as engage in activities that have a reasonable probability of failure (Henk, 2015; Stephency & Vengatesan, 2018).

Decision making has been outlined as the process of generating and selecting alternatives based on the values and preferences of the decision maker (Ahuja, Singh, Sangwan, & Gautam, 2017). The current study measured the decision-making component as the capability of an entrepreneur to formulate several options to a business challenge facing the enterprise and have the ability select best suited option. Psychologist McClelland (1961) conceptualized achievement orientation as a desire to succeed, whereby individuals set very high challenging targets for themselves and strived to achieve them. Measure for achievement orientation was demonstrated by the manner in which an entrepreneur intentionally sets long term goals for the enterprise and develops strategies geared to accomplishing the outlined goals.

Planning ability are essential skills for entrepreneurs to possess, these skills enables them manage their enterprises with success (Arasti, Fakhrisadat, & Imanipour, 2014). The authors

further noted that planning entails the logical sequence of appropriate actions that an entrepreneur undertakes in order to achieve a set target and task. Measurement for planning ability include the day to day plans, both informal or formal, made by the entrepreneur towards accomplishing a certain task. Lastly information seeking behaviour is operationalized as the manner in which people look for information and their ability to utilize this information (Bates, 2010). An entrepreneurial information seeking behaviour constitutes how entrepreneurs scan their surroundings for information with a mission to identify viable opportunities (Marvel, 2013; Frese & Gielnik, 2014). Measures for this component in the current study was the degree to which an entrepreneur utilizes information avenues when gathering information that is relevant for the successful operation of the enterprise.

The entrepreneur behaviour of beekeepers in this current study was operationalized and measured using six components namely, innovativeness, risk orientation, decision making ability, achievement oriented, planning ability and information seeking behaviour. These components were adopted based on their empirical application to studies that focused on entrepreneurial behaviour of farmers.

1.1.2 Farmer Characteristics

Farmers are defined as individuals who rely on farming as their major source of income and practice farming on either a part time or full time basis (Vik & McElwee, 2011). Empirical studies on entrepreneurial behaviour of farmers have alluded to four farmer characteristics that indicate a correlation with entrepreneurial behaviour (Mehta & Sonawane, 2012; Wanyonyi & Bwisa, 2015; Porchezhiyan, Umamageswari, & Manjunatha, 2016). These empirical studies have posited that personal variables, socio economic variables, communication variables and psychological variables influence entrepreneurial behaviour of farmers.

Socioeconomic status is an indicator which encompasses an individual's economic and social standing in the community in relation to other members (Fillit, Rockwood, & Woodhouse, 2010). Studies conducted by Food Agricultural Organization (FAO) established that socioeconomic characteristics of farm households comprised: age of house head, age of the farmer, gender, education level, family size, off farm income, annual income, farming experience of the farmer, farming system observed by the farmer, technical agricultural production training, business training, distance from the road and also from the nearest market (Delgado, Narrod, & Marites, 2003). These characteristics typically assist with the profile

assessment of farmer entrepreneurs. For the purposes of the current study personal variables and socioeconomic variables have been combined together under the variable farmer socioeconomic characteristics guided by the FAO definition. Demographic characteristics can be referred to as socioeconomic characteristics.

The current study examined the following farmer socioeconomic characteristics of beekeepers and sought to establish their effect on the farmers entrepreneurial behaviour; age, gender, education level, family size, annual income, family size, beekeeping experience, annual income, land size, apiary ownership, number of beehives, and honey produced. The characteristics were operationalized as follows; age defined as the number of years since birth, gender was denoted as either male or female, education level was interpreted as completed years in formal education, family size represented the number of men, women and children residing together as a family, beekeeping experience referred to the number of years the farmer has engaged in beekeeping. Annual income was analyzed as a combination of income earned away from the farm also known as off income and on farm income which entailed income from both beekeeping and other farming enterprises. In addition land size was determined as the total acreage owned by the farmer, apiary ownership referred to a existence of a central location where beehives were mounted, the number of beehives was stipulated by the sum total of beehives owned by the farmer, lastly honey produced was indicated by the quantity of honey harvested in the year under investigation (Chaudhari, 2006; Mehta & Sonawane, 2012; Natukunda & Kugonza, 2012; Boruah et al., 2015; Pongener & Jha, 2020) The sub variables incorporated under the socio-economic characteristics depicted the profile of beekeeping farmer based on the aforementioned empirical literature were.

Socio economic characteristics of entrepreneurs are important factors that have been cited to have a profound effect on entrepreneurial behaviour. Kerr, College and Kerr (2017) noted that demographic and human capital factors constituting most socioeconomic characteristics have an influence on the resultant behaviour of entrepreneurs. The Human capital entrepreneurship theory further states that socioeconomic characteristics specifically age, education and work experience influence entrepreneurial behaviour. Individuals with comparable socioeconomic characteristics may have different behavioural outcomes. Presumptions that infer that certain demographic characteristic lead to similar experiences in life have been criticized (as cited in Misra & Kumar, 2000) The current study sought to investigate the effect of farmer socioeconomic characteristic on the entrepreneurial behaviour of beekeepers in Kibwezi west

subcounty based on the uniqueness of individual characteristics which has been noted to generate varying results on behaviour.

Psychological factors refer to the underlying cognitive motivational factors that guide one's behavior in a given context (Deutsch, 2011). Two constructs are considered in operationalizing psychological factors – market orientation and economic orientation. Market orientation relates to the crafting of produce and practices after the identified requirements of a target market (Mahmoud et al., 2016). In the current study, market orientation refers to the intent of commercial production of honey for sale to the market as opposed to subsistence farming by small scale farmers (Kahan, 2013). The effort made by small scale farmers to sell their farm produce to customers via various marketing avenues has also been viewed as a market orientation attribute in the agricultural sector (Heenkenda & Chandrakumara, 2016).

The second psychological factor is the economic orientation of farmers. This is defined as farmers' driving desire to improve their financial status (Stephency & Vengatesan, 2018). It also relates to the drive by an individual to derive financial benefits associated with an endeavor (Shava & Chinyamurind, 2019). Small scale farmers generally earn low incomes which affect their personal livelihoods and the survival of their farming enterprises. Kahan (2013) posits that the future of small-scale farmers is uncertain unless farmers adopt a more entrepreneurial operation of their farm enterprises which entails a progressive approach to produce for the market and increase farm profits. The two psychological factors are considered in the current study as evidenced by extant literature, farmers with high ratings on either sub-variable are likely to score highly on entrepreneurial behavior. Psychological factors are important determinants of entrepreneurial behaviour and therefore, the current study sought to establish their effect on entrepreneurial behaviour of beekeepers in Kibwezi West sub county.

Communication variable refers to the extent to which an individual will seek out information sources individually or by participating in activities organized by institutions that disperse beneficial information targeted to enhance the operation of an enterprise (Chaudhari, 2006) In Kenya, beekeepers typically form groups at the community level for better organization and coordination (Carroll & Kinsella, 2013). Farmer groups are avenues of information exchange among farmers and from agricultural officers (Gebru, Yared, & Gebremichael, 2017). It is for this reason that the current research has adopted the term farmer group participation instead of communication factors. Farmer group participation as encapsulated in the current study entails

engagement of a farmer with other individuals on the basis of mutual interest, similar commodities, and geographical closeness (Ibnu, Offermans, & Glasbergen, 2018).

Two constructs are considered under farmer group participation and both relate to interaction between the farmer and networks. These are social participation and extension participation. Social participation is the extent to which an individual is involved in activities in collaboration with others in the community (Piškur et al., 2014). The construct thus speaks to the extent to which bee farmers engage one to another in the bid to ensure increased yield of produce and market access. Kayina et al., (2018) posit that the factor has a positive impact on the entrepreneurial behavior of farmers; their study was however conducted among dairy farmers, a different population with regard to the management practices and capital requirements involved in the two agricultural pursuits. The current study thus seeks to investigate the validity of this construct as an influencer of entrepreneurial behaviour among bee farmers. The specific sub-variables under consideration in the study included; participation in a bee farm group, cooperative participation, bulk-buyer group participation, NGO involvement, and saving group involvement.

Extension participation encourages exchange of information and skills among farmers and with agricultural officer and it has been shown to influence the adoption of new technologies and best practices (Jack, Adenuga, Ashfield, & Wallace, 2020). Extension participation tangles the challenges faced by rural farmers in information asymmetry of new agricultural practices and technology. Participation improves farm yield and increases the resilience of farmers livelihoods (Suvedi, Ghimire, & Kaplowitz, 2017). The specific constructs under consideration in the study included; beekeeping training programs, field visits to other bee farms, demonstration on beekeeping and business/ entrepreneurship training. The construct was found to contribute towards entrepreneurial behavior (Porchezhiyan et al., 2016). The study was however conducted among dairy farmers, as was the case with social participation, hence the current study seeks to establish the validity of the factor's influence among beekeepers.

According to Dillon (1980), farm management practices involve the processes employed to manipulate situations and resources in the bid to achieve a farmer's goals. Review of existing literature outlined beekeeping management practices to constitute apiary and beehive management essential routine activities that ensure the achievement of optimal honey yield and quality products (AU-IBAR, 2016). Beekeeping management practice entails; use of bee

tools to harvest honey, wearing of bee protective suit during honey harvesting, cleaning beehives, clearing bushes in the apiary or near hives, hive inspection, provision of water and supplementary feeding during the dry seasons. Other practices include planting trees or vegetation that act as bee forage, and lastly use of integrated pest management (IPM) on crop management which reduces pesticide residuals harmful to bees (Extension, 2019; Infonet-Bivision, 2019; Amulen et al., 2019)

Adherence to beekeeping management practices have led to farmers exhibiting entrepreneurial behaviour characteristics. The willingness for beekeepers to incorporate best practices in bee farm management demonstrate their innovativeness (Stephency & Vengatesan, 2018). Adoption of new beekeeping practices means disregarding old way of farming and applying best practices. Apiary and hive management are labour intensive activities which are time consuming especially when diagnosing and managing pest and diseases (Kajobe, Kato, Otim, Kasangaki, & Abila, 2016). Amulen et al., (2019) recommended routine inspection of hives and noted that honey harvesting from 22 hives can take up to five hours. Beekeeping is practiced as an alternative farming enterprise often a small component of the farm enterprise however it compete for attention with other farm and off farm income generating activities (Kajobe et al., 2016). This therefore infers that execution of beekeeping management practices requires farmers to possess planning and decision making abilities to balance the allocation of time and labour as a resource, all across the various incoming generating activities.

Beekeeping management practices requires financial resource allocation. Moinde (2016) observed that the introduction of beekeeping farming at the subsistence level is a low capital engagement, however considerable financial investment is necessary for the development of beekeeping enterprises particularly procuring production equipment namely, modern beehives and accompanying tools and processing equipment. McMEnamin et al., (2017) and Hecklé, Smith, Macdiarmid, Campbell and Abbott (2018) cited risks associated with beekeeping to be: unpredictable pests' invasion, absconding of bees from beehives, pesticide use, climate variability and unstructured market channels, most of these are outside the control of the farmer with no guarantee for the return on the investment . Despite these risks, farmers investing on beekeeping management practices display risk orientated behaviour based on their willingness to take risks. The current study sought to investigate the effect of the beekeeping management practices on the entrepreneurial behaviour of beekeepers because it is paramount to the commercialization of the beekeeping enterprises.

1.1.3 Overview of Beekeeping in Kenya

Beekeeping is the maintenance of honeybees and hives providing farmers and hobbyists with a variety of enterprises including production of beeswax, honey and other edible bee products; crop pollination services and sale of bees to other beekeepers (USDA, 2019). Beekeeping is a low capital investment, requires small space to set up an apiary, has low labour needs, it does not require soil and the modern beekeeping hives can be managed by women and the youth. It is for these reasons that beekeeping has been used as a pro poor income generating agricultural activity to alleviate poverty in marginalized communities (Berem, 2015).

In Kenya beekeeping is practiced in arid and semi-arid areas (ASAL) which often experiences crop failure due to unreliable rainfall. This alternative form of farming has been an important source of resilient income and food to rural communities living in these areas becoming an important contributor to food security and livelihoods in ASAL (MALFI, 2019). Eighty per cent of the country comprises of ASAL meaning that this system of farming is ideal and can be successfully practiced across the country. Beekeeping is predominantly practiced in Baringo, Kitui, Mwingi, Machakos, Makueni, North Eastern, West Pokot, Western and Coastal regions (Chemwok, Tuitoek, & Nganai, 2019; KNA, 2019).

The subsector directly employs 91,000 people which translates to 547,400 people supported by apiculture across the country (KIPPRA, 2019). Kenya has the potential to produce 100,000 metric tonnes per annum, against the current annual production of 25,000 metric tonnes (KIPPRA, 2019). The low honey production in Kenya is attributed to a number of factors which include: climate change, degradation of bees habitat through manmade activities such as cutting of trees, use of poor quality hives, inadequate knowledge on beekeeping practices, lack of markets and market information, lack of new entrants in comparison to those moving out of beekeeping and lastly beekeeping has been unattractive to women and the youth because of the perceived risks like falling from trees and bee stings (Hecklé et al., 2018). Data on honey production in 2017 ranked Kenya fourth in Africa, while Ethiopia was the first in Africa and tenth in the world producing 50,000 tonnes of honey, this was followed by Tanzania producing 30,584 tonnes and Angola came third with 23,411 tonnes (FAOSTAT, 2018).

Makueni County has a vibrant beekeeping livestock sub-sector with farmers producing 110,00kgs of honey yearly. The county government has embarked on several programs that will propel the county to achieve an annual production of 180,000 kgs over the medium term

(Makueni County, 2018). The county government of Makueni through its 2018 – 2022 County Integrated Development Plan (CIDP) selected honey development as a key priority area of focus for the economic empowerment of the farmers in the county. The plan seeks to commercialize beekeeping citing the county's honey production potential and the growing local and international demand of honey. A recent report by Ministry of Agriculture, Livestock and Fisheries Development indicated that there are approximately 816 beekeepers in Kibwezi West Sub-county (Makueni County, 2020). The region has been chosen as the point of focus for the current study because it offers huge potential for upscaling of bee farming activities and the income generated would be pivotal to improving the livelihood of people in the region. Commercialization of beekeeping in the region will require farmers to grow from subsistence bee farming to commercial farming which require an entrepreneurial mindset. The study sought to find out the effect of farmer characteristics on entrepreneurial behaviour of the beekeepers in Kibwezi west sub county.

1.2 Statement of the Problem

The beekeeping sub sector in Kenya is functioning below its optimal production capacity depriving farmers especially in ASAL regions of improved incomes, alleviation of poverty levels and nationally, the creation of indirect employment along the honey value chain in addition to economic and environment gains. According to KIPPRA (2019) current annual honey production stands at 25,000 metric tonnes with the potential to produce 100,000 metric tonnes per annum. However, the subsector is extremely fragmented causing difficulties on quantifying its actual production and growth level (Moinde, 2016). The effects of climate change and human activities that have contributed to environmental degradation that adversely affected honey production in Kenya (Hecklé et al., 2018).

