

**INFLUENCE OF ENTREPRENEURIAL COMPETENCIES ON
COMMERCIALIZATION OF LIVESTOCK FARMING IN NAROK
COUNTY, KENYA**

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THE DEGREE OF DOCTOR OF PHILOSOPHY IN ENTREPRENEURSHIP
OF KENYA METHODIST UNIVERSITY**

OCTOBER, 2025

DECLARATION

I hereby declare that this thesis is my original work and has not been presented for a degree or any other award in any other University.

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ABSTRACT

The county has a very large population that owns large number of livestock but they still remain poor in terms of accessing health services, taking their children to school and access to other basic needs which this study attributes to poor commercialization of their domestic animal farm products for wealth maximization. The aim of this research was to establish the influence of entrepreneurial competencies on the commercialization of livestock farming in Narok County. The research specifically focused on the influence of entrepreneur skill acquisition, market orientation knowledge, entrepreneur risk management knowledge and entrepreneur environment awareness knowledge on commercialization of livestock farming in Narok County, in Kenya. The study also sought to examine the moderating effect of government strategy on the livestock subsector in respect to commercialization of livestock farming in Narok County, Kenya. Descriptive research was adopted based on its reliability and systematic description of a population. The population of the study included all farmers that practice livestock farming in Narok County. The study targeted households of smallholder livestock farmers. Narok County has 150,415 households comprising 721,992 individuals involved in livestock farming. The sample size was determined by use of Cochran's formula, with sample size of 384 households being used. The study adopted mixed sampling design, stratified and random sampling so as to settle on the specific households for inclusion in the study. Primary data was collected from the field through structured self-administered questionnaires. The study adopted drop and pick methodology during data collection. Data analysis was done through both inferential and descriptive statistics using SPSS v24. Inferential statistics that include Pearson correlation and Multivariate binary logistics regression analysis. Results indicated that entrepreneurial skills ($B = 1.14$, $\exp B = 3.128$, $P=0.002$) positively and significantly influenced commercialization of livestock farming; market orientation knowledge ($B = 0.843$, $\exp-B = 2.323$, $P=0.003$) positively and significantly influenced commercialization of livestock farming; entrepreneur risk management knowledge ($B = -0.8$, $\exp B = 0.449$, $p=0.02$) has a negative and significant effect commercialization of livestock farming; entrepreneur environment awareness knowledge had a negative and significant effect commercialization of livestock farming in Narok County ($B = -1.64$, $\exp B = 5.156$, $P=0.01$). This implies that entrepreneur environment awareness knowledge has significant effect on commercialization of livestock farming in Narok County, Kenya; and government strategy moderates the impact of entrepreneurial competencies on commercialization of livestock farming in Narok County. This study recommends households involved in livestock farming to ensure that they effectively manage finances for farming activities, develop business plans for farming enterprises, regularly attend training sessions where farmers are taught entrepreneurship, and make sure to cultivate entrepreneurial abilities that allow farmers to effectively manage livestock farming. Similarly, to improve commercialization of livestock farming, there is need for those involved in livestock farming to equip themselves with market orientation knowledge by developing awareness of all needs of consumers of livestock products and products livestock that originate from the agricultural operations. There is also need to have sufficient market knowledge of livestock and its connected items, access information on the livestock market as well be prepared to take advantage of any market opportunities.

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ABBREVIATIONS

ANOVA	Analysis of Variance
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
KALRO	Kenya Agricultural and Livestock Research Organization
KNBS	Kenya National Bureau of Statistics
NCG	Narok County Government
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
USD	United State Dollars

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The agriculture sector is the gateway for population survival (Khade, et al.,2021). One of its subsectors is animal agriculture or livestock farming. Investment in this subarea is mostly controlled by the private sector in both the developed and the developing countries. Investment in animal farming is usually managed by livestock entrepreneurs who are individuals or a group of families. They are mostly holders of small quantities of farm animals (Khade, et al.,2021; Madi & Tozo, 2020). Livestock enterprises for the most part are self-employment jobs. Two categories of animals are managed in this investment. The livestock comprising of dairy cows, pigs, sheep, goats, camels, horses, mules and other domesticated animals in this class. The poultry animals are chickens, turkey, geese, ducks, Guinea fowl, and other types of birds that humans can domesticate.

The essence of this form of agriculture is to raise various kinds of domestic animals and use their products for human consumption. The investment begins either by using family wealth and family reserve farmlands for pasture or borrowing money and renting land for pasturing. Every investment requires a return and therefore the products are commercialized. Commercialization refers to the production, distribution, and marketing of domestic farm animals' products to meet both the customers' demands and market needs. It requires the use of entrepreneur strategies to achieve commercial success in marketing the products or services to market. Effective commercialization requires input, output, and market participants (Chandio, et al. 2018; Linderhof,et al., , 2019).

Spacey (2017) mentions four categories of commercialization: arts, government, business capabilities, and innovation. Artistic works involving music, painting, film,

and sculpture can be commercialized as well as government business type's activities and innovation (Lolchoki, et al.,2025). Business capabilities involve the entrepreneur having the competencies and skills to perform business tasks and achieve success. This involves planning, controlling, and directing. In planning, procedures are established to achieve desire goals. Keeping adequate records of the business activities is controlling and overseeing and giving instructions to measure performance is directing. Generating revenue to increase the business owner's wealth, job creation, improving infrastructure, and expansion of the business are benefits of commercialization ((Lolchoki, et al.,2025).

From the beginning, livestock production has been driven by commercial interests. In order for smallholder producers to be included in the value chain, they must participate as partners. For the past 40 years, industrialized nations have concentrated on producing farm animal products in big units thereby reducing the size of smallholders (Food and Agriculture Organization [FAO], 2018; Linderhof, et al.,2019). Smallholders commercializing of livestock products has been on for a long time and is still in process. It paves the way for shifting focus from producing for domestic consumption with the possibility of selling excess to creating with an eye toward the market and making a profit.

From 2013 to 2020 the number of livestock species has increased exponentially to more than 67 million. Over the same period breeding facilities have increased that enhanced the number of species to facilitate an increase in commercialization but this objective has not been realized and marketing of livestock is low across the country. The commercialization of livestock products should create empowerment for improving livelihood by creating jobs, bringing income, and enabling savings (Galiè, et.al 2019;

World Economic Forum, 2019). The animals' products make a significant contribution to human existence in terms of sustainable food security. The products are mainly milk, meat and eggs. These products are very rich in proteins and vitamins, providing about 1/3 of the protein human consume globally. Of all the contributions from livestock there exist shortages in the commercialization of the products which creates poverty for livestock owners mostly in developing countries (Gordon, 2018; Sennuga, et al.,2022;).

Entrepreneurial skills are crucial for success in any business venture, including livestock farming. The identification of opportunities, taking of calculated risks and management of resources in an effective way is essential for entrepreneurs in this industry. As stated by Tugade, (2020), "Entrepreneurial skill refers to the ability to create and exploit new opportunities through a combination of creativity, innovation, and risk-taking."

Market orientation knowledge is another important aspect of entrepreneurial success in livestock farming. It involves understanding market trends, customer needs, and competitive dynamics. By staying attuned to market demands, entrepreneurs can tailor their products and services to meet the evolving needs of consumers. According to Dung et al. (2020) "Market orientation knowledge enables entrepreneurs to develop a customer-focused approach and design offerings that resonate with the target market."

Entrepreneur risk management knowledge is crucial in the inherently risky environment of livestock farming. Farmers face various risks such as unpredictable weather patterns, disease outbreaks, and fluctuating commodity prices. Entrepreneurs must develop risk management strategies to mitigate these uncertainties. As highlighted by Klein et al. (2019), "Entrepreneurs need to assess and manage risks effectively by adopting risk

management practices such as diversification, insurance coverage, and contingency planning."

The success of cattle farming operations also depends on the entrepreneur's awareness of the environment. Entrepreneurs need to be aware of the regulatory and legal frameworks governing the industry, as well as the environmental sustainability aspects of their operations. They must comply with environmental regulations, adopt sustainable farming practices, and minimize the negative impacts on natural resources. As emphasized by Sili and Dürr (2022), "Entrepreneurs in livestock farming should be environmentally conscious, incorporating sustainable practices that preserve the ecological balance."

Commercialization of livestock farming is an essential step for entrepreneurs to transform their ideas into profitable ventures. It involves taking the products and services created and making them available to the target market. Entrepreneurs need to develop effective marketing strategies, establish distribution channels, and build strong relationships with customers. According to Hersleth et al. (2022), "Commercialization is the process through which entrepreneurs convert their innovative ideas into marketable products or services by identifying target customers and creating value propositions that resonate with them." Successful entrepreneurs in the livestock farming industry exhibit a combination of these skills and knowledge areas. They possess the ability to identify market opportunities, effectively manage risks, understand the regulatory environment, and commercialize their offerings. By honing these skills, entrepreneurs can enhance their chances of creating sustainable and profitable livestock farming businesses.

1.1.1 Global Perspective of Commercialization of Livestock Farming

In India, livestock and crop commercialization contributed 34% and 66% to the agriculture sector GDP in 2016. To improve livestock output the government invested in the Bovine Breeding Program, a national endeavor for increasing dairy cows in both rural and urban communities to keep up commercialization. An agriculture sector price policy was embarked upon for increasing the purchasing price of the commodity from the producer. The policy ensures remunerative price support for the farmer taking into account the cost of production. This is a market intervention for encouraging the farmer to increase production and distribution. The price increase is to build market infrastructure for the producer and help to expand the investment. The policy is regulated and monitored to avoid the exploitation of consumers. Improving the legal framework of contract farming was initiated to favor both the producer and the buyer of the products. In the past, such farming activity only favors the buyer who may determine the purchasing price of the farm products. The introduction of off-farm activities to diversify employment in the agriculture sector was also initiated. Commercialization has been challenged by little access to credit, limited access to farmland, and limitation in the quality of breeding bulls (Organization for Economic Co-operation and Development [OECD], 2018; Pattanayak, 2016).

For America, to maximize farm animal products for commercialization the Trump administration provided USD 16 billion in aid to the agriculture sector including the livestock subsector. For animal agriculture, the cash was invested in climate change technology and training for the use of the new technology to enhance economies of scale. This opens the corridor to enhance the globalization of American livestock trade (Semuels & Wisc, 2019). Beginning 2017 small and big farmers of livestock faced commercialization challenges of their livestock products due to climate change. The

crisis resulted to reduced production and marketing in the farm animal enterprise. Beef consumption declined by 37% in 2017. The crisis also increased food scarcity and lower farm profitability (Christen 2021; First-Arai 2020). Domestic animal farmers in the Midwest and Northeast regions had difficulties in adaptation and this affected their farm animals. The unbearable situation and trade confrontation with China made farmers ran into a mortgage crisis and other debts from rearing animals without realizing sales.

The EU countries such as Germany, France and Italy have adopted European Green Deal in 2019 as a road map for research to tackle climate change challenges that affected livestock farming among other things. The research once carries out intends to decrease carbon emissions of greenhouse gasses by 55% in 2030 and make the EU carbon neutral in the year 2050 and improve environmental protection practices. The effort will strengthen the EU economy from climate problems and commercialization from the decrease in farm products. For the 27 EU countries commercialization of beef produced from the cow was challenged by climate conditions, variation in livestock practices between countries, animal agriculture characteristics, and price of the product and pasture availability. EU is considered the third-largest producer of beef from cattle globally. Livestock farming declined in the EU. The production of beef decreased in 2019 by -1.4% and pig meat by -0.7% from 2018 production. In 2019, the prices of meat from cattle, goats and sheep declined by -4.1% and -3.0% (Asai et al., 2018; Eurostat, 2020; Hocquette, et al., 2018; Krzysztofowicz et al., Sikora, 2021).

In Pakistan, between 2017-2019 livestock commercialization reported low percentages of 10.5%, 11.4%, and 12% to GDP. Commercialization was affected by low production of beef, poultry meat, wool, hair, skins, and hides. Low commercialization of livestock products was also due to the limited supply of sheep and camel. The short supply of

camel reduces the quantity of milk, meat, hides, and skins marketed. The lack of adequate records keeping of farm activities and lack of proper managerial strategies in farm management also affected livestock farming. Other challenges include the absence of sensitization on the significance of livestock rearing and dairy farming and the lack of adequate training in animal agriculture (Chandio et al.,2018).

The government initiated several strategies to improve the marketing of livestock products. Firstly, increase budgetary support to the government-owned Poultry Farm. Secondly, collaborate with the South Asia livestock research organization for extensive research in the subsector to meet the goal of the region 2030 livestock development agenda. Thirdly, to create a conducive environment for the private sector livestock investment. This involves graduating from subsistence livestock farming to market-oriented and incorporating a competitive price system in the value chain to meet producers' expectations (Ballantyne & Kennady, 2018; Rehman, et al.,2017; Tareen, 2018).

1.1.2 Regional Perspective of Commercialization of Livestock Farming

By 2013 Ethiopia had only 11.4 million households keeping livestock and commercializing its products. The statistics showed low commercialization among the livestock except for dairy cows. Cattle was producing more products and have a huge marketing advantage over the other farm animals. To increase output across the different kinds of animals and reduce poverty in the livestock subsector, the government established the livestock resources development framework responsible for intensive animal agriculture scientific research. The scientific study to increase livestock output for commercialization and reduce food insecurity covers 15 years and was divided into three phases. The first phase, 2013-2017; the second, 2018-2022 and 2023-2028. The

livestock farming road map will reduce the condition of climate change affecting that sector and increase export and foreign exchange from sales. The research will result in the production of surpluses in all red meat, 81%, eggs, 453%, beef, 64%, chicken meat, 19% goat and camel, 7% from their previous low records. To secure the project and achieve success, the government unite with FAO to enforce research in sustaining healthy livestock systems that run up to 2050 (FAO, 2019).

Umar et al. (2019) mention education as a determinant of entrepreneurs' competencies for business success. Formal entrepreneurial education gives the individual the ability to pursue chances and be resourceful for transformation in any business situation. Business knowledge is positively associated with an entrepreneur's business development. Formal education makes a businessman or woman resourceful and has the capability for effective decision-making. The higher the entrepreneur level of education, the advantageous it becomes for good entrepreneurial practice. Such education can influence the recognition of better commercial opportunities (Tittel & Terzidis, 2020). In livestock situations, animal farming entrepreneurship education programs have an impact on entrepreneurial competencies. The training is a vehicle that provides a better understating of animal agriculture activities. Seeking appropriate training can improve competencies and enhance success. Lemma (2016), argue that such education in the livestock enterprise will enable the entrepreneur to seek adequate information about the market, technology, and research opportunities for growth and development.

1.1.3 Local Perspective of Commercialization of Livestock Farming

For Kenya, the devolved system of governance instituted many reforms intended to improve the performance of livestock production and commercialization. Between

2003 and 2008 the government launched Economic Recovery Strategy and Agriculture Revitalization Strategy. The programs enabled livestock and other sectors gain international and regional recognitions. Productivity in livestock steadily increased and the rate of growth was 6.4% in 2008 from 5.2% in 2004. In 2010 the government launched another development strategy for the agricultural sector from 2010-2020 and signed the Comprehensive Africa Agriculture Sector Development Program of the African Union. The programs focused on reducing unemployment, poverty, challenges of infrastructure, and increase growth to create a wealth of people in the livestock and other divisions of the agriculture sector (FAO, 2018; FAO, 2021; Government of Kenya [GoK] 2017).

Among Kenya's six agricultural subsectors, livestock is one to watch. Aside from it, there are horticulture, fishery, forestry, industrial crops, and food crops. The sector is rural inhabitants' surviving point in economies of developing nations. It plays an important role in creating employment, income, saving for households through domestic animal farming. In 2019, the animal agriculture sector contributed 32% of the total output of agriculture commodities, about 39% to agriculture GDP, and approximately 7 % to the country's GDP (Kenya Agricultural and Livestock Research Organization [KALRO], 2021; FAO, 2019).

Livestock is classified as a capital asset because it is capable of generating revenue over more than one year. This asset does not only provide three products, namely meat, milk, and eggs for marketing or household consumption. It also produces wool, manure, fur, and leather. The skins of agricultural animals are very useful. Wool is animal skin used to manufacture materials such as sweaters and coats. Camel, goat, rabbit, and sheep are four of the domesticated animals that produced wool. Manure is the by-products used

as fertilizer to feed crops and other plants. Fur is the hair of dogs, cats, foxes, pigs, beaver, and horse for producing coat, hat, and jacket. The hide or skin of sheep, goats, cattle, calves, and lamb can produce leather (Gupta, & Dhamija, 2019; People for the ethical treatment of animals [PETA], 2020 , 2021).

Livestock can be small and big. The small category is comprised of poultry animals including beehives, pigs, sheep, goats, and rabbits. The larger animals are camel, cattle, donkey, and horses. Of the 7 million Kenyans holding livestock about 55% are smallholders keeping small animals only, and 45% holding both small and large animals. The advantages of the small animals include higher demand, quick sale for cash, fast breeding, backyard rearing, and the ability to survive in harsher terrain. The poultry animals are less costly, fast sales, and bring the highest return on investment (Khade et al., 2021; Omondi 2018).

In Kenya, domestic animal farming supports the economy to growth. Products and values in livestock increased in 2019 to KSh 147.9 billion from KSh 146.8 billion in 2018. Sixty percent or 7 million of total households keeping livestock makes Kenya become the third-biggest holder of livestock after Ethiopia and Botswanan in Africa. Within the agriculture sector, 50% or 8 million of the labor force worked with the livestock sector (FAO, 2019; Kenya National Bureau of Statistics [KNBS] 2019; 2020; Kenya Markets Trust, 2019). The pastoral communities controlled 67,334,689 species of animals comprising of cows or cattle, sheep, goats, camels, and pigs. There are 31 million poultry animals, chickens, and other types of birds (FAO, 2017).

The pastoral division of the economy worth in livestock totaled US\$1.13 billion. The annual tonnes of meat consumed nationally is estimated at 553,200 and the sector contributions 28% or 154, 968 tonnes which are valued at US\$0.189 billion (Nyariki &

Amwata, 2019). These values showed that livestock production and sales bring enough foreign currency that helps to strengthen the shillings. Despite the numerous benefits from livestock, the pastoral society is challenged with poverty. Of the 7 million total households keeping livestock 75% are very poor and living in the nation's more remote regions. Livestock enterprises across the Country are privately own including the commercialization of products but poverty is on the increase in the sector (FAO, 2018).

There exists a continuous trend in low commercialization of livestock products of total agriculture output despite the constant increase in livestock species. From 2015-2018 livestock reported 27%, 30%, 30% and 28% while cash crop was 69%, 70% 71% and 72% (KNBS, 2018; Kenya Markets Trust, 2019). In 2019, the recorded marketed production from livestock farming was Kshs 147.8 billion which was half the recorded marketed production from crop farming which was Kshs 317.8 billion (KNBS, 2020). A report by FAO (2017) shows that agriculture accounts for 26.27% of the GDP of which livestock farming only contributes 2.01% despite the huge potential. Similarly, of the 7 million total households in Kenya that engaged in the keeping and commercializing of livestock products, 75% are very poor and mostly found in rural communities (FAO, 2017). In the Kenya Vision 2030, livestock sector was among the eight (8) priority sectors that were identified based on their potential to drive this growth through various economic development programmes.

Kenya has the potential to be the market leader in the exportation of livestock products but this potential remains unexploited due to traditional approaches used by livestock farmers in Kenya. Entrepreneurial mindset and competencies are some of the key factors of production that are required to enhance the commercialization of livestock farming in Kenya to realize the full potential of this subsector. It is of great importance

for Kenya to adopt strategies to revitalize the livestock subsector to increase export earnings, creation of job opportunities, and increase the contribution of the livestock subsector to GDP and overall economic development.

1.2 Statement of the Problem

Kenya ranks among Africa's top five countries for cattle production. According to latest estimates (2022–23), Kenya's livestock population includes approximately 17.5 million cattle, 27.7 million goats, roughly 10–18 million sheep, about 3 million camels, around 31 million chickens, and 330,000–350,000 pigs. However, the commercialization of livestock farming remains very low compared to that of crop farming (Auma 2018; Khade, et al. 2021). From 2015-2018 livestock reported 27%, 30%, 30% and 28% while cash crop was 69%, 70% 71% and 72% (KNBS, 2018; Kenya Markets Trust, 2019).

In 2022, the recorded marketed production from livestock farming was Kshs 147.8 billion which was half the recorded marketed production from crop farming which was Kshs 317.8 billion (KNBS, 2022). A report by FAO (2019) shows that agriculture accounts for 26.27% of the GDP of which livestock farming only contributes 12.01% despite the huge potential (KNBS, 2022).

Low commercialization of the livestock is widespread throughout the country but severely affect counties such as Narok that most of their households were mostly supported by raising livestock. Out of the 7 million total households in Kenya that engaged in the keeping and commercializing of livestock products, 75% are very poor and mostly found in rural communities (FAO, 2017). Despite the numerous benefits from livestock, the pastoral society is challenged with poverty. Livestock enterprises across the Country are privately own including the commercialization of products but poverty is on the increase in the sector (FAO, 2018).

Low commercialization of livestock has existed since independence since there has been no concrete and deliberate strategies to improve commercialization (Khade, et al., 2021). In order to achieve Sustainable Development Goal on poverty eradication, enhancing commercialization of livestock farming is one of the strategies that government may adopt to eradicate poverty. Addressing low commercialization will further address the challenges of unemployment because the livestock value chain will create numerous job opportunities.

This area has received considerable attention from previous researchers. For instance, Arero (2018) and Komen, (2019). Yet, the role of entrepreneurial talents in Kenya's livestock farming industry's transition to a more commercial model has received scant research. In order to bring a business idea to market and see it through to expansion, entrepreneurial spirit is essential. This means that our understanding of how entrepreneurial talents affect the commercialization of cattle production in Kenya is limited, both conceptually and in terms of actual information.

1.3 Purpose of the Study

The aim of this research was to establish how entrepreneurial competencies influence the commercialization of livestock farming in Narok County. The county has a very large population that owns large number of livestock but they still remain poor in terms of accessing health services, taking their children to school and access to other basic needs which this study attributes to poor commercialization of their domestic animal farm products for wealth maximization.

1.4 General Objective

The general objective of the study was to establish the influence of entrepreneurial competencies on commercialization of livestock farming in Narok County, Kenya.

1.4.1 Specific Objectives

- i. To examine the influence of entrepreneurial skill on commercialization of livestock farming in Narok County, Kenya.
- ii. To evaluate the influence of market orientation knowledge on commercialization of livestock farming in Narok County, Kenya.
- iii. To establish the influence of entrepreneur risk management knowledge on commercialization of livestock farming in Narok County, Kenya.
- iv. To determine the influence of entrepreneur environment awareness knowledge on commercialization of livestock farming in Narok County, in Kenya.
- v. To examine the moderating influence of government strategy on the livestock subsector in commercialization of livestock farming in Narok County, Kenya.

1.5 Research Hypotheses

The following null hypothesis governed the study.

H₀₁ There is no significant influence between entrepreneurial skill and commercialization of livestock farming in Narok County, in Kenya.

H₀₂ There is no significant influence between entrepreneur market orientation knowledge and commercialization of livestock farming in Narok County, in Kenya.

H₀₃ There is no significant influence between entrepreneur risk management knowledge and commercialization of livestock farming in Narok County, in Kenya.

H₀₄ There is no significant influence between entrepreneur environment awareness knowledge and commercialization of livestock farming in Narok County, in Kenya.

H₀₅ Government strategy of livestock subsector does not have a significant moderating effect on commercialization of livestock farming in Narok County, in Kenya.

1.6 Justification of the Study

Persistence of low commercialization of livestock farming implies that majority of the households that rely on this sector for livelihood will remain in shackles of poverty. Poverty eradication is the first sustainable development goal established by United Nations in 2015. Similarly, the government will lose the opportunity to create jobs for millions of the unemployed people in Kenya as well as lose the opportunity to generate income from taxes paid by players in this subsector.

This study contributes in providing solutions in addressing the challenges Kenya has been facing in commercialization one its key subsector. This study is therefore important and thoughtfully assesses entrepreneurial methods and procedures used by livestock farmers in other countries with high level of livestock commercialization. The aim of the study was to contribute knowledge that may be used to achieve success and improve livestock commercial activities in this part of Africa. The study focused on livestock farmers since they are the primary producers in the livestock value chain. Also it is the node with majority of the actors with the highest potential of job creation, wealth creation. Similarly, commercialization at this level is bound to have a spiral effect to other actors in the value chain such as aggregators, processors, distributors and exporters.

1.7 Limitations of the Research

This research experienced several limitations which included language barriers since the study population comprised of households in rural parts of Narok, of which a proportion could not understand English. The study mitigated this limitation by using local research assistants who understand the local language. The research assistant assisted in interpretation of the questionnaires into the local language. The study also

relied on primary data which is subject to the honesty of the respondents; this was mitigated by explaining the importance of this study so as to increase the respondents trust and honesty while responding to the statements in the questionnaire.

1.8 Delimitation of the Study

This research is confined to variables and samples that study commercial activities of livestock farming in Narok County, Kenya, and the findings and approaches can be reexamined either using the same population sampled or a large population.

1.9 Significance of the Study

Based on the results, this study offers significant contribution to theory, practice and policy. By reviewing the relationship between entrepreneurial characteristics and commercialization of livestock investment among pastoralists, the findings significantly contribute to existing theory by either supporting or disapproving the assumptions advanced on livestock entrepreneurship. Empirical evidence generated acts as a pool of knowledge for academia interested in social entrepreneurship particularly livestock entrepreneurship. In practice, the livestock sub-sector has high potential for income generation, the findings of the study demonstrate how to improve commercialization of livestock investment not just in Narok County but across the country.

Equally, the findings and recommendations seek to isolate areas for support by the government and private entities interested in social entrepreneurship development particularly livestock investment commercialization. Additionally, the information generated may be helpful to policy makers introducing policies in addition to legislations aimed at boosting commercialization of livestock investment. The findings are expected to help policy makers understand entrepreneurial dynamics within

livestock investment for the purpose of formulating viable policies as well as development programs.

1.10 Assumptions of the Study

The study made assumptions which are listed as follows; the commercialization of livestock farming products exists and is controlled by the county authority, there are government programs to improve the livestock subsector of the economy and finally, animal agriculture farming is practiced among the rural dwellers and increases the agriculture sector GDP but the farmers remain poor.

1.11 Scope of the Study

This study covers the commercialization of livestock farming activities that include production, distribution, and marketing for wealth accumulation of the inhabitants of Narok County. The study specifically analyzed the influence of entrepreneurial skill, market orientation knowledge, entrepreneur risk management knowledge, entrepreneur environment awareness on commercialization of livestock farming in Narok County, in Kenya. The study, in addition, analyzed the moderating effect of government strategy of livestock subsector on commercialization of livestock farming in Narok County, in Kenya. Narok is one of the counties before independence whose inhabitants are deeply involved in pastoral activities. The recommendations from the findings are intended for government policy and action covers the 47 counties. The study was carried out in 2021 and 2022 in Narok County.

1.12 Operational Definition of Terms

Commercialization refers to the production, distribution, and marketing of domestic farm animals' products to meet both the customers' demands and market needs. It requires the use of entrepreneur strategies

to achieve commercial success in marketing the products or services to market (Linderhof et al.,2019).

Entrepreneur competencies are the ability to use related business knowledge and skills obtained to successfully perform critical work functions or tasks in the most appropriate ways (Baylie & Singh, 2019; Mohammed, et al.,2017; Zizile & Tendai, 2018)

Entrepreneurial skill acquisition is defined as the knowledge and skills of an entrepreneur obtained through training that enhances the personal livelihood by enduring the challenges of business startups, enhancing employment opportunities, and promoting economic growth and development (Krieger ., 2018).

Environmental awareness knowledge is education for understanding the benefits and harm caused by animal farming to the environment and how to protect the environment from animal problems that threaten it using environmental management measures (Du et al.,2018).

Market orientation knowledge is a strategic business approach for identifying processes to design and develop products with qualities to satisfy the consumers' needs and desires (Slater et al.,2019).

Risk management Knowledge is skills acquire from training that enables an individual to identify, assess and control threat such as fraud, accidents, and other disasters that could affect a business's investment and earnings (Anton, 2018).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Both theoretical and empirical reviews of the literature are included in this chapter. The chapter also presents conceptual framework and research gaps in existing related studies that the current study intends to address.

2.2 Theoretical Review

Theories that give the research a sense of creditability is discussed in this framework. The foundation rests on the premise that research constructs are clearly delineated and comprehended (Adom et al.,2018). This study is anchored on human capital entrepreneurship theory. Market orientation theory, stakeholder theory, contingency theory, entrepreneurial alertness theory, and Knight's theory of risk are among the additional theories that provide support.

2.2.1 Human Capital Entrepreneurship Theory

The study was anchored on Human Capital Entrepreneurship Theory which was proposed by Becker (1964) and later advanced by Rosen (1989). The theory is an economic approach for understanding human behavior mentioned in management studies. It talks about how human behavior can influence education and training for self-efficacy to curtail poverty (Holden & Biddle, 2017; McKernan & Ratcliffe, 2002; Olaniyan & Okemakinde, 2008; Teixeira, 2014). The theory is a framework for formulating education policy and analyzing the cost and benefit associated with acquiring education. It is useful in understanding the importance of investing in schooling to understand economic variables such as employment, investment, income, loss, and poverty.

The Human Capital Entrepreneurship Theory posits that individuals' knowledge, skills, experience, and competencies are critical assets that determine their entrepreneurial success. The theory, grounded in the broader human capital theory by Becker (1964), suggests that investments in education and training enhance entrepreneurs' productivity and business outcomes. In the context of this study, the theory directly supports the general objective, as it argues that entrepreneurial competencies such as skills, market knowledge, risk management, and environmental awareness significantly influence the commercialization of livestock farming. Farmers with higher entrepreneurial competencies are more likely to identify opportunities, manage resources efficiently, and navigate the challenges of entering commercial markets. However, a key criticism of the theory is its overemphasis on individual attributes while often ignoring structural and environmental factors such as market access, institutional support, and capital availability that may limit commercialization irrespective of individual competencies.

Wilson and Briscoe (2004), acknowledge that adequate knowledge and skills acquired are positively associated with commercialization that influences economic growth experienced from the production and distribution of products or services. A favorable correlation exists among productivity, commercialization, and economic growth, which subsequently influences GDP. An increase in productive capacity using available resources will increase both commercialization and growth.

The commercialization of productivity is highly linked to the entrepreneur's expertise. The provision of proper training for the entrepreneur provides the enabling environment in understanding the business venture and this increases productivity and economic performance. Investment in human capital can increase commercialization because it is the remedy for effectiveness and efficiency. Schooling enhances labor productivity and

enables the entrepreneur to take advantage of communication skills, problem-solving ability, and management of the enterprise (Khayinga & Muathe, 2018 ; Mačiulytė-Šniukienė & Matuzevičiūtė, 2018). The study is adopting this theory as an explanation for the connection between entrepreneur skill acquisition and commercialization of livestock farming.

To comprehend the elements that impact the prosperity and expansion of livestock farming enterprises, it is essential to comprehend the connection between entrepreneurial abilities, the theory of human capital entrepreneurship, and the commercialization of livestock farming. The theory of human capital entrepreneurship places a premium on human capital. In order to propel entrepreneurial endeavors and their respective consequences, human capital is essential. This consists of people's expertise, experience, and information. Entrepreneurial spirit is crucial for the commercialization of cattle husbandry. Entrepreneurial livestock farmers can better sense opportunities in the market, mitigate risks, and make calculated judgments. These skills include business planning, financial management, marketing, risk assessment and management, innovation, and networking.

The application of entrepreneurial skills in livestock farming leads to several benefits that support the commercialization of the sector: Opportunity Identification: Entrepreneurial skills enable livestock farmers to identify market gaps, consumer demands, and emerging trends in the livestock industry. This allows them to develop innovative products or services, target specific market segments, and create unique value propositions. By seizing opportunities, farmers can differentiate their products and gain competitive advantage in the market, thus facilitating commercialization.

Entrepreneurial skills contribute to market orientation, which involves understanding and meeting customer needs effectively. Livestock farmers with strong entrepreneurial skills can conduct market research, analyze consumer preferences, and develop marketing strategies that align with market demands. This customer-centric approach enhances the commercialization process by ensuring that farmers produce and market livestock products that are in high demand. Entrepreneurial skills are essential in managing risks associated with livestock farming. Farmers not only need to assess risks, but also lessen the impact of potential threats including environmental crises, disease epidemics, and market swings. Effective risk management practices, facilitated by entrepreneurial skills, minimize potential losses and disruptions, ensuring the continuity and sustainability of livestock farming businesses. This, in turn, supports their commercialization efforts.

Entrepreneurial skills help livestock farmers optimize their resources, including financial capital, human capital, and physical assets. Better resource allocation, investment decisions, and cash flow management are all possible when farmers have strong financial management skills. Efficient resource utilization enhances productivity, reduces costs, and improves profitability, supporting the commercialization of livestock farming ventures. Entrepreneurial skills foster innovation and adaptability in livestock farming. Technological advancements are more readily accepted by farmers with experience, implement sustainable farming practices, and explore value-added opportunities. Innovation and adaptability enhance productivity, product quality, and market competitiveness, driving the commercialization of livestock farming by meeting evolving consumer demands.

Entrepreneurial skills facilitate networking and collaboration among livestock farmers and with other stakeholders in the industry. Through effective networking, farmers can access valuable information, share knowledge and experiences, and forge partnerships that enhance market access and business opportunities. Collaborations contribute to the commercialization of livestock farming by expanding market reach and establishing mutually beneficial relationships. In summary, human capital entrepreneurship theory recognizes the critical role of entrepreneurial skills in the commercialization of livestock farming. By leveraging entrepreneurial skills, livestock farmers can identify market opportunities, adopt market-oriented approaches, manage risks, optimize resources, innovate, and collaborate effectively. These factors collectively contribute to the growth, profitability, and sustainable development of livestock farming enterprises, ultimately enhancing the commercialization of the sector.

2.2.2 Market Orientation Theory

This study was further be anchored on market orientation theory as advanced by Jaworski and Kohli (1996). The theory covers marketing activities including the development of products, employees, managerial strategies, and provides an understanding of customers' engagement and support for performance (Van Raaij, & Stoelhorst, 2008). Market orientation also has important and well-structured literature that explains international marketing cases which can be used to understand domestic market situations. International marketing cases guide domestic market practices (Gheysari, et al.,2012).

Market Orientation Theory, as advanced by scholars like Kohli and Jaworski (1990), focuses on how a firm or entrepreneur responds to market needs by generating, disseminating, and responding to market intelligence. The core proposition is that a

market-oriented approach enhances organizational performance and customer satisfaction. This theory is relevant to the second specific objective, which seeks to evaluate the influence of market orientation knowledge on commercialization. Livestock farmers who understand market dynamics, customer preferences, and competitor actions are better positioned to produce market-demanded products and enhance commercialization outcomes. However, the theory is critiqued for being overly focused on marketing to the exclusion of other essential business functions such as innovation, production, and finance, which are equally important in agriculture-based enterprises.

Market orientation is a marketing method as explained by the theory focusing on product creation to meet the demands of the consumers. It involves the production, distribution, and marketing which are the components of commercialization (Linderhof et al.,2019). This means market orientation includes the commercialization of goods and services. One study found that the more market-oriented rural farms were, the more commercialized their agricultural products were (Martey et al.,2017). Findings from this correlation were adjusted for parameters such as total livestock units, household size, farm size, and availability of formal markets.

