PARTICIPATORY ANALYSIS OF LIVELIHOOD DETERMINANTS, INDIGENOUS CHICKEN PRODUCTIVITY AND INNOVATIONS IN RURAL COMMUNITIES OF KERICHO COUNTY, KENYA

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A THESIS SUBMITTED TO THE BOARD OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE CONFERMENT OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN AGRICULTURAL EXTENSION AND INNOVATION OF THE UNIVERSITY OF KABIANGA

UNIVERSITY OF KABIANGA

NOVEMBER 2025

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This thesis is my original work and has not been presented for the conferment of a degree or for the award of a diploma in this or any other University:

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DEDICATION

I dedicate this work to my parents; Moses Cheruiyot Marisin and Ludia Chepkemoi Marisin

ACKNOWLEDGEMENT

I am grateful to God for the gift of good health and strength throughout the course of this study. My sincere appreciation goes to my supervisors; Prof. Joash Kibett, Prof. Michael Omunyin, and Dr. George Kere for their guidance and insightful feedback. I thank the staff of the Department of Agriculture, Livestock and Cooperative Development in Kericho County, especially those in Ainamoi, Soin/Sigowet, and Kipkelion West Sub-counties. I am grateful to the County Directors for Agriculture and Livestock Development for their support. Special thanks to the lead farmers and all participating farmers and stakeholders who generously shared their experiences and time. Your contributions were central to this study. I appreciate the interviewers in Ainamoi, Soin/Sigowet and Kipkelion West for their dedication in the fieldwork. Lastly, I acknowledge my family members and everyone who in one way or another contributed to the success of this study, whether through direct participation or words of encouragement. Thank you all for being part of this journey.

ABSTRACT

Socioeconomic prosperity in rural areas is closely linked to the productivity and sustainability of agricultural resources. Conventional socioeconomic indicators such as lighting and energy access often fail to capture local priorities and lived realities. In many resource-constrained households, indigenous chicken (IC) rearing constitutes a vital low-input livelihood strategy. Despite its significance, IC productivity remains constrained by multifaceted challenges that are insufficiently examined from community perspectives. This study investigated the latent roles of indigenous chickens in the livelihoods of rural smallholders in Kericho County, Kenya, employing community-based participatory action research design. The study aimed to assess the socioeconomic determinants of livelihoods, analyze livelihood strategies, and evaluate factors influencing IC productivity and value chain performance within grounded theory and value chain frameworks. Data were obtained from 398 households across three sub-counties representing diverse agro-ecological and socioeconomic contexts. Mixed-method analysis integrated grounded theory analysis with descriptive and inferential statistics using SPSS (version 27). Results indicate that interactions among environmental-economic factors, inherited knowledge, market-orientation, resilience motives, education, social embeddedness, and intergenerational dynamics shaped livelihood strategies. Most households practiced dual livelihood systems combining farm-based activities with small-scale trade, seasonal work, or formal employment. Indigenous chickens fulfilled multiple roles including livelihood insurance, market engagement, ecological balance, nutritional support, and social connectedness. Egg production differed significantly by gender (Welch $F(1, 384.12) = 4.814$, $p = .029$), access to information ($F(4, 62.84) = 12.376$, $p < .001$), and group membership ($F(2, 60.01) = 66.848$, $p < .001$). Positive correlations were observed between egg production and farm size, enterprise diversification, flock size and household size (Spearman's, $p < .05$). Chick survival was influenced by education, information access, and group membership, and correlated positively with flock size ($r_s = .374$, $p < .001$). Both egg production and chick survival varied across community-defined prosperity stages. In conclusion IC practices enhanced genetic diversity and resilience but were constrained by epistemic, market, and infrastructural barriers. Strengthening participatory platforms can foster co-created innovations in poultry health, capacity-building and predator control. Through participatory and socioeconomic analyses, the study demonstrates how local knowledge and social networks influence productivity and welfare; guiding inclusive policies that support sustainable, community-driven agricultural development.

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LIST OF ABBREVIATIONS AND ACRONYMS

CBPAR	Community Based Participatory Action Research
DFID	United Kingdoms' Department for International Development
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus Group Discussion
GFRAS	Global Forum for Rural Advisory Services
GT	Grounded Theory
GTI	General Theory of Innovation
IC	Indigenous Chicken
IFAD	International Fund for Agricultural Development
KCSAP	Kenya Climate Smart Agricultural Project
KNBS	Kenya National Bureau of Statistics
NGO	Non Governmental Organization
PAR	Participatory Action Research
PDR	Participant Driven Recruitment
PRA	Participatory Rural Appraisal
SID	Society for International Development
VCP	Value Chain Player

OPERATIONAL DEFINITION OF TERMS

Collaborative action: In common usage refers to two or more people or entities working together to achieve some common aim. In this study similarly it referred to joint action between the researcher, community and key stakeholders to achieve shared objectives

Community-based participatory action research: A research approach that directly engaged communities, their knowledge and other stakeholders in the research process and on its implications for action to bring about social change.

Context: Set of structured conditions in which action and interaction took place

Determinants of livelihood: Factors that were considered in selection of strategies to meet basic household needs as perceived by the household heads. In the current study, it referred to factors that affected livelihood outcomes, from the perspective of the community.

Efficacy: In normal usage it refers to the ability to produce a desired or intended result. In this study it referred to the value chain practices that produced the desired results from the perspective of the value chain players, productivity and sustainability.

Innovation: In common business usage refers to the introduction of a new idea, object or process to create new value to an enterprise. In this study, it referred to the creation of new ideas or processes to the community, to create value, specifically to the indigenous chicken rearing among the community members.