This low production had adverse effects on honey exports where a decline of 73 per cent was recorded from, USD 130,116 in 2012 to USD 26,976 in 2016 (Ministry of Industry, 2018). The report further stated that for the honey export to revert to the 2016 export levels, honey export needs to increase at a rate of 40 per cent per annum between 2018 to 2022. The low honey production has also rendered the country a net importer of honey evident by the domestic demand of honey which surpasses its production. A report by United Nations Commodity Trade Statistics Database revealed that Kenya imported honey worth USD 228,604 from Egypt, Australia and Tanzania (UN, 2013). The demand of honey in the domestic and global markets presents huge opportunities for the Kenyan beekeeping sub sector. The government plans to

target export opportunities in honey destination markets which include; European Union, United States of America, China, Gulf Cooperation, Japan, Canada and East Africa Community where the annual market size is valued at USD 1.9 billion (Ministry of Industry, 2018). Furthermore, the government proposes that if the country attains an annual honey production of 80,000 tonnes, it would be among the top ten producers of honey globally.

For the subsector to harness these opportunities, beekeepers play a critical role in honey production and they are an integral part of the bee farm enterprise. Bee farming in Kenya is largely practiced as a subsistence form of farming and there is need to commercialize it into a viable farm enterprise. Moinde (2016) noted that entrepreneurial behaviour among beekeeping farmers can foster improved production conditions in the farm leading to production maximization at lower costs. The author also postulated that entrepreneurial behaviour facilitates access to markets and other opportunities deemed necessary for the sustainable development of the sector for both the beekeepers and other actors in the industry.

Although several empirical studies have been conducted investigating the entrepreneurial behaviour of farmers with farmer social economic characteristics, psychological and group participation as the independent variables, contradictory findings have been reported. For instance, Mehta and Sonawane (2012) in a study involving mango farmers in India indicated that age, land holding and family size had no association with entrepreneurial behaviour of the mango farmers while education and annual income had a positive effect on entrepreneurial behaviour. Contrastingly, Pongener and Jha (2020) examining the effect of age, education, experience, landholding and annual income of cucumber farmers posit that age and experience had a negative impact on entrepreneurial behaviour whereas landholding and education had a positive effect on entrepreneurial behaviour. On the other hand, Wanyonyi and Bwisa (2015) further indicated that education level and farm size had no effect on the entrepreneurial behaviour while age had an effect on entrepreneurial behaviour of cabbage farmers in Camikini ward Trans Nzoia county, Kenya.

It is thus apparent that there is need to conduct further studies to assess the effect of farmer characteristics on entrepreneurial behaviour in different geographical contexts and in different farming production systems. The conflicting findings presented a justification for the current study where the study sought to investigate the effect of socio economic, psychological factors and group participation on entrepreneurial behaviour of beekeepers in Kibwezi West Sub

county, Makueni County. Literature on beekeeping has inferred to relationship between beekeeping management practices with four components of entrepreneurial behaviour which are innovativeness, risk taking planning and decision making. The study was justified by the knowledge gap identified by the limited empirical study on the effect of beekeeping management practices on entrepreneurial behaviour, where entrepreneurial behaviour is operationalized as a compounded skill. The study investigated the effect of beekeeping management practices of bee farmers in Kibwezi west subcounty on entrepreneurial behaviour.

1.3 General Research Objectives

To determine the effect of farmer characteristics on the entrepreneurial behavior among bee farmers in Kibwezi west sub-county, Kenya.

1.3.1 Specific Research Objectives

- i. To determine the effect of socio economic characteristics on entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County.
- ii. To determine the effect of psychological factors on the entrepreneurial behaviour of beekeeping farmers in Kibwezi West County.
- iii. To determine the effect of group participation factors on the entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County.
- iv. To establish the effect of beekeeping management practices on the entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County.

1.4 Research Questions

- i. What is the effect of socio economic characteristics on entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County?
- ii. What is the effect of psychological factors on the entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County?
- iii. What is the effect of group participation factors on the entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County?
- iv. What is the effect of beekeeping management practices on the entrepreneurial behaviour of beekeeping farmers in Kibwezi West Sub County?

1.5 Significance of the Study

This research study findings will be of benefit to policymakers at the national and county level. The findings will highlight the most important factors to consider in the bid to commercialize beekeeping. The findings are expected to be useful to the Makueni county government being

that one of the strategic development areas of focus is the growth of the beekeeping subsector. An understanding of the determinants of entrepreneurial behaviour in the region will allow for the crafting of policies that leverage these insights to spur entrepreneurial activity in the region

The study results will also be beneficial to beekeeping farmers in Kibwezi West sub county. The findings will enlighten the beekeepers on the role that farmer and farm characteristics play in either improving or hampering their entrepreneurial behaviour. The information will empower farmers to devise solutions that will enable them to overcome challenges that render them to be less entrepreneurial and optimize on behaviour that will improve their entrepreneurial outlook for sustainable and profitable farming operations. The findings will guide stakeholders in designing and developing appropriate interventions that will improve the entrepreneurial disposition of the beekeepers. The enhancement of the farmers entrepreneurial behaviour will strengthen the honey value chain as farmers play a key role in the production of honey and other apiary products.

Empirical findings generated from this study will be an invaluable addition to the body of knowledge as researchers seek to gain deeper understanding on what drives entrepreneurial behaviour of beekeeping farmers. The research findings also contributed to human capital entrepreneurship theory and McClelland human motivation theory by confirming the theoretical concepts on which the theories are anchored.

1.6 Scope of the Study

The geographic scope of the research was confined to beekeeping farmers located within the six wards in Kibwezi West Sub County, Makueni County. The study considered the effect of socio economic characteristics, psychological factors, group participation and beekeeping management practices on entrepreneurial behavior. The study incorporated six indicators that were used to measure entrepreneurial behaviour notably innovation, risk orientation, decision making ability, achievement orientation, planning ability, and information seeking behaviour. The research scope was limited to quantitative descriptive design study. The sample scope consisted of 272 beekeeping farmers. Purposive sampling was employed to select farmers who had practiced beekeeping for a minimum period of two years from inception. Data collected was for the period between January and December 2019, this requirement was deemed necessary to allocate sufficient time for new beekeeping farms to have gone through the production cycle from beehives set up to harvesting of honey.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter presents the review of critical literature relevant to the study. It discusses theories related to entrepreneurship behaviour and empirical literature related to the study area. The chapter also outlines the research gaps, conceptual framework and operationalization of variables guiding the research study.

2.2 Theoretical Review

A theoretical framework acts as a foundation on which a research study is developed and constructed (Grant & Osanloo, 2014). The study is founded on the human capital entrepreneurship theory and McClelland human motivation theory; the theories are subsequently discussed.

2.2.1 Human Capital Entrepreneurship Theory

One of the early proponents of human Capital theory Schultz (1961) constructed the human capital elements to be skill, knowledge and associated attributes that influence specific human capabilities to perform productive work. The theory stated that investment made in building human capabilities improved the wages and earnings of individuals hence yielding a return on the investment and creating an economic value. Becker (1975) distinguished human capital into generic and specific categories. Generic human capital referred to general knowledge acquired within the formal education system and from professional experience. On the other hand, specific human capital refers to capabilities that can be applied to a particular job.

Unger, Rauch, Frese and Rosenbusch (2011) posit that there is a positive relationship between human capital and business success. Human capital improved entrepreneurs' capability to identify and exploit business opportunities. Through these acquired capabilities, entrepreneurs have attained other beneficial resources such as financial and physical assets. In addition, human capital has also facilitated the entrepreneurs' acquisition of new knowledge and skills. The authors further postulated that entrepreneurial success has a higher association with outcomes of human capital that is knowledge and skills than with human capital investments such as education and experience. Marvel, Davis and Sproul (2016) argue that the value of human capital is not its existence but its usefulness when handling tasks which depend on the quality and type of human capital. The authors outlined specific entrepreneurial human capital

constructs which included; work experience in similar industry or previous managerial experience, education and entrepreneurial experience, demographics, cognition and psychological characteristics. However, human capital theory has been criticized due to the importance individuals attach to acquiring education and training to appeal to employers and investors instead of seeking knowledge and skills (Spence, 1973).

This theory was pertinent to the current study as it indicates that, investments in education, experiences and training should translate to knowledge and skills that direct entrepreneurial behaviour. The theory assesses the quality and relevance of the acquired capabilities to accomplish the task at hand and for entrepreneurs the formation of an entrepreneurial behaviour.

2.2.2 McClelland Human Motivation Theory

McClelland (1985) theorized that human beings are driven by three motivations namely need of achievement, affiliation and power. These three motivations are universal irrespective of age, gender or culture. The theory posits that everyone is driven into action by one of these needs more than the other two therefore shaping individuals behaviour and performance. The theory postulated that need of achievement trait was attributed to individuals who have an intense desire to succeed, while need of affiliation was associated with an individual's desire to belong to a social group and to be accepted and lastly, need of power was denoted as a desire to influence and direct people and not dictatorship. Theory also states that individuals acquire three needs through childhood experiences, however individuals can also be taught how to embody these motivates so that they can become part of their personality.

Barba-Sánchez and Atienza-Sahuquillo (2012) posited that need of achievement, affiliation and power are important motivations that contribute to the formation of entrepreneurial behaviour. McClelland (1985) attributed need of achievement to entrepreneurial behaviour, he argued that individuals with high levels of achievement set very high challenging targets for themselves and they also thrive in competitive situations where they aim to outperform their competitors. Individuals with high need of achievement are attracted to entrepreneurial careers. These qualities equip entrepreneurs to cope with the complexities and uncertainties of entrepreneurship by becoming more resilient and persistent in pursuing business opportunities. Tang (2014) in a study on the correlation of achievement motivation and risk-taking propensity on new business performance found out that an entrepreneur's level of achievement motivation

directly influenced the performance of a new enterprise irrespective of the munificence level in the environment.

According to Brudel and Preisendorfer (1998) affiliation motivation developed through social networks such as family and friends has been found to contribute to entrepreneurial success. The authors further argued that social relationships are beneficial to entrepreneurs especially during the business startup phase and through social networks, entrepreneurs have access to knowledge and other resources that their businesses may require. However, people with high need of affiliation avoid conflict and prefer status quo which is detrimental to entrepreneurship. The business environment is continuously evolving which call for new innovative ideas, processes or technology. Lachman (1980) purported that a combination of high achievement levels and low affiliation motivation promotes entrepreneurial behaviour more than other motivation combination. This was also confirmed by Silva (2010) who stated that affiliation motivation and need of achievement motivation were prevalent among entrepreneurs who were operating growing enterprises. This theory has been criticized by Robbins, Judge and Sanghi (2009) who stated that the motivations are subconscious in nature therefore individuals who may have high levels of these motivations may not be aware of it. The authors also noted that these motivations are difficult to measure.

The theory is relevant to the current study for it reveals internal motivations that drive people into action, and the actions taken culminate to behaviour. Th two motivations need of achievement and need of affiliation were relevant to the current study. Need of achievement was measured by economic orientation and market orientation. Need of affiliation was represented by the participation of beekeepers in groups that provided opportunities for social and extension participation. The theory provided insight on which motivations contributed to the entrepreneurial behaviour of beekeepers in Kibwezi west sub county.

2.3 Empirical Review

Empirical literature was reviewed in accordance to the research objectives. Empirical gaps that the study sought to fulfil were identified.

2.3.1 Socioeconomic characteristics and entrepreneurial behaviour

Wanyonyi and Bwisa (2015) study on factors influencing entrepreneurial behavior of cabbage farmers in Kiminini ward Trans Nzoia County, Kenya, was conducted among 100 farmers who

were chosen applying stratified random sampling techniques. The study applied a semi structured questionnaire for data collection. Statistical analysis was conducted utilizing descriptive analysis specifically mean, standard deviation and inferential statistics namely correlation and multiple regression. The research findings established that age and marital status of respondents had significant bearing on risk orientation, decision making abilities and innovativeness of the farmer. The current study examined entrepreneurial behavior of cabbages farmers in Kiminini Trans Nzoia County, while the present research study sought to investigate farmers in another farming system namely beekeeping and in a different geographical location in Kibwezi west subcounty, Makueni County. The current study borrows the analysis approach applied in this study through consideration of descriptive statistics and specifically multiple regression analysis in assessing the impact of farmer and farm characteristics on entrepreneurial behavior.

Mishra's (2015) research on gender and dynamics of technology adoption was carried out in Uganda. The research used secondary data obtained from Uganda National Household Survey and from Uganda Bureau of Statistics. The research findings indicated that gender plays a significant role in agricultural technology adoption. Male headed households generate higher income and are allocated larger parcels of farm land, subsequently they become early adopters of agricultural technology while on the other hand, women headed households earn lower incomes and are allocated smaller parcels of land therefore lack a financial buffer to mitigate against farming shocks consequently become laggards in adoption of technology. One of the entrepreneurial behaviour component is innovativeness which analyses the adopt of new beekeeping technologies, in the current study other five components of entrepreneurial behaviour are assessed.

Yordanova and Alexandrova-Boshnakova (2011) research on the effect of gender on risk propensity of Bulgaria entrepreneurs, identified 382 entrepreneurs by utilizing stratified sampling technique. The study revealed that male and female entrepreneurs have same levels of risk perception, however female entrepreneurs demonstrate lower risk taking behaviour than male entrepreneurs. The researchers further explained that risk propensity between genders is connected to outcome history of previous risk behaviour. Due to various challenges that women entrepreneurs face such as limited opportunities and resources both human and capital in relation to male entrepreneur they have a lower probability to encounter success in past risk behaviour making them risk averse. Charness and Gneezy (2012) research investigated gender

differences in risk taking by applying an experimental research approach whereby one investment game was used. Fifteen sets of experiments were conducted in different countries and by different researchers. The study revealed consistent findings that women invest less resources than men in assets considered to be risky and therefore seem to be financially more risk adverse. The current study tests the influence of gender in a different socio-cultural setting i.e. rural Kenya and specifically Kibwezi sub-county.

Boruah, Borua, Deka, Borah, and Gossaigaon (2015) studied the entrepreneurial behavior of tribal winter vegetable farmers in Jorhat district of Assam, India in relation to their socioeconomic characteristics. The sampling technique utilized in the study was purposive and random sampling. Data analysis was presented using frequency distribution, percentages, mean, standard deviation, correlation and multiple regression. Findings indicated that the respondents had medium level entrepreneurial behaviour. Socio economic characteristics that were found to have a positive and significant relationship with entrepreneurial behaviour were education level, family size, farm size under cultivation, and annual family income. The study investigated the effect of socioeconomic characteristic on entrepreneurial behaviour with the current taking a similar approach with the inclusion of farm characteristics as additional variables that speak to the less pliable characteristics of bee farming.

Chaurasiya, Maratha, and Badodiya (2017) sought to establish factors influencing the entrepreneurial behaviour of dairy farmers in India. Random sampling technique was employed to choose 200 respondents from a list of dairy farmers who had practiced dairy farming for a minimum of five years. Data was analyzed using mean, standard deviation, percentage, Karl Pearson's coefficient of correlation and multiple regression analysis. The findings indicated that two thirds of the dairy farmers had medium level entrepreneurial behaviour. The researchers further indicated that education, dairy experience and land holding have a positive and significant relationship with entrepreneurial behaviour. The study investigated farmers entrepreneurial behaviour in India whereas the present study examined entrepreneurial behaviour in Kenya. The current study focuses on bee farming hence the researcher seeks to assess the applicability of the impact of the mentioned factors across sub-industries from dairy to bee farming.

Pongener and Jha (2020) examined the effect of socioeconomic characteristics -age, education level, land holding, experience and annual income – on entrepreneurial behaviour of off season

cucumber growers. Entrepreneurial behaviour was assessed as a function of innovativeness. The researcher selected 100 respondents from three villages employing proportionate random sampling technique. The findings revealed that age and experience variables had a negative and significant effect on entrepreneurial behaviour whereas size of land under cultivation and education variables were found to have a positive and significant effect. The study focused on cultivation of crops whereas the current study focused on bee farming activities hence the validity of the influencing factors across sub-sector of farming is presented in the current study.