Market orientation is paramount for increasing innovation performance that contributes to the competitive advantage of firms' commercial activities. Management functions of planning, coordinating, budgeting and reporting are positively related to market orientation framework and commercialization. The orientation of the market is a progressive strategy that is pivotal to stakeholders' gratification, market intelligence gathering, and information dissemination that contributes to firms' sustainability (Ashrafi & Ravasan, 2018; Odhiambo, 2018; Udriyah,et al., 2019). This research takes

the theory into account in order to clarify the connections between market orientation knowledge and the marketing of products from animal husbandry.

Market orientation theory focuses on the merits of understanding and meeting customer needs and preferences to achieve organizational success. In the context of livestock farming, the link between market orientation theory and the commercialization of the sector is significant. Here's how market orientation theory influences the commercialization of livestock farming: Market orientation theory emphasizes the need for livestock farmers to be customer-focused. By conducting market research and analysis, farmers can identify consumer demands, preferences, and trends. Understanding customer needs enables farmers to develop products and services that align with market requirements, increasing the chances of successful commercialization.

Market orientation theory emphasizes the importance of developing products that meet the specific needs of the target market. Livestock farmers can utilize market orientation principles to identify opportunities for product development and diversification. By tailoring their products to meet consumer demands, farmers can enhance their market competitiveness, attract a wider customer base, and drive commercialization. Market orientation theory emphasizes the need to gain a competitive advantage in the market. By understanding customer preferences, farmers can differentiate their offerings from competitors. This differentiation may come through product quality, packaging, branding, or unique selling propositions. A strong market orientation allows farmers to position themselves favorably in the market, improving their chances of commercial success.

Market orientation theory highlights the importance of gathering and utilizing market information and intelligence. Livestock farmers need to stay informed about market trends, competitor activities, and consumer behavior. Farmers are able to better respond to market demands and make educated business decisions with the support of this data. Market intelligence enables farmers to identify commercialization opportunities and adapt their farming practices accordingly. The theory emphasizes the development and implementation of effective marketing strategies. Livestock farmers can leverage market orientation principles to develop targeted marketing campaigns, promotional activities, and pricing strategies. By understanding their target market's preferences, farmers can tailor their marketing efforts to effectively communicate the value of their products and generate demand. Effective marketing strategies contribute to the commercialization of livestock farming by creating awareness, driving sales, and expanding market reach.

Market orientation theory recognizes the significance of customer satisfaction and loyalty in sustaining business growth. By consistently meeting customer expectations and delivering value, livestock farmers can build strong relationships with their customers. Customers that are happy and loyal are more inclined to buy from the company again, tell their friends about it, and even promote it. The success and longevity of cattle farming businesses depend on happy and loyal customers. In a nutshell, the market orientation thesis stresses the significance of knowing and catering to client preferences and demands. By adopting a market-oriented approach, livestock farmers can develop products that align with market requirements, gain a competitive advantage, utilize market information effectively, implement targeted marketing strategies, and build strong customer relationships. These factors collectively contribute

to the successful commercialization of livestock farming by enhancing market competitiveness, driving sales, and fostering long-term business growth.

2.2.3 Stakeholder Theory

The study as well was anchored on Stakeholder Theory was formulated by Freeman (1984). The basic purpose for the theory development is to provide understanding and solution to three fundamental business problems that are interconnected. The problems of how can a business enterprise create value and have it traded, the challenge of relating ethics and capitalism, and how managers can think from a management perspective and solve the problems of the firm value creation and interlink business and ethics (Parmar et al., 2010). The preposition supports the argument of the value maximization of a business enterprise for both stakeholders and shareholders.

Stakeholder Theory, argues that an organization must consider the interests of all its stakeholders not just shareholders to be successful. These stakeholders may include customers, suppliers, communities, employees, and governments. In the context of livestock commercialization, this theory supports the broader role of government strategies (as in the fifth specific objective) and community engagement in shaping livestock markets. It also aligns with the idea that farmers need to build networks with market actors and institutions to succeed in commercialization. The theory's relevance lies in its holistic approach to entrepreneurship, especially in communal and socio-economically complex environments like Narok County. However, the theory is sometimes criticized for being vague and difficult to operationalize, as it provides limited guidance on how to prioritize competing stakeholder interests.

The value is commercialized for receiving another value which is business profit. Risk is associated with creating value for the enterprise and therefore risk management

experiences and strategies are important for success. The skills of managing internal and external risks in creating the firm value influence commercialization. Adequate knowledge of risk management is important in creating values. When the risk is high, the creation of value will be negatively affected and this, in turn, affect commercialization, and therefore, risk should be managed (Adeyonu et al., 2021; Chand, et al.,2018; Teweldemedhin & Kafidii, 2019)

To create value is making something valuable and giving it out and receiving something valuable in return. Stakeholders such as producers, suppliers, and customers are involved in value creation (Sadovskaet al.,2020; Tapaninaho & Kujala 2019). The theory is adopted in this study to relate the entrepreneur as a stakeholder's risk management knowledge to the commercialization of livestock products. Business enterprises are established primarily for creating value for sustainability.

Stakeholder theory emphasizes that for a business to achieve long-term success, focus should not only be on the interests and expectations of shareholders, but on all stakeholders. When applied to the commercialization of livestock farming, the link between stakeholder theory and the sector becomes evident in several ways. Livestock farmers are integral stakeholders in the community in which they operate. Adopting stakeholder theory principles encourages farmers to engage with the local community, understand their needs, and contribute to their well-being. Building strong relationships with the community can lead to various benefits such as increased support, access to resources, and a positive reputation, which ultimately contribute to the commercialization of livestock farming.

Stakeholder theory recognizes the importance of collaboration and mutually beneficial relationships among stakeholders. Working together with other parties like as suppliers,

processors, distributors, and retailers is an important part of cattle husbandry. Livestock farmers can enhance their commercialization potential by forming solid partnerships along the supply chain. This improves efficiency, quality control, and access to markets. The theory emphasizes the significance of understanding and meeting the expectations of consumers. In the livestock farming sector, consumers have increasing demands for ethically produced, sustainable, and high-quality products. By aligning their farming practices with these expectations, farmers can capture consumer loyalty, drive demand, and enhance the commercialization of their products.

According to stakeholder theory, companies should carefully consider how their actions may affect the environment. In the case of livestock farming, sustainable and environmentally friendly practices are increasingly valued by stakeholders, including consumers, government agencies, and environmental organizations. Improve your reputation, stay in compliance with regulations, and reach niche markets by embracing sustainable farming techniques. These include lowering water and energy usage, limiting waste, and supporting biodiversity. By doing so, you can help commercialize your products. The theory acknowledges the influence of government policies and regulations on businesses. In the context of livestock farming, engaging with government agencies and regulatory bodies is crucial for compliance with laws related to animal welfare, food safety, and environmental standards. Establishing a positive relationship with these stakeholders can lead to support, financial incentives, and favorable policy frameworks that facilitate the commercialization of livestock farming.

Stakeholder theory further recognizes the importance of financial stakeholders, such as investors and financial institutions. When livestock farmers prioritize stakeholder interests, including the environmental and social aspects of their operations, they may

attract socially responsible investors and gain access to financing options that support their commercialization efforts. Opportunities for livestock farmers with excellent stakeholder relationships are expanding as investors and financial institutions evaluate non-financial considerations more and more when making investment decisions. Finally, stakeholder theory stresses the importance of farmers taking into account the needs and expectations of all parties participating in their livestock operations. By engaging with the community, collaborating along the supply chain, meeting consumer expectations, embracing sustainability practices, complying with regulations, and attracting financial stakeholders, livestock farmers can enhance the commercialization of their farming ventures. A stakeholder-focused approach contributes to long-term success by fostering positive relationships, building trust, and creating value for all stakeholders involved in the livestock farming sector.

2.2.4 Contingency Theory

This theory was proposed by Fiedler and Nealey (1966). The preposition is based on the premise that no best approach exists in establishing an organization and in leading or making decisions but the leader course of action in achieving goals and objectives is dependent on both the internal and external circumstances (Gleeson, 2019; Kihara, 2016). These factors can influence organization performance based on the strategy or plan of action of the leader. The preposition also maintains that leadership style and its qualities are paramount to achieving organization success and that different circumstances required distinct leadership styles. This implies that every situation has its own style of leadership. The effectiveness of the leadership style is important to suit a particular condition (Akpapere et al., 2019; Al Khajeh, 2018).

Contingency Theory posits that there is no single best way to manage or organize a business; instead, the optimal course of action depends on internal and external contingencies or variables. In entrepreneurship, this theory implies that success depends on how well strategies are aligned with environmental conditions. For this study, the theory supports the fourth objective on environment awareness knowledge by emphasizing that entrepreneurs must adapt to environmental factors such as climate, policy shifts, and market trends to achieve commercialization. Farmers who are aware of and responsive to changing external conditions are more likely to commercialize successfully. A key criticism of contingency theory is its lack of predictive power—it tells us what not to do (i.e., avoid universal strategies) but offers limited guidance on what to do in specific contexts.

The contingency preposition acknowledged that the effective management of the inside and outside factors drive institutions to achieving success. The inner factors consist of the organization mission, vision, leadership style, strategy, culture, structure, communication and learning. The economic, political and technology are the external factors. The theory attaches great importance to organization performance and this can be achieved by using a leader plan of action (Gleeson, 2019; Slocum, 1984).

There is positive relationship between government strategy on businesses and business performance. Using government strategy on businesses in managing various activities within its organizational structure improve business performance. Government has to make used of management functions such as planning, organization, controlling and directing as part of the internal contingency factors to drive performance (Meznar & Johnson, 2005). Leaders have to use strategy to evaluate every situation and decide which leadership style or situational control procedure is useful.

Critically, the theory makes specific reference to leadership style in influencing organization performance but did not identify exactly which leadership style is appropriate for a particular situation. So, using this theory leader examine situations and find solutions on the basis of try-and-error which will take more time in solving problems to resolve organization crisis. Also, it did not mention strategy did is appropriate for a particular leadership style (Abba et al.,2018). The study employs this theory to explain the relationship between government strategy as moderating variable and commercialization of livestock farming.

The basic idea behind contingency theory is that different organizations encounter different kinds of situations and contingencies, and that the best way to handle these situations is to adapt your strategy and processes accordingly. When applied to the commercialization of livestock farming, the link between contingency theory and the sector becomes apparent in the following ways. Contingency theory recognizes that market conditions can vary significantly, and different strategies may be required to succeed in different market environments. In the context of livestock farming, the commercialization process can be influenced by factors such as market demand, competition, pricing dynamics, and consumer preferences. Farmers need to analyze these contingencies and adapt their commercialization strategies accordingly. For instance, in a highly competitive market, farmers may need to focus on product differentiation or value-added services to gain a competitive edge.

The size of the farm and available resources can impact the commercialization strategies employed. Contingency theory suggests that smaller-scale farms may need to adopt different approaches compared to larger-scale operations. Small farmers might focus on niche markets, direct marketing, or local distribution channels, while larger

farms may have the resources to explore broader markets and engage in large-scale production and distribution. Commercialization strategies should be contingent upon the farm's resources, capabilities, and constraints. The commercialization of cattle farming is greatly affected by technological improvements. Contingency theory recognizes that the adoption and utilization of technology can vary based on the specific needs and capabilities of individual farms. Farmers need to assess the suitability and feasibility of different technologies, such as precision farming techniques, automated feeding systems, or data analytics, in relation to their specific context. The effective use of technology can enhance productivity, efficiency and market competitiveness, thereby driving the commercialization of livestock farming.

Contingency theory acknowledges that environmental factors, such as climate, geography, and natural resources, can shape the commercialization strategies in agriculture. In the case of livestock farming, farmers must consider the environmental contingencies that impact their operations. For instance, farmers in arid regions may need to focus on drought-resistant livestock breeds and sustainable water management practices. Adapting to these environmental contingencies ensures the long-term viability and commercial success of livestock farming ventures. The theory recognizes that external factors, including government policies and regulations, can significantly influence the commercialization process. Livestock farmers need to consider the legal and regulatory contingencies related to animal health, food safety, environmental protection, and trade restrictions. Compliance with these contingencies is essential for market access, consumer trust, and long-term commercialization success. The regulatory landscape is always changing, so farmers need to be aware of this and adjust their tactics appropriately.

Contingency theory also suggests that supply chain dynamics and relationships with suppliers and buyers should be considered in commercialization strategies. Livestock farmers need to analyze the contingencies related to supply chain coordination, market intermediaries, and buyer preferences. Developing effective relationships with suppliers and buyers, optimizing logistics, and aligning with supply chain requirements contribute to successful commercialization. In summary, contingency theory highlights the importance of considering specific contingencies and adapting strategies accordingly in the commercialization of livestock farming. Farmers need to assess market conditions, farm size, available resources, technological advancements, environmental factors, government policies, and supply chain dynamics to make informed decisions and develop effective commercialization strategies. By aligning their approaches with the specific contingencies they face, farmers can maximize their chances of success and achieve sustainable commercialization in the livestock farming sector.

Developed by Israel Kirzner, Entrepreneurial Alertness Theory focuses on the entrepreneur's ability to recognize unnoticed opportunities in the market. It argues that entrepreneurs who are alert are better positioned to exploit gaps and inefficiencies in the market. This theory underpins several aspects of this study, especially the first and second objectives, as entrepreneurial skill and market orientation both depend on recognizing and acting upon business opportunities. In livestock farming, being alert to price changes, market needs, or shifts in consumer behavior can significantly boost commercialization efforts. The main criticism of the theory is that it lacks a clear mechanism for how entrepreneurial alertness is developed or measured, making it difficult to translate into actionable interventions or empirical studies.

Frank H. Knight's Theory of Risk distinguishes between measurable risks (quantifiable uncertainties) and unmeasurable uncertainties. Knight argues that entrepreneurs are those who are willing to bear unmeasurable uncertainties for potential profits. This theory is especially relevant to the third specific objective on the influence of entrepreneur risk management knowledge. In livestock farming, risks such as disease outbreaks, price volatility, and climatic shocks are inherent, and the farmer's capacity to manage such risks affects their willingness to commercialize. The theory helps explain why some farmers commercialize while others do not despite similar circumstances they differ in their risk tolerance and knowledge. A notable criticism of Knight's theory is its abstract nature, especially in distinguishing between risk and uncertainty, which can be blurred in real-world contexts.

In sum, these six theories provide a multidimensional theoretical foundation for understanding how entrepreneurial competencies influence the commercialization of livestock farming. They collectively highlight the role of individual capacity (human capital, alertness, risk tolerance), market engagement (market orientation), external adaptation (contingency), and stakeholder collaboration (stakeholder theory), while also acknowledging the influence of government interventions and systemic conditions.

2.3 Empirical Literature

In this section empirical studies related to the variables were reviewed. The study reviewed empirical studies related to entrepreneurial skills, market orientation, risk management, environment awareness and how they relate to commercialization of livestock subsector.

2.3.1 Entrepreneurial Skills

Studies have been conducted on livestock entrepreneurship. These include Ndlovu-Hlatshwayo and Nesamvuni (2022) study that focused on mechanisms of coping with drought by communal cattle farmers in Umzingwane district in Zimbabwe. The independent variable was drought coping strategies and livestock management dependent. A qualitative approach was adopted. The research was carried out using a descriptive survey design that was directed by the procedures for data collecting. Both structured and non-structured questionnaires were sent to rural farmers in order to uncover the ways in which they were dealing with the effects of the drought. The size of the sample was determined to be 180 community cattle owners, and it was chosen from six different dip tanks out of a total population of 3324 stock owners. This results in an average of 30 respondents being drawn from each dip tank. According to the findings of the research, most livestock farmers in rural areas depend on moisture-sensitive coping techniques. This finding suggests that rural farmers have not adopted current approaches for livestock management.

Abdullah et al. (2018) conducted a study that uses a de-compositional test to examine entrepreneur skills and their successfulness in business. The case study approach was used to test three hypotheses on entrepreneur skills of marble manufacturing companies in Pakistan. The five-point Likert-scale was used to test twelve items developed from respondents' demographic information and company profile. These were the two-variable considered in the survey. The population was 209 and were all males as the only gender used in the study. For data analysis, the correlation coefficient of Karl Pearson was used to measure managerial, strategic, strategic skill and resilience skills of respondents. The variables that were chosen for the study were correlated using multiple regression. This study reported that entrepreneurial skills positively

contributed to the success of marble manufacturing industry in Pakistan. This implies that entrepreneurial skills affect the production, distribution and marketing of goods and services which is commercialization. Researchers concluded that resilience skills got high influenced on the other entrepreneur skills.

Study by Bercu et al. (2020) examines entrepreneurship learning in higher education institutions using entrepreneurial models to assess entrepreneurs learning. The study was experimental and descriptive statistics was employed to analyzed data gathered from 30 respondents. The results showed that effective models for entrepreneurial education enhances the attitudes and behaviors of entrepreneurship students and this positively impact their social benefit of job-related activities. Also, entrepreneur learning in higher education affects their involvement in business related activities. This means entrepreneur education can influence the production and distribution of goods and services.

Sinclair et al. (2018) examined the Asian Livestock Sector's efforts to enhance animal wellbeing. Independent variables were demographics information such as country of origin, sex, region, religion, and age, area of residence, religiosity and qualification. The dependent variable was animal welfare improvement, livestock sector measured by general attitudes, resources for animal welfare improvement, number of animals' slaughter and transport. The research used only primary data from 1,041 livestock stakeholders in the 4 Asian countries of China, Malaysia, Vietnam and Thailand. For the purpose of data analysis, the multinomial (polytomous) logistic regression method was used in Stata version 15, and the logit program was used to fit models to the data. According to the findings, respondents from China had the greatest level of trust in their capacity to enhance animal welfare, and veterinarians had a higher level of confidence

than livestock team leaders did. Other respondents reported high or low intents, and either high or low confidences for animal welfare. However, they recognized extrinsic variables such as conduct in the workplace and fluctuating business goals, in addition to a lack of personal knowledge connected with either enhanced or unimproved animal welfare.

Dairy farmers' entrepreneurial skills were investigated by Stalgiene et al. (2018) in Slovenia, Poland, and Lithuania. Factors that served as independent variables included the farmer's age, educational level, preferred farming strategy, farm size, milk sales, family income, and farm performance, as well as any relevant entrepreneurial competencies. Milk production, total agricultural land utilized, and the number of cows owned by a dairy farmer make up the dependent variable. Data were gathered through standardized questions in this qualitative survey. There were 334 dairy producers from Lithuania, 362 from Poland, and 362 from Slovenia that contributed to the data set. The rural way of life of Central and Eastern Europeans was supposed to be reflected in these countries. The study used descriptive statistics, univariate ANOVA, and Pearson's Chi² tests to examine the data. Dairy farmers in these nations are production-oriented, with increased milk output and specialized dairy farming being the most popular farm plans over the next five years, according to the study's findings. The research found that farmers who rated themselves as more competent were more open to new ideas, operated bigger farms, had a brighter perspective on the future, and were happier with their farm's financial and productive outcomes.

In Sindh, Pakistan, Chandio (2018) looked at the increase in cattle populations and dairy farming practices. Livestock population growth was the independent variable, and it was quantified by counting the number of animals, milk production and price, dairy

farm management costs, and revenue from milk sales. Dairy production was the dependent variable. Quantitative research methods were used in the investigation.

The primary data set was compiled from primary and secondary sources, including information gathered from 85 dairy farms in Dadu District, Pakistan. The government's livestock population report from 2006 through 2016 and the census of animals from 2006 were used as secondary sources of data. The livestock population that was considered was categorized into five; cattle, buffaloes, sheep, goats and camels. The study used panel data covering 10 years. Linear regression and descriptive statistical methods were applied for analysis of data. The findings revealed that livestock entrepreneurs have problem with financial recording keeping system, with only a few dairy livestock farmers keeping record of their dairy farms. Other challenges included lack of modern dairy techniques in livestock management and constraints in milk marketing strategies. They also lacked veterinary services and loan facilities from banking institutions for investment purposes. Review of literature in this section support the hypothesis made by this study that entrepreneurial skills positively impact on commercialization of livestock farming in Narok County, Kenya.

Various studies have been conducted on livestock entrepreneurship. These include Ndlovu (2019) was a researcher in Zimbabwe's Umzingwane district who studied communal cattle producers' techniques for dealing with drought. The independent variable was drought coping strategies and livestock management dependent. A qualitative approach was adopted. Data gathering procedures informed a descriptive survey design for this investigation. Both planned and unstructured surveys were used to learn how rural farmers dealt with the drought. There were a total of 3324 stock owners in the community from whom 180 were randomly selected, making the average

number of responses per dip tank 30. The research indicated that most livestock producers depend on procedures that are particularly vulnerable to moisture, suggesting that rural farmers have not adopted modern methods of livestock management.

In a study conducted by Lubungu and Birner (2021) an examination was undertaken to explore the various factors that exert influence on the dynamics of livestock marketing within the context of Zambia. The independent variable in this study consisted of socio-demographic information pertaining to the members of the household. To gain insights into the intricacies of market participation, the researchers selected livestock marketing as the dependent variable. This variable was assessed through various indicators, including the quantity of livestock stock owned, sales figures, market accessibility, and customer base. The research employed pre-existing data sources. The panel data for the past three years was obtained through a nationwide representative survey, encompassing responses from 524 households that possessed cattle. The implementation of all three survey waves was overseen by the CSO of Zambia in collaboration with the FSRP of Michigan State University, currently recognized as the IAPRI. The surveys in question utilized the identical households as the Post-Harvest Survey (PHS) conducted during the 1999/2000 period. The interviews were carried out with the aforementioned families. Data analysis made use of multinomial logistic regression. Findings from the study indicate that a multitude of factors considerably influence a household's inclination to engage in or refrain from the cattle market. These factors include the educational attainment of the household head, asset ownership, market accessibility, institutional variables, and household shocks. In addition, the flow of cattle into and out of market systems is greatly affected by the diversity of revenue sources.

Naminse and Zhuang (2018) look at how entrepreneurship among farmers could help reduce rural poverty in China. The available evidence from Guangxi Province. This study examined the relationship between demographic factors, including gender, age, educational level, and marital status, as independent variables, and rural poverty alleviation as the dependent variable. Economic, knowledge, educational, and socio-cultural capacities of entrepreneurs in rural agricultural settings were all part of the dependent variable's measurement. Structural Equation Modeling and Confirmatory Factor Analysis in AMOS version 21 were used for the data analysis. Researchers in the Baise, Liuzhou, and Guilin regions used a multistage sampling technique to gather 309 responses from a wide variety of populations. Eight Baise communities, six Liuzhou communities, and two Guilin communities made up the sample. We used a random sampling technique to choose our responders. Livestock, including sheep, goats, and cattle, and poultry, including ducks and chickens, are owned and managed by these communities. Organic mango, garden tea, star fruit, and bananas are just a few of the tropical and subtropical fruit crops that they invest in. Based on the findings, farmers' socio-cultural capabilities were the most important factor in their ability to engage in entrepreneurial activities. Quality growth, rather than attitude toward entrepreneurial growth, greatly influences the impact of farmer entrepreneurship on rural poverty.

The impact of Tanzania's government's Extension Service program on smallholder farmers' decisions to engage in livestock was examined by Atanasi et al. (2018) in the Mbulu and Bariadi Districts. The extension service program offered by the government served as the independent variable, while judgments about investments in livestock served as the dependent variable. The quality of extension services was evaluated using a variety of metrics, including technology transfer, access to training and information,

access to technical advice, and the technical expertise of livestock technical personnel. While participation in the club and access to cattle facilities were taken into consideration while making investment selections. A cross-sectional study approach was used for the survey and it included 333 families that were chosen at random from among the smallholder farmers. Exclusively first-hand accounts and observations were utilized in the research. An online survey served as the principal instrument for collecting this data. Deterministic theory-based data model analysis. Research shows that group membership and limited access to livestock facilities influence livestock investment decisions negatively. But there are a number of things that have a good effect, such as connections to markets, the ability to transfer technology, training opportunities, information availability, technical advice, and competent livestock technical staff.

Reporting from the Innovation System: Bridging the Gaps in Technology Adoption in Ethiopia's Livestock Sector (Kebebe, 2019). Researchers looked at the innovation system in the cattle sector as a dependent variable and the gaps in technological adoption as an independent variable. Using six focus groups and in-depth interviews, this study collected data using a qualitative research strategy. The survey included a wide range of participants, including community members, experts, and office bosses. Important stakeholders also included the Diga District Office of Agriculture, the Livestock Research Directorate at BARC and the Veterinary Medicine department at Wollega University in Ethiopia. Supplementing the survey results, we also conducted a content analysis of several internal documents, including policy papers, annual reports, and program assessment reports, to round out our knowledge. According to the study, the problem with the cattle industry's adoption of sophisticated technology is the inadequate or nonexistent innovation systems. The innovation systems encompass

various components such as entrepreneurship, market expansion, dissemination of information, and advocacy for policy changes.

An analysis was conducted by Mortonb et al. (2018) on the topic of translating aspirations into improvements in animal welfare within the Asian livestock sector. For the independent variables, we used demographic data, which included things like nationality, region, sex, age, neighborhood, religion, level of religiosity, and education level. The dependent variable was animal welfare improvement, livestock sector metrics measured by general attitudes, resources for animal welfare improvement, number of animals' slaughter and transport. Full reliance on primary data was exercised throughout the research. The majority of the information included in this research came from 1,041 cattle industry professionals in four Asian countries: Thailand, Vietnam, China, and Malaysia. Data analysis was carried out using Stata version 15, specifically the multinomial (polytomous) logistic regression technique. To fit the models, the logit tool was used. It was clear from the data that Chinese respondents were the most confident in their capacity to advance animal welfare. In addition to this, veterinarians exhibited a higher level of self-assurance in comparison to livestock team leaders. Other respondents' intentions towards animal welfare were either high or low, and their confidence levels were either high or low. They discovered extrinsic variables such as conduct in the workplace and different business goals, as well as an internal element, which was a lack of personal knowledge connected with either enhanced or unimproved animal welfare.

Dairy farmers' entrepreneurial skills were investigated by Stalgiene et al. (2018) in Slovenia, Poland, and Lithuania. Factors that served as independent variables included the farmer's age, educational level, preferred farming strategy, farm size, milk sales,

family income, and farm performance, as well as any relevant entrepreneurial competencies. Dependent variable, dairy farmer measured by milk production, number of cows owned, and total of utilized agricultural land. The study was a qualitative survey using structured questionnaires for data collection. It is believed that the data collected from 362 dairy farmers in Slovenia, 334 dairy producers in Poland, and 334 dairy farmers in Lithuania are typical of farming communities in nations in Central and Eastern Europe. For the purpose of analyzing the data, descriptive statistics were used with univariate ANOVA and Pearson's Chi²-tests. According to the findings of the research, dairy farmers in the nations that were analyzed are production-focused, and when asked about their preferred farm strategy for the next five years, the vast majority of them selected increasing dairy output and increasing their level of specialization within the dairy farming industry. Farmers who had a higher degree of competence exhibited a greater propensity for change. The findings also showed that these farmers had a more optimistic outlook on their future, that they owned bigger farms, and that they were happier overall with their family income and the outcomes of their farming efforts.

Tavener and Crane (2018) investigated the power dynamics of gender in the Kenyan dairy industry, focusing on cows, commodities and commercialization. This investigation made use of a qualitative research strategy. Factors that were taken into consideration included the quantity of milk produced, the amount of cattle owned, the income from the farm, and demographic data such as age, gender, education level, marital status, number of children, and number of dependents. The research was qualitative and included a total of 22 discussion groups, all of which were made up of dairy farmers and hub leadership boards. The interviews were semi-structured, while the talks about gender roles in dairy production were less organized. The interviews and

discussions were based on a questionnaire. In addition, a total of 34 one-on-one interviews were carried out with important informants, including dairy extension agents, milk dealers, processing plant managers, government officials and Heifer International employees. These conversations had participants of both sexes. The technique of analysis that was used for the research was coding. Reading the interview transcripts was the first step in the research project, which was then followed by the writers determining the most important themes and topics that emerged from the interviews. The process of coding resulted in the formation of categories based on recurrent ideas and topics. According to the results of this research, both the cattle and formal dairy market participation are laced with gendered meanings that produce and sustain the validity of men's privilege over the revenues of dairy farming.

Singh and Shergill (2018) analyzed the livestock economy of Punjab and provided both theory and empirical evidence from farm households. The independent variable was microeconomic indicators. These indicators were changing pattern in livestock population, trends regarding milk production, and per capita availability of milk institutional infrastructure. The dependent variable was the livestock economy. This research looked at the livestock sector in the Punjab District of India through the lens of household-level entrepreneurs using a case study technique. Researchers drew from a variety of sources for their findings. Questionnaires were distributed to 224 farm households in the summer of 2017 to collect primary data. Secondary data came from the yearly reports of the Indian government's department of animal husbandry and dairying, and interviews were also carried out with members of the households and leaders of farmer organizations. In order to examine the collected data, descriptive statistics were employed. The findings established that livestock rearing by household entrepreneurs provide income through sale of milk and asset creation. This enhances

food security and provides employment opportunity across different farming households.

Isabelle et al. (2018) conducted an analysis of the trade-offs involved in cattle development on farms including several individuals with distinct goals. The examination of trade-offs in choosing livestock production methods with an emphasis on household and farm level, gender equality, economic benefits, environmental concerns, human nutrition, and food safety were the independent variables. The dependent variable is livestock management at farm level. The research used a case study with seven distinct family dairy systems in Senegal using a combined strategy on direct evaluations including milk production and farmer breed preferences. The research was carried out in Senegal. Modeling matrices, such as those for household profit and the intensity of emissions of greenhouse gases, were also employed. Financial and operational statistics from dairy farms run by families or by individual animals make up the case study's data set. All of this data came from keeping tabs on 220 dairy cow rearing households in various regions, who lived either in rural or peri-urban locations. The information was gathered by having 14 separate enumerator visits spread out over a period of roughly two years at approximately equal time intervals. More than 3,200 cattle were owned amongst all of the families in the case study. The examination of trade-offs indicated effective management approaches on the agricultural level. Good milk yields, better home profits, and the best household benefit to cost ratio were all achieved by prudent management of the various dairy cattle-production systems in the research locations, which resulted in the study's findings. In addition, men and women who had dairy cattle expressed a strong preference for the animals that were a hybrid of two different breeds. It was also discovered that the intensity of emissions of greenhouse gases was low.

With a focus on three agro ecological zones in Ghana, Wilsone et al. (2018) conducted a study on reducing anemia by leveraging smallholder livestock production. The variables that were applied were motivations for raising livestock in Ghana, barriers to consumption (especially for women) and management of different livestock-centered interventions whose aim was reducing anemia. In the qualitative study, identifying participants was accomplished by the use of a sampling method called purposive maximum variation. Interviews with key informants and discussions in focus groups were used throughout both stages of the data collection process. A total of thirteen key informants from both the public sector and NGOs were located and enlisted. Separate criteria were used to produce interview questions; one set of guidelines was for stakeholders involved in agriculture, while the other set was for stakeholders involved in health. The questions were then built around a conceptual model. These guides were used to inform the development of interview questions. The findings imply that investing in livestock facilitates savings, enables families with limited resources to acquire assets, and helps with both scheduled and unanticipated expenses like school fees and medical bills.

Business commercialization involves transforming ideas, knowledge, or inventions into viable products or services that generate economic value. A key driver in this transformation is the possession and application of entrepreneurial skills, which encompass a range of competencies such as innovation, risk-taking, strategic thinking, and business acumen. This review synthesizes the insights from selected literature to explore how entrepreneurial skills influence the commercialization process across different contexts from high-technology industries to agricultural enterprises.

Gbadegeshin (2019) underscores the centrality of commercialization skills for high-technology entrepreneurs, particularly in the digital era. He argues that beyond technical know-how, entrepreneurs must develop competencies in identifying market opportunities, managing intellectual property, securing funding, and engaging stakeholders. These skills enable innovators to navigate the complex ecosystem of tech commercialization. The study presents a conceptual framework where commercialization skills act as a bridge between innovation and market success. In the context of rapid technological evolution, the possession of such skills becomes a necessity rather than an option.

Abd et al. (2015) delve into the unique role of academic entrepreneurs in commercializing emerging technologies. The study reveals that entrepreneurial skills such as opportunity recognition, networking, and business planning are crucial for academics transitioning from research to commercial ventures. Importantly, the authors highlight institutional support, entrepreneurial orientation, and interdisciplinary collaboration as key enablers. The implication is that the commercialization of university-based innovations depends not only on the technical merit of the research but also on the entrepreneurial competence of the academic entrepreneur.

Sabir et al. (2019) and NawzadSabir et al. (2019) both examine how entrepreneurial characteristics influence attitudes toward knowledge commercialization in Malaysia. The studies find that traits such as innovativeness, proactiveness, and risk-taking significantly shape an individual's disposition toward transforming knowledge into marketable outputs. These characteristics, often nurtured through education and experience, foster a commercialization mindset among entrepreneurs. The authors emphasize that without the right attitudes, even technically skilled individuals may

hesitate to engage in commercialization activities due to fear of failure or lack of confidence.

Adebayo et al. (2024) explore the role of business skills commercialization among postgraduate students in Ogun State, Nigeria. They argue that entrepreneurial education, when effectively delivered, equips students with the skills necessary to create businesses that improve their economic well-being and contribute to societal development. The study links commercialization of skills with elevated standards of living, emphasizing the transformative role of entrepreneurship training. This research reinforces the idea that entrepreneurial skills serve as tools for personal and community development when effectively commercialized.

Merkel (2019) and Sihite et al. (2025) shift the focus to the agricultural sector, particularly livestock farming. Merkel discusses how entrepreneurial skills can catalyze the commercialization of smallholder livestock enterprises. These include strategic planning, financial management, and customer orientation, which are necessary for transitioning from subsistence to market-oriented farming. Similarly, Sihite et al. (2025) identify entrepreneurial competence—encompassing innovation, risk-taking, and opportunity recognition as a determinant of livestock farmers' performance. The study shows that farmers who exhibit higher levels of entrepreneurial competence tend to achieve better economic outcomes and are more likely to commercialize their produce.

Novanda et al. (2021) extend the investigation of entrepreneurial characteristics and innovation among Madura cattle farmers. The study finds that entrepreneurial and innovation characteristics jointly influence the development of entrepreneurial skills, which in turn enhance the commercialization capacity of farmers. The paper

emphasizes continuous learning and knowledge exchange as vital in building the necessary skills. It also notes the role of government and non-governmental organizations in providing training and extension services, highlighting that enabling environments are essential for translating entrepreneurial potential into commercial outcomes.

Chemis (2017) provides a detailed analysis of commercialization strategies and their impact on dairy enterprises in Nandi County, Kenya. He identifies strategic marketing, product diversification, and value addition as key commercialization strategies. Underpinning these strategies are entrepreneurial skills in market analysis, resource mobilization, and innovation. The dissertation argues that the success of commercialization efforts hinges on the entrepreneur's ability to adapt and align business operations with market demands. The findings support the broader view that entrepreneurial skills are critical in bridging the gap between production and market uptake.

A cross-cutting theme in the reviewed literature is that entrepreneurial skills are indispensable for successful commercialization regardless of the sector. Whether in technology, academia, or agriculture, the ability to identify opportunities, innovate, and strategically manage resources determines how effectively individuals and organizations convert ideas into economic value. Several key insights emerge: The psychological traits of entrepreneurs, such as confidence, risk tolerance, and resilience, shape their willingness and ability to engage in commercialization activities (Sabir et al., 2019). While core entrepreneurial skills are broadly applicable, sector-specific knowledge enhances their utility. For instance, understanding livestock management nuances is crucial for farmers aiming to commercialize (Sihite et al., 2025). Institutional

frameworks, including training, mentorship, and policy support, play a critical role in enabling entrepreneurs to commercialize their innovations (Abd Rahim et al., 2015; Novanda et al., 2021). Entrepreneurial education fosters the development of commercialization skills and empowers individuals to turn their expertise into viable ventures (Adebayo et al., 2024).

The reviewed literature converges on the conclusion that entrepreneurial skills are pivotal to successful business commercialization. These skills empower individuals to transform knowledge, innovations, and technical outputs into marketable solutions that drive economic and social value. The scope of influence spans diverse sectors from academia and high-tech to agriculture demonstrating the universal relevance of entrepreneurship in today's knowledge-driven economy. For policymakers, educators, and development practitioners, the key takeaway is to prioritize the cultivation of entrepreneurial competencies through targeted interventions, ecosystem support, and continuous learning opportunities to enhance commercialization outcomes.

2.3.2 Market Orientation Knowledge

The impact of market orientation, marketing innovation, and sustainable competitive advantage on company success was investigated in a study by Na, et al. (2019) with 400 entrepreneurs serving as respondents. They found that consumer orientation, product innovation, communication innovation and market information generation significantly influence competitive advantage and this positively affects business performance. The study concluded that for product development entrepreneurs should give preference to customer orientation. That is, to primarily consider customer demands before goods and services are produced. The influence of consumer demand in market orientation enhances commercialization of the goods and services produced.

Alhakimi and Mahmoud (2020) conducted a study in Sana'a, Yemen using a sample of 206 managers, owners and operators of SMEs to examine market orientation knowledge on innovativeness of entrepreneurs. A combination of descriptive statistics, correlation, and regression formed the basis of the data analysis. The results revealed that knowledge of market, customer and supplier orientation awareness impacts positively on SMEs innovativeness but inter-functional coordination and competitor have no effect on SMEs creativeness. In addition, an evaluation by Ghahroudi et al. (2019) found a supporting relationship between knowledge management orientation, market orientation knowledge and new product commercialization using a sample size of 252 manufacturing companies in Iran. Data analyzed using descriptive statistics, correlation and regression methods also reported that management orientation has significant influence on the development and marketing of new products.

The purpose of Hussein et al. (2018) research was to look at how knowledge management orientation and market orientation affected the operation of SMEs in Indonesia. The study's data came from 131 SME owners who filled out the survey. Their data analysis technique of choice was the partial least squares approach. They found that one of the most important factors influencing market orientation and company performance is the sharing of knowledge amongst business professionals. This indicates that efficient knowledge management is vital for promoting market orientation, manufacturing, and selling products and services. Ho et al. (2018) dug further into the Vietnamese market to find out how 190 beef cattle producers correlated with innovation along the agricultural value chain. Having a focus on the market has little effect on performance, according to this study. The study does, however, find a favorable association between innovation and financial success as well as customer orientation and intergroup cooperation. If you want your commercialization efforts to

be fruitful, you must prioritize customer orientation inside a market orientation framework.

Lubungu and Birner (2021) conducted research to study the elements that influence the dynamics of cattle marketing in Zambia. Members of the household's socio-demographic information served as the independent variables. Animal marketing was incorporated as a dependent variable to enhance understanding of the dynamics of market involvement. Sales, market penetration, animal stock, and customer count were the metrics used to evaluate this variable. Data that had already been obtained was used for the research. The Central Statistical Office (CSO) of Zambia was responsible for conducting all three waves of the survey, which gathered three years' worth of panel data from 524 homes that owned cattle. Over the period of three years, the survey was carried out. The Indaba Agricultural Policy Research Institute (IAPRI) and Michigan State University's Food Security Research Project (FSRP) worked together on this study. In these surveys, the same households who participated in the Post-Harvest Survey (PHS) in 1999/2000 were tracked and questioned once more. For the purpose of data analysis, the multinomial logit regression was used. The findings indicate that the ownership of assets, the educational level of the head of the family, market access, institutional variables, and household shocks all had some amount of effect on the chance of a household moving into and out of cattle markets. In addition, the degree of diversity of revenue sources is a factor in determining the flow of cattle into and out of markets.

By looking at the cattle industry in Ethiopia through the lens of the innovation system, the study by Balehegn et al. (2020) adds to what is already known about how to close the technology adoption gap. Using the innovation system in the cattle sector as the

dependent variable, the qualitative research centered on investigating the technological adoption gaps as independent variables. Office managers, livestock specialists, and community members participated in the study via in-depth interviews and six separate focus groups. Members of the Diga District Office of Agriculture, the heads of the Livestock Research Directorate at Bako Agricultural Research Centre, and the college of Veterinary Medicine at Wollega University in Ethiopia were also involved in the research. Government policy papers, yearly reports, and program evaluation reports were among the many internal documents examined as part of the content analysis process used to enhance the data. Based on the research findings, it can be observed that the limited uptake of enhanced technologies within the cattle industry can be attributed to the inefficiency or lack of effectiveness in the various components of the innovation system. These components encompass the dissemination of information, entrepreneurial endeavors, market expansion, and policy advocacy.

In their study, Tavenner and Crane (2018) conducted an examination of gender power dynamics within the Kenyan dairy sector, with a specific focus on the roles played by cows, commodities, and commercialization. A qualitative research approach was used in the investigation. The factors that were taken into account included the ownership of cattle, milk output, farm income and demographic details such as gender, age, education level, marital status, household size, and number of dependents. The research project involved the conduction of a series of 22 guided discussion groups with dairy farmers and hub leadership boards. The sessions utilized a semi-structured interview questionnaire as a means of directing the discourse. Conversations pertaining to gender roles within the context of dairy farming and production were conducted, albeit with a somewhat diminished level of formality compared to customary standards. Furthermore, a comprehensive set of 34 key person informant interviews were

undertaken, encompassing milk dealers, managers of milk processing facilities, dairy extension agents, select government officials, and personnel affiliated with Heifer International. Both males and females were involved in these discussions. The chosen methodology for the analysis in this research involved the utilization of coding as the primary technique. The initial phase involved perusing the transcripts of the interviews, subsequently leading the writers to ascertain the paramount subjects and concepts. Subsequently, the coding methodology was employed to categorize the recurring ideas and themes. The findings of the study suggest that participation in the cattle and formal dairy market is imbued with gendered significance, which reinforces the notion of men's entitlement to dairy profits.

Lubungu and Birner (2021) studied factors influencing livestock marketing dynamics in Zambia. The study used secondary data. The three-year panel data on 524 families with cattle came from a nationwide representative survey. The study was conducted in the United States. The Central Statistical Office (CSO) of Zambia worked in collaboration with the Food Security Research Project (FSRP) of Michigan State University, which is now known as the Indaba Agricultural Policy Research Institute (IAPRI). Together, they carried out all three waves of the survey. The surveys tracked the same households who were questioned for the Post-Harvest Survey (PHS) in 1999/2000 and followed their responses. The multinomial logit regression was applied for data analysis. Results indicate that ownership of assets, level of education of household head, market access, institutional factors, household shocks and level of income source diversification influence the likelihood of a household moving into and out of cattle markets. Review of literature in this section support the hypothesis made by this study that market orientation knowledge positively impacts on commercialization of livestock farming in Narok County, Kenya.

In their study, Rahuta and Alib (2018) conducted an assessment of the effects of climate-change risk coping strategies on livestock productivity and household welfare. The empirical evidence used in this analysis was obtained from Pakistan. The study examined climate-change risk coping strategies as the independent variable, with livestock productivity being the dependent variable under consideration. The assessment of climate change strategies involved the utilization of updated meteorological data, analysis of climate change occurrences, evaluation of livestock insurance schemes, examination of the expansion of fodder areas and consideration of migration patterns. Participant demographics made up the control variables. The researchers used a multivariate probit model to look at what factors impact livestock risk mitigation techniques in the face of climate change, and a Poisson regression model to predict what factors impact livestock ownership. In order to gauge the degree of association between the variables and livestock ownership, both models were utilized. Azad Jammu and Kashmir (AJK) and Gilgit Baltistan are two autonomous provinces in Pakistan; 700 livestock producers from these areas were the main sources of data. The study reveals that Pakistani livestock producers employ four primary coping mechanisms to effectively mitigate the risks associated with climate change. The aforementioned activities encompass the trading of cattle, the acquisition of livestock insurance, the provision of additional land space for fodder, and, in extreme circumstances, the relocation of individuals. Based on the research findings, various factors, including the age, educational attainment, wealth, access to essential extension services, and involvement in support non-governmental organizations (NGOs), were found to exert a substantial influence on the climate-risk coping strategies adopted by livestock producers.

Katundu et al. (2018) looked at how smallholder farmers in Tanzania's Mbulu and Bariadi Districts make decisions about livestock investments based on cultural and socioeconomic factors. In this research, we look at how cultural and social variables influence livestock investment decision-making. The social culture component as it pertained to cattle served as the independent variable, and the investment choices taken a dependent one. Wealth as measured by cattle ownership, family size (husbands and children), bride price, and ethnic/tribal identification were all examples of social cultural elements that could be measured. This study used a cross-sectional analytic approach as its research methodology. A total of 339 participants were interviewed for this study, with additional information gleaned from 9 key informants. A structured questionnaire and a key informant checklist were used to gather the primary data for this investigation. In order to determine how social capital factors (SCFs) affect cattle investment decisions, this study used a binary logistic regression model (BLRM). A noteworthy discovery was made in Tanzania's Mbulu and Bariadi districts, suggesting that people's penchant for investing in cattle was heavily influenced by their financial means. Then, one's social status was a factor, then one's dowry costs, one's ethnic background, and lastly, one's family's reproduction rate.

Animal population expansion and dairy farming in Pakistan's Sindh province were the subjects of an empirical examination in a report by Chandio (2018). Metrics such as the number of livestock, milk production, price, cost, and income of milk, as well as dairy farm management, were used to evaluate the increase of the livestock population, which was the independent variable under consideration. This study used the output of dairy farms as the dependent variable. This study used a quantitative approach to its investigation. Both primary and secondary sources of information were used in the research. A total of 85 dairy farms in Pakistan's Dadu District provided the main data

used in this analysis. The government's Livestock Census of 2006 and Livestock population projections up to 2016 were also used as secondary sources of information. Cattle, buffalo, sheep, goats, and camels were all part of the animal group that this study looked at. The study made use of longitudinal data that extended over a period of ten years. The data was analyzed using linear regression and descriptive statistical methods. The research findings indicate that individuals engaged in livestock entrepreneurship encounter challenges in maintaining an effective financial record-keeping system. A limited number of dairy farmers maintain documentation of their dairy farms, exhibit a deficiency in the implementation of contemporary livestock management techniques, and encounter limitations in their milk marketing strategies. The region in question exhibits a deficiency in veterinary services and a dearth of loan provisions from financial institutions for the purpose of investment.

Ngeno (2018) determined how dairy centers have improved the lives of Kenyan smallholder farmers. In order to probe this connection, the analysis relied on results from empirical studies. This study takes into account a number of independent variables, including the following: the age and educational attainment of the household head, his or her prior experience in dairy farming, the availability of credit, the size of the landholding in hectares, the ownership of livestock, the number of adult household members, the proximity to the central hub, and membership in farmers' groups. Milk yields and net returns serve as the dependent variables in this study. Household involvement in the dairy hub is indicated by a value of one for the dummy variable, and by a value of zero for records that do not show involvement. In order to find observation units in the Rift Valley area of Kenya, a multistage sampling method was used. From a total population encompassing seven separate administrative regions, 59 dairy producers were chosen at random. A total of 826 farm families provided observations

for the dataset's construction. Of these families, 457 sold their products through dairy hubs and 369 through more traditional means. The data was analyzed using logistic regression and descriptive statistics derived from a structured household questionnaire. The empirical results of the study show that there were multiple elements that affected the involvement of farmers in the dairy hub. The farmers' level of education, the resources available to them, the size of their landholdings and tropical livestock units, how close they are to the dairy hub, whether or not they work off the farm, how many people live in their household, and so on are all factors. Being a part of a dairy center also enhances agricultural yields and overall net earnings, according to the research.

To determine the impact of urbanization on food security in developing countries, Cavinato (2019) surveyed the relevant literature on the topic. The researchers in this study used a systematic review approach, searching every relevant publication published between 1980 and 2017 in databases like Scopus, ISI Web of Science, and PubMed. After reviewing all of the articles, 72 of them were determined to be eligible for inclusion. The study's results revealed a lack of cohesion in the existing research due to the relatively small number of conducted studies. This body of research spans across various disciplines, livestock systems, habitats, and consumption patterns. Another noteworthy finding pertained to the resolution of the issue surrounding the absence of an intermediate stage in cattle value chains with regards to food security. This food security-oriented livestock value chain primarily centers on the production and consumption of livestock. Nevertheless, various factors and stakeholders within the value chain tend to be disregarded.

The perceptions of pastoral communities in northern Tanzania on climate change and its impact on cattle productivity were examined by Toribio et al. (2018). Livestock

production was the dependent variable, while people's views on climate change were the independent ones. Climate change awareness programs, rainfall, drought, animal mortality, and milk production decline were used to assess how people perceive climate change. The variables that dictated the outcome of the study were the demographic ones. Several methods were used to gather information for this study, and descriptive statistics and theme analysis were used to examine the data that was gathered. The research collected information from a total of 130 livestock owners and 81 people who took part in focus group talks in around ten different communities situated in Tanzania's Monduli District. From each of the 10 communities, between 8 and 12 people were chosen to participate. The executive leaders, including the elders of the community, as well as those who work in animal health participated in focus group talks. The research showed that pastoralists had a good understanding of the broad climatic patterns that occur in their region, as well as its unpredictability and the effect that severe weather has on the production of animals. Additionally, it was discovered that there are currently no early warning systems or climate risk programs in place throughout the whole of the district. The effects of climate change on livestock productivity are unfavorable, and they include a scarcity of water and pasture, which may ultimately lead to famine and malnutrition. This, in turn, results in a large number of mortality, outbreaks of illnesses, decreased milk output, and decreased pricing for cattle.

In a comprehensive study conducted by Zander (2018), the focus was placed on examining the impact of climate change on cattle and their corresponding adaptations. In accordance with the PRISMA guidelines, which have been previously employed in systematic reviews pertaining to climate science, a comprehensive examination was conducted as part of a systematic review, encompassing a total of 126 peer-reviewed journal articles that met the eligibility criteria. This review was conducted using the

information presented in the aforementioned publications. The findings indicate that investigations into the effects of climate change on livestock systems and strategies for adaptation must extend beyond narrow geographic boundaries and encompass significant considerations of vulnerability, particularly in developing countries. The susceptibility of developing nations to the impacts of climate change is attributed to this phenomenon.

An analysis of the value chains for livestock by-products in Somaliland was carried out by Mugunieri et al. (2018). The researchers used the example of tallow and bones to perform their research. The demographic information of the people who owned animals served as the basis for the variables. In order to conduct its assessment, the Somaliland Meat and Development Association provided secondary data from 2016 and a mix of qualitative and case study methods were employed. In addition to that, an interview with trainers and owners of cattle was carried out. The trained group consisted of a total of 30 participants who were split into two groups: the first group, consisting of 15 individuals, got instruction in bone crafts, while the second group, which was composed mostly of women, received instruction on soap production using tallow. The research shows that the value chains for livestock by-products, tallow, and bones used in Somaliland for livestock marketing and exports are often rather brief, producing goods with low value, utilizing inputs with low value, and involving members of minority groups, women, and young people. Additionally, the results revealed that these value chains involved people from Somaliland. Inferring from this that they provide a chance for inclusive economic development that includes the most disadvantaged populations in the nation is equivalent to saying that they do so.

An effect review of the Kenyan smallholder dairy commercialization initiative was conducted out by Coombes (2018). The demographic and economic factors that were taken into consideration were factors such as educational level, income, age, and employment status. Both quantitative and qualitative methods of research were used in the study's construction. Ex-post assessment was conducted using a quasi-experimental design for propensity score marching. This method was used in the research investigation. A survey that was carried out by Research Solution. Africa allowed for the collection of important information. The total sample size consisted of 2,562 individuals, which was further categorized into two groups. The first group comprised 1,297 farmers who were recipients of the Smallholder Dairy Commercialization Programme and were affiliated with 95 distinct dairy groups. The second group consisted of 1,265 farmers who were selected as matched comparisons and belonged to 8 different dairy groups. Descriptive statistics were used to analyze the data. The data suggests that the Smallholder Dairy Commercialization Programme exhibited notable efficacy in augmenting milk production. However, its impact on increasing the quantity of milk sold or the financial gains derived by farmers from milk sales was found to be limited. This is due to the fact that the program specifically focused on smallholder farmers. In contrast to non-Smallholder Dairy Commercialization Programme households, Smallholder Dairy Commercialization Programme farmer households exhibited a higher likelihood of women being responsible for managing the proceeds generated from milk sales. This had a notable impact on the intra-household bargaining power of the farmer households.

Market orientation strategies are increasingly recognized as pivotal in driving livestock commercialization among smallholder farmers. These strategies involve aligning production and marketing decisions with market needs, preferences, and dynamics. In

livestock systems, commercialization refers to the transition from subsistence-oriented to market-driven production, enabling farmers to generate income, improve productivity, and integrate more deeply into value chains. This review synthesizes findings from various scholarly works to elucidate how market orientation strategies affect livestock commercialization across different geographies and production systems.

Yaseen et al. (2018) underscore that market orientation encompasses customer orientation, competitor orientation, and inter-functional coordination. In livestock farming, these dimensions translate into practices such as understanding consumer demand for meat or milk, adapting production to meet those preferences, and coordinating resources across production and marketing functions. The authors argue that market orientation is often overlooked in agricultural policy, despite being central to shaping commercialization behaviour. Their study demonstrates that farmers with higher market orientation are more likely to innovate, adjust herd management practices, and participate in markets.

Gebremedhin (2010), however, challenges the simplistic linkage between market orientation and commercialization. While farmers may be oriented toward markets, actual participation may be constrained by infrastructural, institutional, or socio-economic barriers. Thus, market orientation is a necessary but insufficient condition for full commercialization; it must be supported by enabling systems such as access to information, inputs, transport, and markets.

Henriksen and Rota (2014) present a framework showing how market orientation improves profitability and production efficiency in smallholder livestock systems. Market-oriented producers focus on demand-driven production, allowing for better

alignment with market trends and price signals. This improves their bargaining power and resilience to market shocks. The study advocates for targeted interventions such as farmer training, market infrastructure development, and improved access to inputs, which collectively support commercialization.

Similarly Abafita, et al. (2016) highlight that market-oriented smallholders in Ethiopia were more likely to participate in livestock markets. They emphasized the role of institutional support, particularly access to extension services and market information, in enhancing market orientation and participation. Micheels and Gow (2015) examine the impact of market orientation on innovativeness and learning among primary agricultural producers. Their findings suggest that market-oriented farmers are more likely to engage in continuous learning and adopt innovations, which in livestock contexts may include improved breeds, feeding techniques, or animal health practices. This learning culture fosters commercialization by increasing productivity and aligning production with market requirements.

Okello and Luttah (2022) show that market orientation enhances the resilience of dairy farmers in emerging economies. Market-oriented farmers are better positioned to manage risks, diversify income streams, and adjust to market and climatic fluctuations. These adaptive capabilities improve both commercialization outcomes and farm performance, reinforcing the value of embedding market-oriented thinking in livestock development strategies. Several studies highlight factors that influence a farmer's market orientation and, by extension, commercialization behaviour: Access to Extension and Information: Martey et al. (2017) find that access to market information and extension services are significant predictors of market orientation among farmers

in Northern Ghana. These services help farmers understand demand trends, pricing, and buyer requirements.

Koye et al. (2021) identify education, land size, herd size, and access to credit as determinants of both market orientation and participation. Wealthier or better-educated farmers are often more inclined to commercialize due to higher capacity to manage market risks. Institutional Environment: Gebremedhin, et al. (2007) show that institutional inefficiencies such as weak marketing cooperatives and limited infrastructure can inhibit the translation of market orientation into actual commercialization, even when farmers are willing and able to sell. Marketing Arrangements and Social Capital: Wangu, et al. (2021) examine dairy farmers in rural Kenya and highlight how informal social networks and formal marketing arrangements such as cooperatives shape market orientation. Farmers embedded in strong networks were more market-oriented and had better commercialization outcomes.

Multiple studies including those by Gebremedhin (2010), Gebremedhin et al. (2007), and Belay et al. (2021) present Ethiopia as a key site for understanding market orientation in livestock. The findings consistently show that farmers with a high market orientation e.g., those producing for live animal exports or urban markets invest more in livestock productivity and infrastructure. However, commercialization remains uneven due to market access challenges, limited capital, and cultural attachments to livestock as assets rather than market commodities. Anno et al. (2023) critique existing livestock marketing initiatives in Turkana for their "myopic" approach, failing to embed sustainability, entrepreneurship, and market orientation. They advocate for transformative models that integrate value co-creation and local entrepreneurship to enhance commercialization. Merkel (2019) notes that livestock commercialization

among smallholders in Indonesia is driven by shifts toward market-oriented policies, yet constrained by limited capacity among farmers. Building entrepreneurial and market-responsive capabilities is key to improving commercialization outcomes.

The collective evidence suggests that market orientation is more than just a set of business practices; it is a strategic mindset that underpins the commercialization process. Farmers adjust livestock types, volumes, and breeding strategies based on market preferences. Market-oriented farmers actively seek out market opportunities, negotiate better prices, and build buyer relationships. Increased orientation leads to reinvestment in productivity-enhancing inputs such as feed, housing, and veterinary services. However, market orientation must be complemented by policy and institutional support. Without roads, cold chains, pricing transparency, and access to finance, even highly market-oriented farmers may remain marginal in actual commercialization outcomes.

Market orientation strategies play a critical role in enabling livestock commercialization by aligning production and marketing with evolving market demands. These strategies foster innovation, improve market participation, and enhance the resilience and performance of smallholder livestock farmers. However, the translation of market orientation into actual commercialization is not automatic. It requires a supportive ecosystem that includes extension services, infrastructure, access to inputs, and inclusive marketing systems.

For policy makers and development agencies, fostering market orientation through training, incentives, and institutional reforms presents a viable pathway to unlocking the commercial potential of livestock sectors in developing regions. Future initiatives must also address the social, cultural, and structural barriers that limit full participation

in markets, ensuring that commercialization is inclusive, sustainable, and transformative.

Commercialization of livestock farming defined as the transformation of subsistence-oriented livestock production into market-oriented enterprises has become a key focus in agricultural development across the Global South. However, commercialization is inherently risky, as it exposes farmers to market volatility, production shocks, disease outbreaks, climate variability, and institutional uncertainties. In this context, risk management knowledge including risk perception, evaluation, and the ability to employ effective risk mitigation strategies emerges as a fundamental determinant of successful livestock commercialization.

2.3.3 Risk Management Knowledge

Yang et al. (2018) examined risk management practices on enterprise performance using structural equation modeling and 304 SMEs operating in Pakistan. The outcome reported was that making use of risk management positively affect SMEs competitive advantage and their performance. This means once risk is managed in the livestock farming business it influences commercialization of the animal farming products. The study concluded that entrepreneurs should document risk management practices and implement them in managing their enterprises.

Using Resource-based theory, Hanggraeni et al. (2019) assessed the internal and external factors in managing risks on the bottom line of SMEs in Indonesia. Business characteristics, entrepreneurs' skills, the firm assets, information sharing and knowledge were internal components of risk and products and services threats, monopoly power, influence of suppliers, competitors' rivalry and buyer power were the

external factors. Data were obtained from 14 major cities and analyzed using regression. The researchers found that the performance of the business operations depends on risks identified and properly managed from both internal and external factors.

In a related survey in Slovak, Strelcova, et al. (2018) analyzed the present state of risk management practices using descriptive statistics involving 485 Small and medium enterprises and found that entrepreneurs give minimum regard to identification, analysis and assessment of risks in their enterprises. In conclusion, the researcher confirmed that 25% pay very little attention to risk management activities and of the remaining 75%, at most 24% dealt with all risk management variables to strongly protect their firms. Research by Chand et al. (2018) investigated the root of risks and strategies to manage them in livestock farming and production of animal products in India. Data from 913 livestock farmers were gathered from two variables: socio-economic and demographic characteristics of farmers and analyzed using descriptive statistics and regression. The researcher found that the sources of animal agriculture risks were marketing and customers' orientations, institutional policy, the animal health and breeding. They pointed that this risk could be managed using consultation, seeking veterinary services, engaging in forward contracts for sale of animals and their products and seeking short- and long-term finances from financial institutions.

Asante, et al. (2018) study factors for crops and livestock farming diversification, a mean of risk management in the agriculture sector in Ghana and found that examination and consideration are two factors for evaluation in the selection process of diversification of the agriculture products to control risks. The study gathered data from 608 smallholders and used Cragg two-step regression model for the analysis. Another

study by Asrat and Simane (2018) analyzed risk management knowledge of farmers on their awareness of climate change and its adaptation strategies in crops and livestock farming in Ethiopia. The research employed descriptive statistics for the analysis of data obtained from 734 household farmers engaged in crops and domestic animals farming. The study found that farmers' demographic factors coupled with their experience and decision influenced their perception on climate change adaption strategies.

Lubungu and Birner (2021) conducted research to study the elements that influence the dynamics of cattle marketing in Zambia. The socio-demographic information of the members of the family served as the independent variables, and the selling of cattle was the focus of attention for the dependent variable. The dependent variable was measured using the following variables: sales, market access, customers, and the number of livestock stock that was owned. Data that had already been obtained was used for the research. The data for this three-year panel was derived from 524 households that participated in a nationally representative survey. The US was the site of the survey's administration. The IAPRI, formerly known as the FSRP of Michigan State University, and the CSO of Zambia worked together to oversee the administration of the survey in all three waves. IAPRI was instrumental in establishing the aforementioned partnership. Households that were interviewed for the 1999/2000 Post-Harvest Survey (PHS) were also invited to participate in the follow-up interviews for these surveys. In order to analyze the data, multinomial logistic regression was employed. The results of this study show that the movement of cattle into and out of markets is influenced by many factors, including the level of education of the main breadwinner in a family, the accessibility of markets, the ownership of assets, the traits linked to institutions, the severity of shocks that households face, and the diversity of their income sources.

Using an innovation system viewpoint, the survey by Balehegn et al. (2020) sought to close the technology adoption gap in Ethiopia's cattle sector. The qualitative research examined the innovation system and the gaps in technology adoption in the livestock industry as independent variables. The dependent variable of this qualitative study was constructed using data collected from six focus groups and interviews with the heads of the BARC, the DDOA and the Veterinary Medicine department at Wollega University in Ethiopia. A research site in Ethiopia was chosen. To put the numbers in context, we looked at government policy papers, annual reports, and reports on program evaluations. The study concludes that the failure or inability of the innovation system to promote the spread of information, the development of markets, the participation of entrepreneurs, and the advocacy for new policies are likely to blame for the slow uptake of cutting-edge technologies in the cattle industry.

Tavener and Crane (2018) investigated the power dynamics of gender in the Kenyan dairy subsector, paying particular attention to cows, commodities and commercialization. The research was conducted from a qualitative point of view and the variables included things like the number of cattle owned, the revenue from the farm, the amount of milk produced, as well as demographic information like age, gender, level of education, marital status, number of children, and number of dependents. The investigation was conducted out with the involvement of a total of 22 distinct discussion groups, all of which were comprised of dairy farmers and hub leadership boards. We used a questionnaire that was semi-structured to conduct the interviews, and in addition to this, we had conversations discussing gender roles in dairy production that were less planned. In addition, a total of 34 individual key informant interviews were performed with milk dealers, managers of milk processing facilities, dairy extension agents, select officials from the government, and staff members from

Heifer International. These interviews were done throughout the course of the last year. There were individuals of both sexes taking part in the talks that were taking place. Coding is going to be the method of analysis that is used to the data that is analyzed. The first thing that the authors did was read the transcripts of the interviews, and then, using the information that they had gleaned from the interviews, they determined the most relevant themes and concepts. The procedure of coding was used to classify the many recurring thoughts and discussions into the appropriate subheadings. According to the results of this study, participation in the cattle and formal dairy markets is endowed with a gendered meaning that, in the end, establishes legitimacy around men's privilege over dairy revenues. This meaning is provided with a gendered meaning since males are more likely to participate in these markets. Review of literature in this section support the hypothesis made by this study that risk management knowledge positively impacts on commercialization of livestock farming in Narok County, Kenya.

This review explores the effect of risk management knowledge on livestock commercialization using a range of empirical studies from diverse geographies including Ethiopia, Kenya, Uganda, Nigeria, Nepal, and Thailand. Perception of risk influences farmers' willingness to commercialize. Riwthong et al. (2017) found that Thai farmers' risk perceptions especially concerning crop failure, price volatility, and health risks shaped their commercialization decisions. In livestock contexts, similar perceptions of disease outbreaks, market instability, or policy unpredictability can deter farmers from intensifying production for the market. Where risk management knowledge is limited, farmers adopt conservative strategies that prioritize household food security over commercial gains.

Gebreegziabher and Tadesse (2014) affirm this in the Ethiopian dairy sector, observing that farmers with better knowledge of risks such as animal disease, feed shortages, and fluctuating milk prices were more likely to apply adaptive strategies like diversified feed sources and animal health planning, which in turn enhanced their commercial engagement.

According to Ullah et al. (2016), risks in agricultural commercialization fall into five categories: production, market, financial, institutional, and human or personal risks. In livestock farming: Production risks involve disease outbreaks, feed scarcity, and reproductive issues. Market risks include price fluctuations, demand shifts, and buyer unreliability. Institutional risks emerge from policy changes, lack of veterinary infrastructure, and weak farmer organizations. Without knowledge of how to anticipate and mitigate these risks, commercialization efforts become unsustainable. This reinforces the need for farmers to develop skills in risk identification, analysis, and strategic response.

Valeeva et al. (2011), in the context of pig farming in Europe, found that farmers' adoption of risk management strategies—particularly those addressing animal health—depended on their belief in the efficacy of the strategies. In developing countries, where formal insurance markets and government safety nets are weak or non-existent, knowledge-based strategies such as vaccination, diversification, savings, contract marketing, and collective action play a crucial role in risk mitigation and commercialization success. Akinbile et al. (2013) document how small-scale poultry farmers in Nigeria used personal savings, early sales, and group cooperatives to mitigate risks. These strategies rooted in farmers' experiential knowledge enabled

consistent market participation and enhanced income security, fostering commercialization. Kiniso (2021) goes further to explore how institutional arrangements, such as community-based risk sharing and social safety nets, shape commercialization. Farmers with knowledge of such institutional mechanisms were more confident to engage in market-oriented livestock production, demonstrating that risk literacy also includes understanding and utilizing institutional frameworks.

In Ethiopia, Belay et al. (2021) link risk management knowledge to smallholder commercialization in Tigray. Farmers who understood market dynamics and livestock health risks were better at choosing optimal sale times, using appropriate breeding technologies, and investing in animal healthcare. These practices significantly increased their commercial returns. Tabe et al. (2022) highlight that commercialization, in turn, builds farmers' asset base and enhances their ability to invest in risk mitigation infrastructure (e.g., improved housing, fodder storage), creating a reinforcing cycle between risk management and commercialization.

In Kenya, Mutea et al. (2025) found that risk-aware farmers in semi-arid areas prioritized adaptive strategies like feed conservation and collective marketing. These approaches reduced vulnerability to seasonal price dips and feed shortages, ensuring continuity in market supply and income generation. In Uganda, Ruhangawebare (2010) found that cattle keepers who perceived fewer risks owing to higher education levels and extension exposure were more likely to specialize in market production. Conversely, those perceiving higher risks from diseases or theft remained subsistence-oriented. In Nepal, Gc and Hall (2020) observed that commercialization of smallholder farming was hampered by farmers' poor risk awareness and inadequate access to

extension services. Those with better risk knowledge often obtained through cooperatives or NGOs adopted improved practices and marketed more livestock.

Animal diseases represent one of the most significant risks to livestock commercialization. Alarcon et al. (2017) note that in Nairobi's urban livestock systems, farmers with stronger disease management knowledge particularly concerning zoonotic risks were more integrated into formal value chains. Knowledge-enabled practices such as routine vaccination, quarantine, and hygienic production systems reduced production shocks and boosted commercialization. Similarly, Bishu (2014) explored the role of cattle insurance in Tigray and found that knowledge about insurance as a risk management tool was limited. Where farmers understood insurance benefits, they were more willing to invest in commercially oriented cattle production.

As digital technologies enter livestock farming, new risks and knowledge needs are emerging. Kopler et al. (2023) discuss farmers' perceptions of risks associated with precision livestock farming (PLF) technologies in the EU. Farmers who understood the technological risks (e.g., data breaches, system failures) and benefits (e.g., disease prediction, efficiency) were more likely to adopt PLF and expand commercial operations. This illustrates that modern risk literacy including technological risk awareness is crucial in contemporary livestock commercialization.

Findings from the reviewed literature suggest several policy and practice implications:

Extension Services: Strengthening extension systems to include structured risk management training is essential. Farmers should be taught not only technical skills but also market forecasting, price trend analysis, and institutional risk navigation

Education on livestock insurance, savings schemes, and credit can empower farmers to take calculated risks necessary for commercialization. Mobile platforms and digital advisory

tools can bridge information gaps on weather, disease, and markets, enhancing farmers' capacity for proactive risk management. Farmer cooperatives, associations, and community-based platforms can serve as effective channels for disseminating risk knowledge and coordinating collective responses.

Risk management knowledge plays a pivotal role in shaping smallholder farmers' decisions and ability to commercialize livestock farming. It influences how farmers perceive risks, make investment decisions, and engage with markets. Without adequate risk literacy, commercialization efforts may expose farmers to unsustainable vulnerabilities. As such, policies and development programs aimed at livestock commercialization must incorporate comprehensive risk management education, backed by institutional support and information systems. Investing in farmers' risk intelligence is not just a defensive strategy it is a transformative enabler for inclusive, resilient, and sustainable livestock market participation.

2.3.4 Environment Awareness Knowledge

Empirical evidence was obtained from Guangxi Province for Naminse and Zhuang's (2018) research on the weather farmer (crops and livestock) and how entrepreneurship may relieve rural poverty in China. The data for the study was collected from that province. The demographic metrics of age, gender, degree of education, and marital status were taken into account as the independent factors in this study. The reduction of rural poverty was the dependent variable, and it was assessed by the capacities of rural farm entrepreneurs in terms of their economic standing, educational attainment, and sociocultural standing. The analysis of the data was performed using a confirmatory factor analysis and structural equation modeling, both of which were based on AMOS version 21. A multistage selection approach was utilized to pick 309 respondents

through a random sampling process. These respondents came from eight villages in Baise, six communities in Liuzhou, and two communities in Guilin. These communities make investments not just in livestock (such as cattle, goats, and sheep), but also in poultry (such as chickens and ducks). They also make investments in subtropical and tropical fruit crops, such as organic bananas, mangoes, starfruits, and garden tea. According to the data, farmers' socio-cultural capabilities have the biggest effect on the expansion of their entrepreneurial activity. The qualitative development of farmer entrepreneurs' abilities has also been shown to have a substantially more significant influence on rural poverty than their views regarding the expansion of farmers' entrepreneurship.