Jiménez, Palmero-Cámara, González-Santos, González-Bernal and Jiménez-Eguizábal's (2015) research undertaking on the impact of educational levels on formal and informal entrepreneurship identified the dependent variables as World Bank Entrepreneurship Snapshot (WBES) for formal entrepreneurship and the Informal Entrepreneurship Index (IEI) from 2003 to 2005 for informal entrepreneurship. The independent variables were measured by using the total enrollment rates in secondary and tertiary education. The research findings revealed that tertiary education has a positive significant influence on formal entrepreneurship and a negative effect on informal entrepreneurship. Secondary education also had a positive and significant effect on formal entrepreneurship but the effect on informal entrepreneurship was insignificant. Secondary education sensitizes on challenges of informal entrepreneurship however this is hampered by the lack of management skills. The researchers further point out that higher education empowers individuals identify and assess business opportunities, improve their knowledge and skills as well as boost their self-confidence and minimize perceived risks. The current study seeks to contribute to this empirical findings by addressing the conflict in findings on the influence of education as posited by Wanyonyi and Bwisa (2015) who unlike Jiménez et al. (2015) indicate that education is not influential to enterpenurial behavior.

Mehta and Sonawane (2012) carried out a study among mango farmers, where 100 respondents were selected using purposive techniques. Statistical analysis applied in the study included, percentages, mean, standard deviation and coefficient of correlation. The results indicated contrary findings, where age, land holding, and family size had no association with entrepreneurial behaviour of the mango farmers. Similarly Wanyonyi and Bwisa (2015) further indicated that education level, and farm size had no effect on the entrepreneurial behavior of cabbage farmers in Kiminini ward Trans Nzoia county, Kenya.

Natukunda and Kugonza (2012), the researchers examined factors affecting the adoption of beekeeping and related technologies in Bushenyi district, in Uganda. The study selected 100 farmers utilizing both purposive and random sampling approaches. Data was analyzed using descriptive such as percentages and frequencies, and inferential statistics which included, chi square tests and logistic regression model. The findings revealed that age, level of income, beekeeping experience and farm size had a positive and insignificant influence on the adoption of the modern beehives and other associated beekeeping technologies. The current study assesses whether the insignificance of findings derived from consideration of a small sample size by conducting a study featuring more respondents.

Affognon et al. (2015) sought to investigate impact of Commercial Insects Programme (CIP) program ran by the International Centre of Insect Physiology and Ecology (ICIPE) on the adoption of modern beekeeping in former Mwingi district, Kenya and impact on honey production. The level of education of the household head influenced the adoption of new modern hives. In the current study adoption of modern hives indicates innovativeness. Findings showed that a high level of education enabled the head of household to easily access information related to new technologies and also enhanced the acceptance of the new practice. The current study expands this study by concurrently considering a wider assemblage of socioeconomic factors deemed influential to bee farming.

According to KALRO (2008) there are four common types of beehives used in Kenya - traditional log hive, Kenya Top Bar Hive (KTBH) and langstroth bee hive both classified as modern hives, and lastly kapkukul super log frame which integrates modern and traditional knowledge in the construction and usage of the hive. KALRO further outlines the performance of each hive, traditional log hive has an occupancy rate of 75 per cent with honey yields of 15kg per harvest, while the KTBH has an occupancy rate of 45 per cent and yields 20 kg per harvest, langstroth bee hive occupancy is 30 per cent and yields 10 kg of honey per harvest and lastly kapkukul super log hive has an occupancy of 75 per cent with 18kg honey yield per harvest. In Ethiopia, beekeepers harvest honey biannual and the average honey yield per hive per year was 13.3 kg from traditional hives, 19.8 kg from transitional hives and 22 kgs from modern hives (Gebretsadik & Negash, 2016), while Saudi Arabia modern box hives have better yield returns at 72 per cent more than the traditional hives (Al-Ghamdi, Adgaba, Herab, & Ansari, 2017).

Gebiso (2015) conducted research in Ethiopia that sought to establish the determinants of modern beehive adoption and its financial benefits. A sample size of 251 beekeepers participated in the research. The findings confirmed that modern hives had a higher productivity of 19.77kg per hive while traditional beehives yielded 5.13 kg per beehive. Traditional beehives were found to be the main beehive used by the beekeepers. The findings further indicated that the number of local beehives possessed were among the determinants found to influence the adoption of modern beehives; the validity of influence of the number of hives, in the current study, is further assessed in the Kenyan context.

Kiiti (2019) research on modern beehive box adoption in Kitui County utilized both descriptive and inferential statistics to analyze data collected. Descriptive statistics included frequencies, percentages while inferential statistics incorporated, chi-square, t-test, Pearson's correlation and logistic regression. The research established that the farmers kept two types of hives namely the traditional log hive and the modern Langstroth box hive, with the traditional log beehives being the main beehive used. Kenya Top Bar Hive (KTBH) had a very high absconding rate in the area it was therefore not used for beekeeping. According to the research findings traditional log hive had the lowest occupancy rate while the modern box hive had the highest. Honey yields differed based on the hive type. Farmers with log hives harvested twice a year with an average of 8-10 kg per season of honey while farmers with Langstroth box hives harvested four times a year with yields averaging 20-24kg per season. Regression analysis revealed that modern beekeeping practices, farmer apiary visits and extension contact had a positive and significant influence on the adoption of modern beehives. On the contrary, the size of the bee colony and knowledge of beekeeping had a positive and insignificant effect on adoption. The study was limited to adoption of modern beehives, that is innovativeness, one of the components of entrepreneurial behaviour. The current study incorporated five other components namely, risk orientation, decision making ability, achievement oriented, planning ability, information seeking behavior.

Contrary to previous studies on income Affognon et al. (2015) research findings indicated estimated household income had a significant negative relationship to prospects of adoption of modern beekeeping in Mwingi district. It was reported that the higher the farmers' income the less the likelihood of adoption. According to the study the region had associated beekeeping as a resource poor strategy designed to alleviate poverty and individuals with high income levels did not wish to be associated with beekeeping. The present study was limited to adoption

whereas the present study also investigated other elements of entrepreneurial behaviour of beekeepers.

Kumar, Sharma, and Yadav (2013) investigated factors that affected entrepreneurial behaviour of vegetable farmers. Multistage random sampling approach was used to select eight villages to participate in the study. Thereafter, fifteen respondents were randomly selected from each village to constitute a sample size of 120 respondents. A structured interview schedule was used to collect data. Path analysis was applied to examine the relationship between the independent and dependent variables. The results revealed that contradictory findings, that education, sources of information utilization, training, and farm experience had negative effect on entrepreneurial behaviour. Education exerted the most negative influence on entrepreneurial behaviour. From the study it emerged that persons with higher education levels preferred to pursue alternative livelihood opportunities away from the uncertainty of farm entrepreneurship. However, a positive indirect outcome in education was observed where well-educated youth recommended other people to engage in entrepreneurial activities while they refrained from such involvement. The contradiction on the influence of education as posited by Jiménez et al. (2015) and Wanyonyi and Bwisa (2015) is addressed in the current study through provision of additional empirical evidence contributing to the rhetoric.

Contradictory findings on the effect of different aspects of socioeconomic characteristics on entrepreneurial behaviour were observed by the studies presented. This current research sought to investigate what would be the effect of these characteristics on entrepreneurial behavior of the beekeepers in Kibwezi West subcounty.

2.3.2 Psychological factors and entrepreneurial behavior

Lawrence and Ganguli (2012) carried out a study on entrepreneurial behavior of dairy farmers in India. A sample of 100 farmers were selected using purposive sampling to select the region and random sampling to select the respondents. The researchers collected data using a pre-tested interview schedule and analyzed the data collected employing percentages, spearman's co-efficient of correlation and regression analysis. Economic motivation and market orientation had a positive and significant influence on entrepreneurial behaviour of the farmers. The research elaborated that farmers with a few cattle had the desire to enlarge their herd and improve their economic earnings; the impact of number of agricultural units is assessed in the

current study through the consideration of the physical assets of the farmers as an independent variable affecting entrepreneurial behavior.

Raina, Bhushan, Bakshi and Khajuria (2016) investigated entrepreneurial behaviour of farmers with psychological factors being one of the determinants examined. Respondents were identified by utilizing purposive and random sampling techniques and data was collected using a pretested questionnaire. Descriptive data analysis and correlation analysis were applied to analyze the data collected. The results revealed that economic motivation had a positive and significant influence on entrepreneurial behaviour of the farmers. The research attributed this finding to the farmers proactiveness to seek out new farming practices, it was noted that farmers who displayed this information seeking behaviour had larger land holding; both landholding and information-seeking behavior, in the current study, are factors influencing entrepreneurial behavior.

Wanole (2018) studied the relational analysis of entrepreneurial behaviour of banana farmers. Multistage sampling approach was employed to select 120 respondents from three villages. A pretested structured interview guide was used to collect data. Descriptive and inferential statistical analysis was utilized to analysis data. The finding established that economic motivation and market orientation had a positive and significant effect on entrepreneurial behaviour. The research implied that farmers actively sought market information outside of their immediate surroundings. The information comprised of current market status, market trend, demand and supply of bananas. Though impactful to banana farming, the researchers make no mention of the applicability of the findings to other farming practices – the current study addresses this gap in bee farming.

Stephency and Vengatesan (2018) conducted research to evaluate the entrepreneurial behaviour of 120 coconut farmers in India. The sample size was constituted by adopting a proportionate random sampling technique. Data collection was done by conducting personal interviews using a pretested structured interview guide. The findings presented disclosed that majority of the respondents had medium to high level entrepreneurial behaviour. Majority of the farmers had medium level market orientation. This was credited to the farmers' collective action in marketing and the existence of an organized farmers market which led to the development of a well-structured marketing system. Lastly, economic orientation of the respondents was noted as medium level. This finding was tied to the respondents assured,

steady and sustained income from coconut farming. The current study tests the validity of the findings in bee farming in the Kenyan context.

A study in Ethiopia established that majority of the beekeeping farmers had low market orientation characteristics for they mainly produced honey for household consumption, however there was a small percent that produced for commercial purposes. These farmers who were motivated to produce for commercial purposes sold all the honey they had produced which demonstrated that they exclusively engaged in beekeeping for income generation. Their distribution channels included, traders, beekeepers associations, local consumers and tourists. (Gebretsadik & Negash, 2016). Market orientation, in the current study, is considered a subset of psychological factors and is deemed to impact on entrepreneurial behavior.

Literature reviewed highlighted the effect of psychological variables on entrepreneurial behavior across various farming systems with very little empirical evidence available to indicate the influence of psychological variables on entrepreneurial behavior in beekeeping farming. The present research sought to establish the effect of farmer and farm characteristics on entrepreneur behaviour in beekeeping farming in Kenya. Available empirical research findings indicated that economic motivation and market orientation had a positive and significant influence on entrepreneurial behaviour, contrary findings were not found. This current research sought to investigate whether contrary findings will be revealed in the research undertaking.

2.3.3 Group participation factors and entrepreneurial behaviour

Abeyrathne and Jayawardena (2014) study on the influence of group interactions on entrepreneurial behavior among 60 farmers found that group interactions had a significant positive correlation on the respondents' entrepreneurial behavior. Aspects of entrepreneurial behavior that prominently emerged through the group interactions were decision making and planning abilities. The researchers established that these two behavioral traits were high during seasonal planning and during the selection of crops to cultivate. In contrary, group interactions were very low when it came to selling their produce. Risk orientation in the group was also found to be considerably low. Smaller groups were found to be more effective than larger groups. The study focused on group interactions on entrepreneurial behaviour, while the current study incorporated other variables effect on entrepreneurial behaviour.

Popa, Marghitas and Pocol (2012) research findings on a study that sought to examine determinants of entrepreneurship in the beekeeping sector in Romania revealed that collaboration with other beekeeping enterprises in the sector had a significant positive relationship to entrepreneurship. The researchers further noted that establishing an alliance through intricate social network facilitated better access to information on profitable business opportunities as well as financial resources. Gao, Zhang and He (2013) investigated the influence of social capital on farmers' entrepreneurial opportunity recognition in China. The size of the farmers' social network especially the weak tie network was found to be a decisive factor towards recognition of opportunities. Strong ties network had no notable influence on entrepreneurial opportunity identification behavior. The study found out that working from outside of the home and maintaining contact with informed people were keyways of growing and strengthening the weak tie network. The research established that contrary to approaches of capital promotion to farmers, access to information was the key driver of entrepreneurial opportunity recognition which was found to be fundamental to the development of the respondents' enterprises. This study investigated one aspect of group participations that is social participation, the current research included extension participation of farmers to further analyses the effect of this variable on entrepreneurial behaviour.

Kayina, Ram, Devi and Miranda (2018) conducted a research study to determine the variables that promote or inhibit entrepreneurial behaviour of farmers. The findings indicated that social participation and extension participation variables were positive and significantly influenced the entrepreneurial behaviour of the farmers. The research further established that extension participation increased the farmers' interaction with extension personnel therefore increasing their confidence in applying new practices subsequently contributing to the farmers' medium to high level achievement orientation. The current study considers the impact of extension and social participation on entrepreneurial behavior of beekeepers.

Porchezhiyan, Umamageswari and Manjunatha (2016) indicated that extension participation and social participation were among variables found to have a positive and significant relationship with entrepreneurial behaviour. Extension participation and social participation had a positive influence on several components of entrepreneurial behaviour of the farmers, this included, decision making, risk taking, planning ability and information seeking behaviour.. Chithra, Meti, Maraddi and Manjunatha (2018) carried out a study that examined

the entrepreneurial behaviour of pigeon pea seed growers in India. Purposive sampling technique was applied to identify 40 respondents from five villages and thereafter data was collected through interviews using a pretested interview guide. Descriptive and inferential statistics were utilized to analyze the data collected. Evidence from the study indicated that extension participation was one of the variables that demonstrated a significant relationship with entrepreneurial behaviour. The study focused on dairy and pigeon pea farmers whereas, the present study examined the extension and social participation of beekeepers

Wodajo (2012) conducted a study on financial benefits of the box hive and the determinants of its adoption in Ethiopia. The study employed mixed research methods that is quantitative and qualitative approaches. Data was collected using a pretested structured questionnaire, focus group discussions, personal interviews with key informants and observations. The study revealed that visits to demonstrations positively and significantly influenced the adoption of box hive and beekeeping technology. Visits to apiaries owned by other beekeepers provided an opportunity for peer learning and beekeepers experienced first-hand the advantages of improved hives and management practices. The apiary visits motivated the beekeepers to consider adopting the new hive technology. The researcher noted that apiary visits were a suitable extension approach to introduce beekeeping technology. The study further indicated that majority of beekeepers who adopted new beekeeping technologies had contacted extension agents. Beekeepers who frequently visited extension workers became acquainted with the technology and were more likely to decide to adopt it. Training was also pointed out as important because it develops the beekeepers' self confidence in the new technology and increases the productivity of the beekeepers who have adopted the improved hive technologies. The impact of new technology and training whereas considered pivotal to self-confidence is tested in the current study with entrepreneurial behaviour, a multi-sub-variable-construct, considered as the dependent variable.