An investigation towards closing the technological adoption gaps in Ethiopia's cattle industry was carried out by Kebebe (2019). The research employed a qualitative approach, incorporating interviews alongside six focus group discussions involving office heads, livestock experts, and community members. The interviews were carried out with the heads of the Livestock Research Directorate at Bako Agricultural Research Centre, the Diga District Office of Agriculture, and the Faculty of Veterinary Medicine at Wollega University in Ethiopia. A content study of a number of internal papers, such as policy documents for the government, annual reports, and reports on the evaluation of programs, was used to enhance the material that was presented. The results imply that the low adoption rate of enhanced and better technologies in the cattle sector is a reflection of the weak or nonexistent innovation system activities such as information distribution, entrepreneurship, market development, and policy advocacy. This is because the rate at which these technologies are adopted is low. The outcomes of the research provide credence to these conclusions, which were drawn from the study.

In their 2018 research, Chandio, Talpur, and Rajput focused on an empirical investigation of the increase in the number of animal populations as well as dairy farming in Sindh, Pakistan. The investigation used a quantitative approach throughout its whole. For the purpose of the research, both primary and secondary sources of information were collected, with the primary data coming from 85 dairy farms located in the Dadu District of Pakistan. Secondary data was gathered from the government livestock census in 2006 and the livestock population forecast up to 2016. The types of animal populations that were taken into consideration were camels, buffaloes, sheep, and goats. This data includes a time sample that is a panel that spans 10 years. In order to do the data analysis, linear regression and descriptive statistical approaches were used. The results indicate that entrepreneurs in the livestock industry have issues with the system for preserving financial records, with just a small number of dairy animal producers maintaining records of their dairy farms. The bulk of them do not make use of current dairy procedures in the management of their cattle and face limitations in milk marketing tactics. They do not have access to veterinary services, nor do they have the ability to borrow money from financial organizations for investment reasons. Review of literature in this section support the hypothesis made by this study that environmental awareness knowledge positively impacts on commercialization of livestock farming in Narok County, Kenya.

Livestock commercialization the transition from subsistence-based livestock production to market-oriented production is gaining traction in agricultural transformation strategies across Africa and Asia. While commercialization is often promoted as a path to improving rural incomes, food security, and productivity, its success is influenced by a complex interplay of institutional, socioeconomic, infrastructural, and behavioral factors. Belay et al. (2021), in their study in Tigray,

Ethiopia, found that livestock commercialization is positively influenced by household characteristics such as education, gender of household head, family size, livestock herd size, and access to credit. Educated farmers and those with larger herds were more likely to engage in market-oriented production.

Similarly, Myo Kywe et al. (2014) found that commercialization in rural Myanmar was driven by herd size, income level, and labor availability. Households with more labor and larger livestock assets could manage production intensification and respond to market demand. Access to market information, veterinary services, roads, and transportation plays a critical role in commercialization. Merkel (2019) emphasizes that poor infrastructure in rural areas impedes market participation, while proximity to urban markets increases the likelihood of commercialization due to higher demand and better prices. Gc and Hall (2020), in their Nepal study, similarly noted that road access and proximity to market towns significantly influenced smallholders' decision to commercialize. Farmers with better physical access to inputs and outputs exhibited greater participation in livestock value chains.

Yaseen et al. (2018) highlight market orientation—the extent to which producers gather market intelligence, respond to customer needs, and adapt their strategies—as a critical yet often overlooked factor. Farmers who proactively seek market information, build customer relationships, and innovate in response to demand trends tend to achieve higher levels of commercialization. Ntshangase et al. (2021), studying goat farmers in South Africa, also found that market knowledge, price expectations, and business-oriented thinking (entrepreneurship) significantly affected both participation in markets and the intensity of commercialization. Government policy frameworks, extension services, cooperatives, and NGOs play a central role in enabling or hindering

commercialization. Belay et al. (2021) and Hagos and Geta (2016) emphasize that institutional support such as input subsidies, market linkages, and training boosts commercialization, particularly when targeted at smallholders. Conversely, weak institutional coordination, inadequate veterinary support, and volatile pricing environments can dissuade investment in commercial production.

Even when the desire to commercialize exists, smallholders often face significant constraints: As noted by Gc and Hall (2020), smallholders are often risk-averse, fearing price volatility, disease outbreaks, or failed investments. Without effective risk management mechanisms (insurance, price stabilization), they tend to remain partially commercial or rely on diversified income streams. Yaseen et al. (2018) and Belay et al. (2021) observed that female-headed households are often disadvantaged in commercialization due to lower access to land, capital, and markets. In some regions, livestock serve social or cultural functions (e.g., dowry, ceremonies), limiting their availability for market sale. Merkel (2019) argues that commercialization efforts must consider these sociocultural dimensions to avoid resistance.

Ntshangase et al. (2021) provide a nuanced analysis by distinguishing between market participation (whether a farmer sells livestock or not) and the extent of commercialization (what proportion of production is marketed). While some farmers may sell sporadically, only a subset actively plan, invest, and structure their production for regular market engagement. Hagos and Geta (2016) found that commercialization is not a binary outcome but a spectrum. Farmers transition from low to high commercialization in stages, influenced by incentives, experience, and capacity building. The commercialization of livestock farming among smallholders is a multi-faceted process influenced by household, institutional, infrastructural, and behavioral

factors. While market orientation and entrepreneurship are powerful drivers, commercialization cannot thrive without supportive systems for knowledge, finance, infrastructure, and risk mitigation. The reviewed studies collectively emphasize that livestock commercialization is not just a technical or economic process it is a socio-institutional transformation that must be carefully nurtured through context-sensitive interventions.

2.3.5 Government Strategy

Studying small-scale farmers in Tanzania's Mbulu and Bariadi districts, Atanasi et al. (2018) examined how the government Extension Services program affected their livestock investment decisions. This research used the government extension services program as its independent variable and livestock investment decisions as its dependent variable. Access to extension services was evaluated by taking into account a number of characteristics, such as the availability and ease of information, training, technical assistance, technology transfer, and the competency of livestock technical personnel. By contrast, access to livestock facilities and membership in particular groups were considered when evaluating investment choices. For this study, researchers used a cross-sectional approach to examine 333 homes selected at random from a pool of smallholder farmers. The study exclusively utilized primary data, employing a questionnaire as the method of data collection. The utilization of a probit regression model for the purpose of data analysis. The findings derived from the survey indicate that both group membership and access to livestock facilities exert a detrimental impact. On the contrary, the presence of information and training opportunities, market connections, technology transfer, technical guidance, and the expertise of livestock technical professionals have been found to exert a positive and significant impact on the decision-making process regarding investments in livestock.

Research by Mayala et al. (2018) sought to determine how extension services affected smallholder farmers' decisions to invest in livestock in Tanzania's Mbulu and Bariadi Districts. The survey was administered to around 333 families, chosen at random from a group of smallholder farmers, using a cross-sectional study approach. In this study, only primary data, collected through questionnaires, was used. I used a probit regression model to look at the data. Both group participation and availability of varied livestock facilities are found to have detrimental effects, according to the research. When deciding to invest in livestock, a number of factors come into play, including the availability of relevant information and training, contacts in the market, ability to transfer technology, availability of technical help, and the knowledge and experience of livestock technical professionals.

Livestock commercialization, the shift from subsistence-based production to a market-oriented livestock economy, is crucial for improving rural livelihoods, boosting national food security, and driving agricultural GDP. However, this transition requires deliberate and sustained government intervention. Drawing from a synthesis of the provided literature, this discussion outlines key government strategies that facilitate the commercialization of livestock farming, highlighting best practices, challenges, and policy recommendations across African and Asian contexts. Hinderink and Sterkenburg (2022) assert that agricultural commercialization in Africa is deeply influenced by government policy frameworks, which shape market infrastructure, input provision, and farmer behavior. They emphasize that commercialization succeeds where governments have deliberately; created favorable investment climates; Strengthened institutions (e.g., veterinary services, cooperatives); Promoted market liberalization while avoiding excessive state control. A key lesson is that government should

coordinate rather than dominate markets, ensuring functionality without crowding out private sector actors.

Belay et al. (2021) further stress the importance of decentralized institutional support tailored to smallholder needs. In Ethiopia's Tigray region, weak institutional arrangements and inconsistent policy enforcement limited commercialization. Governments must build robust local-level institutions capable of delivering training, finance, and infrastructure support. Henriksen and Rota (2014) highlight that physical and market infrastructure is the backbone of livestock commercialization. Their global review, with a focus on IFAD-supported programs, shows that governments can enable commercialization by: Investing in feeder roads, livestock markets, and cold chain infrastructure; Promoting mobile abattoirs and milk collection centers to enhance perishables trade; Developing livestock market information systems (MIS) to help farmers make timely sales decisions. Such infrastructure reduces transaction costs and market risks, enabling even remote pastoralists to access formal markets.

Merkel (2019) argues that inadequate veterinary services and poor extension support remain major bottlenecks to livestock commercialization in low- and middle-income countries. He recommends that governments: Strengthen veterinary networks and decentralize them to village levels; Promote public-private partnerships in livestock health and breeding; Support livestock extension officers to disseminate knowledge on feeding, disease control, and market standards. This aligns with Myo Kywe et al. (2014), who found in Myanmar that weak technical services reduced productivity and discouraged farmers from intensifying production for market purposes.

Access to capital is a game-changer in livestock commercialization. Henriksen and Rota (2014) note that smallholders need affordable and timely credit for investing in

improved breeds, feed, and infrastructure. Governments can step in by: Facilitating agricultural lending schemes through banks and microfinance institutions; Providing input subsidies for vaccines, mineral supplements, and improved genetics; Offering insurance schemes (e.g., index-based livestock insurance) to reduce exposure to shocks. Belay et al. (2021) emphasize that lack of capital and collateral limits participation in commercial livestock ventures. Their findings suggest that targeted financial inclusion policies, especially for women and youth, can significantly enhance commercialization levels.

A recurring theme in the literature is the marginalization of women and youth in commercial livestock systems. Myo Kywe et al. (2014) and Belay et al. (2021) recommend that governments mainstream gender-sensitive policies by: Earmarking subsidies and credit for women livestock keepers; Supporting female-dominated value chains (e.g., small ruminants, poultry, dairy); Promoting female leadership in cooperatives and extension programs. Inclusivity ensures that commercialization drives broad-based development rather than widening inequality. Governments play a vital role in catalyzing innovation in livestock farming. According to Henriksen and Rota (2014), governments must invest in: Livestock R&D to develop adaptive breeds and feeding regimes; Knowledge transfer through ICT-enabled platforms; Encouraging university extension farmer linkages for participatory research. Merkel (2019) further adds that research should inform the design of climate-smart and resource-efficient livestock systems suitable for local conditions.

The commercialization of livestock farming is not a spontaneous process—it is nurtured through deliberate and strategic government actions. The reviewed literature converges on the idea that successful commercialization hinges on policy coherence, infrastructure

investment, access to services, and institutional inclusivity. By adopting these strategies, governments can transform livestock from a survival enterprise into a commercially viable and sustainable pillar of rural economies.

2.3.6 Commercialization of Livestock Farming

Singh and Shergill (2018) analyzed the livestock economy of Punjab and provided both theory and empirical evidence from farm households. The independent variable was microeconomic indicators. The microeconomic indicators identified and applied were changing patterns in livestock population, milk production trends, and per capita availability of milk institutional infrastructure. The dependent variable was the livestock economy. A case study approach was used in this investigation on livestock entrepreneur at the household level in Punjab District of Indian livestock economy. Primary and secondary data were used in the study. The primary data was obtained through questionnaires from 224 farm households during the summer of 2017. Interview was also conducted on family members of the households, leaders from the farmer organizations, the secondary data was collected from annual reports of department of Animal Husbandry and Dairying, Govt. of India. Data obtained was analyzed using descriptive statistics. The findings established that livestock rearing by household entrepreneurs induce income through various ways such as creation of assets, sale of milk, enhancement of food security and provision of employment opportunity across different land holdings of farming households.

An investigation of the trade-offs involved in cattle growth at the farm level with multiple actors who each had their own individual aims was carried out by Isabelle et al. (2018). The examination of the trade-offs involved in selecting the livestock production techniques serves as the independent variable in this study. The issues of

gender equality, environmental concerns, economic advantages, human nutrition, and food safety were the primary focuses of this investigation. The interviews were place in people's homes and on working farms. The dependent variable is livestock management at farm level. The research consisted of a case study that was conducted in Senegal with seven different family dairy systems. It used a hybrid technique that includes direct assessments of aspects such as milk output and farmer breed preferences in addition to modeling with the application of metrics such as household profit and the intensity of greenhouse gas emissions. This methodology was applied. Monitoring 220 dairy cow keeping houses in rural or peri-urban areas within these locations enabled the collecting of the case study data, which included the essential economic and production information at the individual animal or household dairy business level. These locations were chosen for their proximity to the research sites. This information was included into the case study. The data was collected by having 14 different enumerator visits spaced out over the course of about two years at nearly equal time intervals. All of the households who participated in the research had a total of more than 3,200 cattle between them. The research on trade-offs found that successful management strategies at the farm level and at different dairy cattle-producing systems resulted in bigger milk yields, larger household profits, and the largest household benefit to cost ratio. These outcomes were brought about by increased milk yields at the farm level. This was the case despite the fact that a variety of different manufacturing methods were used. In addition to this, those who care for dairy cows, whether they are male or female, have a significant preference for animals of mixed breeds since the intensity of the greenhouse gas emissions they produce is considerably lower.

Wilsone et al. (2018) carried out a study with the goal of determining whether or not the production of smallholder livestock may be used in such a way as to reduce the

prevalence of anemia. The study was qualitative in nature and focused on three agro ecological zones in Ghana as its major research area. Ghana served as the primary research location. The following is a list of some of the criteria that have been chosen: the reasons why people in Ghana retain livestock, the hurdles that prohibit people, especially women, from eating goods derived from livestock, and the administration of different programs that are focused on livestock and have the objective of reducing anemia. The participants were selected using a method called deliberate maximum variation sampling, and the data were gathered in two stages: first via interviews with key informants, and subsequently through discussions in focus groups. Thirteen important informants from a variety of organizations, including governmental and non-governmental groups, were gathered together for this study. The conceptual model served as a framework for the preparation of the questions, and the interview questions were developed with the aid of two independent guides: one for stakeholders involved in the agricultural industry, and the other for stakeholders involved in the health industry. According to the results of the research, it seems that investing in livestock allows saves, enables families with limited resources to acquire assets, and aids in financing both planned and unforeseen needs such as school fees and medical bills. These benefits may be derived from the fact that investing in livestock permits savings, enables families with limited resources to acquire assets, and provides these benefits.

Katundu et al. (2018) conducted a study in Tanzania's Mbulu and Bariadi Districts with the intention of investigating the socio-cultural factors that affect smallholder farmers' decisions about livestock investments. The research was carried out with the goal of determining the factors that have the most impact. The objective of this study is to analyze the link between various elements of social culture and decisions about the ownership of cattle as an investment. It was believed that the decision-making process

regarding investments was the dependent variable, while the social culture of cattle was considered to be the independent variable. The wealth of a family's cattle, the number of women and children who were born into the family, the cost of a bride, and the family's ethnicity or membership with a tribe were the components that were evaluated. In order to collect the main data, we made use of both a structured questionnaire and a key informant checklist. We conducted our research using a method known as cross-sectional, and the total number of participants in our sample was 333. In addition, we spoke with nine individuals who were considered to be key informants. In order to study the relationship that exists between SCFs and livestock investment options, a binary logistic regression model, which is also referred to as a BLRM, was used. According to the results of this research, the wealth of a household is the factor that has the most influence on that family's decision on whether or not to make an investment in livestock in the districts of Mbulu and Bariadi in Tanzania. The cost of the bride is the next consideration, followed by status, then ethnicity, and lastly the total number of children that are born into the households. Despite this, there has not been a general movement toward more commerce in regards to investments in cattle.

Cavinato (2019) conducted a literature review to investigate the connection between the urbanization of livestock systems and the threat to the nation's or nation's ability to provide enough food to its citizens. A comprehensive analysis of the research that was published over the span of 37 years, starting in 1980 and continuing through 2017, was carried out with the assistance of the databases PubMed, ISI Web of Science, and Scopus. The information was culled until there were just 72 remaining articles that were eligible for selection and satisfied all of the criteria. The results revealed that the literature that could be accessed was unorganized and only contained a relatively small number of research that were situated in a wide range of study areas, ecosystems,

livestock systems, and consumption patterns. Additionally, the number of studies that were included in the literature was rather restricted. Another key finding centered on the subject of how to address the "missing middle" problem in cattle value chains in connection to food safety. This was an important step forward. In the perspective of ensuring there is enough food for everyone, the production of cattle and the consumption of beef are at opposing ends of this value chain. Throughout the whole of the value chain, the notion that there are other associated aspects and participants is ignored.

The level of commercialization of livestock farming in emerging countries remains relatively low, though it is gradually improving due to increased government and private sector interventions. As observed by Belay et al. (2021) in the Tigray region of Ethiopia, smallholder livestock farmers are slowly transitioning from subsistence-oriented production to market-oriented systems. However, commercialization levels are uneven due to infrastructural deficits, limited access to inputs, and poor institutional support. These limitations inhibit farmers from fully participating in livestock markets, often forcing them to rely on traditional, low-productivity practices.

A major factor contributing to the low level of commercialization is the lack of access to market infrastructure and services. Henriksen and Rota (2014) emphasize that market-oriented livestock production requires functional value chains, including access to roads, market centers, processing facilities, and cold chains. In many emerging countries, the absence of such infrastructure limits farmers' ability to sell their products beyond local markets. Additionally, the lack of structured marketing arrangements, such as contract farming or cooperatives, undermines farmers' ability to negotiate better prices or secure stable demand.

Commercialization is also hindered by inadequate technical services and extension support. As noted by Merkel (2019), many smallholder farmers lack access to veterinary care, improved breeds, and extension education that could boost productivity and enable market participation. Governments in emerging economies have often underinvested in livestock extension, resulting in low awareness of market standards, animal health management, and productivity-enhancing technologies. This gap in knowledge and services discourages farmers from intensifying livestock production for commercial purposes.

Another limitation is financial exclusion. Belay et al. (2021) and Myo Kywe et al. (2014) highlight that many livestock farmers in emerging countries face significant barriers to accessing credit and livestock insurance. Without financial resources, they cannot afford to invest in improved inputs or infrastructure, which are essential for commercialization. The absence of financial services tailored to livestock keepers especially pastoralists and women further compounds this problem, leading to a cycle of low investment and low returns.

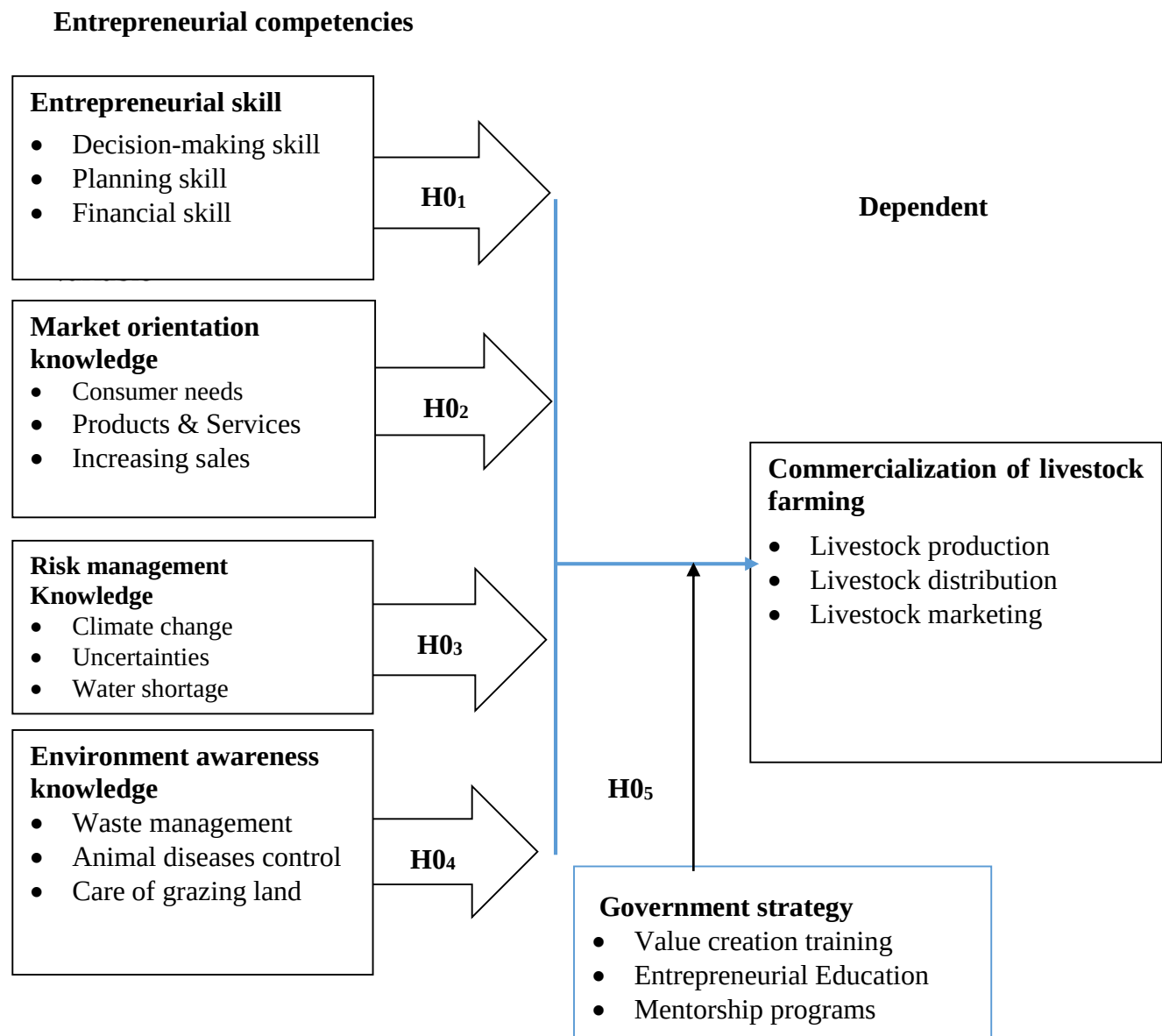
Nevertheless, there are signs of progress in some contexts. Hinderink and Sterkenburg (2022) argue that policy reforms in Africa and Asia such as liberalized livestock markets, improved veterinary policies, and livestock commercialization strategies have begun to yield modest gains. Some countries are also piloting inclusive financial models, livestock corridors, and public-private partnerships to support commercialization. While such initiatives remain localized and often donor-driven, they demonstrate the potential of targeted interventions to improve commercialization outcomes. In conclusion, while the level of livestock commercialization in emerging countries remains limited, it is not stagnant. Progress is evident in areas where

governments have prioritized enabling policies, infrastructure, and inclusive services. To accelerate this transition, there is a need for sustained investment in rural infrastructure, financial inclusion, extension services, and market development. A strategic and inclusive approach helps smallholders transition from subsistence farming to commercially viable livestock production systems, contributing to rural transformation and national economic growth.

2.4 Conceptual Framework

Adom, et al. (2018), said the ground plan of the study is the framework that contains the variables important to the study. It gives a picture of how the variables might relate to each other. It is also the analytical tool used to understand a given phenomenon. The frame is the basis for analyzing the relationship among a set of ideas. The main benefit of the structure is establishing a body of concepts and objectives used in solving new and emerging practical problems.

Figure 2.1:
Conceptual Framework



Source: Author, (2023)

The independent variables as indicated in the conceptual framework are entrepreneurial competencies which include entrepreneurial skills, market orientation knowledge, risk management knowledge and environment awareness knowledge while Commercialization of livestock farming is the dependent variable. The study's

theoretical and empirical foundations led the researchers to postulate that entrepreneurial competencies greatly benefit cattle farming's transition to a more commercial model. The research also looked at how entrepreneurial competencies and cattle farming's commercialization were affected by government policy.

2.5 Summary of Literature Review

This chapter reviewed the existing literature related to determinants of livestock commercialization from global context to local context. The chapter further presents some of the major theories the study was anchored on. The study relied on the human capital theory to explain the relationship between entrepreneur skill acquisition and commercialization of livestock farming. According to the theory, human competencies contribute significantly to growth of the various sector which include the livestock sector. Other supporting theories that inform the relationship between entrepreneurial competencies and commercialization of livestock in Kenya include market orientation theory, stakeholder theory, Knight's theory of risk, uncertainty and profit and the entrepreneurial alertness theory. Previous studies reviewed under empirical literature showed how various player in the livestock subsector have adopted various entrepreneurial mindset to expand their venture and earn high revenue. The study relied on theories and results of the empirical studies analyzed to hypothesize the relationship between independent and dependent variables.

Table 2.1:*Summary of Literature Review*

Topic	Author/ Year	Variables	Methodology	Findings/ conclusion	Research Gap
Socio-cultural Factors influencing livestock investment decisions among Smallholder Farmers in Mbulu and Bariadi Districts, Tanzania	Nyanjige et al. (2018)	The study analyzes the relationship between social culture factors and livestock investment decisions. Independent variable was livestock social culture factor and investment decisions considered dependent variable. Social culture factors was measured by wealth in livestock ownership, number of wives and children born to the family, bridge price and ethnicity-tribal group that owns livestock.	The study employed a research style known as a cross-sectional study, and our methodology included interviewing 9 key informants and surveying 333 respondents. This study relied on a key informant checklist and a structured questionnaire to collect its primary data. A binary logistic regression model, also known as a BLRM, was used by the researchers so that they could investigate the connection between Socio-cultural Factors and judgments about investments in cattle.	According to the findings of this study, the availability of a store of money is the social and cultural element that has the most impact on individuals' choices about investments in the Mbulu and Bariadi regions of Tanzania. After this comes status, the cost of a bride, a family's ethnicity, and the number of children that are born to that household. However, the trade trend in cattle investment does not grow.	This study analyzed the relationship between social culture factors and livestock investment decisions to see if those factors can influence investment decisions for increase in trade trend in livestock investment in Tanzania. The results showed that social culture factors do not influence investment decisions for increase in trade trend in livestock investment. However, there is research gap in livestock entrepreneurial skills, education, management style and

entrepreneurial groups characteristics for investment decision to increase trade trend in livestock

Factors influencing livestock marketing dynamics in Zambia	Lubungu and Birner (2021)	Independent variables consisted of socio-demographic metrics on household members, while dynamics of market participation and livestock marketing were the dependent variables The dependent variables were measured by number of livestock stock owned, livestock sales, access to market access, and customers.	The research used secondary data, collecting information from a nationwide survey of cattle owners over the course of three years. The survey included responses from 524 homes. The survey was conducted in three phases by the CSO of Zambia and the FSRP, which is now known as the IAPRI at Michigan State University. The surveys were conducted among the same households who were questioned in the Post-Harvest Survey (PHS) in 1999/2000.	The results show that a family's propensity to enter and exit the cattle market is affected by variables such as the degree of education of the household head, the ownership of assets, access to markets, institutional factors, household shocks, and the family's level of income diversification.	Livestock investment is still on a small scale in Africa and is mainly family oriented. The result is smallholder of 1-3 cows and etc. There is research gap in livestock entrepreneurial financing, managing livestock investment risk, entrepreneurial skills, market orientation, institutional strategies for increase in livestock investment, diversification of investment in livestock assets and adequate government policy,
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			The information was analyzed using a multinomial logit regression.		programs, training and financing in order to manage livestock investment risk.
Can crop and livestock entrepreneurship help reduce rural poverty in China? Results obtained in Guangxi Province.	Eric et al. (2018)	Information about people's ages, sexes, educational backgrounds, and marital statuses served as the independent variables. Entrepreneurs in rural areas were assessed based on their socio-cultural, educational, knowledge, and economic capacities. Chinese efforts to reduce poverty in rural areas served as the dependent variable.	In order to evaluate the data, structural equation modeling and confirmatory factor analysis were employed. A total of 309 participants were selected at random from eight Baise villages, six Liuzhou communities, and two Guilin communities using the multistage sampling approach. The communities sampled invest in livestock, mainly cattle, goats and sheep. They also invest in birds such as ducks and chicken. Garden tea, organic mangoes, star fruits, bananas, and other tropical and subtropical fruit harvests are available to	It turns out that farmers' socio-cultural skills play a big role in how their entrepreneurial spirit grows. There is a significantly larger impact on rural poverty reduction via increases in the number and quality of farmer entrepreneurship.	Finding out how much of an effect agricultural entrepreneurs have had on alleviating poverty in China's rural areas was the driving force behind this study. In order to have adequate poverty alleviation strategies, there is research gap in government strategies for rural entrepreneurship growth, entrepreneurial skills, for investing in livestock and other crops, institutional strategies for risk management in livestock and crops investment and entrepreneurial human capital management for adequate capability.

Tanzanian Smallholder Farmers' Perceptions of Extension Services and Their Impact on Livestock Investment Decisions in the Mbulu and Bariadi Districts	Mayala et al. (2018)	Livestock investment choices as a dependent variable and government extension services as an independent variable. Information availability, technology transfer, training opportunities, technical advice, and the expertise of livestock technicians were used as yardsticks for evaluating extension services. While group membership and access to livestock facilities were used as measures of investment choices.	them, along with animals. For this cross-sectional study, researchers randomly selected 333 residences owned by smallholder farmers. Everything that went into the study was based on primary data, which was largely collected through questionnaires. The information was examined with the use of a probit regression model.	According to the findings, being part of a group and having easy access to animal facilities are both detrimental. Factors such as access to markets, information, training, technical assistance, and knowledgeable livestock technical staff have a substantial role in influencing livestock investment decisions.	This study set out to investigate the impact of the Livestock Extension Services program in Tanzania on the financial commitments and expected returns of smallholder farmers. However, there is research gap in studying entrepreneurial groups' characteristics on livestock investment, gap in livestock risk management strategies and gap in livestock investment financing in relation to its risk for improve livestock facilitates.
Moving Goals Towards Better Animal Welfare in	Michelle et al. (2018)	Independent variables were demographics such as country of origin, age, region,	Only primary sources were used for this investigation. Primary data was acquired	Veterinarians exhibited higher levels of confidence than livestock team leaders, and Chinese respondents	This study used data from just four Asian nations to examine the commitment of

Asia's Livestock Industry.

sex, area of origin, religion, religiosity and qualification. The dependent variable is animal welfare improvement, livestock sector measured by general attitudes, resources for animal welfare improvement, number of animals slaughter and transport. The study was guided by Theory of Planned Behavior.

through a questionnaire from 1,041 individuals involved in the cattle industry in the four Asian nations of China, Malaysia, Vietnam, and Thailand. Multinomial (polytomous) logistic regression was used to analyze the data, and Stata 15's -logit-command was used to fit the models.

were the most optimistic about their abilities to improve animal welfare. While some respondents had high intentions and high confidences regarding animal welfare, others had low intentions and low confidences regarding animal welfare but identified extrinsic factors such as workplace behavior and different company priorities, as well as an intrinsic factor of lack of personal knowledge, as contributing to the status quo or the lack thereof.

livestock industry players to improving animal welfare. However, there is research gap in studying livestock welfare management strategies, studying the behavior of livestock attendants, and work place management strategies for animals slaughtering care.

Proficient business acumen among Slovenian, Polish, and Lithuanian dairy producers.

Carolien et al. (2018)

Farmer age, farmer education, farm strategy, farm size, milk sales, family income, and farm success were used as independent variables to evaluate entrepreneurial abilities. Dairy farmer's milk output,

The research was qualitative in nature, and information was gathered using a pre-tested questionnaire. Lithuanian, Polish, and Slovenian dairy farmers (334 and 362) were surveyed since they were thought to be representative of rural

The research found that dairy farmers in the studied nations are output-focused, with development of dairy production and specialization in dairy farming being the most popular farm plans for the intermediate to long-term future (five years out). It was also found that farmers with greater levels of competence

After Lithuania, Poland, and Slovenia joined the European Union, significant changes were expected in the cattle industry. However, there is research gap in studying the appropriate strategies for investing in

cow count, and acreage in use are the independent variables.

populations across Central and Eastern Europe. Univariate analysis of variance and Pearson's Chi2 tests were employed with descriptive statistics to analyze the data.

were happier with their family income, efforts, and agricultural outcomes; were more open to change; owned bigger farms; and were more optimistic about the future.

entrepreneurial competencies to help farmers deal with the challenges they are facing and keep their farms viable. Studying the investment strategies for small farms growth and adequate management.

Gender power in Kenyan dairy: cows, commodities, and commercialization	Katie Tavenner Todd A. Crane (2018)	Quantitative and qualitative data should be collected from the following sources: milk production, cow count, farm income, gender, age, education level, marital status, dependents, children count and ages, and the number of dependents.	This qualitative research included a total of 22 focus groups comprised of dairy farmers and hub leadership boards. A semi-structured questionnaire was used for interviews, and candid conversations on the roles of men and women in dairy farming were undertaken in an informal setting. Milk vendors, processing facility supervisors, dairy extension agents, appropriate government	This study's findings support the notion that males deserve more of the spoils from the dairy industry because of the gendered relevance associated with cow ownership and institutional engagement in the dairy market.	The purpose of this research was to look at the marketing and management of dairy products in Kenya from a female perspective. Dairy income in Kenya is held by more men than women, according to the report. In Kenya, men control all aspect of the dairy business, including the revenue. There is research gap in livestock entrepreneurship financial management,
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			officials, and Heifer International employees were among the 34 key informants questioned. People of both sexes participated in these discussions. The researchers coded data to analyze it. After reading through all of the interviews, our authors chose the most pertinent insights and discussions to include in the final draft. Codes were used to categorize similar thoughts and concepts into separate sets.		gap in gender financial control in Kenya dairy commercialization, and gap in livestock financing and investing decisions in relation to gender.
The theory and practice of livestock economics in Punjab: data collected from rural households.	Baldev et al. (2018).	Independent Variables Microeconomic indicators: Changing pattern in livestock population, trends regarding milk production, and per capita availability of milk institutional infrastructure.	This research of the home livestock entrepreneurs in the Punjab District of India employed a case study methodology. The research relied on both primary and secondary sources. In	The research confirmed that maintaining animals by home-based business owners leads to increased revenue from milk sales and the development of assets. In addition to these benefits, it increases food security and creates jobs for those living on farms of all sizes.	While the research looked at the microeconomics of entrepreneurs in India's livestock market, it didn't investigate why so many of those entrepreneurs were unable to make a profit from their livestock

		Dependent Variable Livestock economy	the summer of 2017, 224 agricultural families were surveyed using questionnaires as a primary source of data collection. Secondary data was gathered from yearly reports of the department of Animal Husbandry and Dairying, Government of India; interviews were also done with household members and leaders from farmer groups. The information was analyzed using descriptive statistics.		investments and were living in poverty.
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Livestock development trade-offs at the farm level: Multiple players with competing goals.	Gareth Salmona et al. (2018).	The independent variable is economic growth, gender equality, environmental protection, human health, and food security; the dependent variable is an analysis of the costs and advantages of different	The present investigation employed a case study approach to examine the livestock entrepreneurship at the household level within the livestock economy of Punjab District, India.	The trade-off analysis showed that the best milk yields, household profits, and benefit-to-cost ratios were achieved through well-managed dairy cattle production systems at the research sites and through good farm-level management methods. Also, the intensity of greenhouse gas emissions	The study indicated the importance for trade-off analysis and management of livestock—cattle production systems generating highest entrepreneur—household income. There is research gap in entrepreneur
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livestock production systems from the viewpoints of households and farms. The level of livestock management at the farm level is the dependent variable.

A combination of primary and secondary sources of information were used in the findings. Over the course of the summer of 2017, 224 farming households were surveyed to gather primary data. Secondary data came from the yearly reports of the Indian government's Department of Animal Husbandry and Dairy, in addition to interviews with household members and farmer organization leaders. In order to analyze the data, descriptive statistics were used.

By maintaining tabs on 220 households that kept dairy cattle in these locations,

was minimal, and the cross-bred animals were greatly liked by both male and female dairy keepers.

livestock investment strategies and management for sustainability. Also, for management of investment returns in relation to expansion and improvement of entrepreneurial livelihood.

			researchers were able to compile case study data that included production and economic metrics at the household or individual animal level (where applicable). Over the course of nearly two years, fourteen enumerator visits were conducted at approximately equal intervals to gather the data. More than 3,200 cattle were owned by the households included in the case study.		
Three agro-ecological zones in Ghana were the focus of a qualitative investigation into the potential of smallholder livestock production to alleviate anemia.	Hanson et al. (2018).	Variables applied in this study included farmers' motivation for raising livestock in Ghana, obstacles to consumption, particularly for women, and the administration of	A qualitative research design was used in the study. To find people to take part in the research, researchers used a technique called purposive maximum variation sampling. Key informant	The findings of the analysis indicate that investing in livestock facilitates savings, allowing resource-constrained households to amass assets and fund various anticipated and unanticipated expenses,	This study conducted an analysis on the relationship between livestock investment and health hazards, highlighting the various advantages associated with livestock investment,

		various livestock-centered therapies to decrease anemia.	interviews and focus groups were the two main methods of data collection. A total of thirteen key informants were hand-picked from various government and non-government entities. Two separate guides were used to develop the interview questions; one was for stakeholders in the health sector and the other for those in the agriculture sector. Theoretical groundwork provided the basis for the questions.	including educational fees and medical costs.	such as savings, asset accumulation, and the ability to finance planned expenditures, such as children's tuition. However, there exists a research gap pertaining to the impact of livestock investment on the livelihoods of various categories of entrepreneurs engaged in livestock investment.
A qualitative study looked at the possibility of smallholder livestock production in three Ghanaian agro-ecological zones to reduce anemia. The effect of livestock	Dil Bahadur Rahuta, Akhter Alib (2018).	Independent variable was climate-change risk coping strategies while livestock productivity was considered for the dependent variable. Climate change strategies were measured through	To determine what factors impact livestock ownership, the study used a Poisson regression model. To assess what factors impact the adoption of strategies to deal with climate threats, it used a multivariate probit	The research findings suggest that livestock farmers in Pakistan commonly employ four distinct strategies to mitigate climate-related risks. Some of these methods include moving to a new place, increasing the amount of land used for fodder	The present study did not specifically investigate the relationship between climate change and its impact on the growth of entrepreneurial livestock investment. Furthermore, this study did not provide a

productivity and household welfare on options for coping with climate change: data from Pakistan and other countries.

Leveraging the innovation system to narrow the technological adoption gap in Ethiopia's cattle sector.

Kebebe (2019).

update weather information, climate change experiences, livestock insurance, increase in fodder area and notable migration patterns.

Control variables were drawn from available demographic information

This was qualitative research. Gaps in technology adoption were noted as the independent variable, while the innovation system in the cattle sector was recognized as the dependent variable.

model. Seven hundred livestock producers from all four of Pakistan's main provinces, plus Gilgit Baltistan and Azad Jammu and Kashmir (AJK), provided the main data sets.

The research conducted was of a qualitative nature, employing interviews and six focus group discussions.

Members of the community, office administrators, livestock experts, and officials from the Diga District Office of Agriculture, the Bako Agricultural Research Centre's Livestock Research Directorate, and Wollega University

production, selling cattle, and purchasing livestock insurance. Livestock producers' decision-making process about ways to respond to climate risk is profoundly influenced by factors like age, education, wealth, access to extension services, and participation in non-governmental organizations (NGOs).

The findings indicate that deficiencies in the innovation systems, specifically in areas such as knowledge diffusion, entrepreneurship, policy advocacy, and market development, are responsible for the limited adoption of enhanced technologies within the livestock industry.

comprehensive analysis of the effective methodologies or approaches for entrepreneurial livestock investment and management in the context of climate change, with a specific focus on mitigating diminishing returns. The study did not examine the particular technological requirements for enhancing the pace of entrepreneurial progress and market orientation within the livestock industry of the economy.

in Ethiopia's Veterinary Medicine department were among those who took part. Content analysis was used to enhance the information in numerous internal papers, including yearly reports, program assessment reports, and government policy documents.

Investigation on the Dynamics of Sindh, Pakistan's Livestock Population and Dairy Production.	Shah et al. (2018).	The independent variable for the study was livestock population growth as measured by number of animals kept, milk produced, price of milk, cost of producing milk, revenue of milk and dairy farm management. On the other hand, dependent variable was dairy farming as measured by output.	The study used quantitative research technique and obtained primary and secondary data from 85 dairy farms in Pakistan's Dadu District, while secondary data was taken from the official livestock Census 2006 and animal population projections through to 2016. Cattle, buffaloes, sheep, goats, and camels were the five livestock types considered. This	According to the data, livestock entrepreneurs have a difficulty with financial record keeping systems, with just a few dairy animal owners maintaining records of their dairy farms. They also lack sophisticated dairy procedures for animal management, have limitations in milk marketing tactics, and lack veterinarian services as well as financial institution credit facilities for investment objectives.	The research used a linear regression model to explain the cattle entrepreneur's inadequate financial record-keeping system. There is a study vacuum in the characteristics of entrepreneurial organizations on cattle investment and management.
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Impact of dairy hubs on smallholder welfare: empirical evidence from Kenya	Vincent Ngeno (2018).	The independent variables in this study include the following: the age of the household head, the number of years of schooling of the household head, the availability of credit, the size of the landholding in hectares, the number of livestock owned, the distance to the hub, the number of adult household members, and membership in the farmers' group. Profits after expenses and milk yields are the dependent variables here. More so, a	analysis is based on panel data spanning ten years. The data was analyzed using linear regression and descriptive statistical approaches. From the Kenyan Rift Valley, observation units were selected using a multistage sampling approach. A total of seven administrative sites had their data collected, with 59 dairy farmers being randomly picked from each. In all, 826 farm households were observed for this data set, with 457 of those households selling through dairy hubs and 369 through more conventional means. Data was collected using a structured household questionnaire.	The research findings show that the factors that primarily influence farmers' involvement in dairy hubs include their level of education, factors such as access to extension services, household size, credit, landholding, tropical livestock unit, hub distance, and off-farm employment opportunities may vary. Additionally, yields and net returns are greatly enhanced when dairy hub participation is included.	In the context of fast urbanization, there is a lack of research that investigates the relationship between entrepreneurial tactics and the management of cattle value chains. The relationship between livestock investment techniques and food security in developing nations going through fast urbanization has also not been thoroughly studied. Moreover, in light of developing nations' fast urbanization, it is essential to investigate the connection
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dummy variable can be assigned to one if the household is participating in dairy hub and zero otherwise.

Descriptive statistics and logistic regression were utilized for data analysis by the researchers.

between food security and animal production.

A literature assessment on developing nations' urbanization, livestock systems, and food security	Assem et al. (2019).	The review of literature in this study focused on urbanization, livestock systems, and food security in developing countries.	This study employed a systematic review methodology, drawing from the following databases: Scopus, ISI Web of Science, and PubMed, covering the years 1980–2017. Results showed that 72 articles were suitable according to the criteria set out in advance.	The findings indicate that there is a lack of cohesion in the existing body of literature, which is primarily derived from a limited number of studies. Furthermore, this literature is situated within diverse research domains, encompassing various environmental contexts, livestock production systems, and patterns of consumption. Another significant discovery pertains to the strategies employed in tackling the issue of the missing middle within livestock value chains in relation to food security. The livestock value chain in relation to food security primarily focuses on the aspects of livestock production and consumption,	Few studies have looked at the interplay between livestock investment strategies and food security in developing nations during times of fast urbanization, or how entrepreneurial tactics relate to the management of livestock value chains in such contexts. Additionally, the connection between developing nations' fast urbanization and food security as it relates to animal production.
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Northern Tanzanian pastoralists' views on climate change and its effects on livestock production	Esther et al. (2018).	Variables were climate change perception independent and livestock production dependent. Climate change perception was measured by climate change awareness programs, days of rainfall, days of drought counted, number of livestock death, and reduction in milk production. The control variables was demographic characteristics.	The research utilized a combination of quantitative and qualitative methods, with descriptive statistics and thematic analysis employed for data analysis. The empirical data for this study was collected from a sample of 130 cattle owners and 81 participants who took part in focus group discussions. These individuals were selected from ten villages located in the Monduli District of Tanzania. A deliberate selection process was employed to choose a total of 8-12 participants from each of the study villages. The study employed focus group	while neglecting other components and stakeholders involved in the value chain. The results indicate that pastoralists possess a comprehensive understanding of the overall climate patterns in their specific region, including its fluctuation and the consequences of severe weather occurrences on livestock productivity. Furthermore, it is worth noting that there is a lack of climate risk programs and early warning systems within the district. Climate change has been found to have adverse effects on livestock production, primarily manifesting as a scarcity of forage and water resources. This scarcity subsequently contributes to the occurrence of starvation and malnutrition among livestock populations. Consequently, these circumstances result in	This study centered on the examination of climate change perception and its effects on livestock production. Climate change has been observed to have detrimental effects on various aspects of the livestock industry, including a decrease in livestock population, a decline in milk production, a decrease in meat production, a decline in livestock market prices, and a reduction in earnings. There exists a research gap pertaining to entrepreneurial strategies aimed at enhancing livestock production, investment, and
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discussions as a method of data collection, involving executive leaders, village elders, and animal health workers. significant mortality rates, the occurrence of infectious diseases, reduced milk yields, and unfavorable livestock market prices. marketing in the context of climate change.

The Impacts and Adaptation of Climate Change on Livestock: A Systematic Review.	Jacquelyn et al. (2018).	Impacts and Adaptation of Livestock on a Changing Climate: A Systematic Review. A study that merely reviews the literature does not test any variables; it focuses solely on methods.	Following the standards laid out by PRISMA framework, 126 relevant academic publications published in peer-reviewed journals were subjected to a thorough evaluation. In the past, systematic reviews in the field of climate research have used these criteria.	Research on the impacts of climate change and adaptability in livestock systems has to broaden its focus beyond particular geographical locations, according to the results. Particularly in poor countries, the main worries about vulnerability must be considered.	This study set out to investigate livestock-related adaptation strategies to climate change. Nevertheless, there is a lack of study about the effects of climate change on livestock investment, growth, and production practices. Another issue is the dearth of studies that connect the dots between climate change and the
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					adaptive strategies employed by cattle systems. It is also worth mentioning that there hasn't been enough focus on the adaptability of monogastric cattle species in the current literature.
How communal cattle farmers in Zimbabwe's Umzingwane area are coping with the drought	Thabo Ndlovu1 (2019).	The independent variable was drought coping strategies and livestock management dependent.	A qualitative methodology was employed to investigate the strategies employed by rural farmers in managing drought conditions. The study employed a descriptive survey design, utilizing structured and non-structured questionnaires to collect data. The aforementioned surveys were conducted on a population of 180 individuals who owned communal cattle, selected from six	The findings of the research indicate that rural livestock farmers in Umzingwane district, Zimbabwe, have not adopted modern livestock management techniques and primarily rely on coping strategies that are influenced by moisture levels.	The study also failed to examine the issue of poverty among entrepreneurs who invest in livestock, as well as the specific types of entrepreneurs involved, their characteristics, and their investment strategies in the livestock sector.

The value chains of Somaliland's animal by-products: tallow and bones as a case study.	Nadhem et al. (2018).	The purpose of this qualitative study is to examine the value chains of tallow and bones, two by-products of cattle, in the Somaliland context. People who kept livestock had their demographics considered in the study.	different dipping locations. With an average of 30 responders per dip tank, the sample tanks in this study were discovered to be owned by 3324 individuals together. Using secondary data collected in 2016 by the Somaliland Meat and Development Association, this study utilizes a qualitative technique with a case study approach. Also interviewed were trainers who deal directly with farmers and ranchers. Thirty people were surveyed and split into two groups for the study. Fifteen people were instructed in bone crafts, while the other group, mostly made up of women, was instructed in soap production using tallow.	The findings indicate that the value chains pertaining to livestock by-products, specifically livestock bones and tallow, employed in Somaliland for the purposes of livestock marketing and exports, exhibit limitations in terms of length, utilization of low-value inputs, participation from underrepresented groups, such as women and young people, and the creation of goods with modest value. Because of this, it seems like they offer a chance for the nation's most disadvantaged people to participate in economic growth.	This study primarily examined the value chains associated with livestock by-products, specifically focusing on the utilization of livestock bones and tallow within Somaliland. The objective of this investigation was to explore how these by-products can contribute to the economic empowerment of livestock owners who are socioeconomically disadvantaged. There exists a research gap pertaining to the methodologies
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employed for financing livestock investments by entrepreneurs, as well as the approaches utilized in the development of livestock value chains.

Impact evaluation of the Smaller Dairy Commercialization Programme in Kenya	Bonilla et al. (2018).	The variables were demographic and economic characteristics, educational level, income, age, and occupational status	The inquiry also made use of quantitative and qualitative methodologies. Scientists used ex-post evaluation in a quasi-experimental study that used propensity score matching. Research Solution did a survey in Africa, and it found some important information. The sample for the study consisted of 2,562 houses that agreed to take part. In all, 1,297 farmers were selected as beneficiaries of the Smaller Dairy	The results show that the Smaller Dairy Commercialization Programme was successful in increasing milk output, but it had little impact on increasing farmers' milk sales volume and pricing. When comparing households who participated in the Smaller Dairy Commercialization Programme (SDCP) with those that did not, researchers found that women were more likely to be in charge of handling the money made from milk sales in the former group.	The study primarily examined the commercialization of dairy milk by smallholder farmers. However, there are existing gaps in research regarding the institutional strategies that can be employed to enhance milk production quantities and foster entrepreneurship, ultimately leading to improvements in market intermediaries.
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Commercialization
Programme from among
95 distinct dairy groups.
To round out the
sample, 1,265 farmers
were chosen as
comparatives from
among 8 other dairy
groups. The method of
data analysis made use
of descriptive statistics.

Source: Author, (2023)

2.6 Research Gaps

This area has received considerable attention from previous researchers. For instance, Arero (2018) studied factors influencing livestock marketing in the Marsabit region. Factors studied included socio-economic factors, market infrastructure, and conflict. Komen et al. (2019) investigated variables affecting beef cattle selling behavior in Kenyan pastoral areas: the significance of livestock market information. The research focuses exclusively on producers' access to livestock marketing information in Kenyan pastoral markets, rather than farmers' entrepreneurial abilities and how it influences livestock commercialization. The research by Henriksen and Rota (2014) focuses on the commercialization of livestock production, with the goal of creating a successful and market-oriented smallholder livestock production system.

The current study focused on constraints of livestock commercialization such as market access and availability, ensuring equitable share of product and commodity value goes to farmers who are the primary producers in this value chain as well as ensuring transparency in market prices. A review of previous literature reveals that there is little attention on the influence of entrepreneurial competencies on the commercialization of livestock farming in Kenya. Similarly, entrepreneurship is a critical component for the commercialization and growth of any business venture. Hence there exists both a conceptual gap and a knowledge gap on how entrepreneurial competencies influence the commercialization of livestock farming in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methods that were adopted by the study to test the research hypotheses and make conclusion. This include the type of research philosophy and design to be employed. Study population, justification of the population, methods to be used in sampling, data collection instruments and procedure, pilot testing, diagnostic tests, data analysis and presentation and finally ethical issues.

3.2 Research Philosophy

A research philosophy encompasses a collection of principles and convictions regarding the methods by which information pertaining to a particular subject should be obtained, analyzed, and applied. The subject matter encompasses a variety of philosophical methodologies, such as epistemology, ontology, and axiology. Two additional prominent research theories are positivism and interpretivism. Positivism entails the utilization of existing theoretical frameworks to formulate hypotheses that subsequently underwent scrutiny within the research endeavor. According to the positivist ideology, truth is attributed solely to factual information that is acquired through the processes of measurement and observation.

Positivism is based on measurable observations that lead to statistical analysis with the goal of generalizing the results. The researcher in positivism is independent of the investigation; there is little consideration for human interests in the study (Collins, 2010; Crowther & Lancaster, 2008). The positivism research philosophy guided this study, because, it intends to carry out an empirical enquiry by testing hypotheses that are attached to the existing relevant theories, so as to determine the authenticity of tested hypotheses based on the quantitative analysis and findings.

3.3 Research Design

The mixed research design was used because it is dependable and provides a systematic description of the population. One way to better understand a study problem is via a mixed research design, which mixes qualitative and quantitative methodologies. This strategy is also called a mixed-methods research design. Combining qualitative and quantitative methods allowed researchers to overcome the limitations of each and make the most of their strengths when gathering and analyzing data. A more comprehensive and reliable picture of the research problem was produced by this approach. The design was relevant to achieve the objective of the study which was to establish the influence of entrepreneurial competencies on commercialization of livestock farming in Narok County, Kenya.

By integrating qualitative and quantitative methods, the researchers were able to gain a more comprehensive understanding of the study subject. Statistical patterns, generalizability, in-depth insights, and contextual understanding were all provided by the mix of quantitative and qualitative data, which enriched the analysis. By combining approaches, scientists can check the accuracy of their results using many sets of data. The credibility of research findings is enhanced when qualitative and quantitative analysis converge, which boosts confidence in the study's conclusions. This approach was used to gather quantitative information on livestock farming in Narok County by inhabitants for statistical analysis of the representative sample. This goal is useful in allocating resources for the research, stating the study condition, and identification of further research areas based on the results and conclusion of the study (Akhtar, 2016).

3.4 Population of the Study

The target population of this study was 150,415 households involved in livestock farming in Narok County (KNBS, 2019). The unit of analysis was households involved in livestock farming in Narok

while household heads was the unit of observation. The study population was therefore 150,415 households in Narok County.

3.5 Sampling Frame

A sampling frame is a list of all the members of the population from whom the sample size was drawn for the research. The sample frame for this research was a list of all registered livestock producers who are registered with the ministry of agriculture's livestock department. The research obtained the population sample frame where the sampling technique was carried out.

3.6 Sampling Technique and Sample Size

In order to establish the sample size, the researcher's first turned to Cochran's formula. A formula for calculating a representative sample was developed by Cochran (1977). Researchers frequently employ the formula to determine the sample size for populations greater than 10,000 because of its accuracy.

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

No = the sample size;

Z = is the selected critical value of desired confidence level;

P = is the estimated proportion of an attribute that is present in the population;

Pq = $1 - p$ and e is the desired level of precision.

$$No = \frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2} = 384$$

No = 384 (sample size)

Table 3.2

Sample Size

Sub counties	The population of households engaged in livestock farming	Sample size Proportion
Transmara West	31880	81
Transmara East	16630	42
Narok North	31041	79
Narok South	14658	37
Narok West	31234	80
Narok East	24971	64
Total	150,415	384

Source: Author, (2023)

This study adopted the stratified and simple random sampling approach to obtain the sample from the livestock farmers' population of 150,415 households. First the population was stratified based on the sub-counties (Table 2) within Narok County so as to ensure that the sample presents fair representation of the entire county. The study finally conducted random sampling to select the specific households that were included in the study. A list of the livestock farmers was obtained from department of livestock at the sub-county level and names were randomly selected from the list to until all the 384 households were selected. This mixed sampling techniques ensured that there is no biasness in the selection of the sample.

3.7 Data Collection Instruments

Using self-administered semi-structured questionnaires, primary data was collected in the field. There were both open-ended and closed-ended questions on the surveys. The closed-ended items were assessed utilizing a 5-point Likert scale, which consisted of questions designed to capture the opinions and concerns of the participants. In order to enhance the dependability of the participants' answers, the utilization of this approach was deemed suitable given the technical complexity of the items within the scale. The survey consisted of five distinct sections, with the initial section (A) focusing on inquiries pertaining to the respondents' background information. The following section was derived from the specific objective of the study, while the final section assessed the dependent variable. According to Kothari and Garg (2014), the utilization of a questionnaire allows respondents to allocate sufficient time for formulating well-considered responses. In support of this claim, Sekaran and Bougier (2009) state that questionnaires are useful data gathering instruments when the researcher knows exactly what to ask for and how to quantify the relevant variables. In addition to the implementation of a questionnaire, the study employed interviews and focus group discussions as supplementary methods to gather information from key informants.

Secondary data refers to information that is obtained from published materials and other sources, rather than being collected directly. According to Kombo and Tromp (2006), the item in question is readily accessible, offers convenience, and is economically advantageous. In order to ascertain the suitable factors influencing the commercialization of livestock farming, secondary data was gathered. The research primarily utilized pre-existing published literature concerning the impact of entrepreneurial factors on the commercialization of livestock farming.

In order to fully grasp a phenomenon or research subject, this study used qualitative and quantitative methods. The research process benefits from the distinct qualities and viewpoints

offered by each data source. Mathematical information is the focus of quantitative data. It gives us hard numbers that we can use to make conclusions based on statistical analysis of trends, correlations and patterns. Quantitative data is often collected through surveys, experiments, or the analysis of existing datasets. On the other hand, qualitative data involves collecting non-numerical information, such as narratives, observations, interviews, or focus group discussions. Qualitative data provides rich, in-depth insights into individuals' perspectives, motivations, and experiences. It helps researchers understand the context, meanings, and social dynamics surrounding a research topic. In the livestock farming example, qualitative data was collected through interviews with farmers to explore their experiences with the new feed, their perceptions of its impact on animal health, or their views on its practicality in different farming systems.

By combining qualitative and quantitative data, researchers gained a more holistic and nuanced understanding of the research topic. First, the use of multiple data sources and methods (quantitative and qualitative) enable the study validate and cross-verify findings. When different types of data converge and support each other, it enhances the credibility and robustness of the research. Qualitative data further provided depth and insights that quantitative data alone may not capture. It helps uncover the underlying reasons, motivations, and contextual factors behind observed patterns in quantitative data. The combination of both types of data allows for a more comprehensive and nuanced analysis. To collect quantitative data, the study used structured surveys. Surveys were administered through online platforms, phone interviews, or in-person questionnaires. Existing datasets were obtained from public sources, research institutions, or industry databases. Qualitative data collection methods included interviews, focus groups, participant observation, and document analysis. Interviews were conducted face-to-face or through phone. Focus groups involved gathering a small group of participants to discuss a specific topic.

Participants observation involved immersing oneself in the research setting and observing and documenting behaviors, interactions, and experiences. Document analysis entailed reviewing existing documents such as reports, diaries, or archival records related to the research topic.

3.8 Data Collection Procedure

First and foremost, in order to gather primary data, we had to get a study authorization from NACOSTI (the National Commission for Science, Technology and Innovation) and an introduction letter from Kenya Methodist University. Furthermore, permission was requested from the relevant federal and county government departments and agencies. The research employed a method of administering the questionnaires in a physical manner. The researcher, in collaboration with trained research assistants, conducted in-person visits to the chosen respondents in order to administer the questionnaires. This phenomenon can be attributed to the fact that a portion of the participants required assistance in comprehending the questionnaires due to their lack of literacy skills.

3.9 Pilot Study

To ensure the validity and reliability of the research instruments used for data collection, the procedure of pilot testing is crucial in the field of research affairs. The primary objective of pilot testing is to determine the reliability and validity of the research instruments. The study conducted a pilot study on 38 respondents from the study population an equivalent to 10% of the study population which were excluded from the final sampling procedure. The rationale for conducting the pilot study in Samburu County was based on the recognition that comprehending the practices of two distinct cohorts engaged in livestock farming and commercialization would yield substantial implications for the study's outcomes. The process of pilot testing offers a valuable opportunity to identify and address various potential issues that may arise with an instrument.

These issues may encompass inquiries that participants fail to comprehend or questions that are ambiguous in nature.

3.9.1 Reliability of the Research Instrument

The term "reliability" describes how well a research instrument maintains its accuracy throughout multiple cycles (Sekaran, 2008). Before administering the instrument as a pretest, the researchers checked its reliability using Cronbach's alpha, a method first proposed by Burns and Bush (2010). Additionally, the test was used as a follow-up to evaluate the reliability of the data obtained from the instrument. Statistical Package for the Social Sciences (SPSS) is used to compute item correlations among themselves. A value of 0.7 was chosen because it is commonly recommended. One common internal consistency measure in the field of psychometrics is Cronbach's alpha. An expanded form of the Kuder-Richardson (K-R) 20 formula, it determines the internal consistency of a measuring device by comparing the split-half reliabilities of all possible data sets from the device. This method shortens the time needed to calculate a dependability coefficient in comparison to others.

The Kuder-Richardson (K-R)20 is derived from the formula proposed by Kothari (2006).

$$KR^{20} = \frac{(K)(S^2) - \sum s^2}{(S)(K - 1)} \dots\dots\dots \text{equation}$$

KR²⁰ Reliability coefficient of internal consistency

K Number of item used to measure the concept

S² Variance of all scores

S^2 Variance of individual items

3.9.2 Validity of the Research Instrument

To assess the desired notion or phenomenon, a measurement or test must be able to consistently and accurately give valid results. The validity of an instrument is defined by how accurately it assesses the relevant features. One part of a comprehensive framework is validity, which is the degree to which the measuring tools precisely capture the intended constructs (Neuman, 2006). Validity in research includes evaluating if the results meet all the requirements of scientific research methods, such as using randomization to assign sample groups, and it is related to the thoroughness of the experimental design (Shuttleworth, 2008). A number of methodological approaches were used in this study to guarantee that valid data was collected from the field. Among these methods were using factor analysis, a pilot study, the idea of triangulation, and expert input in research instrument design.

3.10 Diagnostic Tests

Diagnostic tests are adopted to ascertain that the various models can be used in inferential analysis. The proposed model of this study was examined by use of regression analysis technique; therefore, diagnostic tests were deemed vital to be undertaken to cover tests for normality, linearity, heteroscedasticity and multicollinearity, in order to ensure that the results are reliable.

3.10.1 Test of Normality

The researchers employed tests of normality to assess the adequacy of the data's modeling and its adherence to a normal distribution (Gujarati, 2002). Ghasemin and Zahediasi (2012) argue that for the purpose of generalizing the results beyond the sample, it is desirable for the variables to exhibit approximate normal distribution. The Kolmogorov-Smirnov normality test was utilized in the

study. Based on the Kolmogorov-Simonov test, if the outcomes of the normality tests demonstrate a significance level of less than 0.05, it can be deduced that the data deviates from a normal distribution.

3.10.2 Linearity

In order to determine whether there is a multiple linear relationship between the dependent variable (livestock commercialization) and the independent variables (X's) (entrepreneur skill acquisition, market orientation knowledge, entrepreneur risk management knowledge and entrepreneur environment awareness), this study collects data from entrepreneurs. It was necessary to verify that $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_0$. This was accomplished by utilizing the ANOVA table, which allows for the calculation of the F-Statistic. If this value is significant, then the linearity assumption is met.

3.10.3 Test of Multicollinearity

Intercorrelation between the explanatory variables is what's known as multicollinearity. If two or more predictor variables in a multiple regression model are significantly correlated, it is called multicollinearity (Rukckle et al., 2013). According to Tabaknick and Fidell (1996), while some degree of correlation between the variables or items is acceptable, it should not be so strong as to cause excessive multicollinearity or correlations higher than 0.90. To assess multicollinearity, the methodology given by Rumsey (2009) the Variance Inflation Factor (VIF) was utilized. It is generally recommended to conduct further investigation into a variable when its VIF values exceed 10. The tolerance statistic is a common tool for other researchers to assess multicollinearity. By finding the inverse of the variance inflation factor (VIF), one can obtain the mathematical equation for tolerance. A VIF of 10 can be compared to a tolerance value of less than 0.1. If the VIF is

greater than 10 and the tolerance level is less than 0.1, it is possible that a particular variable can be better understood as a linear combination of other independent variables.

3.10.4 Heteroskedasticity

Heteroscedasticity refers to the presence of unequal variability or scatter in data across a collection of predictor variables, thereby violating the assumption of homoscedasticity. One of the more significant issues related to heteroscedasticity is the presence of biased standard errors. Nevertheless, the presence of standard error in the data poses a challenge when utilizing regression analysis for significance testing and confidence interval estimation. This is due to the fact that the coefficients obtained may be biased, rendering the results invalid (Field, 2013). Ideally, it is desirable for the error term to exhibit homoscedasticity in terms of its variance. The consequences of deviating from the assumption of homoscedasticity vary in magnitude, becoming more pronounced as the level of heteroscedasticity increases. The research utilized the Levine test statistic to evaluate the presence of heteroscedasticity, assuming the null hypothesis that the error term remains constant. The acceptance rule is to retain the null hypothesis when the p-value exceeds 0.05. This observation suggests that the condition of homoscedasticity is met, thereby enabling valid inference on the significance of the coefficients.

3.10.5 Factor Analysis

When conducting surveys using unproven measures, factor analysis is an effective approach for validation. Using SPSS Version 21, we factor loaded and analyzed the variables and sub-variables. In addition, we used the Bartlett Test of Sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy to assess if the dataset was suitable for factor analysis. We used the results of these tests to see if the correlations between the variables that were reported were indeed statistically significant.

3.11 Data Analysis and Presentation

Upon finishing the data gathering process from respondents through questionnaires, the gathered information was edited and coded to make it ready for analysis. The next step was to enter the cleaned and coded quantitative data into the SPSS application for analysis. Analyzing the data required the use of both descriptive and inferential statistics. The descriptive statistical analysis encompassed the calculation of percentages, frequencies, means, and standard deviations. Descriptive analysis was employed to examine the manner in which participants responded to the statements presented in the questionnaires. The findings were presented through the use of statistics, tables, frequency distributions, and visual representations. Some examples of inferential statistics that were utilized to test the hypotheses and find out how the variables were related were multiple binary logistic regression analysis and Pearson correlation.

For this reason, the study utilized a binary logistic regression model to predict how the independent factors affected the dependent variable, which displays two potential outcome categories. Either a combination of continuous and categorical types for the independent variables or a categorical type for the dependent variables makes the proposed model operate. This binary dependent variable does not lend itself to the conventional approach to regression analysis that seeks to minimize the error surrounding the line of best fit. The condition of least squares deviation should be used instead. Logistic regression is a statistical method that employs binomial probability theory. The primary aim of this method is to make predictions regarding the probability (p) of an event or individual belonging to one group rather than the other, with p being equal to 1 instead of 0. Logistic regression is a statistical methodology that utilizes the maximum likelihood approach to develop a model that optimally aligns with the given dataset. The objective of this approach is

to optimize the likelihood of correctly categorizing the observed data based on the regression coefficients.

Like traditional regression, logistic regression utilizes the estimation of a coefficient ' β ' to quantify the individual impact of each independent variable on the predictor variable's variability. Finding the shortest model that can accurately predict the outcome category for specific circumstances is the goal. The development of an all-encompassing model that incorporates all relevant predictor variables for the response variable is essential to accomplishing this goal. The researcher may choose to input variables into the model in a stepwise fashion, akin to regression analysis, if deemed appropriate. Logistic regression is utilized for two principal objectives: One of the main goals is to predict the categorization of individuals into distinct groups. The probability of success relative to the probability of failure can be estimated using logistic regression, a statistical technique. Therefore, an odds ratio is used to display the analysis's results.

3.7.5 Assumptions of Logistic Regression

The model was built with a few basic assumptions in mind. Logistic regression does not require a linear relationship between the dependent and independent variables, which is worth mentioning first. Also, the answer variable can't have more than two possible values; otherwise, the result was binary. Additionally, it is not necessary for the predictor variables to be interval variables, adhere to a normal distribution, demonstrate linear relationships, or possess equal variances within each group. In addition, it is imperative that the categories or groups exhibit mutual exclusivity and exhaustiveness. This implies that each case can only be assigned to a single group, and every case must be encompassed by one of the groups. In conclusion, it is necessary to have larger sample sizes in comparison to linear regression, as the estimates of maximum likelihood coefficients are based on extensive samples. It is advisable to ensure a minimum of 50 cases per predictor.

3.7.6 Model Explanation

It is not possible to create a linear regression line of optimal fit using binary logistic regression since there are only two possible predictor variables for Y: being in the category or not. It differs from linear regression in that it does not attempt to predict a single value for Y. Instead, it yields a probability indicating the likelihood of an observation belonging to one of two categories of Y (commercialized or not commercialized). This probability can assume any value between 0 and 1, as opposed to being restricted to only 0 or 1. Additional mathematical manipulation of a logarithmic transformation is necessary in order to achieve normalization of the distribution. The application of a logarithmic transformation to the p-values results in a distribution that aligns with the normal regression equation, facilitating the establishment of a connection between the two. There are a few different names for the log distribution: logit (p), the logistic transformation of p, and the logit of p. The logit function, or $\text{logit}(p)$, is a way to express the odds ratio or likelihood ratio linked to the dependent variable being equal to 1 as a natural logarithm (base e). Consequently, the logarithm of the odds was provided as;

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K = \sum_{j=0}^K \beta_{kj} X_{kj}$$

The response probability are then uniquely determined and thus their summation is equal to 1.

$$P(Y = 1/X_i), P(Y = 2/X_i), \dots, P(Y = j/X_i)$$

Where $j=0, 1, 2, 3$ and where $i=1, 2, 3 \dots n$

$$\sum_{j=1}^K P(Y = j/X_i) = 1$$

While the range of p is limited to values between 0 and 1, the following formula demonstrates the connection between the conventional regression equation ($\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$), which represents a linear relationship, and the logistic regression equation.

The form of the logistic regression equation was:

$$\log[p(x)] = \log\left(\frac{P(x)}{1-P(x)}\right) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4$$

The model exhibits similarities to linear regression; however, logistic regression differs in its underlying principles despite both methods seeking to identify the most optimal equation for fitting the data. Instead of employing a criterion based on least-squared deviations to determine the optimal fit, this approach utilizes a maximum likelihood method. This method seeks to maximize the probability of obtaining the observed results, given the regression coefficients that have been fitted. This finding suggests that logistic regression uses different criteria than linear regression to evaluate overall significance and goodness of fit. Logistic slope coefficients are understood in terms of how a one-unit change in X affects the predicted logit, with all other model variables maintained at their original levels. Here we examine how changing just one variable X affects the logarithm of the probabilities, with all other model variables maintained constant. If the variable in question is dichotomous, then the odds of belonging to the target group can be calculated by dividing the target group's probability by the alternative group's probability. Therefore, the logarithm of the odds were presented as;

$$\log\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_1Z + \beta_6X_2Z + \beta_7X_3Z + \beta_8X_4Z$$

If the moderation coefficients β_5 , β_6 , β_7 and β_8 are found to be statistically significant, it can be inferred that the association between the independent variables X_1, X_2, X_3, X_4 and the probability of Y being equal to 1 is influenced by the interaction effects of all these independent variables with the variable Z. The fact that Z could be either a binary or a continuous variable should also be noted. The $2 \times 2 \times 2$ contingency table analysis is what the analysis amounts to when X1 and Z

are both binary variables. The evaluation of the interaction can be performed by employing either the Wald chi-squared test or a likelihood ratio test, both of which compare models that incorporate and exclude the interaction term. Allison (2014) has posited that, within the particular context being examined, the Wald test demonstrates superior efficacy in comparison to the likelihood ratio test.

To improve the understanding of the lower-order effects, β_1 and β_2 , which are occasionally called main effects, it is suggested to rescale the predictors several times during this process (Aiken & West, 1991). The process of generating deviation scores entails subtracting the mean from the original value of each predictor. By employing these new variables in the model, multicollinearity among the predictors is mitigated prior to calculating the interaction term. There is no effect on the significance and interaction coefficient of the rescaling of variables. The elimination of non-essential multicollinearity, however, raises the standard errors of the primary effects.