Research findings by Suvedi, Ghimire, and Kaplowitz (2017) revealed different finding on extension participation. The study investigated farmers' participation in extension activities and technology adoption in Nepal. Multistage random sampling approach was used to select a sample of 198 farmers. Data was analyzed by utilizing logistic regression model, frequency, counts and percentages. Research findings indicate that there was low extension participation of farmers and this was attributed to inaccessibility of extension services due to the distance from the farm to the offices of the extension providers and the infrequent visits from extension

workers. It was reported that extension participation was important as it influenced farmers' decision to adopt an agricultural technology. This study suggests interplay between extension activities and technology. The current study assesses the two as independent variables impacting entrepreneurial behavior hence the relative impact of the variables is put forward in findings from the current study.

2.3.4 Beekeeping management practices and entrepreneurial behavior

Mazengia and Tesfay (2018) investigated beekeeping management practices and bee colony gap analysis in Ethiopia. The research utilized primary and secondary data sources. Primary data was collected from 384 beekeepers using semi structured questionnaires' and filed observations. Secondary data sources included, reports from agriculture rural development, NGO, published and unpublished resources. Data was analyzed using descriptive statistics, ANOVA and t-tests. The research findings revealed that majority of the farmers kept their beehives in apiaries which improved monitoring of the bees. External hive inspection was frequently practiced whereas internal hive inspection was limited owing to absence of protective suits and hive tools, fear of being stung, risk of colony absconding, and lack of awareness of the importance of this internal hive inspection. The findings further noted that the beekeepers did not replace the old combs for a long time indicating that the beehives were not being cleaned. The study was limited to investigating the beekeeping practices observed by beekeepers, whereas the present research sought to establish whether beekeeping practices influence entrepreneurial behaviour of beekeepers.

Popa, Marghitas and Pocol (2012) conducted a survey study to establish the determinants of entrepreneurship in the beekeeping sector in Romania. The sample constituted 420 members of the Romania beekeepers' association. Data was collected using a questionnaire and SPSS statistical program was utilized to carry out data analyzing. Chi square test was applied to test associations between the variables. The findings revealed that beekeeping training, experience, and bee farm characteristics such as modernization of the apiary and the size of apiary were some of the factors that influenced entrepreneurship in the beekeeping sector. The study concluded that it was important for beekeepers to obtain information on new, modern and efficient practices in relation to the beekeeping in order to become successful entrepreneurs. The study was carried out in Romania whereas the current study was conducted in Kenya.

Kumsa and Takele (2014) sought to establish the effect of seasonal honeybee management on honey production in Ethiopia. A sample size of 75 respondents who used modern beehives and had 5 years of beekeeping experience was randomly selected. Structured interview guides and bee inspection schedules were applied to collect data. Descriptive statistics were utilized to analyze the data. The findings pointed that inadequate skills in bee management and information on local bee forage led to bee colony abounding and low honey production. Abou-Shaara (2012) publication on water collection behaviour of honeybees stated that it is critical for beekeepers to supply apiaries with alternative water sources in arid areas and regions with high temperatures especially where natural water sources were unavailable.

2.4 Research Gaps

Two main gaps are evident from the foregoing exposition of literature – conflict in findings and knowledge gap on the relationship between farmer and farm characteristics of beekeepers and entrepreneurial behaviour. Mehta and Sonawane (2012) indicated that age, land holding and family size had no association with entrepreneurial behaviour of the mango farmers. Similarly Wanyonyi and Bwisa (2015) further indicated that education level, and farm size had no effect on the entrepreneurial behavior of cabbage farmers in Kiminini ward Trans Nzoia county, Kenya. These findings, in part, contradict those by Pongener and Jha (2020) who observe that age and experience variables had a negative and significant effect on entrepreneurial behaviour whereas size of land under cultivation and education variables had a positive and significant effect. Both studies were conducted in India. Additionally, Affognon et al. (2015) in a study conducted in Kenya observes that the level of education of the household head influenced the adoption of new modern hives subsequently impacting on the yield put forth by farmers. Viewing, among other variables, age, land holding, family size, education as factors pertinent to one's human capital hence influential on entrepreneurial behavior, the current study seeks to understand factors affecting entrepreneurial behavior among beekeepers in Kibwezi west subcounty, Makueni county. With regard to the knowledge gap in findings, the study sought to investigate the effect of beekeeping practices on entrepreneurial behaviour as a composite characteristic.

2.5 Conceptual framework

The conceptual framework depicts the relationship between the different variables under the current study. It demonstrates how the independent variables, socio economic characteristics, psychological factors, group participation factors and beekeeping management practices affect entrepreneurial behaviour which is the dependent variable. The framework borrows from the human capital theory in that the biodemographic characteristics of the famer, farm practices, skill and knowledge of the famer have a bearing on the respective farmer’s entrepreneurial behavior. Deriving from McClelland’s human motivation theory, the psychological predisposition of the individual farmer impacts on their entrepreneurial behavior.

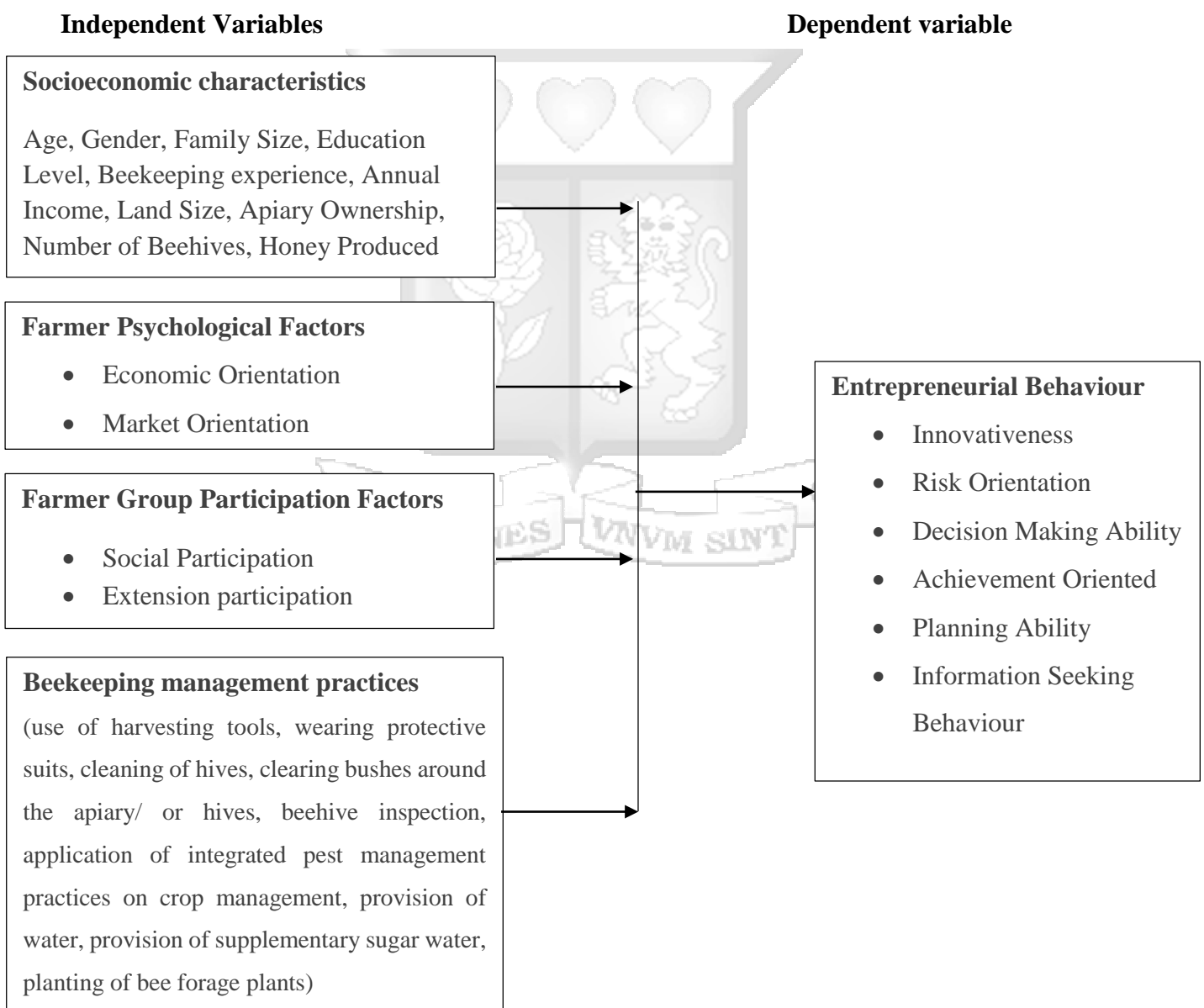


Figure 2.1 Conceptual Framework

Source: Researcher (2020)

2.6 Operationalization of Variables

Table 2.2 presents measurements of the various variables

Table 2.2 Operationalization of the Variables

Independent Variables	Sub Variables	Measurement	Source
Socioeconomic characteristics	Age Gender Family Size Education Level Beekeeping experience Annual Income Land size Apiary ownership Number of beehives Honey Production	Ratio scale	(Chaudhari, 2006; Mehta & Sonawane, 2012; Natukunda & Kugonza, 2012; Boruah et al., 2015; Pongener & Jha, 2020)
Psychological factors	Economic orientation Market orientation	4-point Likert scale	(Kahan, 2013; Heenkenda & Chandrakumara, 2016; Stephency & Vengatesan, 2018)
Group participation	Social Participation Extension participation	4-point Likert scale	(Piškur et al., 2014; Porchezhiyan et al., 2016; Gebru et al., 2017)
Beekeeping management practices	Beekeeping management practices	4-point Likert scale	(Kumsa & Takele, 2014; Amulen et al., 2019; Infonet-Bivision, 2019; Extension, 2019)
Dependent Variable	Sub Variables	Measurement	Source
Entrepreneurial Behaviour	Innovativeness Risk motivation Decision Making Ability Achievement motivation Planning Ability Information Seeking Behaviour	4-point Likert scale	(Lawrence & Ganguli, 2012; Boruah et al., 2015; Wanyonyi & Bwisa, 2015; Chaurasiya et al., 2017; Wanole, 2018)

Source: Researcher (2020)

2.7 Chapter Summary

The chapter discussed two theories that the study was anchored on that is, human capital entrepreneurship theory and McClelland's human motivation theory. Empirical review linking the independent and dependent variables was discussed. The study presented the research gaps, conceptual framework and outlined how the variables were operationalized.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter details the research methods that were applied in conducting the study. These aspects include the research design, target population and sampling approach adopted, data collection procedure, data analysis, research quality and finally ethical considerations. Each of these aspects of the methodology are addressed in subsequent subsections.

3.2 Research design

Kumar (2019) highlighted that research design determines the framework employed in collecting and analyzing data. As detailed by Dannel (2018) quantitative descriptive research allows for inference on what exists with regard to the status of phenomena in respect to variables or conditions. The descriptive research design applied centered on the collection of primary data analyzed through assessment of relationships between the independent and dependent variables considered in the study. In the current study, the researcher employed descriptive correlational research design to establish the relationship between four independent variables namely socio economic characteristics, psychological factors, group participation factors, beekeeping management practices and entrepreneurial behaviour as the dependent variable.

3.3 Population and sampling

3.3.1 Target Population

Dannel (2018) defines a population as the total number of entities to which research findings are generalizable. Makueni county is made up of six sub counties namely Kilome, Makueni, Kaiti, Mbooni, Kibwezi East and Kibwezi West (Makueni County, 2018). The study was conducted in Kibwezi West sub county, the sub county has six wards notably Emali/Mulala, Kikumbulyu North, Kikumbulyu South, Makindu, Nguu/Masumba and lastly Nguumo (Makueni County, 2018). In the current study, the population under study consisted farmers in Kibwezi West Sub County, Makueni County. According to a recent report by the county's Ministry of Agriculture, Livestock and Fisheries development there are a total of 816 beekeeping farmers located in Kibwezi west sub county (Makueni County, 2020).

3.3.2 Sample Size

The study employed Taro Yamane formula to determine the sample size where the confidence level was given at 95% and marginal error of 5% (Yamane, 1967).

Taro Yamane Formula indicated as follows:

$$n = \frac{N}{1+N(e)^2}$$

Where N=population size- 816 e= sampling error at 0.05 n=sample size

$$n = \frac{816}{1+816(0.05)^2}$$

$$n = 272$$

3.3.3 Sampling Frame

A sampling frame refers to a comprehensive register of all the units in the target population from which a sample will be selected (Saunders, Lewis, & Thornhill, 2016). The sampling frame of the current study was drawn from the beekeepers' population in the six wards, Kibwezi West subcounty. The sampling frame was constituted as follows; 111 beekeepers from Emali/Mulala, 102 from Kikumbulyu North, 92 from Kikumbulyu South, 201 from Makindu, 159 from Nguu/Masumba and lastly 151 from Nguumo (Makueni County, 2020). The sample size for each ward was determined by the proportion of the beekeepers in the region.

Table 3.1 Sampling Frame

Ward	Number of Beekeepers	Sample Size
Emali/ Mulala	111	37
Kikumbulyu North	102	34
Kikumbulyu South	92	31
Makindu	201	67
Nguu/Masumba	159	53
Nguumo	151	50
Total	816	272

3.3.4 Sample selection

The study utilized a nonprobability sampling technique for the sample selection, specifically purposive sampling. One of the research objectives was to determine the influence of farmer and farm attributes (with honey produced determined as a sub variable) on entrepreneurial behaviour. The study was designed to collect data on honey produced between the period January 2019 and December 2019. It was therefore imperative to select beekeepers who have engaged in beekeeping since early 2018, a minimum of two years to ensure sufficient time allocation for honey production by the bees. According to Saunders, Lewis, & Thornhill (2016) purposive sampling is applied by a researcher based on his judgement when choosing respondents who would be able to supply data required to answer research questions as well as meet the research objectives. A networking approach was applied where respondents interviewed recommended subsequent respondents.

3.4 Data collection method

A questionnaire was used to collect the data. The questionnaire contained five sections – socio economic characteristics, psychological factors, group participation factors, and beekeeping management practices and entrepreneurial behaviour. Each of the sections addressed a specific construct with the first four focusing on the independent variables of the study and the final, the dependent variable. Each of the questions included in the questionnaire pertain to a sub-variable derived from the study constructs. The questionnaire comprised of questions and Likert scale statements with four point range. Saunders et al.(2016) points out an even number of points in a Likert scale is applied to compel the respondents to express their feelings towards the statement. This study employed even point Likert scale to explore the beekeepers' unique perception to the statements outlined in the questionnaire.

Two research assistants from the community who were familiar with the location of beekeepers' households were recruited and subsequently trained on how to administer the structured questionnaires to the respondents. It was anticipated that language barriers may occur in the data collection exercise therefore, the inclusion of research assistants was deemed necessary. The research assistants translated questions, to the native Kamba language, which enhanced question clarity through explanations when this was required. The translation method was applied to the pilot study. The data collected during the pilot study was subjected to construct validity assessment and reliability assessment. Respondents had an opportunity to query on the questions in the questionnaire and indicated that they were well understood

(including by bilingual respondents). The scales yielded Cronbach scores of 0.6 and higher. No bias was therefore introduced through the translation process

3.5 Reliability

Saunders et al. (2016) posits that reliability assess the dependability of a questionnaire and its ability to replicate consistent findings at various times and settings or with a separate sample group. In the current study, internal consistency of the scales used in the study was assessed by analyzing data from the pilot test by applying Cronbach Alpha. The acceptable level of reliability ranges from 0.6 – 0.7, while values above 0.8 are considered very good and finally scores above 0.95 could indicate redundancy (Hulin, Netemeyer, & Cudeck, 2001). Upon shortfalls in the scores observed for the various scales, subsequent checks were conducted to ensure understandability and consistency of the questions constituting the respective scales. The results indicate a value of 0.6 which is deemed to be an acceptable level of reliability. The results are summarized in Table 3.2 below.