The model with interaction effect is given as;

$$\log[p] = \log\left(\frac{p}{1-p}\right) = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_1 Z + \beta_6 X_2 Z + \beta_7 X_3 Z + \beta_8 X_4 Z$$

Then;

Y = Commercialization of Livestock Farming (commercialized/Not commercialized)

B_0 is the y-intercept or model coefficient;

$\beta_1 - \beta_4$ are the coefficients of the predictor variables;

$\beta_5 - \beta_8$ are the coefficients of the predictor variables with the interaction (moderation) effect;

X_1 = Entrepreneur Skill Acquisition

X_2 = Market Orientation Knowledge

X_3 = Risk Management Knowledge

X_4 = Environment Awareness Knowledge

Z= is the moderator variable - Regulatory Framework

β_0 is the commercialization of livestock farming when independent variables are zero

$\beta_1 \dots 4$ is the Regression coefficient of independent variables

3.11.2 Qualitative Data Analysis

Thematic and content analysis were used to examine the qualitative data gathered from the open-ended questions in the study. All the responses were reviewed to establish recurring themes which were presented in narration forms.

3.12 Research Ethical Issues

To make sure the study follows all the rules of scientific research, the researcher did a number of things. Before giving out any questionnaires, the researcher made sure to get participants' informed consent and kept their information private throughout the study. In addition, there was zero tolerance for prejudice against the participants. The questionnaire was designed to gather information pertinent to the study; respondents were not asked any sensitive personal questions. In addition, the researcher was required to keep all information strictly confidential and to disclose any necessary details accurately, while also using them exclusively for academic purposes.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1 Introduction

This section presents the research findings and related debates. Research in this area was carried out in Narok County with the aim of ascertaining the impact of entrepreneurial competences on the commercialization of cattle husbandry. The goals of the research were to determine how entrepreneurs' knowledge of risk management, market orientation, and environmental awareness impacted the commercialization of livestock farming in Narok County, as well as to evaluate the effects of entrepreneurs' knowledge of these factors on commercialization. The commercialization of livestock production in Narok County was another target of the study, as was the moderating effect of the county's livestock subsector government policy. Following is an outline of the content covered in this chapter: response rate, respondent demographics, descriptive statistics for each research variable, and finally, inferential statistics.

4.2 Response Rate

The study collected data from 384 households involved in livestock farming in Narok County who were the respondents of the study. Findings on the response rate are as presented in table 3.

Table 4.3

Response Rate

Response Rate	Frequency	Percent (%)
Forms That Were Returned	288	0.75
Forms Not Returned	96	0.25
Total	384	100

Source: Survey Data (2022)

Out of the 384 (three hundred and eighty-four) respondents who were sampled, 288 (two hundred eighty-eight) responded to the questionnaires. Based on the findings of Mugenda and Mugenda

(2003), the response rate achieved was 75%, a level deemed adequate for conducting data analysis and interpreting the results. Saunders et al. (2007) proposed that a minimum response rate of 50% is recommended for conducting statistical analysis. Additionally, it has been suggested that a response rate of at least 50% be considered enough for analysis as well as publication (Babbie 2004). The 75% was appropriate for carrying out data analysis and draw any conclusions regarding the study objectives, according to the recommendations of aforementioned scholars.

4.3 Pilot Study Result

The data collection tool's dependability was ensured via a preliminary survey. The study's reliability of the scale used to measure the study variables was tested using Cronbach's Alpha. The results are shown in the Tables below.

4.3.1 Reliability statistics of Study Variables

The first variable for the study was entrepreneurial skill. This variable was measured using 5 indicators as shown in Table 4. The results of the reliability statistics as shown below.

Table 4.4

Reliability statistics of Entrepreneurial Skill

Variable	Reliability Statistics		
	Cronbach's Alpha	N of Items	Remarks
Entrepreneurial Skill	0.887	5	scale is reliable

The Cronbach's Alpha for entrepreneurial skill was 0.887, which was above the threshold of 0.70 adopted in this research. Therefore, the scale used to measure entrepreneurial skill was reliable; hence, there was no need for modification of the construct used to measure entrepreneurial skill. Table 5 shows Cronbach Alpha of individual items used for this variable.

The second independent variable was market orientation knowledge, which was measured using 5 constructs. Tables 5 show the reliability statistics.

Table 4.5

Reliability Statistics of Market Orientation Knowledge

Reliability Statistics			
Variable	Cronbach's Alpha	N of Items	Remarks
Market Orientation Knowledge	0.822	5	scale was reliable

The Cronbach's Alpha for market orientation knowledge was 0.822, which was above the threshold of 0.70 adopted in this research. Therefore, the scale used to measure market orientation knowledge was reliable; hence there was no need for modification of the construct used to measure market orientation knowledge.

The third independent variable for the study was risk management knowledge, which was measured using 5 constructs. The results for reliability statistics are shown in Table 7 below

Table 4.7

Reliability Statistics of Risk Management Knowledge

Reliability Statistics			
Variable	Cronbach's Alpha	N of Items	Remark
Risk Management Knowledge	0.901	6	Scale reliable

The Cronbach's Alpha for risk management knowledge was 0.901, which was above the threshold of 0.70 adopted in this research. Therefore, the scale used to measure risk management knowledge was reliable; hence there was no need for modification of the construct used to measure risk management knowledge.

The Cronbach's Alpha for environmental awareness knowledge was 0.742, which was above the threshold of 0.70 adopted in this research. Therefore, the scale used to measure environmental awareness knowledge was reliable; hence, there was no need for modification of the construct used to measure environmental awareness knowledge.

Table 4.6

Reliability Statistics of Environmental Awareness Knowledge

Reliability Statistics			
Variable	Cronbach's Alpha	No. of Items	Remark
Environmental Awareness Knowledge	0.742	5	Scale Reliable

The Cronbach's Alpha for the government strategy was 0.936, which was above the threshold of 0.70 adopted in this research. Therefore, the scale used to measure government strategy was reliable; hence, there was no need for modification of the construct used to measure government strategy.

Table 4.8

Reliability Statistics of Government Strategy

Reliability Statistics			
Variable	Cronbach's Alpha	N of Items	Remark
Government Strategy	0.936	5	Scale was Reliable

4.3.2 Validity Test Results

The validity measured by this study includes both content and construct validity. The study used qualitative tests to ensure that validity was achieved. First, the indicator adopted in the data collection tool was based on measures used by other scholars identified through analysis of existing literature. Explanatory factor analysis was used to determine construct validity. The

results in Table 11 show that factor loadings for all the indicators used in the data collection tool were above the threshold of 0.40 hence the construct validity for the data collection tool was achieved.

Table 4.9

Summary of the Validity Results

Variables	Factor Loadings Range	No. of Items
Entrepreneurial Skill	0.507 -0.841	5
Market Orientation Knowledge	0.695-0.893	5
Risk Management Knowledge	0.597-0.784	6
Environmental Awareness Knowledge	0.549-0.786	5
Government Strategy	0.721-0.866	5

Extraction Method: Principal Component Analysis.

Entrepreneurial skill, market orientation knowledge, risk management knowledge, environmental awareness knowledge, and government strategy all had high Cronbach's alpha values, according to the results of the pilot test. The other four categories had lower values. These findings demonstrated the reliability of the variable measurement scale and supported the validity of the data obtained, thereby approving the tool for use in real data collecting. We did not need to make any changes to the data collection tool.

4.4 Demographics Data of the Respondents

An analysis of the participants' unique characteristics was the driving force for this research. Presenting the results of the participants' demographics follows. Respondents' gender, age, education level, family size, farming method, and types of animals kept were the main variables in this study. The findings are laid out in tabular form and analyzed in the parts that follow.

4.4.1 Respondent Gender

The study established the gender composition of the respondents. The results are presented in Table 12.

Table 4.10

Gender of the Respondents

Gender	Frequency	Percent
Male	216	75
Female	72	25
Total	288	100

Source: Survey Data (2022)

Table 12 findings regarding the gender of the respondents indicate that males made up the bulk of research participants (75%), while females made up 25%. This indicates a comparatively substantial gender gap among households engaged in livestock farming in Narok County. According to FAO (2018) report women make significant contributions to the agricultural economy, but they are faced with a number of obstacles that prevent them from producing and commercializing livestock to their full potential. However, the findings also suggest that the study's sample was fairly gender-representative.

4.4.2 Respondent Age

The study also established the age bracket of the participants of the study. Findings are shown in table 13.

Table 4.11

Age Brackets of the Respondents

Age bracket	Frequency	Percent
Under twenty-five years	16	5.6
Years of 25–35	24	8.3

Years of 36–46	105	36.5
47–57 years old	76	26.4
More than fifty-seven years	67	23.3
Total	288	100

Source: Survey Data (2022)

The majority of the sample, accounting for 36.5%, fell within the age range of 36 to 46 years. This was followed by 26.4% of participants who were aged between 47 and 57 years. Additionally, 23.3% of the participants were found to be above the age of 57 years. Participants in the study were all under the age of 50, making up a small fraction of the overall sample (13.9%). The findings suggest that a significant proportion of livestock farmers in Narok County are above the age of 35.

4.4.3 Respondent Highest Level of Education

The highest level of education of the participants of the study was further established. Table 14 below presents the results.

Table 4.12

Highest Level of Education of the Respondents

Highest Level of Education	Frequency	Percent
No formal education	89	30.9
Primary education	113	39.2
Secondary Education	70	24.3
Tertiary level of education	16	5.6
Total	288	100

Source: Survey Data (2022)

According to the study's findings regarding respondents' education levels, table 14 reveals that the majority of respondents, 39.2, had only acquired a primary education. This was followed by

respondents with no formal education (30.9%), secondary education (24.3%), and tertiary education (5.6%). According to the findings, the majority of households in Narok County that are engaged in livestock farming have little formal education, which presents a substantial obstacle to the commercialization of livestock farming, as noted by Mbatha (2021).

4.4.4 Respondent Household Size

The study also established the family size of the respondents and the results are presented in table 15.

Table 4.13

Family Size of the Respondents

Family Size	Frequency	Percent
Below three individuals	45	15.6
Four to six individuals	53	18.4
Seven to nine individuals	70	24.3
Above 9 individuals	120	41.7
Total	288	100

Source: Survey Data (2022)

Table 15 data show that 41.7 percent of respondents indicated their family consisted of more than nine people, followed by 24.3 percent who stated that their family consisted of between seven and nine people, and 18.4 percent who said their family consisted of between four and six persons. Only 15.6% of the respondents indicated their families consisted of no more than 3 persons. This demonstrates that the majority of households in Narok County that raise livestock have fairly large families with more than six members. Family size has a considerable impact on livestock production, according to Boru et al. (2015).

4.4.5 Type of Farming

There are three types of farming: crop production, livestock farming and mixed farming which combines the first two. This study therefore sought to find out the category of farming that households in Narok County preferred. The findings are presented in table 16.

Table 4.14

Type of Farming

Type of Farming	Frequency	Percent
Livestock farming only	186	64.6
Livestock +Crop Farming	102	35.4
Total	288	100

Source: Survey Data (2022)

Table 16 shows that majority of households in Narok county, 64.6 percent practice livestock farming only as opposed to 35.4 percent who practice livestock and crop farming. Narok County is predominantly occupied by pastoral communities (mostly Maasai ethnic group) whose major economic activity is livestock farming although crop production is also practiced but to a small scale (Dabasso et al.,2021).

4.4.6 Category of Animals

The study finally sought to establish the type of animals kept by households in Narok County and the results are presented in table 17.

Table 4.15

Category of Animals

Category of Animals	Frequency	Percent
Large animals	76	26.4
Small animals or Poultry animals	107	37.2
Both categories	105	36.5

Total	288	100
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Source: Survey Data (2022)

The findings in table 17 show that the largest proportion of households in Narok County involved in livestock farming, 37.2 percent, keep small animals or poultry animals, 36.5 percent keep both large and small animals while 26.4 percent prefer production of large animals. Cattle make up the majority of large animals, while sheep and goats are examples of small animals. Pastoralism is practiced in a variety of terrain and habitats throughout Narok County, which is reflected in the variety of pastoral breeds.

4.5 Descriptive Statistics for Study Variables

The descriptive statistics for the individual variables are summarized in this section. Participants were requested to rate each of the variables that were part of the study. The study used central tendency and dispersion measurements, namely the mean and standard deviation, to summarize the results for each tested variable.

4.5.1 Entrepreneurial Skills

The purpose of the study was to determine how entrepreneurial skills influenced commercialization of livestock. As a result, respondents were asked to rate how much they agreed or disagreed with various statements about entrepreneurial skills on a scale from 1 to 5. To analyse the responses, the study used mean and standard deviation. Table 18 presents the findings.

Table 4.16

Descriptive Statistics for Entrepreneurial Skills

Statements	SD	D	N	A	SA	Mean	Std Dev
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I have high skills rewarding decisions in my livestock farming	38.5%	50.3%	5.6%	0.0%	5.6%	1.84	0.96
I have skills to develop business plan for my farming business	41.0%	47.9%	5.6%	0.0%	5.6%	1.81	0.97
I effectively manage finances for my farming activities	38.2%	42.4%	8.3%	5.6%	5.6%	1.98	1.09
I frequently attend programs/training where we are taught entrepreneurship	38.2%	45.1%	0.0%	8.3%	8.3%	2.03	1.21
I have entrepreneurial skills that enable me to effectively manage my livestock farming	51.7%	39.9%	5.6%	2.8%	0.0%	1.59	0.72
Aggregate score						1.85	0.99

Source: Survey Data (2022)

Table 18 shows that when asked if they made judgments involving livestock husbandry that rewarded their talents, most respondents (50.3% disagreed, 38.5% strongly disagreed, and 5.6% agreed) fell into the "no" category. With a mean score of 1.84, it was clear that most people thought the statement was wrong. The biggest percentage of the sample, 47.9%, with a mean value of 1.81, disagreed with another statement that aimed to establish if the study participants had the ability to construct a business plan for a farming enterprise. Standard deviation of 0.97 shows that the responses were fairly close to the mean. On whether respondents effectively manage finances for farming activities, the largest proportion represented by 42.4 percent disagreed while a further 38.2 strongly disagreed and only 5.6 percent agreed or strongly agreed. A standard deviation of 1.09 shows that the responses were relatively largely spread from the mean value. The next statement sought to find out whether respondents frequently attend programs/training where they are taught entrepreneurship. On this statement, 45.1 percent who represented the largest fraction

disagreed while 38.2 percent strongly disagreed. A mean of 2.03 also shows that majority of respondents disagreed that respondents frequently attend programs/training where they are taught entrepreneurship. The last statement sought to establish whether respondents had entrepreneurial skills that enable them to effectively manage livestock farming whereby majority, 51.7 percent and mean value of 1.59 strongly disagreed. An aggregate score of 1.85 shows that majority of respondents strongly disagreed with statements regarding entrepreneurial skills which implies that majority of households in Narok county involved in livestock farming have limited entrepreneurial skills.

Some of the entrepreneurial skills mentioned by the respondent that assisted them to turn their farming operations into profitable business ventures include; Business Planning and Financial Management: Developing a solid business plan was mentioned as crucial for any entrepreneur. Successful livestock farmers have well-defined objectives, targets, and plans to increase their bottom line. Additionally, understanding financial management principles, such as budgeting, cash flow management, and cost analysis, helped farmers make informed decisions about resource allocation and investment opportunities.

The farmer mentioned that they conducted market research to identify target markets, consumer preferences, and competitive dynamics. This knowledge allowed them to develop differentiated products or services, position their offerings effectively, and create marketing campaigns that resonate with their target audience. Adoption of Innovation and Adaptability: The livestock farmers mentioned that they were constantly evolving, and entrepreneurs needed to be innovative and adaptable to stay ahead. This involved staying updated on technological advancements, industry trends, and changing consumer demands. By embracing innovation and adapting their

practices, farmers can improve productivity, introduce new products, and seize emerging opportunities.

The farmer further mentioned managing risks as crucial in the unpredictable world of livestock farming. Entrepreneurs needed to identify and assess potential risks, such as disease outbreaks, volatile market conditions, or adverse weather events, and develop strategies to mitigate these risks. This included diversifying their product offerings, implementing appropriate insurance coverage, and establishing contingency plans. Finally, the farmer mentioned that networking and relationship building with industry stakeholders, such as suppliers, buyers, and fellow farmers, was advantageous. Collaborations and partnerships led to shared resources, knowledge exchange, and access to new markets. Additionally, being an active participant in industry associations and events can provide valuable networking opportunities and industry insights.

The results corroborated those of Ndlovu (2019), who also discovered that rural farmers are still embracing antiquated methods of livestock management, as the majority of livestock producers use coping mechanisms that are susceptible to moisture. This research lends credence to the findings of Abdullah et al. (2018), who found that entrepreneurial spirit was a key factor in Pakistan's thriving marble manufacturing sector. This implies that entrepreneur skills affect the production, distribution and marketing of goods and services which is commercialization. The researchers concluded that resilience skills got high influenced on the other entrepreneur skills. Similarly, this study supported Bercu et al. (2020) results that showed that effective models for entrepreneurial education enhances the attitudes and behaviors of entrepreneurship students and this positively impact their social benefit of job-related activities. Additionally, their engagement in business-related pursuits is influenced by what they learn about entrepreneurship in higher

education. This suggests that schools that focus on entrepreneurship can affect how products are made and where they are sold.

The present study corroborates the findings of Mortonb et al. (2018), which indicated that individuals from China exhibited a strong belief in their capacity to enhance animal welfare. Moreover, it was observed that veterinarians displayed greater confidence in this regard compared to livestock team leaders. The participants in the study exhibited divergent levels of intentions and confidences regarding animal welfare. They attributed these attitudes to a range of factors, including workplace behavior, differing organizational priorities, and their own limited understanding of the subject matter.

Stalgiene et al. (2018) found that dairy farmers in the nations they questioned are very production oriented. Their chosen strategies for the next five years include increasing dairy production and specializing their farms even further. The research findings indicated that farmers with higher levels of competence exhibited greater receptiveness to change, displayed a higher degree of optimism regarding their future prospects, managed larger agricultural holdings, and reported higher levels of satisfaction with their household incomes and farm outcomes. According to Chandio et al. (2018) research, it was discovered that livestock entrepreneurs encounter challenges in maintaining an effective financial record-keeping system. A limited number of dairy livestock farmers maintain documentation of their dairy farms, exhibit a deficiency in the adoption of contemporary dairy techniques in livestock management, and encounter challenges in devising effective milk marketing strategies. The region experiences a dearth of veterinary services and encounters limited access to loan facilities provided by banking institutions for the purpose of investment.

4.5.2 Market Orientation Knowledge

The second objective of the study was to evaluate the influence of market orientation knowledge on commercialization of livestock farming in Narok County, Kenya. Firstly, the study sought to find out whether participants had knowledge on how livestock prices are determined in the market. As shown in figure 2, majority of them, 76 percent indicated no while only 24 percent indicated yes. This shows that majority of households involved in livestock farming in Narok County do not have knowledge on how livestock prices are determined in the market.

Figure 4.2

Respondent's Knowledge on Livestock Prices



The study also sought to find out how respondents priced their livestock in the market. As depicted in figure 3, majority of respondents (Frequency=211) indicated that they price livestock based on market forces of demand and supply while 77 indicated that they based their livestock prices on government regulations in the market.

Figure 4.3

Mode Used in Pricing Livestock

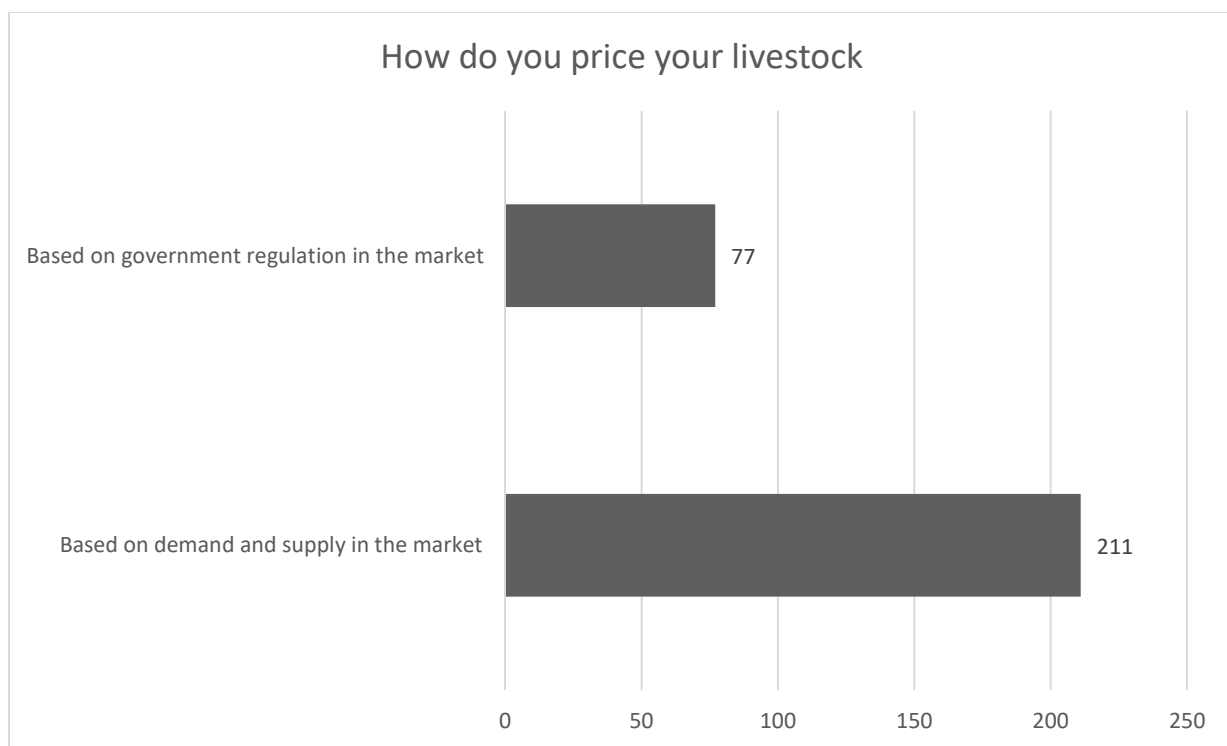


Figure 4 shows that the majority of respondents (71 percent) disagreed with the study's stated goal of determining whether market pricing are beneficial. This shows that majority of households

involved in livestock production in Narok County do not consider the prices of livestock offered in the markets near them to be favorable.

Figure 4.4

Whether Livestock Prices Offered in the Local market were favorable to farmers



Further, respondents were required to indicate the level of agreement with various statements about market orientation knowledge on a scale from 1 to 5. Table 22 presents the findings.

Table 4.17*Descriptive Statistics for Market Orientation Knowledge*

Statements	SD	D	N	A	SA	Mean	Std Dev
I am aware of all the needs of consumers of livestock products	0.0%	2.4%	5.2%	60.8%	31.6%	4.22	0.65
I am aware of all the products livestock farmers can derive from the farming activities	0.0%	2.4%	2.4%	60.1%	35.1%	4.28	0.63
I have adequate market information on livestock and all the products associated with livestock farming	0.0%	8.0%	10.8%	57.6%	23.6%	3.97	0.82
I frequently access information on livestock market such as prices, demand and market preferences	2.8%	8.0%	8.0%	49.0%	32.3%	4.00	0.99
I am aware of the market opportunities in livestock farming	0.0%	5.2%	5.2%	58.3%	31.2%	4.16	0.74
Aggregate score						4.12	0.76

Source: Survey Data (2022)

Presented in table 19 above, findings show that majority of respondents, 60.8 percent and mean 4.22, agreed that they are aware of all the needs of consumers of livestock products while a further 31.6 percent strongly agreed. Only 2.4 percent of the respondents failed to agree to the claim that they are aware of all the needs of consumers of livestock products. Responses were generally concentrated around the mean as depicted by a low standard deviation of 0.65. The next statement

sought to determine whether respondents were aware of all the products livestock farmers can derive from the farming activities whereby a mean of 4.28 shows that majority of respondents, 60.1 percent, agreed as 35.1 percent strongly agreed and only 2.4 percent disagreed. A standard deviation of 0.63 also indicates low spread of individual responses from the mean value.

Similarly, majority of respondents, 57.6 percent and mean of 3.97 agreed that they have adequate market information on livestock and all the products associated with livestock farming while 8 percent disagreed. With regard to the statement that households frequently access information on livestock market such as prices, demand and market preferences, the largest proportion of respondents, 49 percent, agreed while 32.3 percent strongly agreed. This is confirmed by a mean of 4 denoting that majority agreed to the above claim. Generally, responses were clustered around the mean, as seen by the low std of 0.99. On whether respondents were aware of the market opportunities in livestock farming, majority of them represented by 58.3 percent and mean 4.16 agreed while a further 31.2 percent strongly agreed. The findings in this section generally imply that respondents agreed to possessing market orientation knowledge as shown by a mean of 4.12.

The study further sought to find out how managing risks was essential for livestock farmers to improve the commercialization of their ventures. Some of the strategies mentioned by farmer include; Livestock farmers conducted assessment of potential risks and identify the specific risks that could impact their business. This included analyzing factors such as weather events, disease outbreaks, market volatility, and financial risks. By identifying and understanding the risks, farmers developed appropriate strategies to mitigate them. They further mentioned diversifying the product portfolio or revenue streams to assist farmers spread the risks associated with market fluctuations or unexpected events. For example, farmers considered diversifying their livestock

breeds, expanding into niche markets, or exploring value-added products such as processed meats or specialty dairy products. Diversification provided stability and reduced the reliance on a single product or market. Some mentioned they had protected themselves against certain risks by obtaining insurance coverage tailored to their specific needs. Insurance policies assisted them to mitigate losses due to natural disasters, disease outbreaks, or other unforeseen events. Livestock farmers should work with insurance professionals who understand the industry and can provide comprehensive coverage options.

This finding is consistent with the results of Alhakimi and Mahmoud (2020) which showed that knowledge of market orientation and customer orientation positively influence innovativeness which boosts commercialization of farm products. Ghahroudi et al. (2019) also discovered a positive correlation between a focus on knowledge management and financial success for companies. The study finding supported the finding of Na et al. (2019) that found that consumer orientation, product innovation, communication innovation and market information generation significantly influence competitive advantage and this positively affects business performance. The study concluded that for product development entrepreneurs should give preference to customer orientation. That is, to primarily consider customer demands before goods and services are produced. The influence of consumer demand in market orientation enhances commercialization of the goods and services produced.

4.5.3 Entrepreneur Risk Management Knowledge

The third objective was to determine how entrepreneurial risk management knowledge influenced commercialization of livestock farming in Narok County. As a result, respondents were asked to rate how much they agreed or disagreed with various statements on this variable. Table 23 shows the findings.

Table 4.18*Descriptive Statistics for Entrepreneur Risk Management Knowledge*

Statements	SD	D	N	A	SA	Mean	Std Dev
I am aware of all the risk threats facing livestock farming within my region	41.7%	36.5%	10.8%	2.8%	8.3%	2.00	1.18
Climate change and its effects on my cattle husbandry are well-understood.	47.6%	44.1%	2.8%	2.8%	2.8%	1.69	0.88
To lessen the blow that a water scarcity could deal to my cattle, I have plans.	35.1%	51.7%	2.8%	5.6%	4.9%	1.93	1.02
Because of my preparations, my cattle will be less negatively affected by the current scarcity of grazing space.	47.9%	44.1%	0.0%	8.0%	0.0%	1.68	0.84
I have adequate knowledge to handle all the uncertainties livestock farming face	42.7%	43.8%	5.2%	2.8%	5.6%	1.85	1.03
I have knowledge on how to identify and mitigate risk livestock farmers face	43.1%	51.4%	0.0%	2.8%	2.8%	1.71	0.84
Aggregate score						1.81	0.96

Source: Survey Data (2022)

The findings of the study which are covered in table 20 reveal that the largest proportion of respondents, 41.7 percent and mean 2 strongly disagreed that they are aware of all the risk threats facing livestock farming within my region. However, 8.3 percent strongly agreed while 2.8 agreed with the above statement. The responses provided did not significantly cluster around the mean as confirmed by a standard deviation of 1.18. The next statement sought to find out whether respondents had adequate knowledge on the impact of climate change on livestock farming whereby the largest percentage, 47.6 and mean 1.69, strongly disagreed as 44.1 percent disagreed

while 2.8 percent agreed or strongly agreed. A std value of 0.88 shows low variation of responses from the mean. Another statement established whether respondents had strategies to mitigate the impact of water shortage on livestock. In this regard, majority of respondents, 51.7 percent and mean 1.93, disagreed while a further 35.1 percent strongly disagreed. In a similar manner, the largest proportion of respondents, mean 1.68 and 1.85 respectively strongly disagreed that they had strategies to mitigate the impact of grazing land shortage on livestock and that they have adequate knowledge to handle all the uncertainties livestock farming faces. With regard to statement that participants had knowledge on how to identify and mitigate risk livestock farmers face, majority of respondents, 51.4 percent and mean of 1.71 disagreed while 2.8 percent either agreed or strongly agreed to the above statement. A mean of 1.81 generally shows that majority of respondents strongly disagreed to various statements which suggested that they have entrepreneurial risk management knowledge.

These finding are consistent with the results of study by Yang et al. (2018) which showed that making use of risk management positively affects competitive advantage and performance. Moreover, the results fail to mirror the findings of Hanggraeni et al. (2019) who found that performance of the business operations depends on risks identified and properly managed from both internal and external factors. The study finding supported the finding of Slovak, Strelcova et al. (2018) who concluded that that 25% pay very little attention to risk management activities and of the remaining 75%, at most 24% dealt with all risk management variables to strongly protect their firms. Research by Chand et al. (2018) investigated the root of risks and strategies to manage them in livestock farming and production of animal products in India and found that the sources of animal agriculture risks were marketing and customers' orientations, institutional policy, the animal health and breeding. They pointed that this risk could be managed using consultation,

seeking veterinary services, engaging in forward contracts for sale of animals and their products and seeking short- and long-term finances from financial institutions.

4.5.4 Entrepreneur Environment Awareness Knowledge

The study also sought to determine the influence of entrepreneurial environment awareness knowledge on livestock commercialization of livestock. Table 21 below shows the descriptive results.

Table 4.19

Descriptive Statistics for Entrepreneur Environment Awareness Knowledge

Statements	SD	D	N	A	SA	Mean	Std Dev
I have adequate skills and knowledge in managing waste and keeping my environment favorable for livestock farming	36.5%	28.8%	8.3%	26.4%	0.0%	2.25	1.20
I am aware on how to manage animal diseases to improve the quality of my livestock	30.6%	37.5%	0.0%	29.2%	2.8%	2.36	1.26
I am enlightened on how to manage grazing field	26.4%	27.4%	27.8%	15.6%	2.8%	2.41	1.12
I always scout for modern agribusinesses skills to improve my livestock farming	28.8%	36.1%	13.9%	15.6%	5.6%	2.33	1.20
I always scan my environment for latest technologies to improve my livestock farming	38.9%	34.4%	13.9%	12.8%	0.0%	2.01	1.02
Aggregate score						2.27	1.16

Source: Survey Data (2022)

The results of the study as depicted in table 21 reveal that the largest proportion of respondents, 36.5 percent strongly disagreed that they have adequate skills and knowledge in managing waste and keeping my environment favorable for livestock farming, mean value 2.25. Similarly, 37.5 percent and mean 2.36 disagreed that they are aware on how to manage animal diseases to improve the quality of livestock, 27.4 percent disagreed that they are enlightened on how to manage grazing field with a mean of 2.41. With regard to statement that participants always scout for modern agribusinesses skills to improve my livestock farming, 28.8 percent strongly disagreed, 36.1 percent disagreed while 15.6 percent agreed. The statement in question was strongly disagreed with by the majority of responders, as seen by the mean score of 2.33. Similarly, 34.4% of respondents disagreed and 12.8% agreed that they constantly monitor their surroundings for new technology to enhance cattle production, with 38.9% strongly disagreeing. While a std of 1.02 indicates little difference from the mean value, a mean of 2.01 suggests that most respondents disagree that they constantly examine their environment for current innovations to better cattle farming.

The study further sought to find out how environmental awareness enable farmer to boost livestock farming: The farmer mentioned the following; Sustainable Resource Management: Environmental awareness knowledge assisted the farmers understand the importance of sustainable resource management. This included efficient use of water, energy, and land resources. By adopting sustainable practices, such as implementing water conservation techniques, utilizing renewable energy sources, and practicing responsible land management, farmers can reduce their environmental impact and optimize resource efficiency.

Livestock farmers noted that their environmental awareness enable them to recognize the importance of biodiversity conservation. They understood that a diverse and balanced ecosystem is essential for long-term sustainability. By implementing practices that protect and enhance biodiversity, such as preserving natural habitats, planting native vegetation, and creating wildlife-friendly areas, farmers can contribute to the preservation of local ecosystems.

Further they mentioned that environmental awareness knowledge emphasized the importance of soil health and conservation. Livestock farmers adopted practices like rotational grazing, cover cropping, and composting to improve soil fertility, prevent erosion, and reduce the need for synthetic fertilizers and pesticides. Healthy soils provide better nutrition for livestock and support sustainable agricultural production.

Environmental awareness knowledge enabled farmers to implement effective waste management and recycling systems. Livestock farming generates organic waste such as manure, which, if not managed properly, can have negative environmental impacts. Farmers can implement strategies such as composting, anaerobic digestion, or innovative waste treatment technologies to convert waste into valuable resources like organic fertilizers or renewable energy. Being environmentally aware allowed farmers to minimize environmental pollution associated with livestock farming. Farmers can implement best practices to mitigate air and water pollution. For example, adopting proper manure management techniques, implementing runoff control measures, and utilizing advanced waste treatment systems can help minimize the release of pollutants into the environment.

Environmental awareness knowledge ensured that farmers stay informed about relevant environmental regulations and comply with them. This includes adhering to legal requirements

regarding waste management, water usage, air emissions, and conservation practices. Compliance with environmental regulations helps farmers maintain good standing within their communities and minimizes the risk of penalties or legal issues. Growing consumer demand for sustainably produced agricultural products provides market opportunities for environmentally aware livestock farmers. Consumers are increasingly seeking products that are produced in an environmentally responsible and ethical manner. By embracing sustainable farming practices and transparently communicating their environmental stewardship, farmers can differentiate their products and appeal to this growing market segment. Last but not least, the respondents' environmental awareness knowledge allowed cattle farmers to take advantage of market opportunities, safeguard natural resources, and implement sustainable practices. By incorporating environmental considerations into their farming practices, farmers can enhance the long-term viability and profitability of their livestock farming ventures while contributing to a more sustainable and resilient agricultural sector.

The findings of this study are in line with those of Naminse and Zhuang (2018), who also discovered that the most important factor in the development of farmer entrepreneurship is socio-cultural capacity. The effect of the expansion of farmer entrepreneurship on rural poverty exhibits a greater emphasis on qualitative aspects, in contrast to the impact of attitudes towards this growth. The current investigation provides support for the conclusions drawn by Kebebe (2019), who established that the inadequate or nonexistent operation of innovation systems, encompassing the dissemination of knowledge, entrepreneurial capabilities, market expansion, and policy promotion, plays a role in the restricted uptake of advanced technologies in the livestock sector. The study conducted by Chandio et al. (2018) focused on an empirical examination of the expansion of the livestock population and the implementation of dairy farming in the Sindh region

of Pakistan. The findings of the research suggest that individuals involved in livestock entrepreneurship face difficulties in establishing and maintaining an efficient system for financial record-keeping.

4.5.5 Government Strategy

The moderating influence of government strategy of livestock subsector on commercialization of livestock farming in Narok County was the purpose of this study. Presented in table 22 are descriptive findings on the moderating variable using mean and standard deviation.

Table 4.20*Descriptive Statistics for Government Strategy*

Statements	SD	D	N	A	SA	Mean	Std Dev
I have attended various government training on value creation and addition in livestock farming	44.1%	31.2%	8.3%	8.3%	8.0%	2.05	1.26
The government conduct entrepreneurship training where livestock farmers from this region acquire skills to enhance their livestock farming	33.3%	44.4%	8.3%	8.3%	5.6%	2.08	1.12
Government organizes mentorship programs where livestock farmers ate properly trained on modern ways of livestock farming	33.3%	44.4%	8.3%	8.3%	5.6%	2.08	1.12
Having government programs on livestock farming will improve revenue from livestock farming	33.0%	39.6%	8.3%	13.5%	5.6%	2.19	1.19
The government provides extension services program on livestock investment decisions	36.1%	33.3%	11.1%	13.9%	5.6%	2.19	1.22
Aggregate score						2.12	1.18

Source: Survey Data (2022)

The first statement sought to find out whether study respondents had attended various government training on value creation and addition in livestock farming whereby results in table 22 show that the largest proportion of respondents, 44.1 percent and mean 2.05 strongly disagreed, 31.2 percent disagreed, 8.3 percent agreed while 8 percent strongly agreed. A standard deviation of 1.26 shows that the responses were well spread from the mean value. The results also show that 44.4 percent of study participants disagreed that the government conducts entrepreneurship training where livestock farmers from this region acquire skills to enhance their livestock farming while 33.3

percent strongly disagreed. A mean of 2.08 also confirms the results on the above statement. The same results were replicated on the statement that sought to find out whether the government organizes mentorship programs where livestock farmers are properly trained on modern ways of livestock farming as a mean of 2.08 indicates that majority of respondents disagreed. On whether having government programs on livestock farming improved revenue from livestock farming, the largest proportion of respondents, and 39.6 percent and mean value 2.19 disagreed supported by 33 percent who strongly disagreed. Only 5.6 percent strongly disagreed while 13.5 percent agreed. The final statement was designed to establish whether the government provides extension services program on livestock investment decisions. In this case, the results show that 36.1 percent strongly disagreed followed by 33.3 percent and mean value of 2.19 who disagreed while 13.9 percent agreed. An aggregate mean score of 2.12 shows that majority of the study respondents disagreed with various statements that sought to ascertain the influence of government strategy on commercialization of livestock farming.

The present outcome aligns with the research conducted by Atanasi et al. (2018), which suggests that government extension services programs, encompassing market linkages, information accessibility, technology transfer, training opportunities, technical guidance, and the proficiency of livestock technical personnel, have a positive impact on decisions related to livestock investment. The study finding support those of Hinderink and Sterkenburg (2022) who asserted that agricultural commercialization in Africa is deeply influenced by government policy frameworks, which shape market infrastructure, input provision, and farmer behavior. They emphasize that commercialization succeeds where governments have deliberately; created favorable investment climates; Strengthened institutions (e.g., veterinary services, cooperatives); Promoted market liberalization while avoiding excessive state control

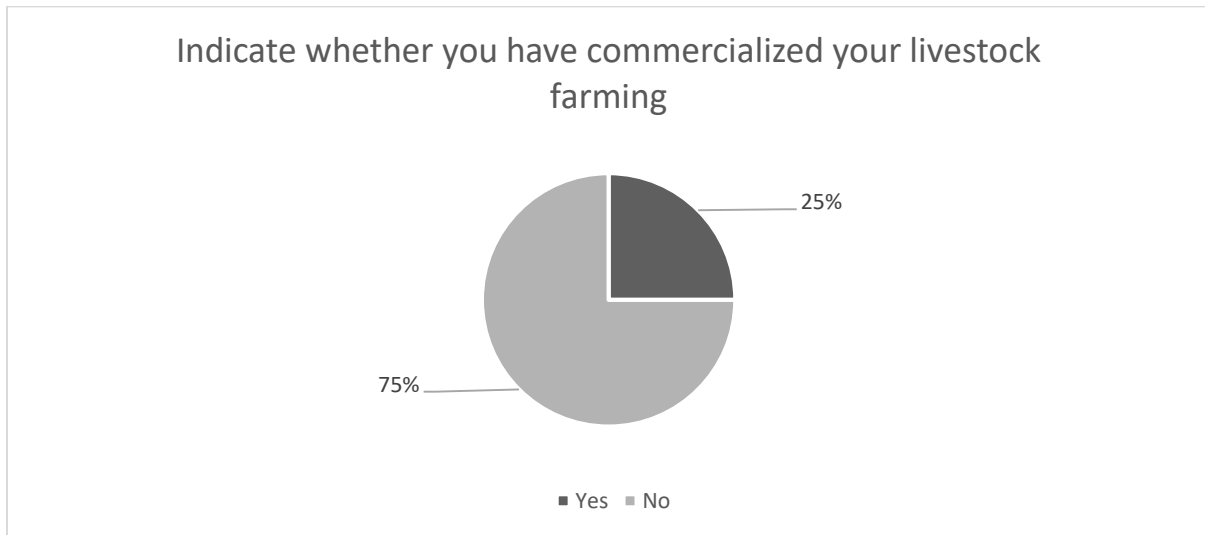
Further, Belay et al. (2021) stress the importance of decentralized institutional support tailored to smallholder needs. In Ethiopia's Tigray region, weak institutional arrangements and inconsistent policy enforcement limited commercialization. Governments must build robust local-level institutions capable of delivering training, finance, and infrastructure support. Merkel (2019) also argues that inadequate veterinary services and poor extension support remain major bottlenecks to livestock commercialization in low- and middle-income countries. He recommends that governments: Strengthen veterinary networks and decentralize them to village levels; Promote public-private partnerships in livestock health and breeding; Support livestock extension officers to disseminate knowledge on feeding, disease control, and market standards. This aligns with Myo Kywe et al. (2014), who found in Myanmar that weak technical services reduced productivity and discouraged farmers from intensifying production for market purposes.

4.5.6 Commercialization of Livestock Farming

Commercialization of livestock farming in Narok County was the dependent variable of this study. This section of the analysis therefore presents the results on this variable. The findings as shown in figure 5 shows that 75 percent of respondents indicated that they have commercialized livestock farming while 25 percent have not.

Figure 4.5

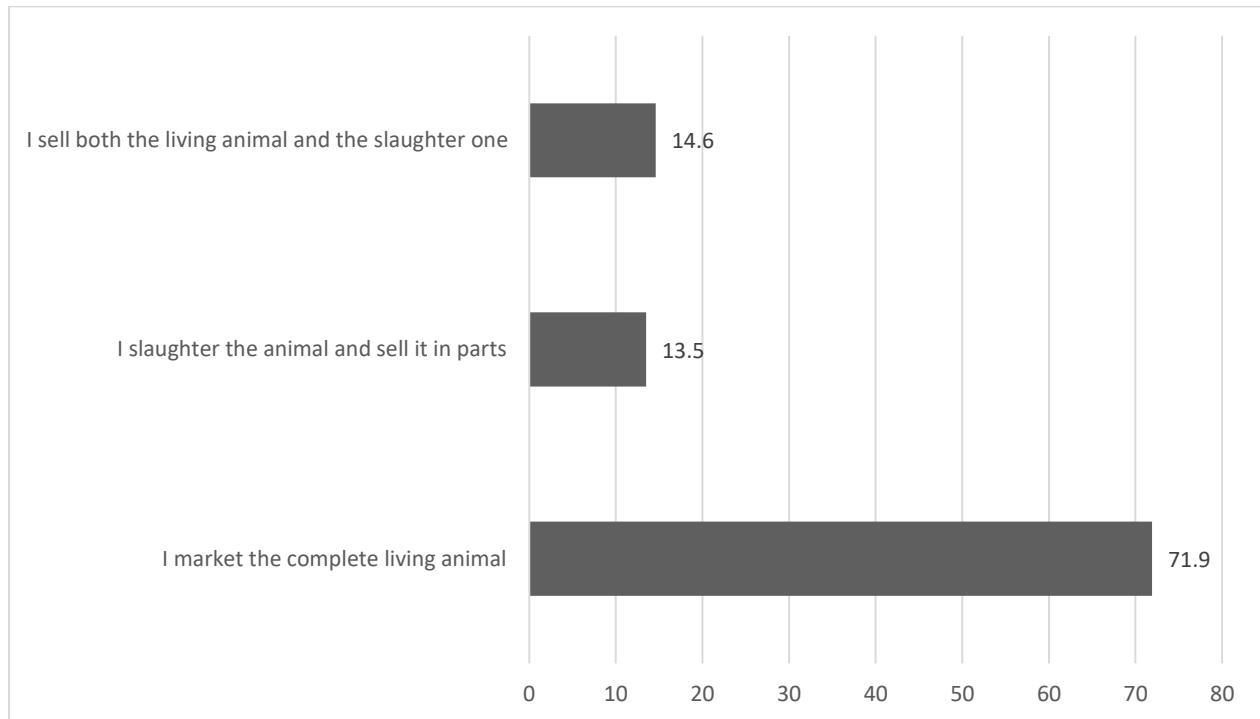
Level of Commercialization of Livestock Farming in Narok County



The research also determined how livestock farming in Narok County is commercialized; as shown in figure 6, the majority, or 71.9 percent, indicated that they market the entire live animal, while 14.6% claimed that they sell both the live and butchered animal. Additionally, 13.5% indicated they slaughter the animal prior to actually selling it. This points to limited commercialization of livestock in Narok County.

Figure 4.6

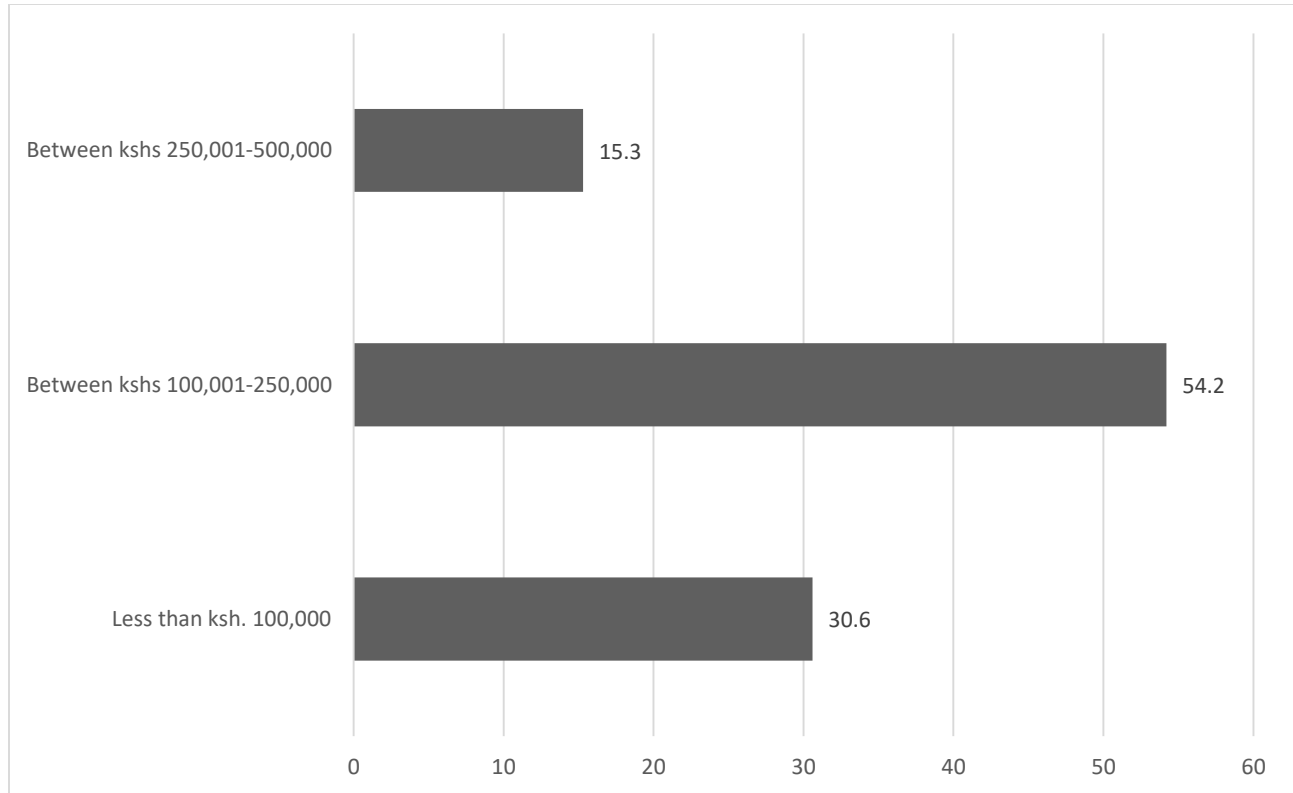
Mode of Commercialization of Livestock Farming in Narok County



The study also determined Narok County's average annual income from commercial livestock farming. Figure 7 reveals that 54.2% of respondents indicated that their average annual income from the commercialization of livestock was between Kshs. 100,000 and Kshs. 250, 000, followed by 30.6% of respondents who indicated that their average annual income was less than Kshs. 100,000, and 15.3% of respondents who indicated a range of Kshs. 250,001 to Kshs. 500,000. This points to low average annual income gained from livestock farming in Narok County.

Figure 4. 7

Average Annual Income from Commercialization of Livestock Farming in Narok County



Respondents were also required to indicate the level of agreement with various statements about commercialization of livestock farming in Narok County on a scale from 1 to 5. Table 23 presents the descriptive findings.

Table 4.21

Descriptive Statistics for Government Strategy

Statements	SD	D	N	A	SA	Mean	Std Dev
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I engage in value addition and distributes them to the market for huge profit	55.90%	33.70%	2.80%	4.20%	3.50%	1.66	0.98
I have been able to access regional and international market opportunities for my livestock products	52.10%	39.20%	0.00%	4.90%	3.80%	1.69	0.98
I have a reliable market for my livestock and products from livestock farming	54.50%	29.50%	5.90%	5.20%	4.90%	1.76	1.09
I engage in livestock farming purely for commercial purposes	63.20%	22.90%	3.80%	6.60%	3.50%	1.64	1.06
I engage in the production, distribution, and marketing of livestock products to meet both the customers' demands and market needs	64.20%	22.60%	4.20%	3.80%	5.20%	1.63	1.08
Aggregate score						1.68	1.04

Source: Survey Data (2022)

Based on the data presented in Table 23, it can be observed that a significant proportion of participants, specifically 55.9 percent, expressed strong disagreement, with a mean score of 1.66, regarding their perception of contributing value to livestock products and subsequently selling them at a substantial profit. A mere 3.5 percent of respondents expressed strong agreement. A standard deviation of 0.98 suggests that the individual responses exhibit limited dispersion from the mean value. A significant proportion of participants (52.1%) expressed strong disagreement with the assertion that they possessed the capability to access opportunities in regional and global markets for their livestock commodities, whereas only 39.2% concurred. The findings are substantiated by a mean value of 1.69. The responses exhibited a high degree of clustering around the mean, as evidenced by the small standard deviation of 0.98. A significant proportion of participants expressed strong disagreement with the assertion that they possess a secure market for

their livestock and livestock-derived goods, with 54.5 percent of respondents and a mean score of 1.76. The following statement asked respondents to indicate whether they raised animals only for commercial gain. Of those, 63.2 percent and mean 1.64 strongly disagreed, 22.3 percent disagreed, and 6.6 percent agreed. In response to the final question, which asked participants if they produce, distribute, and market animal products to satisfy both consumer and market needs, 64.2 percent strongly disagreed, with a mean score of 1.63. An average score of 1.64 implies low level of commercialization of livestock farming in Narok County.

4.6 Diagnostics Tests Results

To examine the impact of the independent variables on the dependent variable in the current study, logistic regressions were used. However, in order to effectively estimate the regression model and satisfy the fundamental requirements of logistic regressions, diagnostic tests had to be run prior to evaluating the study hypotheses. According to Peter and Ahmed (2018), these tests must be carried out in order to increase the model's predictive power. The next subsections present the results of normality, multicollinearity, linearity and heteroscedasticity tests that were conducted.

4.6.1 Test of Normality

What is meant by "normality," as defined by Black et al. (2010), is the degree to which a model's data follows the properties of a normal distribution. It is possible to estimate the likelihood that the underlying random variable in a data set follows a normal distribution and find out if the data set itself follows a normal distribution by using a normality test. For this purpose, we used the Kolmogorov-Smirnov test to see whether my data was normally distributed. From -0.1 to +1.0, the numerical range of the Kolmogorov-Smirnov Statistics is displayed. The data is considered to follow a normal distribution if the p-value is greater than 0.05, which is the threshold for evaluating data normality. The results are presented in Table 24.

Table 4.22*Kolmogorov-Smirnova Test of Normality*

Tests of Normality	Kolmogorov-Smirnova		
	Statistic	Df	Sig.
Entrepreneurial Skills	0.973	288	0.615
Market Orientation Knowledge	0.948	288	0.153
Entrepreneur Risk Management Knowledge	0.945	288	0.121
Entrepreneur Environment Awareness Knowledge	0.947	288	0.151
Government Strategy	0.936	288	0.082
Commercialization of Livestock Farming	0.937	288	0.078
a Lilliefors Significance Correction			

Source: Survey Data (2022)

The p-values of the variables, as seen in Table 24, was higher than the significance level of 0.05. This suggests that the null hypothesis, which posits that the data does not follow a normal distribution, was rejected. Consequently, it was deduced that the data pertaining to each of the variables examined in the study exhibited a normal distribution.

4.6.2 Test of Multicollinearity

Multicollinearity arises when there is a strong correlation among independent variables, resulting in several undesirable consequences such as significantly low t statistics, inflated standard errors, unpredictable alterations in coefficient magnitudes or signs, and non-significant coefficients. Such an approach, according to Field (2005), can lead to incorrect conclusions about the linear relationship between the dependent and independent variables. The use of variance inflation factors allowed for the investigation of multicollinearity. When the tolerance values drop below 0.1 and the Variance Inflation Factor (VIF) surpasses a threshold of 10, multicollinearity can be identified. Table 25 displays the findings of the collinearity assessment that was carried out using regression analysis.

Table 4.23*Variance Inflation Factor (VIF) Test of Multicollinearity*

(Constant)	Collinearity Statistics	
	Tolerance	VIF
Entrepreneurial Skills	0.712	1.404
Market Orientation Knowledge	0.841	1.19
Entrepreneur Risk Management Knowledge	0.932	1.073
Entrepreneur Environment Awareness Knowledge	0.797	1.254
Government Strategy	0.734	1.363

a Dependent Variable: Commercialization of Livestock Farming

Source: Survey Data (2022)

Table 25 demonstrates that the tolerance values range from 1.073 to 1.404 while the VIF for all independent variables ranges from 0.712 to 0.932. Entrepreneurial skills, market orientation knowledge, entrepreneur risk management knowledge, entrepreneur environment awareness knowledge, and government strategy had respective VIF values of 0.712, 0.841, 0.932, 0.797, and 0.734, which were all below the Field-recommended cut-off point of 10. In a similar vein, all tolerance values exceeded 0.1. As a result, the findings suggest that the variables' multicollinearity was not demonstrated.

4.6.4 Heteroskedasticity

The study used Levene's statistic to check if the error term was heteroskedastic. A significance level of 0.5 was selected as the critical value for assessing heteroskedasticity. In this context, it is necessary for the p-value to exceed 0.05 in order to satisfy the heteroskedasticity assumption and enable subsequent examination utilizing the regression model.

Table 4.24*Levene Statistic Test of Homogeneity of Variances*

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Sig.
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Entrepreneurial Skills	0.618	1	286	0.0870
Market Orientation Knowledge	0.186	1	286	0.6670
Entrepreneur Risk Management Knowledge	0.086	1	286	0.7700
Entrepreneur Environment Awareness Knowledge	1.978	1	286	0.0760
Government Strategy	1.766	1	286	0.0865
Commercialization of Livestock Farming	0.138	1	286	0.7120

Source: Survey Data (2022)

The findings in Table 26 indicate that all the variables had Levene statistics with p-values greater than 0.05. The respective Levene statistics for entrepreneurial skills, market orientation knowledge, entrepreneur risk management knowledge, entrepreneur environment awareness knowledge, government strategy and commercialization of livestock farming are 0.618, 0.186, 0.086, 1.978, 1.766 and 0.138 with significance values for each all above 0.05. This indicates that the study failed to refute the null hypothesis that the data was homoscedastic.

4.7 Inferential Statistics

The primary purpose of inferential statistics is to make inferences that extend beyond the limitations of the existing data. Statistics are utilized to infer the beliefs of a population based on the data collected from a sample. Alternatively, they are employed to evaluate the probability that an observed disparity between groups in this study is statistically significant or one that could have arisen randomly. To draw conclusions about more generalized situations from specific data, inferential statistics are used. The dependent variable, commercialization of livestock farming, was examined in this study using logistic regression and correlation analysis to determine the link and impact of the independent variables and moderator.

4.7.1 Bivariate Analysis Results

In order to accomplish this, researchers looked for any correlations between the factors. As a result, a correlation analysis was conducted. The correlation between the variables in the study was

assessed using the Pearson correlation coefficient. The Pearson correlation coefficient demonstrates a numerical range that extends from -1 to +1. A negative correlation becomes more powerful as the numerical value gets closer to -1, while a positive correlation becomes more significant as the value gets closer to +1. When the Pearson correlation coefficient is negative or equal to zero, there is no apparent link between the two variables. In addition, a perfect correlation between the two variables is indicated when the correlation coefficient takes on the values +1 or -1. The correlation matrix for the study variables is presented in Table 27.

Table 4.25

Pearson Correlation Matrix

		X ₁	X ₂	X ₃	X ₄	Z	Y
Entrepreneurial Skills (X1)	Pearson Correlation	1					

Market Orientation Knowledge (X2)	Pearson Correlation	-.149*	1				
Entrepreneur Risk Management Knowledge (X3)	Pearson Correlation	0.105	-0.032	1			
Entrepreneur Environment Awareness Knowledge (X4)	Pearson Correlation	-0.034	-.337**	.218**	1		
Government Strategy (Z)	Pearson Correlation	.480**	-0.011	0.039	.125*	1	
Commercialization of Livestock Farming (Y)	Pearson Correlation	.623**	.567**	-0.563	-0.539	.640*	1
	Sig. (2-tailed)	0.000	0.004	0.000	0.513	0.000	
	N	288	288	288	288	288	288

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Source: Survey Data (2022)

The findings displayed in Table 27 demonstrate a statistically significant correlation between entrepreneurial skills and the commercialization of livestock farming in Narok County. The results were supported by a Pearson correlation coefficient of 0.623 and a significance level of 0.000, which is lower than the predetermined significance level of 0.05 used in this study. This finding implies that the improvement of entrepreneurial abilities among households involved in livestock farming in Narok County leads to a significant and positive advancement in the commercialization of livestock farming. The results of the correlation analysis indicate a statistically significant and positive relationship between the level of market orientation knowledge and the extent of commercialization in the livestock farming sector within Narok County. The results were supported by a Pearson correlation coefficient of 0.567 and a significance level of 0.004. Furthermore, it can be inferred that an enhancement in the market orientation knowledge possessed

by households engaged in livestock farming in Narok County results in a noteworthy and favorable advancement in the commercialization of livestock farming.

Furthermore, the findings presented in Table 27 demonstrate a negative correlation between the level of entrepreneurial risk management knowledge and the degree of commercialization in the livestock farming sector. This negative relationship is supported by the Pearson coefficient of -0.563. The significance of this association is further underscored by a level of significance of 0.000. The finding suggests that enhancing the households' understanding of risk management among entrepreneurs engaged in livestock farming in Narok County results in a notable decrease in the level of commercialization in this sector.

The findings displayed in Table 27 demonstrate that there existed an insignificant and negative correlation between the level of environmental awareness and the commercialization of livestock farming in Narok County. The results were supported by a Pearson correlation coefficient of -0.539 and a significance level of 0.513, which surpasses the predetermined significance level of 0.05 utilized in this specific study. This finding indicates that increasing the level of entrepreneurial environmental awareness among households involved in livestock farming in Narok County leads to a minimal decrease in the extent of commercialization within the livestock farming industry. Tripathi and Mishra (2017) found the opposite to be true; they attribute the less-than-ideal marketing of agricultural products to a lack of understanding of the issue and a lack of proactive measures to combat it. In fact, a favorable and statistically significant association between government strategy and the commercialization of cattle production in Narok County was revealed by the examination of correlations. A Pearson correlation coefficient of 0.64 and a degree of statistical significance of 0.000 provided support for the results. Moreover, it can be deduced

that an improvement in governmental strategic initiatives leads to a significant and beneficial progress in the process of commercializing livestock agriculture.

4.7.2 Multivariate Binary Logistic Regression Model

A binary logistic regression model was utilized to examine the impact of entrepreneurial competencies on the commercialization of livestock farming in Narok County. The researchers employed binary logistic regression analysis in this study due to the categorical nature of the dependent variable, which was coded using a binary function. Specifically, the variable represented the commercialization of livestock farming, with a value of 0 indicating non-commercialization and a value of 1 denoting commercialization. The summary results of the model are displayed in Table 28 as shown below.

Table 4.26

Model Summary for Multivariate Binary Logistics Model

Model Summary	
-2 Log likelihood	98.225
Cox & Snell R Square	0.463
Nagelkerke R Square	0.626
Wald-Chi-square	84.505 (p=0.000)

Source: Survey Data (2022)

The most commonly used method for assessing the overall model fit in binary logistic regression is the likelihood ratio test. This test involves comparing the chi-square difference between the null model, which includes only constants, and the model that includes the explanatory variables. The -2log Likelihood statistics is 98.225, as shown in Table 28. This metric assesses how effectively the model accounts for commercialization of livestock farming. The model is more accurate the smaller the statistic. As evidenced by the model's significant and excellent fit, the p-value was

0.000 less than 0.05. Despite not being a very similar approximation, the Cox and Snell statistic in logistic regression is comparable to the coefficient of determination or R square in linear regression. The Pseudo R2 value (Nagelkerke R Square) for the model is 0.626, indicating that there are additional factors that have not been taken into account in this model and that the independent variables only account for about 62.6 percent of the variance in the commercialization of livestock farming in Narok County. Table 30 presents the coefficients for the binary logistic regression model before moderation.

Table 4.27

Coefficients for Multivariate Binary Logistics Model

		β	S.E.	Wald	Sig.	Exp (B)
Coefficients	Entrepreneurial Skills	1.140	0.376	9.175	0.002	3.128
	Market Orientation Knowledge	0.843	0.279	9.089	0.003	2.323
	Entrepreneur Risk Management Knowledge	0.800	0.344	5.397	0.020	0.449
	Entrepreneur Environment Awareness Knowledge	1.640	0.640	6.567	0.010	5.156
	Constant	9.536	2.299	17.200	0.000	0.000

a Variable(s) entered on step 1: b Predictors: (Constant), Market Orientation Knowledge, Entrepreneur Risk Management Knowledge, Entrepreneur Environment Awareness Knowledge, Entrepreneurial Skills Score.

Source: Survey Data (2022)

The output comprises the variables B, Wald's X^2 , the odds ratio (expB), and the significance value (P-value). The Wald's X^2 test is utilized to evaluate the statistical significance of individual independent variables, while accounting for the potential impact of other variables. In contrast, the odds ratio provides a numerical representation of how important each predictor is within the overall scenario. Kinnear and Gray (2002) found that a predictor variable's combined odds ratio (Exp B) value must be more than 1 and its significance value must be less than 0.05 for it to be

deemed statistically significant in a model. This led to the conclusion that entrepreneurial skills ($\beta=1.14$, $\text{sig}=0.002$), market orientation knowledge ($\beta=0.843$, $\text{sig}=0.003$), and entrepreneur environment awareness knowledge ($\beta=1.64$, $\text{sig}=0.01$) were the independent variables (entrepreneurial competencies) that could significantly predict the commercialization of livestock farming in Narok County as they are statistically significant and met the odds ratio requirement.

If the moderation coefficients are significant, the probability that livestock farming is commercialized (the dependent variable) is inextricably linked to the magnitudes of all interactions of independent variables and government strategy (moderation variable, Z). The Wald chi-squared test and/or a likelihood ratio test are commonly employed when comparing models that include an interaction component with those that do not. The coefficients for the moderated binary logistic regression model are presented in Table 30.

Table 4.28 :*Coefficients for Moderated Binary Logistics Model*

		B	S.E.	Wald	Sig.	Exp(B)
Coefficient	Entrepreneurial Skills	32.626	13.266	6.048	0.014	14.761
	Market Orientation					
	Knowledge	13.299	5.512	5.821	0.016	0.000
	Entrepreneur Risk					
	Management Knowledge	2.524	6.727	0.141	0.707	0.080
	Entrepreneur Environment					
	Awareness Knowledge	23.853	12.048	3.92	0.048	0.540
	X1*Z	7.475	3.12	5.74	0.017	0.301
	X2*Z	3.294	1.289	6.53	0.011	6.938
	X3*Z	0.362	1.527	0.056	0.813	1.436
	X4*Z	5.838	2.852	4.189	0.041	4.958
	Constant	4.711	2.67	3.114	0.078	0.009
Model						
Summary	-2 Log likelihood		79.670a			
	Cox & Snell R Square		0.531			
	Nagelkerke R Square		0.719			
	Chi-Square		103.06 (p=0.000)			

a Variable(s) entered on step 1: b Predictors: (Constant), Market Orientation Knowledge, Entrepreneur Risk Management Knowledge, Entrepreneur Environment Awareness Knowledge, Entrepreneurial Skills Score, X1*Z, X2*Z, X3*Z, X4*Z

Source: Survey Data (2022)

From the results in table 30 above, the role of government strategy in moderating the effects of entrepreneurial competencies on commercialization of livestock farming was significant. This is demonstrated by Wald chi-square of 0.000. Moreover, comparing with and without the interaction term, likelihood ratio decreases from 98.225 to 79.67.

4.7.3 Test of Hypotheses

Hypotheses H1 to H5 are hereby tested through the logistic regression analysis results above.

H0₁ There is no significant influence between entrepreneurial skill and commercialization of livestock farming in Narok County, in Kenya.

The study sought to test null hypothesis that entrepreneurial skill has no significant effect on commercialization of livestock farming in Narok County, in Kenya. The binary logistics regression model coefficient results in Table 29 show that holding other factors constant, entrepreneurial skill has a positive and significant effect commercialization of livestock farming in Narok County ($B = 1.14$, $\exp B = 3.128$, $P=0.002$). The null hypothesis was therefore rejected. The implication of the result is that entrepreneurial skill has significant effect on commercialization of livestock farming in Narok County, in Kenya. Accordingly, a unit increase in entrepreneurial skill results in an increase in the probability of commercialization of livestock farming in Narok County. The present study's results align with those of Ndlovu (2019), whose research revealed that moisture-sensitive coping strategies are predominantly employed by livestock farmers. This suggests that rural farmers have yet to adopt modern livestock management practices. Results from this study corroborate those of Abdullah et al. (2018), who found that entrepreneurial spirit contributed to Pakistan's thriving marble manufacturing sector. This suggests that the competencies possessed by entrepreneurs have an impact on the processes of producing, distributing, and marketing goods and services, ultimately leading to their commercialization. The researchers reached the conclusion that resilience skills exerted a significant influence on the development of other entrepreneurial skills. This study provides further support for the findings of Boldureanu et al. (2020), which demonstrated that the implementation of effective models for entrepreneurial education has a positive influence on the attitudes and behaviors of students in entrepreneurship programs. Consequently, this leads to a favorable impact on their engagement in job-related activities that contribute to social benefit. Moreover, the engagement of entrepreneurs in business-related endeavors is influenced by their acquisition of knowledge through higher education.

Entrepreneurial education has the potential to exert influence over the processes of production and distribution of goods and services.

The present study corroborates the findings of Mortonb et al. (2018), which revealed that participants from China exhibited the highest degree of self-assurance in their capacity to enhance animal welfare. Moreover, the study found that veterinarians displayed greater confidence compared to livestock team leaders. The participants in the study exhibited divergent levels of intentions and confidences regarding animal welfare. They attributed these attitudes to a range of external factors, including workplace behavior and differing organizational priorities. Additionally, they acknowledged internal factors such as limited personal knowledge about enhanced or unimproved animal welfare.

Results from the study by Verhees et al. (2018) show that dairy farmers in the sample countries are very production-oriented; over the next five years, they plan to increase their focus on dairy farming specialization and expand their dairy production. Farmers who demonstrated a high level of competence exhibited a greater propensity to adopt change, displayed more optimistic outlooks regarding their future, managed larger-scale farms, and derived greater satisfaction from their household income and agricultural outcomes. According to Chandio et al. (2018) study, it was discovered that livestock entrepreneurs encounter challenges in maintaining an effective financial record-keeping system. A limited number of dairy livestock farmers maintain documentation of their dairy farms, exhibit a deficiency in the adoption of contemporary livestock management techniques, and encounter challenges in implementing effective milk marketing strategies. The region experiences a dearth of veterinary services and encounters limited access to loan facilities provided by banking institutions for the purpose of investment.

H0₂ There is no significant influence between entrepreneur market orientation knowledge and commercialization of livestock farming in Narok County, in Kenya.

The study also tested the null hypothesis that entrepreneur market orientation knowledge has no significant effect on commercialization of livestock farming in Narok County, in Kenya. The binary logistics regression model coefficient results show that holding other factors constant, entrepreneur market orientation knowledge has a positive and significant effect commercialization of livestock farming in Narok County ($B = 0.843$, $\exp B = 2.323$, $P=0.003$). The null hypothesis was therefore rejected. This implies that entrepreneur market orientation knowledge has significant effect on commercialization of livestock farming in Narok County, Kenya. In this case, an increase in entrepreneur market orientation knowledge results in an increase in the probability of commercialization of livestock farming in Narok County. This finding is consistent with the results of Alhakimi and Mahmoud (2020) which showed that knowledge of market orientation and customer orientation positively influence innovativeness which boosts commercialization of farm products. Ghahroudi et al. (2019) also discovered a positive correlation between a focus on knowledge management and financial success for companies.

The study finding supported the finding of Na et al. (2019) that found that consumer orientation, product innovation, communication innovation and market information generation significantly influence competitive advantage and this positively affects business performance. The study concluded that for product development entrepreneurs should give preference to customer orientation. That is, to primarily consider customer demands before goods and services are produced. The influence of consumer demand in market orientation enhances commercialization of the goods and services produced.

Hussein et al. (2018) looked at how knowledge management orientation and market orientation affected the performance of SMEs; the present study's findings are in line with their findings. Their study's results show that business experts' ability to share and absorb information significantly affects their market orientation, which affects the company's overall performance. This suggests that information management is highly beneficial for facilitating production and marketing of goods and services and fostering market orientation. A study was carried out by Ho, Nguyen, Adhikari et al. (2018) to examine the connection between innovation and market orientation in Vietnam's agricultural value chain. The study included a group of 190 beef cattle producers. Market orientation does not significantly impact performance, according to the study's findings. Despite this, we discovered that customer orientation and inter-functional cooperation were positively correlated, and that these two elements enhanced both innovation and financial success. In order to successfully commercialize products or services, it is crucial to prioritize customer orientation within the context of market orientation.