Table 3.2 Reliability Test

Variable	Cronbach Alpha scores	Number of items
Psychological factors	0.6	4
Social participation	0.627	5
Extension participation	0.65	4
Beekeeping management practices	0.719	9
Entrepreneurial behaviour	0.694	6

Source: Researcher (2020)

3.6 Validity

Validity entails the consistency between constructs and the data that is important in the representation of the variables (Drost, 2011). The study incorporated content and construct types validity. Content validity assesses whether the questions in the measurement tool effectively addressed the research questions whereas construct validity evaluates the degree to

which scale item questions measure the occurrence of the constructs the research planned to measure (Saunders et al., 2016). Content validity was undertaken by the appraisal of relevant literature in order to formulate questions for the research tool, in addition, the questionnaire was reviewed with the assistance of the supervisor. Construct validity was conducted through a pilot study where the responses from respondents were analyzed and in consultation with the supervisor the questionnaire was redesigned accordingly where necessary.

3.7 Data analysis and presentation

Descriptive and inferential statistical approaches were employed to address the research objectives. Statistical Packages for Social Sciences (SPSS) was used to analysis data collected. All data collected was summarized using tables for clear representation of the dataset. Descriptive statistics by way of means and standard deviation was computed and reported where appropriate. The purpose of the descriptive statistics provided contextual understanding of the variables under assessment. Inferential statistics applied were correlation analysis, variance analysis (ANOVA) and ordinary least squared multiple regression was subsequently conducted to assess the linear relationship between the variables under the study. The regression model applied to the study as observed by Joen (2015) is suitable for assessment of the relationship between variables in social sciences. The specific model applied is highlighted below:

$$Y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \varepsilon$$

Where:

Y is the dependent variable – Entrepreneurial behavior

β_0 is the constant

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}, \beta_{12}, \beta_{12}$ are the regression coefficients for the variables – age, gender, family size, education level, beekeeping experience, annual income, land size, apiary ownership, number of hives, honey produced, psychological factors, social participation, extension participation, and beekeeping management practices respectively.

$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{11}, x_{12},$ and x_{13} are the independent variables- age, gender, family size, education level, beekeeping experience, annual income, land size, apiary ownership, number of hives, honey produced, psychological factors, social participation, extension participation, and beekeeping management practices respectively.

ε is the error term

3.8 Diagnostic Tests

3.8.1 Normality Test

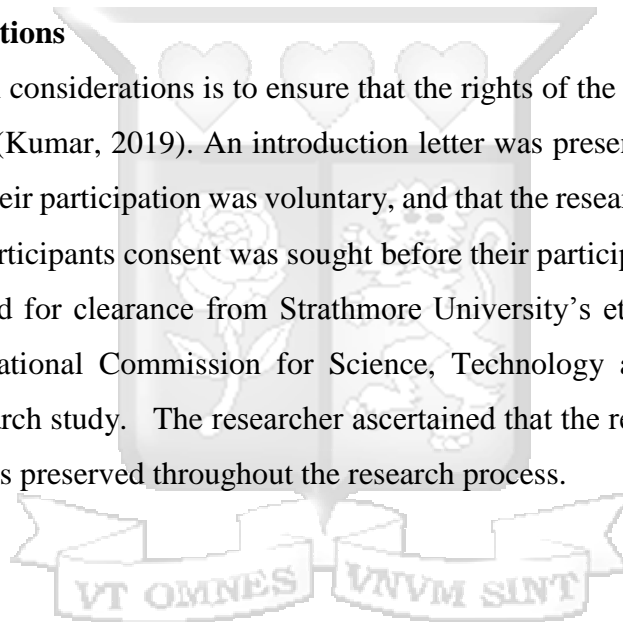
Normality tests were conducted using both numerical and graphically methods. Numerical tests were conducted using Kolmogorov-Smirnov and Shapiro-Wilk statistics whereas graphical tests were done using histogram.

3.8.2 Multicollinearity tests

Multicollinearity test was conducted to determine the degree of correlation between the predictor variables using the dataset collected. This was carried before conducting regression analysis.

3.9 Ethical considerations

The purpose of ethical considerations is to ensure that the rights of the individuals affected by a study are protected (Kumar, 2019). An introduction letter was presented to the participants informing them that their participation was voluntary, and that the research was for educational purposes only. The participants consent was sought before their participation in the research. The researcher applied for clearance from Strathmore University's ethics board and sought approval from the National Commission for Science, Technology and Innovation before commencing the research study. The researcher ascertained that the respondents' anonymity and confidentiality was preserved throughout the research process.



CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

The purpose of this chapter was to address the study objectives by drawing inferences from collected data. The chapter is therefore divided into four main sections. The first presents the introduction, the second reports on the response rate, the third addresses the research objectives and the final provides an overall model aggregating the relationships objectives as guided by the conceptual framework.

4.2 Response Rate

A total of 226 respondents were reached thus representing 83% of the targeted sample. According to Baruch and Holtom (2008) the average response rate on academic research surveys – as indicated from an analysis of over 1000 scholarly articles – is 52%. It is therefore apparent that the current study amasses sufficient responses to merit the analysis conducted to address the objectives of the study.

4.3 Descriptive Statistics

The purpose of this sub section is to present descriptive statistics relating to both the dependent and independent variables. The dependent variable of the study, entrepreneurial behaviour will be the first variable to be discussed, thereafter independent variables that is, socioeconomic characteristics, psychological factors, group participation, and beekeeping management practices will be presented.

4.3.1 Entrepreneurial Behaviour of Beekeeping Farmers

The entrepreneurial behaviour of the beekeeping farmers was the dependent variable of the study. This variable was measured using six sub variables, innovation, risk orientation, decision making, achievement oriented, planning ability and information seeking behaviour. The variable was analyzed using a four Likert scale as follows - Not at all (1), to a small extent (2), to a moderate extent (3), to a great extent (4). The findings are presented in table 4.1 with the aggregated information presented in the mean for each sub-variable.

Table 4.1 Entrepreneurial behaviour Descriptive Statistics

N=226	Mean	Standard Deviation
Easy to invest money and time in new beehives and equipment	3.150	0.819
Effective scheduling of tasks in beekeeping farming	3.072	0.842
Consider several options before making decisions	2.956	0.890
Involved in setting specific bee farm goals and strive to achieve them	2.945	1.024
Seek out various sources of information to improve beekeeping farming	2.912	0.905
Adoption of new beekeeping approaches	2.569	1.076
Entrepreneurial behaviour	2.936	0.583

Findings revealed similar spread in responses with the general mean for each of the questions pivoting around the third response option (to a moderate extent). The general consensus of findings, as indicated by the mean, was that most of the respondents expressed a moderate extent of entrepreneurial behavior. The results indicated that the beekeepers found it easy to invest resources in new hives and equipment with a mean of 3.150 and a standard deviation of 0.819 which show a moderate variation in responses. This inferred that most beekeepers were willing to take the risks and acquire modern beekeeping technologies in order to improve their bee farm enterprises. Adoption of beekeeping practices had the lowest mean of 2.569 and a standard deviation of 1.076 indicating a high variation in responses. An overall entrepreneurial behaviour mean of 2.936 inferred that the respondents had a medium level entrepreneurial behaviour. The standard deviation was noted as 0.553 which indicated a low variation in responses pointing to similarity in responses.

4.3.2 Socioeconomic Characteristics

Social economic characteristics are the first independent variable to be discussed. This variable was assessed through the sub- sub variables) age, gender, family size, years of schooling, years of engagement in bee farming, annual income based on beekeeping, on farm, off farm, total annual income, land size, apiary ownership, number of beehives and honey produced by the

bee farm of the respondents. A summary of the data collected for each of the sub variables is presented in table 4.2.

Table 4.2 Socio economic characteristics Descriptive Statistics

N=226	Mean	Standard Deviation
Age	46.352	12.006
Family size – men	1.866	1.646
Family size – women	1.833	1.642
Family size – Children	4.278	2.482
Family size total	7.703	4.919
Years of schooling	9.982	3.797
Years in beekeeping	13.732	11.927
Annual Income: On farm income earned from beekeeping activities	20743.308	26017.070
Annual Income: On farm income earned from other farming activities	45845.982	81380.540
Annual Income: Off farm	67445.361	170196.687
Annual Income: Total	115822.856	198965.481
Land size	8.194	7.733

The results showed that the mean age of the farmers was 46 years and a standard deviation of 12 years indicating a wide disparity in responses. The mean number of children was noted as 4 children and the average family size was 8 members. The family size figure was however associated with a standard deviation of 5 thereby indicating that there was significant variability in number of individuals per family. In education the mean of years of schooling was 9.982 with a standard deviation of 3.797 years. Assessing the duration in school through the previous 8-4-4 system, the average bee farmer had at least a Form 2 education implying that the average bee farmer was literate. As with family size, high variability was reported for years of engagement in bee farming. The average number of years in beekeeping was 14 and a standard deviation of 12 years, revealing a wide range of responses of beekeeping experience.

Research findings revealed that income from beekeeping activities was the least contributor to the beekeepers' total annual income with mean income of ksh. 20743.308 and a standard deviation of ksh. 26017.070 implying to a high variation in income generation among the

respondents. The highest contributor of annual income was off farm income that indicated a mean income of ksh. 67445.361 and a standard deviation of ksh.170196.687. The total annual income mean was ksh.115822.856 and a standard deviation of ksh. 198965.481. The standard deviation for all the sources of income was very high showing a wide variation of responses inferring to a varied discrepancy of financial status among the beekeepers.

Findings indicated that the mean land size of the respondents was 8.194 acres and a standard deviation of 7.733 acres which implied that the respondents' responses showed wide variation on ownership of farm size.

Gender

Table 4.3 presents a summary of the findings

Table 4.3 Gender

Category	Frequency per category	Rel. frequency per category (%)
Female	49	21.681 %
Male	177	78.319 %

Most of the respondents were male at 78.319 per cent and female respondents constituted 21.681 per cent of the beekeepers thus indicating that bee farming was mostly a male oriented activity within the population with few women engaging in the practice.

Apiary Ownership

Table 4.4 presents a summary of the findings

Table 4.4 Apiary ownership

Category	Frequency per category	Rel. frequency per category (%)
No	48	22.018 %
Yes	170	77.982 %

The research findings indicated that most of the respondents had set up apiaries in their bee farms. This finding implies that most of the respondents had adopted apiary bee farm management as one of the modern beekeeping practices and were committed to practicing better beekeeping management practices.

Number of Beehives

This section constitutes the type of beehive owned by the respondents and the number of beehives. Table 4.5 provides a summary of the findings.

Table 4.5 Number of beehives Descriptive statistics

N=226	Mean (per farmer)	Standard deviation (n-1)	Frequency of the hives by type (%)
Number of Traditional log hive	14.031	14.217	63.71
Number of Kenya top bar hive (KTBH)	7.979	8.314	22.91
Number of Langstroth hive	5.952	28.357	12.73
Number of Kapulkul / modernized traditional log hive	0.711	3.131	0,65
Average number of hives	20.005	17.375	100

From the findings, it was apparent that traditional log frame hives were the most commonly used by the farmers. The average number of hives per farmer was 20 where farmers held one or all four hive types. The figure was associated with a high standard deviation of 17.375 indicating a wide dispersion in beehive ownership. The second most used hive was the KTBH, langstroth and lastly the modernized traditional beehive.

Honey produced

This section represents data analyzed on quantities of honey produced in two seasons.

Table 4.6 provides a summary of the descriptive statistics on honey production

Table 4.6 Honey production Descriptive statistics

N=226	Season	Mean (Kg)	Standard Deviation(n-1)
Traditional log hive honey produced	1 (January- June 2019)	78.880	113.513
Traditional log hive honey produced	2 (October- Dec 2019)	65.452	95.055

Traditional log hive total honey produced in one year		133.933	196.836
Kenya Top Bar Hive (KTBH) honey produced	1(January-June 2019)	54.86	79.021
Kenya Top Bar Hive (KTBH) honey produced	2 (October-Dec 2019)	36.40	43.693
Kenya Top Bar Hive (KTBH) total honey produced in one year		81.17	117.167
Langstroth hive honey produced	1(January-June 2019)	34.702	86.588
Langstroth hive honey produced	2 (October-Dec 2019)	18.732	31.611
Langstroth hive total honey produced in one year		34.125	75.232
Kalpulkul/ modernized traditional log hive produced	1(January-June 2019)	1.545	10.937
Kalpulkul/ modernized traditional log hive produced season 2	2 (October-Dec 2019)	1.734	21.016
Kalpulkul/ modernized traditional log hive total honey produced in one year		3.279	29.430
Average honey produced	1(January-June 2019)	116.717	167.395
Average honey produced	2 (October-Dec 2019)	86.54	108.083
Average honey produced in one year		206.018	256.139

Given the wide ownership of the traditional hive, it was in keeping with expectations that the hive was associated with the highest yield at 133.933 kilograms per beekeeper for the two

seasons in the year 2019 with a standard deviation of 196.836 kilograms while the Kalpulkul/modernized traditional log hive which had the lowest ownership produced an average of 3.279 kilograms honey per beekeeper who owned this type of hive and a standard deviation of 29.430 kilograms. The standard deviations in honey produced was high indicating a high variability of production output among the beekeepers. The highest honey production for the year under investigation was realized in season 1 between January to June 2019 with an average yield of 116.717 kilograms per beekeeper while lower volumes were harvested in season two between October to December 2019 at an average of 86.54 kilograms per beekeeper with a standard deviation of 167.395 and 108.083 respectively. The average annual aggregative yield of honey produced per beekeeper was 206.018 kilograms per year, however the figure was associated with a high standard deviation of 256.139 hence indicating the presence of outlier higher performers

4.3.3 Psychological Factors

The second independent variable psychological factors constituted economic and market orientation sub variables these were assessed among the bee farmers. The scale used in assessment of the variable was as follows – Not at all (1), to a small extent (2), to a moderate extent (3), to a great extent (4). Table 4.7 provides a summary of the findings.

Table 4.7 Psychological Factors Descriptive Statistics

N=226	Mean	Standard Deviation
Economic orientation [More income]	3.434	0.729
Economic orientation [Profitable]	3.247	0.826
Market orientation [New clients]	3.37 0	0.773
Market orientation [Produce honey for market]	2.722	0.972
Farmer Psychological Factors	3.197	0.548

The desire for the farmers to earn more income from beekeeping activities was found to have the highest mean of 3.434, the standard deviation was moderate at 0.729 meaning dispersion of the responses was average. The results revealed that the beekeepers' economic motivation was average as most respondents indicated a moderate extent response. Under market

orientation producing honey for the market had a lower mean of 2.722 indicating responses to a smaller extent, this revealed that some farmers did not produce sufficient honey to sell, it was primarily consumed at the household level. The standard deviation was observed at 0.972 which inferred that there was high variability of responses among the beekeepers. Findings generally indicated moderate psychological orientation as all but one of the sub-variables presented a mean rating lower than 3 that is, market orientation (produce for the market). The findings therefore indicated that most respondents self-reported as being entrepreneurial in their outlook.