Moreover, the results of this study align with the investigation carried out by Alhakimi and Mahmoud (2020), which established a positive relationship between a firm's comprehension of market orientation, customer orientation, and supplier orientation, and its level of innovativeness. However, the study's results show that SMEs' innovative capacities are unaffected by inter-functional coordination and competition awareness. In addition, a scholarly investigation carried out by Ghahroudi et al. (2019) unveiled a noteworthy association between knowledge management orientation, market orientation knowledge, and the process of introducing new products to the market. The establishment of this relationship was predicated upon the analysis of data obtained from a representative sample of 252 manufacturing companies located within the borders of Iran. Lubungu and Birner (2021) has identified various factors that exert influence on the likelihood of

a household's participation in cattle markets. These factors encompass the educational attainment of the household head, ownership of assets, market accessibility, institutional considerations, and household shocks. Moreover, the extent to which income sources are diversified has a significant influence on the fluctuations in participation observed in the cattle markets.

The research results are consistent with the conclusions made by Kebebe (2019), as they suggest that the inadequate adoption of advanced technologies in the livestock sector can be attributed to the insufficient presence or absence of crucial elements in innovation systems. These elements include knowledge dissemination, entrepreneurial competencies, market expansion, and policy promotion. The study ultimately arrived at a comparable finding to Crane and Todd's (2018) research, which indicated that the participation of men in cattle and formal dairy markets is linked to gendered significance, thereby reinforcing the concept of male entitlement to dairy profits.

H0₃ There is no significant influence between entrepreneur risk management knowledge and commercialization of livestock farming in Narok County, in Kenya.

Further, the sought to test null hypothesis that entrepreneur risk management knowledge has no significant effect on commercialization of livestock farming in Narok County, in Kenya. The binary logistics regression model coefficient results in Table 29 show that holding other factors constant, entrepreneur risk management knowledge has a negative and significant effect commercialization of livestock farming in Narok County ($B = -0.8$, $\exp B = 0.449$, $p=0.02$). The null hypothesis was therefore rejected. The implication of the result is that entrepreneur risk management knowledge has significant effect on commercialization of livestock farming in Narok County, in Kenya. Entrepreneur risk management knowledge has significant implications for the commercialization of livestock farming. The implication of these finding include; entrepreneur

risk management knowledge allows livestock farmers to make informed and strategic decisions. By understanding and assessing potential risks, farmers can evaluate the potential benefits and drawbacks of different business strategies. This helps them make proactive choices that minimize risks and maximize commercialization opportunities. The bottom line of cattle farming businesses benefits from well-managed risks. Farmers can maximize resource allocation, avoid losses, and preserve assets by detecting and minimizing risks. Important for commercialization success, this leads to better financial results, more profits, and greater cash flow. Farmers that are well-versed in risk management are better able to weather unpredictable weather and unfavorable market conditions. Farmers can enhance their ability to endure and overcome obstacles by using measures to reduce risk and creating backup plans. The capacity to keep operations running, investments safe, and a competitive advantage in the market are all improved by this.

Livestock farming ventures that demonstrate effective risk management practices tend to inspire confidence among stakeholders such as investors, lenders, and business partners. When stakeholders perceive that risks are being managed systematically and responsibly, they are more likely to provide support, capital, and collaboration opportunities. This facilitates the commercialization process by securing necessary resources and partnerships. Farmers that are well-versed in risk management are better able to see possible weak spots, inefficiencies, or bottlenecks in their processes. Streamlining procedures, optimizing resource use, and improving operational efficiency can be achieved by farmers by addressing these areas. When it comes to commercializing cattle farming, efficient operations can cut costs, boost output, and make you more competitive. The ability to comply with applicable rules and regulations is a last benefit of risk management expertise for farmers. Concerning animal welfare, food safety, environmental preservation, and labor standards, livestock farming is governed by a multitude of regulations.

Avoiding fines, legal trouble, and reputational harm that could impede commercialization attempts is possible if farmers are aware of and take measures to mitigate the risks connected with noncompliance.

These findings are consistent with the results of study by Yang et al. (2018) which showed that making use of risk management positively affects competitive advantage and performance. Moreover, the results fail to mirror the findings of Hanggraeni, et al. (2019) who found that performance of the business operations depends on risks identified and properly managed from both internal and external factors.

The study finding supported the finding of Slovak, Strelcova et al. (2018) who concluded that that 25% pay very little attention to risk management activities and of the remaining 75%, at most 24% dealt with all risk management variables to strongly protect their firms. Research by Chand et al. (2018) investigated the root of risks and strategies to manage them in livestock farming and production of animal products in India and found that the sources of animal agriculture risks were marketing and customers' orientations, institutional policy, the animal health and breeding. They pointed that this risk could be managed using consultation, seeking veterinary services, engaging in forward contracts for sale of animals and their products and seeking short- and long-term finances from financial institutions.

Similarly, the study agreed with Asante, Villano et al. (2018) who found that examination and consideration are two factors for evaluation in the selection process of diversification of the agriculture products to control risks. The study gathered data from 608 smallholders and used Cragg two-step regression model for the analysis. Another study by Asrat and Simane (2018) analyzed risk management knowledge of farmers on their awareness of climate change and its

adaptation strategies in crops and livestock farming in Ethiopia. The research employed descriptive statistics for the analysis of data obtained from 734 household farmers engaged in crops and domestic animals farming. The study found that farmers' demographic factors coupled with their experience and decision influenced their perception on climate change adaption strategies.

H04 There is no significant influence between entrepreneur environment awareness knowledge and commercialization of livestock farming in Narok County, in Kenya.

The study also tested the null hypothesis that entrepreneur environment awareness knowledge has no significant effect on commercialization of livestock farming in Narok County, in Kenya. The binary logistics regression model coefficient results show that holding other factors constant, entrepreneur environment awareness knowledge has a negative and significant effect commercialization of livestock farming in Narok County ($B = -1.64$, $\exp B = 5.156$, $P=0.01$). The null hypothesis was therefore rejected.

This implies that entrepreneur environment awareness knowledge has significant effect on commercialization of livestock farming in Narok County, Kenya. In this case, however, an increase in entrepreneur environment awareness knowledge results in significant decrease in the probability of commercialization of livestock farming in Narok County. The significant relationship between entrepreneur environment awareness knowledge and commercialization of livestock farming was however unexpected because showing awareness to the environmental dynamics such as properly managing wastes, animal diseases control and taking good care of grazing land generally improves livestock.

This study's findings reveal that the expansion of farmer entrepreneurship has a more qualitative effect on rural poverty than attitudes towards this growth, although Naminse and Zhuang (2018)

also found that socio-cultural capability is the most important factor in farmer entrepreneurship development. The current investigation provides support for the conclusions drawn by Kebebe (2019), who established that the inadequate or nonexistent operation of innovation systems, encompassing the dissemination of knowledge, entrepreneurial capabilities, market expansion, and policy promotion, plays a role in the restricted uptake of advanced technologies in the livestock sector. The study conducted by Chandio et al. (2018) focused on an empirical examination of the expansion of the livestock population and the implementation of dairy farming in the Sindh region of Pakistan. The findings of the research suggest that individuals involved in livestock entrepreneurship face difficulties in establishing and maintaining an efficient system for financial record-keeping. A subset of dairy livestock farmers demonstrates a lack of record-keeping practices for their dairy farms, exhibit shortcomings in the adoption of modern livestock management techniques, and face difficulties in formulating efficient milk marketing strategies. The region is characterized by a lack of veterinary services and faces challenges in accessing loan facilities offered by banking institutions for investment purposes.

H0₅ Government strategy of livestock subsector does not have a significant moderating effect on commercialization of livestock farming in Narok County, in Kenya.

Ultimately, the study aimed to determine whether there is a significant moderating influence of the government policy of the livestock subsector on the commercialization of livestock farming in Narok County, Kenya, or not. Table 30 displays the results for the moderated binary logistics model, which indicate that government strategy significantly tempered the effects of entrepreneurial competencies on the commercialization of cattle production. Wald chi-square testing shows this to be true with a value of 0.000. Government policies that encourage the

commercialization of livestock production determines the impact of entrepreneurial competencies. This result disproves the null hypothesis that the commercialization of cattle production in Kenya's Narok County is unaffected by the government's strategy in this area. The current result is in line with the findings of Atanasi et al. (2018), who found that government extension services programs influence livestock investment decisions for the better. These programs cover topics such as market linkages, information accessibility, technology transfer, training opportunities, technical guidance, and the proficiency of livestock technical personnel. The government's strategy and support for the livestock subsector play a significant role in the commercialization of livestock farming. The government's policy and regulatory framework provide a conducive environment for livestock farming commercialization. Clear and supportive policies can encourage investments, provide incentives, and establish guidelines for sustainable and responsible livestock farming practices. By creating a favorable policy environment, the government can attract private sector participation and stimulate the growth of commercial livestock farming.

Government investment in infrastructure development is crucial for the commercialization of livestock farming. Adequate transportation networks, access to markets, and reliable supply chains are essential for livestock farmers to efficiently transport their products and reach customers. Infrastructure development, such as the construction of roads, cold storage facilities, and processing plants, facilitates the commercialization process by reducing logistical challenges and improving market access. Government support for research and development (R&D) activities is vital for the commercialization of livestock farming. R&D efforts can lead to the development of improved breeding techniques, disease control measures, and innovative production systems. By investing in R&D, the government can provide farmers with access to new knowledge, technologies, and practices that enhance productivity, profitability, and market competitiveness.

The government plays a critical role in providing capacity building programs and training opportunities for livestock farmers. Skill development initiatives, technical training, and educational programs equip farmers with the knowledge and skills necessary for successful commercialization. By investing in human capital, the government can enhance the entrepreneurial and managerial competencies of livestock farmers, enabling them to effectively navigate the challenges of commercial farming. The government's efforts in market development and access are crucial for livestock farming commercialization. This includes the establishment of market linkages, trade promotion, and export facilitation. By identifying and creating opportunities for livestock farmers to access domestic and international markets, the government enables them to expand their customer base, increase sales, and achieve profitability.

Financial support and incentives from the government can significantly boost the commercialization of livestock farming. This includes access to credit facilities, loan guarantees, subsidies, and tax incentives. Such support helps farmers overcome financial barriers, invest in modern technologies, improve infrastructure, and expand their operations. The government's role in disease control and biosecurity measures is vital for livestock farming commercialization. Through surveillance programs, vaccination campaigns, and biosecurity protocols, the government helps protect livestock from diseases and prevent disease outbreaks. This not only safeguards animal health and welfare but also assures consumers of safe and high-quality products, facilitating market access and commercialization.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the study. In addition, it covers the important findings and draws the right conclusions. The findings are discussed together with their consequences, the knowledge they add, recommendations, and potential areas for future research. This chapter's conclusions and suggestions are based on the research that was conducted.

5.2 Summary of the Findings

The commercial nature of livestock production has historically necessitated the involvement of smallholder farmers as partners, who must be effectively integrated into value chains. The size of smallholder farms has diminished due to the prioritization of industrial nations in the production of farm animal products on a large scale. Small-scale farmers have been engaging in the commercialization of livestock supplies for an extended period and continue to do so. This enables individuals to shift their production activities from primarily catering to household needs, while also having the potential to sell any excess output, towards a more market-oriented and financially advantageous approach. Nonetheless, the pervasive issue of limited livestock commercialization in the country has a detrimental effect on counties such as Narok, where a significant proportion of the population relies on livestock farming as their primary means of generating income. Health care, schooling for their children, and other basic requirements are still out of reach for the county's inhabitants, despite the large population and large number of livestock owners. Research in this area was carried out in Narok County with the intention of determining how entrepreneurial competences affected the process of cattle farming's commercialization.

A self-administered structured questionnaire served as the basis for the data analysis, which included descriptive and inferential statistics. The major purpose of the study was to analyze how

business acumen, understanding of markets, risk management, and environmental awareness influenced the commercialization of livestock farming in Narok County. Entrepreneurial skills and cattle farming's commercialization were both examined, as was the role of government strategy in mediating this relationship. In this study, households in Narok County that raise animals were the focus. The last objective of the research was to find out how independent mediating variables could affect the connection between entrepreneurial competences and cattle farming's commercialization. Exploring the impact of entrepreneurial talent on the commercialization of livestock production in Narok County, Kenya was the primary purpose of the study.

Descriptive statistics showed that majority of respondents disagreed that they have high skills rewarding decisions in livestock farming, have skills to develop business plan for farming business, effectively manage finances for farming activities, frequently attend training where they are taught entrepreneurship and have entrepreneurial skills that enable them to effectively manage livestock farming. Majority of respondents strongly disagreed with statements regarding entrepreneurial skills which implies that majority of households in Narok county involved in livestock farming have limited entrepreneurial skills. Coefficients of binary logistic regression indicated that entrepreneurial skills positively and significantly influenced commercialization of livestock farming in Narok County.

The second objective of this study was to evaluate the influence of market orientation knowledge on commercialization of livestock farming in Narok County, Kenya. From descriptive results, majority of households involved in livestock farming in Narok County do not have knowledge on how livestock prices are determined in the market, price livestock based on market forces of demand and supply and that prices offered in the market are unfavorable. Majority of respondents

also agreed that they are aware of all the needs of consumers of livestock products, are aware of all the products livestock farmers can derive from the farming activities, have adequate market information on livestock and all the products associated with livestock farming, frequently access information on livestock market such as prices, demand and market preferences and are aware of the market opportunities in livestock farming. Respondents generally agreed to possessing market orientation knowledge. Binary logistic regression coefficients also indicated that market orientation knowledge positively and significantly influenced commercialization of livestock farming in Narok County.

Additionally, the research aimed to determine whether or not entrepreneurs' familiarity with risk management had any bearing on the degree to which cattle farming in Narok County, Kenya, became commercialized. A large portion of the sample did not agree that they are well-versed in the risks associated with cattle farming in their area, that they understand how climate change would affect their industry, or that they have plans to lessen the blow of a water scarcity. The majority also did not agree that they are prepared to deal with the many unknowns in livestock farming, that they know how to recognize and lessen the effects of potential dangers, or that they have plans to lessen the effect of a lack of grazing land on animals. There was a negative, though slight, influence of entrepreneur risk management expertise on the commercialization of cattle farming in Narok County, according to inferential statistics.

The fourth objective sought to determine the influence of entrepreneur environment awareness knowledge on commercialization of livestock farming in Narok County, in Kenya. Descriptive findings showed that they have adequate skills and knowledge in managing waste and keeping environment favorable for livestock farming, are aware on how to manage animal diseases to

improve the quality of livestock and are enlightened on how to manage grazing field. Moreover, majority of respondents disagreed that they always scout for modern agribusinesses skills to improve livestock farming and scan their environment for latest technologies to improve livestock farming. However, inferential statistics also showed that entrepreneur environment awareness knowledge has a negative but insignificant effect commercialization of livestock farming in Narok County. This means that improvement in entrepreneur environment awareness knowledge does not necessarily result to increase in the probability of commercialization of livestock farming in Narok County.

The final objective sought to examine the moderating influence of government strategy of livestock subsector on commercialization of livestock farming in Narok County, Kenya. As summarized in descriptive statistics, majority of the study participants disagreed that they have attended various government training on value creation and addition in livestock farming, the government conduct entrepreneurship training where livestock farmers acquire skills to enhance their livestock farming and that the government organizes mentorship programs where livestock farmers are properly trained on modern ways of livestock farming. Majority of the study participants also disagreed that the government provides extension services program on livestock investment decisions. From inferential statistics, government strategy moderates the effects of entrepreneurial competencies on commercialization of livestock farming as the effect depends on government strategies that support commercialization of livestock farming and commercialization.

5.3 Conclusion

The study's conclusion is that entrepreneurial skills significantly and positively influenced the commercialization of livestock farming in Narok County based on the aforementioned outcomes. These attributes include the ability to effectively manage finances for farming activities, develop

business plans for farming enterprises, regularly attend training sessions where farmers are taught entrepreneurship, and make sure to cultivate entrepreneurial abilities that allow farmers to effectively manage livestock farming. The study also concludes that market orientation knowledge positively and significantly influenced commercialization of livestock farming in Narok County. Consequently, the commercialization of livestock farming in Narok County is significantly improved as a result of knowledge of how livestock prices are established in the market, pricing livestock based on market forces of demand and supply, awareness of all needs of consumers of livestock products, as well as awareness of all the products livestock farmers can originate from the agricultural operations. Sufficient market knowledge of livestock and its connected items, regular accessibility on the livestock market plus awareness of the market opportunities in livestock production are further examples of market orientation knowledge.

Surprisingly however, entrepreneur risk management knowledge was found to have a negative but insignificant effect commercialization of livestock farming in Narok County. In the context of this study therefore, a conclusion is drawn that entrepreneur risk management knowledge has a negative but insignificant effect commercialization of livestock farming in Narok County. This shows that despite its universal importance, entrepreneur risk management knowledge may not necessarily improve commercialization of livestock farming in Narok County. The study also found that commercialization of livestock farming in Narok County is negatively and significantly impacted by entrepreneurs' environmental awareness knowledge. Again, unlike in most other contexts, increasing an entrepreneur's awareness of their environment does not necessarily boost the likelihood of commercializing livestock farming in Narok County; rather, it tends to hinder it.

Finally, the significant effect realized on moderation presupposes that the effects of entrepreneur competencies on commercialization of livestock farming does depend on strategies employed by the government to boost commercialization of livestock farming. In this regard, the success of entrepreneur competencies to improve commercialization of livestock farming in Narok County is contingent upon attending various government training on value creation and addition in livestock farming, the government conducting entrepreneurship training where livestock farmers acquire skills to enhance their livestock farming, organizing mentorship programs where livestock farmers are properly trained on modern ways of livestock farming and government providing extension services program on livestock investment decisions.

In conclusion, entrepreneurial skills have a significant effect on the level of commercialization of livestock farming in Kenya. The development and application of entrepreneurial skills by livestock farmers contribute to the transformation of their farming operations into profitable and sustainable business ventures. By possessing strong business planning and financial management skills, farmers can effectively strategize, set goals, and make informed decisions regarding resource allocation and investment opportunities. This enables them to optimize their financial performance and enhance the commercialization of their livestock farming enterprises.

Moreover, marketing and market research skills are essential for livestock farmers to identify target markets, understand consumer preferences, and position their products effectively. With effective marketing strategies, farmers can differentiate their offerings, create brand awareness, and capture a larger market share, ultimately driving the commercial success of their livestock farming businesses. Risk management knowledge is another crucial entrepreneurial skill that enables farmers to identify, assess, and mitigate risks associated with livestock farming. By

proactively managing risks such as disease outbreaks, market volatility, and adverse weather events, farmers can safeguard their operations, reduce losses, and maintain business continuity. This enhances the level of commercialization by ensuring a stable and secure business environment.

Furthermore, the ability to adapt to changing market dynamics and embrace innovation is a key entrepreneurial skill that positively impacts the commercialization of livestock farming in Kenya. With an entrepreneurial mindset, farmers can identify emerging trends, adopt new technologies, and explore value-added opportunities. This allows them to meet evolving consumer demands, improve productivity, and seize market advantages, ultimately driving the commercialization of their livestock farming ventures. Collaboration and networking skills also play a significant role in the commercialization of livestock farming. By building strong relationships with industry stakeholders, such as suppliers, buyers, and fellow farmers, entrepreneurs can access shared resources, knowledge exchange, and new market opportunities. Collaborations and partnerships contribute to the expansion and market reach of livestock farming businesses, enhancing their commercialization potential.

In conclusion, entrepreneurial skills are instrumental in elevating the level of commercialization of livestock farming in Kenya. Through effective business planning, marketing strategies, risk management, adaptability, and collaboration, farmers can transform their farming operations into profitable and sustainable enterprises. By equipping livestock farmers with entrepreneurial skills, Kenya can foster a thriving livestock subsector, contributing to economic growth, food security, and the overall development of the agricultural sector.

5.3.6 Contribution to knowledge

The fact that this study offered empirical evidence that entrepreneurial skills can forecast the commercialization of livestock farming is one of its key contributions. With relation to the commercialization of livestock farming, these modern competencies are becoming more and more important and well-liked on a global scale. The impact of entrepreneurial skills on the commercialization of livestock production is relatively recent, even though it has been discussed in the literature over the years, particularly in Kenya's pastoral regions like Narok County. By showing how entrepreneurial risk management knowledge, market orientation knowledge, and entrepreneurial abilities significantly impact commercializing cow ranching in Kenya, this study contributes to the current understanding of the competencies needed for this endeavor. Second, the study indicated that while entrepreneurial skills do play a role in commercializing livestock farming, the government's strategies play a moderating role. Third, the success of government policies and programs aimed at commercializing livestock farming greatly impacts the success of entrepreneurial abilities. This research not only addresses a knowledge vacuum in the literature but also provides recommendations for how entrepreneurial talents may be used to enhance the commercialization of livestock production in Kenya. Potential researchers can use it as secondary data, and it can serve as a baseline for future studies.

5.4 Recommendations of the study

By creating prerequisite systems and structures that enable entrepreneurial competencies, the study presented a number of recommendations that, if implemented by various stakeholders, would significantly improve the success of commercializing livestock farming address challenges Kenya has been facing in commercialization one its key subsector. This study recommends households involved in livestock farming to ensure that they effectively manage finances for farming

activities, develop business plans for farming enterprises, regularly attend training sessions where farmers are taught entrepreneurship, and make sure to cultivate entrepreneurial abilities that allow farmers to effectively manage livestock farming. Similarly, to improve commercialization of livestock farming, there is need for those involved in livestock farming to equip themselves with market orientation knowledge by developing awareness of all needs of consumers of livestock products and products livestock that originate from the agricultural operations. There is also need to have sufficient market knowledge of livestock and its connected items, access information on the livestock market as well be prepared to take advantage of any market opportunities.

Implement comprehensive training and capacity-building programs specifically tailored for livestock farmers. These programs should focus on developing entrepreneurial skills, market research and analysis, risk management strategies, and environmental awareness. Training can be conducted through workshops, seminars, and collaborations with agricultural institutions and industry experts. Improve access to relevant information and knowledge resources for livestock farmers. Establish information centres or online platforms where farmers can access market trends, best practices, technological advancements, and environmental regulations. Collaborate with agricultural extension services to disseminate valuable information and provide advisory support to farmers.

Encourage livestock farmers to form networks and associations to facilitate knowledge sharing, collaboration, and collective bargaining power. These platforms can promote the exchange of experiences, market insights, and risk management strategies among farmers. The government and industry stakeholders can support the formation and strengthening of these networks through financial assistance and technical support. Provide targeted financial support and incentives to

livestock farmers to encourage the adoption of entrepreneurial practices, market-oriented approaches, risk management strategies, and environmentally friendly technologies. This can include access to affordable credit, grants for capacity building, and tax incentives for adopting sustainable farming practices.

Invest in research and development initiatives that focus on improving livestock farming practices, product diversification, and value addition. Collaborate with research institutions and universities to conduct studies and provide evidence-based recommendations to farmers. This facilitates innovation, increase productivity, and open up new commercialization opportunities. Facilitate market linkages for livestock farmers by establishing effective value chains and connecting them with reliable buyers, processors, and exporters. Provide support in market research, product development, and branding to enable farmers to meet market requirements and access higher-value markets.

Moreover, though there was evidence that entrepreneur environment awareness knowledge has a negative effect commercialization of livestock farming in Narok County, it is necessary for the effective commercialization activities. It has been shown that having adequate skills and knowledge in managing waste and keeping environment favourable for livestock farming as well as having awareness of animal diseases improves the quality of livestock for commercial purposes. The study also recommends the government to devise effective strategies that promote commercialization of livestock farming in ASALs in Kenya. There is thus need to provide training on value creation and addition in livestock farming and encourage farmers to attend them, conduct entrepreneurship training where livestock farmers acquire skills to enhance their livestock farming, organize mentorship programs where livestock farmers are properly trained on modern ways of

livestock farming as well as providing extension services program on livestock investment decisions.

Raise awareness about the importance of environmental sustainability in livestock farming and provide incentives for farmers to adopt environmentally friendly practices. Advance eco-friendly farming practices, efficient waste management, and the use of renewable energy sources. Put programs in place that compensates farmers for preserving biodiversity, improving soil health, and managing water resources. To determine how well programs that teach people to be more entrepreneurial, market-oriented, risk-aware, and environmentally conscious are doing, set up a reliable system of monitoring and assessment. Make sure to regularly assess how these activities are affecting the commercialization of livestock production and change accordingly.

5.5 Suggestion for Further Studies

According to the findings of the logistic regression, the entrepreneurial competencies explained almost 46% of the variation in the commercialization of livestock farming in Narok County. What this means is that the factors that influence the degree to which cow production is commercialized may vary, and that this study may have overlooked some of these aspects. The study makes the suggestion that additional research concentrate on identifying these variables that contribute for the remaining proportion of variation in livestock farming's commercialization. Second, this research was cross-sectional and limited to Narok County, Kenya due to time and funding restrictions. Therefore, it is advised that research be conducted using a longitudinal approach. The study might also be duplicated in different areas as well as sectors to provide a diverse representation.

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APPENDICES

Appendix I: Introduction letter

Elizabeth S. Lolchoki

BUS-4-0545-1/2019

Kenya Methodist University

RE: REQUEST FOR DATA COLLECTION

My name is Elizabeth S. Lolchoki a postgraduate student pursuing doctorate in Entrepreneurship. I am currently conducting research on “*Effect of Entrepreneurial Competencies on Commercialization of Livestock Farming in Narok County, Kenya*”. As part of the research, I am supposed to collect data from the selected respondents to be able to accomplish my program. All information gathered during this process will be used for academic purposes only. Your participation in the survey will be highly appreciated.

Yours sincerely

Elizabeth S. Lolchoki

Appendix II Questionnaire

This Questionnaire contains seven (7) sections. Section A is on demographic characteristics: Section B covers entrepreneurial skills, Section C covers market orientation knowledge, Section D covers Risk management knowledge, Section E covers environment awareness knowledge, Section F covers Government strategy, and finally section G covers Commercialization of livestock farming. Kindly respond to all the statements with utmost honesty. The questionnaire takes a maximum of 10 minutes only.

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Kindly indicate your gender.

- a. Male ☐
- b. Female ☐

2. Kindly indicate your area of residence from the following Residential Sub County.

- a. Transmara West ☐
- b. Transmara East ☐
- c. Narok North ☐
- d. Narok South ☐
- e. Narok West ☐
- f. Narok East ☐

3. Please indicate your age bracket.

- a. Less than 25 years ☐
- b. 25-35 years ☐
- c. 36-46 years ☐
- d. 47-57 years ☐
- e. Above 57 years ☐

4. Kindly indicate your highest level of education.

- a. No formal education ☐
- b. Primary education ☐
- c. Secondary Education ☐
- d. Tertiary level of education ☐

5. Please indicate the size of your family.

- a. Below 3 members ☐
- b. 4-6 Members ☐
- c. 7-9 Members ☐
- d. Above 9 members ☐

6. Kindly indicate the type of farming engaged in

- a. Livestock farming only ☐

b. Livestock +Crop Farming []

7. Livestock farming comprises of two categories of animals. Which category of livestock do you farm?

- a. Large animals []
b. Small animals or Poultry animals []
c. Both categories []

SECTION B: ENTREPRENEURIAL SKILLS

This section intends to measure the entrepreneurial skills among livestock farmers in Narok County. Use the scale provide to respond to the statement below as it applies to you. Kindly be as honest as possible. **Use the scale 1-5: where 1-Strongly agree, 2-disagree, 3-neutral, 4-agree, 5-Strongly agree**

No	Statement	1	2	3	4	5
8	I have high skills rewarding decisions in my livestock farming					
9	I have skills to develop business plan for my farming business					
10	I effectively manage finances for my farming activities					
11	I frequently attend programs/training where we are taught entrepreneurship					
12	I have entrepreneurial skills that enable me to effectively manage my livestock farming					

13. List any other entrepreneurial skills that have enable you to manage your livestock farming

14. What are some of the entrepreneurial skills that will enable you turn your livestock farming into a profitable business venture?

SECTION C: MARKET ORIENTATION KNOWLEDGE

This section intends to measure the market orientation knowledge among livestock farmers in Narok County. Use the scale provide to respond to the statement below as it applies to you. Kindly be as honest as possible. **Use the scale 1-5: where 1-Strongly agree, 2-disagree, 3-neutral, 4- agree, 5-Strongly agree**

No	Statement	1	2	3	4	5
15	I am aware of all the needs of consumers of livestock products					
16	I am aware of all the products livestock farmers can derive from the farming activities					
17	I have adequate market information on livestock and all the products associated with livestock farming					
18	I frequently access information on livestock market such as prices, demand and market preferences					
19	I am aware of the market opportunities in livestock farming					

20. Do you have knowledge on how livestock prices are determined in the market?

Yes []

No []

21. How do you price your livestock?

a. Based on demand and supply in the market []

b. Based on government regulation in the market []

22. Do you think the prices of livestock offered in the market near you are favorable?

Yes []
 No []

23. Explain your response in 21 above

SECTION D: RISK MANAGEMENT KNOWLEDGE

This section intends to measure the risk management knowledge among livestock farmers in Narok County. Use the scale provide to respond to the statement below as it applies to you. Kindly be as honest as possible. **Use the scale 1-5: where 1-Strongly agree, 2-disagree, 3-neutral, 4- agree, 5-Strongly agree**

No	Statement	1	2	3	4	5
24	I am aware of all the risk threats facing livestock farming within my region					
25	I possess sufficient understanding regarding the ramifications of climate change on my livestock farming operations.					
26	I possess a set of strategies aimed at mitigating the adverse effects of water scarcity on my livestock.					
27	I possess a set of strategies aimed at alleviating the adverse effects resulting from a scarcity of grazing land on my livestock.					
28	I have adequate knowledge to handle all the uncertainties livestock farming face					
29	I have knowledge on how to identify and mitigate risk livestock farmers face.					

30. Explain how you have been able to manage risks faced by livestock farmers in this region.

SECTION E: ENVIRONMENT AWARENESS KNOWLEDGE

This section intends to measure the environment awareness knowledge among livestock farmers in Narok County. Use the scale provide to respond to the statement below as it applies to you. Kindly be as honest as possible. **Use the scale 1-5: where 1-Strongly agree, 2-disagree, 3-neutral, 4- agree, 5-Strongly agree**

No	Statement	1	2	3	4	5
31	I have adequate skills and knowledge in managing waste and keeping my environment favorable for livestock farming					
32	I am aware on how to manage animal diseases to improve the quality of my livestock					
33	I am enlightened on how to manage grazing field					
34	I always scout for modern agribusinesses skills to improve my livestock farming					
35	I always scan my environment for latest technologies to improve my livestock farming					

36. Explain how your environmental awareness knowledge have enable you boost your livestock farming.

SECTION F: GOVERNMENT STRATEGY

This section intends to measure the government strategy among livestock farmers in Narok County. Use the scale provide to respond to the statement below as it applies to you. Kindly be as honest as possible. **Use the scale 1-5: where 1-Strongly agree, 2-disagree, 3-neutral, 4-agree, 5-Strongly agree**

No	Statement	1	2	3	4	5
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37	I have attended various government training on value creation and addition in livestock farming					
38	The government conduct entrepreneurship training where livestock farmers from this region acquire skills to enhance their livestock farming					
39	Government organizes mentorship programs where livestock farmers are properly trained on modern ways of livestock farming					
40	Having government programs on livestock farming will improve revenue from livestock farming					
41	The government provides extension services program on livestock investment decisions					

SECTION G: COMMERCIALIZATION OF LIVESTOCK FARMING

This section intends to measure the commercialization of livestock farming among livestock farmers in Narok County. Use the scale provide to respond to the statement below as it applies to you.

42. Indicate whether you have commercialized your livestock farming.

Yes []

No []

43. Which livestock product do you market?

a. I market the complete living animal []

b. I slaughter the animal and sell it in parts []

c. I sell both the living animal and the slaughter one []

44. How much do you make from livestock farming annually?

a. Less than kshs. 100,000 []

b. Between kshs 100,001 -250,000 []

c. Between kshs 250,001 -500,000 []

d. Between kshs 500,001 -750,000 []

e. More than 750,000 []

Use the scale 1-5: where 1-Strongly agree, 2-disagree, 3-neutral, 4- agree, 5-Strongly agree

No	Statement	1	2	3	4	5
45	I engage in value addition and distributes them to the market for huge profit					
46	I have been able to access regional and international market opportunities for my livestock products					
47	I have a reliable market for my livestock and products from livestock farming					
48	I engage in livestock farming purely for commercial purposes					
49	I engage in the production, distribution, and marketing of livestock products to meet both the customers' demands and market needs					

50.
Please indicate some of the channels used in the

distribution of livestock and livestock products.

1. _____
2. _____
3. _____
4. _____

THANK FOR PARTICIPATION

Appendix III: NACOSTI PERMIT

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Appendix IV Reliability Results

Item-Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I have high skills rewarding decisions in my livestock farming	7.37	11.428	0.584	0.893
I have skills to develop business plan for my farming business	7.24	9.537	0.832	0.837
I effectively manage finances for my farming activities	7.39	11.543	0.617	0.886
I frequently attend programs/training where we are taught entrepreneurship	7.29	10.157	0.775	0.852
I have entrepreneurial skills that enable me to effectively manage my livestock farming	7.34	8.826	0.846	0.834

Item-Total Statistics - market orientation knowledge

Item-Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I am aware of all the needs of consumers of livestock products	16.58	6.629	0.655	0.782
I am aware of all the products livestock farmers can derive from the farming activities	16.63	6.942	0.524	0.812
I have adequate market information on livestock and all the products associated with livestock farming	16.76	5.807	0.656	0.775
I frequently access information on livestock market such as prices, demand and market preferences	16.82	5.56	0.592	0.803
I am aware of the market opportunities in livestock farming	16.58	5.872	0.705	0.76

Item-Total Statistics- Risk Management Knowledge

Item-Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I am aware of all the risk threats facing livestock farming within my region	8.82	16.208	0.721	0.889
I possess sufficient understanding regarding the ramifications of climate change on my livestock farming operations.	8.82	16.857	0.791	0.875
I possess a set of strategies aimed at mitigating the adverse effects of water scarcity on my livestock.	8.95	17.186	0.729	0.884
I possess a set of strategies aimed at alleviating the adverse effects resulting from a scarcity of grazing land on my livestock.	8.87	17.198	0.725	0.885
I have adequate knowledge to handle all the uncertainties livestock farming face	8.92	16.994	0.816	0.871
I have knowledge on how to identify and mitigate risk livestock farmers face.	9.18	20.262	0.681	0.898

Item-Total Statistics- Environmental Awareness Knowledge

Item-Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I have adequate skills and knowledge in managing waste and keeping my environment favorable for livestock farming	8.79	11.792	0.469	0.709
I am aware on how to manage animal diseases to improve the quality of my livestock	8.89	12.097	0.43	0.723
I am enlightened on how to manage grazing field	8.55	10.47	0.542	0.682

I always scout for modern agribusinesses skills to improve my livestock farming	8.79	11.198	0.542	0.682
I always scan my environment for latest technologies to improve my livestock farming	8.97	11.161	0.542	0.682

Reliability Statistics of Item-Total Statistics- Government Strategy

Item-Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I have attended various government training on value creation and addition in livestock farming	8.16	18.407	0.766	0.933
The government conduct entrepreneurship training where livestock farmers from this region acquire skills to enhance their livestock farming	8.26	18.469	0.878	0.912
Government organizes mentorship programs where livestock farmers are properly trained on modern ways of livestock farming	8.42	17.764	0.9	0.907
Having government programs on livestock farming will improve revenue from livestock farming	8.21	18.495	0.832	0.92
The government provides extension services program on livestock investment decisions	8.21	18.279	0.776	0.931