4.3.4 Group Participation factors

4.3.4.1 Social Participation

Social participation was assessed as a sub-variable of farmer group participation factors. Five questions were included in assessing the level of the beekeepers' participation in the listed groups. The variable was assessed on the Likert scale depicting four responses – Never (1), sometimes (2), most of the times (3) and always (4). Table 4.8 provides a summary of the findings.

Table 4.8 Social participation Descriptive Statistics

N=226	Mean	Standard Deviation
Bee farming group	2.207	1.016
Savings group	2.186	1.084
NGO	1.708	0.949
Beekeeping cooperative	1.687	0.899
Bulk buyer farmers group	1.664	0.898
Social Participation	1.888	0.610

The study findings indicated the highest mean participation was in bee farming groups at 2.207 while the standard deviation was found to 1.016. The average responses were indicated as sometimes, however the standard deviation showed a high variability of the responses. Participation in bulk buyer farmers group had the lowest mean of 1.664 with most responses

indicating a never response, the standard deviation was found to be 0.898 indicating moderate variability of responses. The general inference was therefore that most of the farmers did not participate in the groups offering social participation opportunities and those who participated rarely attended the meetings.

4.3.4.2 Extension Participation

Farmer group participation variable were further assessed through participation in beekeeping extension activities. The variable was analyzed on the Likert scale representing four responses – Never (1), sometimes (2), most of the times (3) and always (4). Table 4.9 provides a summary of the findings.

Table 4.9 Extension participation Descriptive Statistics

N=226	Mean	Standard Deviation
Field visits to other bee farms	2.347	0.909
Demonstration of beekeeping	2.101	0.899
Business/ entrepreneurship training	2.053	0.965
Beekeeping training program	1.903	0.892
Extension Participation	2.10	0.64 1

Results reveal that field visits to other farms had the highest mean of 2.347 in extension participation among the respondents with a standard deviation of 0.909 whereas participation in beekeeping training indicated the lowest mean of 1.903 and a standard deviation of 0.892. Both extension participation activities had moderate variation in responses. Mean across the activities included in the assessment of extension participation reflected the response “Sometimes”. The insight was therefore that the respondents, though familiar with various extension services generally rarely interacted with these services. This could be as a result of sparse access to extension services or disinterest among the farmers in the event that the services are readily available.

4.3.5 Beekeeping Management Practices

This section presents findings relating to the fourth variable of the study, beekeeping management practices. The variable was analysed applying a Likert scale with four responses, Never (1), sometimes (2), most of the times (3) and always (4). Table 4.10 provides a summary of the descriptive statistics on bee farm management practices.

Table 4.10 Beekeeping management practices

N=226	Mean	Standard Deviation
Cleaning of beehives	2.658	0.835
Clearing of bushes around the apiary or near hives	2.391	0.875
Conducting beehive inspection	2.221	0.98
Provision of water to bees	2.169	1.187
Planting of trees or vegetation as bee forage	2.013	1.237
The use of beehive tools when harvesting honey	1.854	0.880
Application of Integrated Pest Management (IPM) on crop management	1.735	0.980
The use of protective bee suit during harvesting honey	1.650	0.809
Feeding of bees with supplementary sugar solution	1.425	0.740
Beekeeping management Practices	2.013	0.537

The results indicated that cleaning of beehives had the highest mean of 2.658 and a standard deviation of 0.835 and the feeding of bees with supplementary sugar solution had the lowest mean of 1.425 and standard deviation of 0.74. Both practices had a moderate dispersion of responses. The spread of the means inferred that the respondents were aware of the modern beekeeping practices, but they rarely practiced them denoting that the adoption of the modern beekeeping practices was low.

4.4 Inferential Statistics

The study was conducted to establish association between farmer and farm characteristics on entrepreneurial behaviour. The study adopted inferential analysis namely, correlation analysis, ANOVA testing for the model and regression analysis to determine the association and the magnitude of the relationship. For Likert Scale questions, mean scores per respondent were included as the representative data entries in the regression model. All ratio scales were included as reported by the respondents.

4.4.1 Diagnostic Tests

Diagnostic tests were carried out before running the inferential statistics. Normality tests and multicollinearity tests were applied.

4.4.1.1 Normality Tests

The test of normality as estimated through Kolmogorov-Smirnov and Shapiro-Wilk statistics indicated that the data generally did not indicate a normal distribution, $p\text{-value} < .05$ and the assessment of the histogram pointed to skew to the left. However, with the exclusion of the isolated observations constituting the tail of the skew, it was apparent that the data conformed to a bell curve. Burdinski Jr (2000) posited that graphical normality tests are acceptable for testing for normality. It was thus inferred, by the researcher that the data, except for the meagre isolated observations satisfied the prerequisite of normal distribution. Table 4.11 presents the findings.

Table 4.11 Normality Test Table

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Entrepreneurial behaviour	.105	226	.000	.965	226	.000
a. Lilliefors Significance Correction						

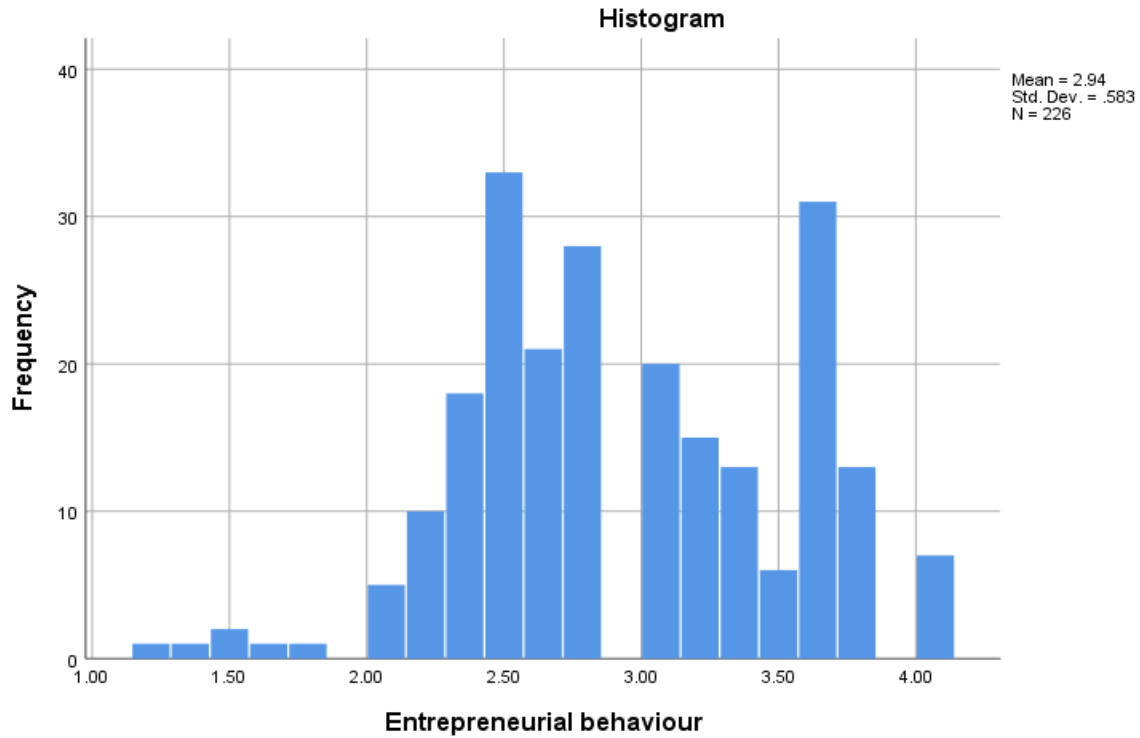


Figure 4.1 Histogram

4.4.1.2 Multicollinearity Tests

Instances of correlations higher than 0.8 were not observed between the independent variables included in the model. The data, in keeping with Chong and Jun (2005) observations, did not show redundancy in variables hence none of the variables were omitted, on account of multicollinearity, from the data set. For the multicollinearity results refer to **appendix V**

4.4.2 Correlation Analysis

This section presents findings on the relationship between the independent variables and entrepreneurial behaviour. The study's independent variables were farmer socio economic characteristics, psychological factors, group participation factors, and beekeeping management practices. The findings are shown in table 4.12 below.

Table 4.12 Correlation Matrix

		Entrepreneurial Behaviour
Age	Pearson Correlation	-.433
	Sig (1-tailed)	.000
	N	226
Gender	Pearson Correlation	.082

	Sig (1-tailed)	.167
	N	226
Family size	Pearson Correlation	-.222
	Sig (1-tailed)	.004
	N	225
Education Level	Pearson Correlation	.597
	Sig (1-tailed)	.000
	N	211
Beekeeping Experience	Pearson Correlation	-.257
	Sig (1-tailed)	.001
	N	226
Annual Income	Pearson Correlation	.387
	Sig (1-tailed)	.000
	N	223
Land Size	Pearson Correlation	.099
	Sig (1-tailed)	.122
	N	226
Apiary Ownership	Pearson Correlation	.317
	Sig (1-tailed)	.000
	N	226
Total Number of Hives	Pearson Correlation	.278
	Sig (1-tailed)	.000
	N	226
Total Honey Produced	Pearson Correlation	.301
	Sig (1-tailed)	.000
	N	222
Psychological Factors	Pearson Correlation	.339
	Sig (1-tailed)	.000
	N	226
Social Participation	Pearson Correlation	-.024
	Sig (1-tailed)	.391
	N	226

Extension Participation	Pearson Correlation	.165
	Sig (1-tailed)	.025
	N	226
Beekeeping Management Practices	Pearson Correlation	-.179
	Sig (1-tailed)	.017
	N	226

The confidence level was at 95% confidence level. Values lower than 0.05 were acceptable as valid correlations. The test of correlation between the dependent and independent variables showed enough correlation for regression analysis

4.4.3 Regression Analysis

The relationship between the independent variables, socioeconomic characteristics, psychological factors, group participation, beekeeping management practices and dependent variable entrepreneurial behaviour, was assessed through a linear regression model consisting of the various sub-variables.

Table 4.13 Regression Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724 ^a	.524	.467	.41931

a. Predictors: (Constant), age, gender, family size, education level, beekeeping experience, annual income, land size, apiary ownership, number of hives, honey produced, psychological factors, social participation, extension participation, and beekeeping management practices

b. Dependent Variable: Entrepreneurial behaviour

The model summary presented an estimation of the variability accounted for by the independent variables as a predictor of the dependent variable. The R square value of 0.524 indicated that the model accounted for 52.4 % variance on entrepreneurial behaviour. The regression summary therefore indicate that the independent variables have an effect on entrepreneurial behaviour.

4.4.4 ANOVA Analysis

The statistical significance of the research model was determined by applying ANOVA analysis. Table 4.14 presents the findings.

Table 4.14 ANOVA Summary

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	40.145	25	1.606	9.133	.000 ^b
	Residual	36.395	207	.176		
	Total	76.540	232			

a. Dependent Variable: Entrepreneurial behaviour

c. Predictors: (Constant), age, gender, family size, education level, beekeeping experience, annual income, land size, apiary ownership, number of hives, honey produced, psychological factors, social participation, extension participation, beekeeping management practices

The analysis of variance (ANOVA) test was conducted to determine the difference between the null and the generated model. The findings revealed the F value=9.133, p-value=.000<.005. It was inferred that the generated model was statistically significant and a good fit. The results established that there is a significant relationship between farmer and farm characteristics and entrepreneurial behaviour of beekeepers. The research therefore rejected the null hypothesis.

4.4.5 Regression Coefficients Model

The regression coefficients model indicates the coefficient effect of the predictor variables on entrepreneurial behaviour and whether the relationship is statistically significant.

Table 4.15 Regression coefficients model

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.523	.292		5.208	.000
	Age	-.008	.004	-.169	-2.150	.033
	Gender	.020	.077	.014	.256	.798
	Family size	.009	.009	.074	.911	.363

	Education	.026	.010	.168	2.651	.009
	Beekeeping experience	-.001	.004	-.016	-.196	.845
	Total annual income	3.75E-08	.000	.013	.083	.934
	Land size	.001	.005	.013	.192	.848
	Apiary ownership	.126	.068	.098	1.864	.064
	Number of hives	.012	.005	.334	2.383	.018
	Honey produced	.001	.001	.240	.974	.331
	Psychological factors	.298	.060	.280	4.961	.000
	Social participation	-.067	.066	-.070	-1.025	.306
	Extension activities	.247	.064	.272	3.844	.000
	Beekeeping management practices	-.045	.072	-.042	-.626	.532

The regression equation:

$$EB = 1.523 + -0.008AG + 0.020G + .009FS + 0.026ED - 0.001BKE + 3.75E - 0.08AI + 0.001LS + 0.126AO + 0.012TNoH + 0.001HP + 0.298PF - 0.067SP + 0.247EP - 0.045BKMP$$

Age, educational level, number of hives, extension participation and psychological factors were found to be valid explanatory variables of entrepreneurial behaviour. The beta values of the predictor variables were -0.08, 0.026, 0.012, 0.247 and 0.298 and respectively with corresponding p-values of 0.033, 0.009, 0.018, 0.000, and 0.000. In assessing by magnitude, the effect on entrepreneurial behaviour, educational level and number of beehives had marginal positive effect while age had a marginal negative effect. Findings indicated that psychological factors had the most influence whereby for every unit increase of psychological factors, entrepreneurial behaviour increased by 0.298 units. Extension participation sub variable followed closely showing a high magnitude effect where for every unit increase of extension participation, entrepreneurial behaviour increased by 0.247 units.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter represents research findings derived from data collected to establish the effect of farmer socio characteristics, farmer psychological factors, farmer group participation and beekeeping management practice on entrepreneurial behaviour. The chapter contains the research summary, discussions, conclusions, recommendations and suggestions for future research work.

5.2. Summary

The research sought to establish the effect of farmer and farm characteristics on entrepreneurial behaviour of beekeepers in Kibwezi West, Makueni County. The sample size consisted of 226 respondents who were selected through purposive sampling technique. A response rate of 83% was attained. The correlation coefficient analysis results indicated sufficient correlation between the independent and dependent variables.

The regression analysis findings revealed that education, number of beehives, extension participation and psychological factors were found to have a positive and significant influence on entrepreneurial behaviour whereas age had a negative and significant effect. These variables were statistically significant at 95 per cent confidence level.

5.3. Discussion of Findings

5.3.1 Socioeconomic Characteristics and Entrepreneurial Behaviour

This was the first research objective in the study to be discussed. Among the socio economic sub variables studied, research findings indicated that age, education level and number of beehives had a significant influence on entrepreneurial behaviour, however the sub variables had a marginal effect. The study found that age had a negative significant influence on entrepreneurial behaviour. The findings showed that for every unit change in age, entrepreneurial behaviour would be affected negatively by beta value (β)= -.008. The implication of this finding is that entrepreneurial behaviour among the beekeepers decreased as the beekeepers grew older. This finding was supported by Pongener and Jha (2020) who noted that age had a negative and significant effect on entrepreneurial behaviour. In another study, Wanyonyi and Bwisa (2015) posited that age had a positive significant influence on

entrepreneurial behaviour. Findings on adoption of modern bee hives, indicated that age had positive and insignificant influence on adoption of modern beehives (Natukunda & Kugonza, 2012). The current findings thus chime into the rhetoric by indicating that Pongener and Jha, (2020) findings are applicable in the Kibwezi West region.

The research findings found that gender had a positive and insignificant effect on entrepreneurial behaviour. The findings revealed that a change in gender would lead to a marginal change of entrepreneurial behaviour by beta value (β)= 0.020. The insignificant relationship was unexpected because beekeeping farming is dominated by men who have a long history of bee keeping and empirical evidence show that men are more risk taking while women are risk averse (Yordanova & Alexandrova-Boshnakova, 2011; Charness & Gneezy, 2012). Study conducted by Mishra (2015) indicated that the gender of the household head is statistically significant when making a decision on technology adoption. The researcher noted that male headed households generate higher income and are allocated larger parcels of farm land, subsequently they become early adopters of agricultural technology while on the other hand, women headed households earn lower incomes and have smaller parcels of land therefore lack a financial buffer to mitigate against farming shocks consequently becoming late adopters of technology.

The present research findings indicated that family size had a positive insignificant effect on entrepreneurial behaviour. A unit change in family size causes a marginal change on entrepreneurial behaviour of beta value (β)= 0.009. A study conducted by Mehta and Sonawane (2012) had similar findings revealing that family size had a positive and insignificant influence on mango growers, whereas contrasting findings from Boruah et al. (2015) indicated that family size had a positive and significant influence on entrepreneurial behaviour of winter vegetable growers. Family members are sources of cheaper farm labour and the survival of a farm is largely dependent on availability of family labour. It can be deduced that mango growers labour requirements are fewer than of those growing vegetables. Different forms of farming have varying labour requirements. Beekeeping is less labour intensive compared to most types of farming and the number of family members is not a determinant of how successful and entrepreneurial a farmer becomes.

Education of the beekeepers in the present study had a positive and significant marginal influence on entrepreneurial behaviour where it was noted that as the education level of the

beekeepers increased it improved their entrepreneurial behaviour. For every change in one unit of education entrepreneurial behaviour would change positively by beta value (β)= 0.026. Research findings by Boruah, Borua, Deka, Borah and Gossaigaon (2015), Affognon et al. (2015), Chaurasiya, Maratha, and Badodiya (2017) and Pongener and Jha (2020) concurred with this finding by revealing that education level had a positive and significant influence on entrepreneurial behaviour of farmers. According to Affognon et al. (2015) high level of education empowered the household head to easily find information associated with new technologies and eased the process of adoption to new practices. Jiménez, Palmero-Cámara, González-Santos, González-Bernal, and Jiménez-Eguizábal (2015) pointed out that education provides entrepreneurs with cognitive skills to better evaluate and exploit entrepreneurial opportunities, increases the level of self-confidence and reduces perceived risk. In contrast Wanyonyi and Bwisa (2015) noted that education had an insignificant effect on entrepreneurial behaviour. On the other hand Kumar, Sharma and Yadav (2013) findings were contrary to the present study which posited that education had a negative significant influence on entrepreneurial behaviour.

Beekeeping experience was found to have a negative and insignificant influence on entrepreneurial behaviour. For every increase in the number of years of beekeeping experience, there was a marginal negative effect on entrepreneurial behaviour. This was indicated by beta value (β)= -.001. This was contrary to findings in beekeeping research which noted that beekeeping experience had a positive but insignificant effect on adoption of modern bee hives and application of bee management practices (Natukunda & Kugonza, 2012). Though it should be noted that adoption, that is, innovativeness is just one aspect of entrepreneurial behaviour among the six components investigated in the present study.

Annual income was also found to be positive and insignificant to entrepreneurial behaviour. For a unit change of annual income entrepreneurial behaviour changes by beta value (β)= 3.75E-08. This finding could be attributed to income generated from beekeeping activities which is a smaller proportion compared to overall farmers' income from other farming activities. These smaller financial returns may disincentivize beekeepers from developing an entrepreneurial capability in their beekeeping venture. However, contrary findings revealed that annual income significantly influenced entrepreneurial behaviour (Mehta & Sonawane, 2012; Boruah et al., 2015).

Additionally, findings from this study indicated that land size had positive and insignificant effect on entrepreneurial behaviour. For every unit increase of land size, entrepreneurial behaviour would change by beta value (β)= .001. This was consistent with studies conducted by Natukunda and Kugonza (2012) and Wanyonyi and Bwisa (2015) whose studies were conducted in Kenya . In Kenya land subdivision is reducing available farmland necessitating farmers to look for ingenious ways of increasing output and running successful farm business operations. Beekeeping requires small section of land to set up beehives. Farm size therefore does not become a determining factor for entrepreneurial behaviour. Boruah et al. (2015) findings contradict and show that farm size has a positive and significant influence on farmers' entrepreneurial behaviour.

The research findings indicated that majority of the beekeepers had set up apiaries where the beehives were kept in one location instead of the traditional practice of setting up the beehives all over the farm. This could be attributed to benefits of participation in extension activities as well the ownership of smaller farms due to land subdivision. Regression analysis results reveal that apiary ownership had a positive and insignificant effect on entrepreneurship behaviour. For a unit change of apiary ownership entrepreneurial behaviour changes by beta value (β)= .126. This finding was contrary to expectations because apiary management is accredited to better production practice that leads to higher honey production and farm efficiency hence improving entrepreneurial actions of the beekeepers. The current research findings are different to research results found by Popa, Marghitas, and Pocol (2012) which showed that apiary ownership had a positive and significant influence on entrepreneurship.

Regression analysis results indicate that number of beehives had a positive and significant effect on entrepreneurial behaviour. A unit change of number of beehives would cause a marginal change of entrepreneurial behaviour by beta value (β)= .012. The regression findings were supported by research conducted by Gebiso (2015) whose findings indicated that the number of local beehives had a significant influence on the adoption of modern hives. Gamit, V, Bhabhor, Tyagi and Rathod (2015) pointed out that livestock possession had a positive and significant influence on entrepreneurial behaviour. The research further noted that farmers received higher rewards from their resources and were more inclined to adopt new technologies in addition to the fact that the farmers had the capacity to absorb risks associated with innovativeness. In contrast Mehta and Sonawane (2012) pointed out that cropping intensity had no association with entrepreneurial behavior.

Research results show that the average honey production per farmer for the year under the investigation was higher in comparison to other regions in Kenya, such as Mwingi district (Affognon et al., 2015). The present study however noted a high disparity in honey harvested where some beekeepers experienced very low harvests while others harvested extremely high quantities. Regression analysis findings indicate that quantities of honey produced had a positive but insignificant effect on entrepreneurial behaviour. A unit change of honey produced would cause a marginal change of entrepreneurial behaviour by beta value (β)= .0001. The regression findings could be attributed to several possible reasons. Present research findings indicate that majority of the beekeepers did not produce sufficient quantities to sell, another reason could be that the honey sold was in raw form or that the quality of processed honey could be low due to lack of processing equipment hence the beekeepers could have received lower returns. Lastly low participation in institutions that promoted collective action deprived beekeepers' benefits associated with market access such as reduction of market information asymmetry, and mitigation against risks related to sale of honey like transaction costs. The findings were contrary to research conducted by Mahindaratne (2013) which noted that the business success of micro and small organic vegetables farmers was significantly affected by quantity of organic vegetables produced.

The study results of two sub variables farmer socio economic construct namely age and beekeeping experience was found to be contrary to the theoretical ethos of the human capital theory. The theory conceptualizes that as the age and experience of entrepreneur increase so does an individual's entrepreneurial capabilities. Age and beekeeping experience had a negative significant and insignificant effect on entrepreneurial behaviour respectively. The education variable conformed to the philosophy of the theory, where an increase in the number of years in schooling increased the likelihood of a farmer possessing an entrepreneurial behaviour.

5.3.2 Psychological Factors and Entrepreneurial Behaviour

The second research variable was investigated to establish the effect of psychological variables on entrepreneurial behaviour. The results indicated that respondents had high economic motivation in that they considered beekeeping had the potential to become a profitable enterprise, in addition they also expressed their desire to earn more income from beekeeping. This could be a result of the high market demand of honey in Kenya and its limited supply,

contributing to high local and national prices. According to findings by Stephency and Vengatesan (2018) economic orientation was driven by income derived from coconut farming. The present research findings revealed that market orientation was high when it came to the willingness to seek new customers, whereas commercialization of honey was hampered by low honey production volumes. Almost half of the beekeepers confirmed that they do not produce enough quantities for sale. It is noteworthy to mention that the research findings indicated that the average honey produced was high, however there was a very high production disparity among the beekeepers where some produced negligible quantities and others harvested very large honey quantities. This was supported by Gebretsadik and Negash (2016) who revealed that majority of beekeeping in Ethiopia produced honey for household consumption.

The regression analysis indicated that psychological factors had a positive and significant effect on entrepreneurial behaviour. A unit change in psychological variable would influence a change of beta value (β)= .298. This finding concurred with findings from Lawrence and Ganguli (2012) and Raina, Bhushan, Bakshi, and Khajuria (2016) whose research findings established that economic motivation and market motivation had a positive and significant influence on entrepreneurial behaviour.

The findings are supported by the McClelland's human theory which conceptualizes that individual motivations direct entrepreneurial behaviour. In the current study need of achievement motivation represented by a high economic motivation and market orientation had a huge influence on the entrepreneurial behaviour of the beekeepers.

5.3.3 Group Participation factors and Entrepreneurial behaviour

Group participation was the third variable under the study with social participation and extension participation as the sub variables. The results indicate low social participation of beekeepers within social networks and institutions in the community. Participation in NGO initiatives, beekeeping cooperatives and bulk buyer farmers' groups showed the lowest participation, yet these are avenues where farmers access markets by consolidating their honey and have better negotiating powers with buyers. These findings were supported by Abeyrathne and Jayawardena (2014) who found out that group interactions among farmers were low when it involved selling their produce. The highest social participation activity observed among the beepers was participation in saving groups. This was supported by a report by Department of

youth gender sports and social services (2017) revealed that most residents in the subcounty were members of a saving group.

The regression analysis findings revealed a negative and insignificant effect of social participation on entrepreneurial behaviour. A unit change in social participation would cause a negative change in entrepreneurial behaviour by beta value (β)= -.067. These regression results were contrary to expectations, as the findings revealed that the more the beekeepers participated in social networks the less entrepreneurial, they became. This could be that the social networks may not be structured to function in a manner to meet the objectives of the institutions. It could also be that participation did not translate to tangible benefits to the beekeepers. In contrast according to Popa, Marghitas and Pocol (2012) study findings indicated that collaborative efforts among beekeepers had a positive significant relationship with entrepreneurship. Social networks provided beekeepers with access to information on profitable business opportunities and financial resources.

Extension participation of the beekeepers in the study was found to be average. Extension activities that had the highest farmer participation were field visits to other farms and beekeeping demonstration by extension workers. This was followed by entrepreneurship related training and finally bee keeping training was the extension activity with the least participation. Wodajo (2012) study findings revealed that farm apiary visits and demonstrations on beekeeping had a positive and significant influence on the adoption of new beehive management technology.

Regression analysis results showed that extension participation had positive and significant effect on entrepreneurial behaviour of beekeepers. A unit change in extension participation would cause a positive change in entrepreneurial behaviour by beta value (β)= .247. The regression findings were in line with findings by, Porchezhiyan, Umamageswari and Manjunatha (2016), Chithra, Meti, Maraddi, and Manjunatha (2018) and Kayina, Ram, Devi and Miranda (2018) that indicated the extension participation had a positive and significant effect on entrepreneurial behaviour. Farmers who participated in extension activities became more familiar with the new technologies thus increasing their confidence in trying out new practices (Wodajo, 2012; Kayina et al., 2018).

McClelland's human motivational theory was applicable in the study of this research sub variables. The beekeepers were found to have low affiliation motivation as results indicated that respondents had infrequent interactions with social networks available in the community. However, they participated in extension activities which the respondents could have deemed to be more beneficial to their beekeeping enterprise. The proponents of the theory observed that even though entrepreneurs may tend to have low affiliation motivations, they may participate in forums that are professional and beneficial to their businesses.

5.3.4 Beekeeping Management Practices and Entrepreneurial Behaviour

The overall beekeeping management practices was found to be average. Cleaning hives was the most practiced beehive management practice while the practice that were least practiced was providing supplementary sugar solution to bees during the dry seasons to sustain them. Regression analysis indicated that beekeeping management practices had a negative and insignificant effect on entrepreneurial behaviour. A unit increase change in beekeeping management practices would cause a negative unit change of entrepreneurial behaviour by beta value (β)= -.045. The regression results were unexpected because application agricultural practices improve farm operations which generally contribute to the success of the entrepreneur and the farm enterprise. Kumsa and Takele (2014) pointed out that inadequate beekeeping management skills affected the production capacity of the bee farm enterprise. In another research study by Mazengia and Tesfay (2018) indicated that a lack of awareness of the benefits of good beekeeping management practices affected honey production in Ethiopia. The beekeeping management practice negative insignificant findings in the present study could also be an issue of lack or inadequate agricultural extension training. Wodajo (2012) observed that extension training was important because it developed the beekeepers' self confidence in new technology and practices therefore increasing the productivity of the beekeepers who have applied beehive technologies.

Entrepreneurial human capital theory puts more importance to specific human capital namely, skills and knowledge than generic human capital acquired through education and experience. The findings under this variable indicate that respondents did not have enough skill level to engage in good beekeeping farm management practices despite having a good level of education and beekeeping experience.

5.4 Conclusions

The study investigated the effect of farmer socio economic characteristics, farmer group participation, farmer psychological factors and beekeeping management practices on entrepreneurial behavior of beekeepers. The results indicated that 52.4% variations in entrepreneurial behaviour was determined by age, experience, number of beehives, psychological factors and extension participation, at 95 per cent confidence level.

The research concluded that psychological factors had the highest positive and significant influence on entrepreneurial behaviour. The beekeepers had high economic motivation which demonstrated that they wanted to improve their livelihoods and particularly their financial wellbeing. The farmers also viewed beekeeping as a form of farming that had the potential to be profitable. Despite this belief, beekeeping contributed marginally to their total annual income. Even though the beekeepers market orientation indicated that the farmers actively engaged in marketing activities to identify new customers, many did not produce enough honey quantities to commercialize their enterprises.

The research concluded that extension participation had a high and positive significant effect on the beekeepers entrepreneurial behaviour. The two most preferred extension activities that reflected higher farmer participation were field visits to other farmers farms and practical demonstrations of beekeeping. Farm visits by farmers inferred that farmers wanted to learn from each other, and they also wanted to confirm whether innovative beekeeping practices were beneficial in addition to ascertaining if the practices added value to farmers who applied them. Extension activities that involved beekeeping demonstrations equipped beekeepers with practical hands on skills that were easily transferrable to their bee farm management. Entrepreneurial training indicated average participation, this form of training empowered beekeeper to view their farms as enterprises and to operate them in a businesslike manner. Entrepreneurial behaviour can be acquired through learning experiences. Extension participation provides a social network where farmers learn from each other on how to adopt new beekeeping innovations, be to more risk oriented and develop ways of mitigating risks, be inspired to become more achievement oriented by seeing how their peers are faring financially, how to plan their production cycles and finally develop an information seeking behaviour when they can see how application of new information has transformed their colleagues farming enterprises.

Research concluded that sub variables under the farmer socio economic characteristics variable revealed a significant effect on entrepreneurial behaviour were age, education, and number of beehives; however, age had a negative and significant effect while education and number of beehives had a positive and significant effect. The sub variables had a marginal influence on behaviour. Regarding age, the findings noted that as individuals grow older, they become less likely to adopt new approaches and innovations, became risk averse and less achievement oriented.

Research concluded that education had a positive and significant marginal effect on entrepreneurial behaviour. Education equips individuals with skills and capabilities that become very useful when they choose to pursue entrepreneurship as an occupation. For farmer entrepreneurs, formal education helps farmer overcome risk averse tendencies and instead instils confidence in entrepreneurs for them to pursue higher goals for their enterprises while utilizing the acquired competencies. Research concluded that as the education level of beekeepers increased, their entrepreneurial behaviour also improved.

The number of beehives was found to have positive and significant influence on entrepreneurial behaviour. Beehives are the main physical assets owned by a beekeeping farm enterprise. The dedication of financial resources to acquire these assets indicated a high level of achievement orientation, risk taking and decisiveness behavioural characteristics by the farmers. Though ownership of an apiary had a positive and insignificant effect at 95% confidence level, it is worth mentioning its p-value =0.064.

The entrepreneurial human capital theory was relevant to the study. The present research findings indicated that education contributed to entrepreneurial behaviour, whereas beekeeping experience inhibited entrepreneurial behaviour. The theory supports these findings, increase in the level of education equipped individuals with competencies that would be relevant in pursuing an entrepreneurial career, however the study findings indicated that experience acquired in beekeeping did not necessarily translate to appropriate and quality knowledge or skills. According to Unger, Rauch, Frese and Rosenbusch (2011) the outcome of work experience is evident in the acquired knowledge and skills, which the proponents of the theory stated to be more important than the existence of the work experience. The quality of the experience is measured on its usefulness to the task at hand. McClelland's human motivation theory was also applicable to the study. The theory informed the identification of the most

prevalent human motivations driving the beekeepers into entrepreneurial action. The study found that the beekeepers were highly motivated by the achievement motivation indicated in the positive and significant influence of psychological variables on entrepreneurial behaviour. The respondents' affiliation motivation was low revealed by the beekeepers' low social participation.

5.5 Recommendations

5.5.1 Policy Makers

Extension participation policy formulation and implementation by the ministry of agriculture, livestock and fisheries at both county and national government should aim at creating an enabling environment for the delivery of extension services either by the government, nongovernment bodies or by private providers. National and county entrepreneurship development policies geared towards job creation and agricultural development should focus heavily on developing strategic plans that will enhance psychological motivation levels of beekeepers. The research findings showed that psychological factors have a high significant influence on entrepreneurial behaviour.

5.5.2 County government, development partners and other stakeholders

The introduction of modern beehives such as KTBH and langstroth should be accompanied by other beekeeping management tools and equipment. When county governments and development partners distribute modern hives for free or at a subsidized price, they also need to account for the total bee farm management costs which include the accompanying beekeeping tools and equipment. Without the equipment, beekeepers will be unable to optimize on the benefits of modern beekeeping practices. This will undoubtedly affect the beekeepers yield negatively and eventually the beekeepers will develop a negative attitude towards modern beekeeping methods. It is therefore recommended that as county governments and development partners sensitize beekeepers on beekeeping practices similar emphasize should be done on the importance of using appropriate beekeeping tools and equipment. Accessibility of the tools and equipment should also be addressed either through a subsidized program or bringing them closer to the beekeepers as most beekeeping communities live far from urban areas where these tools are sold.

5.5.3 Extension service Providers

The study found that the beekeepers in Kibwezi west subcounty had a high number of beehives however, majority of the farmers indicated that they did not produce enough amounts to commercialize their enterprises. Sufficient quantities would entail honey production surpassing household consumption levels and adequate to justify the costs incurred when selling the honey. Indicators low production include low beehive occupancy rate, bees absconding during the dry season or issues associated with hive pests and diseases. The research recommends that extension agents conduct an assessment to identify reasons for the low honey productivity and design outreach activities to address this problem. The research further recommends the utilization of visits to successful bee farms and demonstration training techniques to improve on beekeepers' participation in extension service programs.

Beekeepers participation in entrepreneurship training was average, this could be that there were few opportunities for participation. The research recommends that extension providers to prioritize training on entrepreneurship which will empower the farmer entrepreneurs with competencies that will assist them to innovatively develop solutions to challenges that they encounter and shed off an attitude of dependency on donations or external assistance that has crippled most on farm and off farm agricultural enterprises.

5.5.4 Beekeepers

Social participation was found to have a negative insignificant effect on entrepreneurial behaviour yet social networks in agriculture have been attributed to successfully uplifting small scale farmers from obscurity to be a formidable player in agricultural value chains. Beekeeping group associations and cooperatives provide a platform where farmers leverage on their strength in numbers to competitively access finance, input, technical information and market for their produce. The study recommends that beekeepers should strengthen their beekeeping farmers groups and cooperatives by active participation. Group leadership together with group members should strategize on how they can derive more benefits from their group participation in order to increase their own participation and commitment. Any barriers for new membership in groups or cooperatives should also be investigated to enhance new member recruitment. Instituting governance structures and conflict resolution mechanism will build trust and group longevity.

5.6 Limitations of the study

The research applied purposive sampling technique to select respondents who had practiced beekeeping for at least two years to participate in the study. The research limitation is that the findings can only be generalized in Kibwezi West sub county, Makueni County due to the sampling technique applied in the study. The research collected data using self reporting method which is an approach applied when collecting data on individuals behaviour, however its limitations include dependence on respondents recall and social desirability. The limitation was minimized by using triangulation approach in the questionnaire. Data collection through observation would have overcome this limitation however, this was not possible due to time and budgetary constraints.

5.7 Suggestions for further research

The research was quantitative in nature, it is recommended that qualitative methods be applied to gain in depth knowledge on unexpected findings on social participation. Beekeepers in Kenya form groups for better organization and coordinating and these groups an important channel for both technical and market information access and sharing, yet the findings indicated that social participation had a negative effect on entrepreneurial behaviour. The qualitative study would explore the salient issues relating to low social participation among beekeepers and why it had a negative insignificant effect on entrepreneurial behaviour.

The research was confined in Kibwezi west subcounty and investigated effect of farmer characteristics on entrepreneurial behaviour of farmers in beekeeping farming, a similar research can be conducted across other forms of farming systems in other parts of the country. The research examined two psychological factors namely economic motivation and market orientation; the research recommends further investigations on the influence of other psychological factors on entrepreneurial behaviour.

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APPENDICES

Appendix I: Letter of introduction

Dear Respondent,

I am a student pursuing a Master of Management in Agribusiness degree from Strathmore University Business School. In fulfillment of my degree requirements I am required to conduct research study, I am undertaking a study on **Effect of Farmer and Farm characteristics on Entrepreneurial Behaviour of beekeepers in Kibwezi West Sub County, Makueni County.**

The responses collected will be used for academic purposes and will be treated with utmost confidentiality.

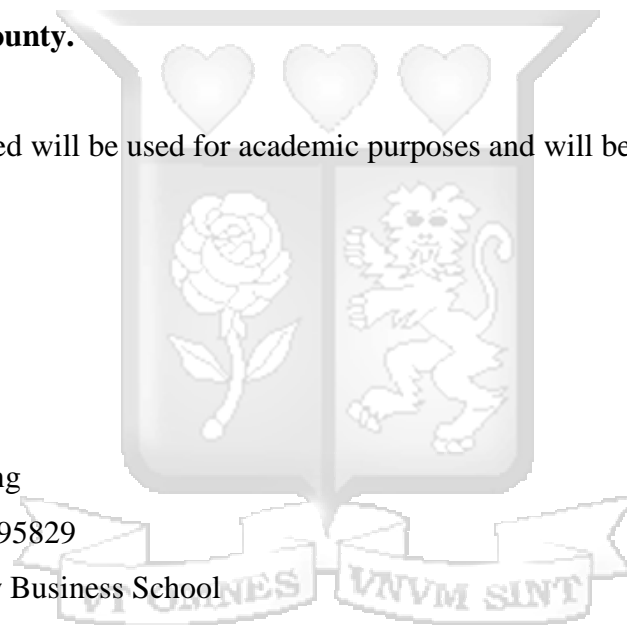
Thank you.

Yours Sincerely,

Margaret Mbesa Strong

Student Registration: 95829

Strathmore University Business School



Appendix II: Strathmore University Ethical Approval



12th March 2020

Mrs Strong, Margaret
margaret.strong@strathmore.edu

Dear Mrs Strong,

RE: The effect of farmer and farm characteristics on entrepreneurial behavior of beekeepers in Kibwezi West Sub County, Makeni County.

This is to inform you that the SU-IERC has reviewed and **approved** your above research proposal. Your application approval number is **SU-IERC0634/20**. The approval period is **12th March, 2020 to 11th March, 2021**.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 72 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,


Dr Virginia Gichuru,
Secretary; SU-IERC

Cc: Prof Fred Were,
Chairperson; SU-IERC



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Appendix III: Research license

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 734138 Date of Issue: 28/March/2020

RESEARCH LICENSE



This is to Certify that Ms.. Margaret Mbesa Strong of Strathmore University, has been licensed to conduct research in Makueni on the topic: The effect of farmer and farm characteristics on entrepreneurial behaviour of beekeepers in Kibwezi West Sub county, Makueni County for the period ending : 28/March/2021.

License No: NACOSTI/P/20/4505

734138
Applicant Identification Number

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Appendix IV: Questionnaire

EFFECT OF FARMER AND FARM CHARACTERISTICS ON ENTREPRENEURIAL BEHAVIOR OF BEEKEEPERS IN KIBWEZI WEST SUB COUNTY, MAKUENI COUNTY

QUESTIONNAIRE

SECTION A: FARMER AND FARM ATTRIBUTES

1. Kindly indicate your age _____ years
2. Kindly indicate the gender of beekeeping enterprise owner Male _____ Female _____
3. Kindly indicate years of schooling _____ years
4. Family Size: Men _____
Women _____
Children _____
Total _____
5. For how many years have you been engaged in bee farming? _____ years

6. What was your annual income?

No.	Source of Income	KSH.
1	Beekeeping	
2	On farm	
3	Off farm activities	
	Total	

7. How many acres is your farm? _____ acres
8. Do you have an apiary? Yes _____ No _____

9. How many hives do you have?

Type of Hives	Number of Hives
Traditional log frame	
Kenya Top Bar beehive	
Langstroth beehive	
Kapkukul beehive/ Traditional Modernized beehive	
Total number of hives	

10. Kindly indicate honey produced

No	Type of Beehive	Season 1 (kg) January-June 2019	Season 2 (kg) October- December 2019	Total (Kg)
1	Traditional log beehive			
2	Langstroth beehive			
3	Kenya Top Bar Beehive			
4	Kalpulkul beehive/ Traditional modernized beehive			
	Total (Kg)			

SECTION B: PSYCHOLOGICAL FACTORS

11. Kindly indicate, on a level of 1 to 4, 1(not all) to 4 (To a great extent) your level of agreement with the following statements

	Not at all (1)	To a small extent (2)	To a moderate extent (3)	To a great extent (4)
Economic Motivation Beekeeping farming is profitable, and I can make a living out of it.				
Economic Motivation: I highly desire to gain more income from my bee farming activities.				
Market Orientation: I produce honey for the market				
Market Orientation: I would like to distribute my product to new client markets				

SECTION C: GROUP PARTICIPATION

12. Kindly indicate on a scale of 1 (never) to 4 (always) your level of social participation.

No.	Membership	Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
1.	Bee farmers Group				
2.	Bee keeping cooperative				
3.	Bulk buyer farmers group				
4.	NGO				
5.	Savings group				

13. Kindly indicate on a scale of 1 (never) to 4 (always) your level of participation in beekeeping extension activities

No.	Extension Activities	Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
1.	Beekeeping training program				
2.	Field visits to other bee farms				
3.	Demonstration on beekeeping				
4.	Business/ entrepreneurship training				

SECTION D: BEE FARM MANAGEMENT PRACTICES

14. Extent of adoption of beekeeping management practices

Kindly indicate, on a level of 1 (never) to 4 (always) how you manage your bee farm.

No.		Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
1	Do you use bee tools to harvest honey?				
2	Do you wear bee protective suit during honey harvesting?				
3	Do you clean beehives?				

4	Do you clear bushes in the apiary or near hives?				
5	Do you conduct hive inspection?				
6	Do you use Integrated Pest Management (IPM) on crop management?				
7	Do you provide water to bees?				
8	Do you feed bees with supplementary sugar solution?				
9.	Do you plant trees or vegetation that act as bee forage?				

SECTION E: ENTREPRENEURIAL BEHAVIOUR

15. Kindly indicate, on a level of 1 to 4, 1(not all) to 4 (To a great extend) your level of agreement with the following statements

	Not at all (1)	To a small extent (2)	To a moderate extent (3)	To a great extent (4)
I generally adopt new beekeeping approaches to create value in my bee farm				
I find it easy to invest money and time in new hives and beekeeping equipment				
When making decisions for beekeeping I consider several options before selecting one				
I set specific beekeeping goals and seek to achieve them				
I can effectively schedule the tasks involved in beekeeping.				

I take my time to seek various sources of information in order to improve my beekeeping farm operations				
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Appendix V: Multicollinearity Test

Correlations

	Entrepreneurial behaviour	Gender	Age	Years of schooling	Family Size - Total	Years in bee farming	Annual income: Total	Farm acres	Social Participation	Extension Activities	Psychological Factors	Do you have an apiary?	Total number of hives	Total S3	Beekeeping Management Practices
Pearson Correlation	1.000	.082	-.433	.597	-.222	-.257	.387	.099	-.024	.165	.339	.317	.278	.301	-.179
	Gender	1.000	-.006	.114	-.032	.135	.092	.042	-.130	-.110	.192	-.005	.170	.166	.118
	Age	-.433	1.000	-.603	.603	.670	-.342	.020	.136	-.021	-.121	-.024	-.002	-.196	.220
	Years of schooling	.597	.114	-.603	1.000	-.495	.474	.088	-.334	.070	.244	.171	.241	.276	-.364
	Family Size - Total	-.222	-.032	.603	-.495	1.000	.631	-.183	.006	.329	-.012	.058	-.010	-.159	.095
	Years in bee farming	-.257	.135	.670	-.481	.631	1.000	-.103	.148	-.047	-.169	.010	.211	.017	.062
	Annual income: Total	.387	.092	-.342	.474	-.183	-.103	1.000	-.084	.041	.147	.294	.356	.335	-.299
	Farm acres	.099	.042	.020	.088	.006	.010	.005	1.000	-.075	.038	.039	.084	.005	-.015
	Social Participation	-.024	-.130	.136	-.334	.329	.148	-.084	-.075	1.000	.542	-.240	-.057	-.069	.445
	Extension Activities	.165	-.110	-.021	.070	-.012	-.047	.041	.038	.542	1.000	-.156	-.009	.011	-.072
	Psychological Factors	.339	.192	-.121	.244	-.106	-.169	.147	.039	-.240	-.156	1.000	.203	.115	-.067
	Do you have an apiary?	.317	-.005	-.024	.171	.058	.010	.294	.045	-.043	-.009	.203	1.000	.340	.307
	Total number of hives	.278	.170	-.002	.241	-.010	.211	.356	.084	-.057	.011	.115	.340	1.000	.639
	Total S3	.301	.166	-.196	.276	-.159	.017	.335	.005	-.069	-.072	-.067	.307	.639	1.000
	Beekeeping Management Practices	-.179	.118	.220	-.364	.095	.062	-.299	-.015	.445	.355	-.072	-.134	-.217	-.332