Latent: This referred to the underlying meaning of contents of a conversation as interpreted from interviews and discussions. Used in this study to refer to the underlying roles of indigenous chickens among rural-based communities.

Livelihood: In normal usage refers to a means of securing the necessities of life. In this study, it was used to refer to a means of securing the needs for the rural-based households.

Livelihood outcomes: The results or achievements that the rural households attained by engaging in their livelihood strategies.

Livelihood strategies: According to DFID, it is a combination of resources and activities undertaken to provide for the basic needs of households. In the current study, it similarly referred to the resources used and activities undertaken by a rural-based community in providing for the basic needs of their households.

Participatory action research: This meant a research method in which key stakeholders in the research outcome were actively involved in the research process and in a discussion on their action implications.

Participatory analysis: A method in which the community members and other key stakeholders are actively involved and participate in the research process; planning, data collection, analysis and interpretation & validation of the results. In this study, it referred to the active involvement of indigenous chicken producers and other key stakeholders in indigenous chicken rearing in the research process.

Participatory approach: Any method of solving a problem or accomplishing a task that involves the people who have a stake in it. In this study, it referred to the involvement of the indigenous chicken producers and other stakeholders.

Participatory rural appraisal: An assessment and learning process that empowers a community to generate and share information about their local conditions, resources and needs for purposes of joint planning and action.

Productivity: In business usage, it means returns to resources used within a specified time period. In this study, it specifically referred to the returns derived from indigenous chicken rearing within a specified period as measured by the chicken producers.

Socio-economic determinants of indigenous chicken productivity: Social and economic factors that shape the management practices and productivity of the indigenous chicken value chain.

Socioeconomic determinants of livelihoods: The social and economic factors that influence the choices individuals, households or communities make to secure their living.

Social innovation strategies: This referred to the structured approaches designed to develop and implement new solutions to socio-economic challenges that limit the productivity of indigenous chicken value chain.

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CHAPTER ONE

INTRODUCTION

1.1 Overview

This section provides background information on rural livelihoods, community-based participatory action research, and indigenous chicken productivity, both globally and within the Kenyan context, while highlighting challenges facing the indigenous chicken sub-sector.

1.2 Background of the Study

A large proportion of the worlds' poorest people live in the rural areas. The rural-poor human populations make up over two-thirds of the worlds' poorest. They mostly derive their livelihoods from agriculture and agriculture-related activities (Famuyiwa et al., 2017). It is in these rural areas where agricultural extension and rural innovations for the productivity of livelihood strategies play a critical role in the field of development. This is particularly so in developing countries which mostly have rural-based economies. These rural-based economies largely rely on existing natural resources for their productivity and to provide socio-economic benefits to their populations (Zhang, 2024). In these developing economies over one-third of the rural population are located in less favourable agricultural land, hampered by biophysical conditions or poor market access (Barbier & Hochard, 2018), thus compromising on the productivity of the agricultural resources. The Agricultural Extension service plays a critical role in these areas. Agricultural Extension has long been understood as a dynamic process in rural areas. It is an informal educational service that helps rural communities solve their problems and improve their livelihoods by integrating diverse knowledge systems and connecting

farmers with other actors in rural development (Maulu et al., 2021) so as to create value. Indeed, one of the key principles of agricultural extension is that extension works with the people and not for them. However, the extent to which rural people are involved to solve their problems is varied both in space and time and therefore varies from one context to another.

According to Rai et al. (2023), the role of Agricultural extension in facilitating learning across diverse contexts is increasingly critical given climate change, market fluctuations, and resource constraints. In a similar vein, Famuyiwa et al. (2017) characterise extension as a process that enables farmers to identify and analyse their challenges and mobilize their own resources to address these needs. These perspectives underscore the necessity of active rural community engagement in both the analysis of local problems and the formulation of contextually relevant solutions. However, earlier research and extension paradigms placed limited emphasis on community participation in agricultural innovation and extension (Cook et al., 2021). Meaningful farmer involvement began to gain traction in the 1980s , particularly with the adoption of the Farming Systems Research and Extension approach by researchers and extension agents (Mapiye & Dzama, 2024), although participation remained limited (Chowdhury et al., 2014). An alternative participatory approach; Participatory Action Research (PAR), initially emerged in the 1940s but received limited application in agricultural development until its revival in the 1980s. Since then, PAR has evolved into a structured method for studying and fostering community-based social innovation (Aiken, 2024).

The emergence of Participatory Action in Research can be traced back to psychologist Kurt Lewin, who introduced the approach in the post second world war period to explore

and address pressing social issues such as discrimination and segregation (Dorothea, 2017; Darryl, 2018). The methodology subsequently spread globally. Paulo Freire is widely credited with adapting and disseminating the approach in the Global South through his engagement with social movements aimed at resisting oppression and exclusion during the same historical period (Dorothea, 2017). Since then, participatory methodologies have evolved, gaining recognition as effective approaches for understanding and improving communities and organizations (Aiken, 2024).

One such methodology is Community-based Participatory Action Research (CBPAR), which builds upon the foundational principles of Participatory Action Research (PAR). CBPAR emphasises collaborative knowledge generation between community members and development agents to jointly identify and address community-specific issues (Ferreira & Gendron, 2011). It focuses on creating new knowledge through the collective integration of existing knowledge sources. According to Ferreira and Gendron (2011), this process involves incorporating local knowledge into problem-solving research, enabling community members to analyse their own situations and develop solutions in partnerships with external researchers. The phrase community-based in CBPAR is used deliberately to highlight that the central focus of this participatory, action-oriented research is the community itself. But, what are the defining characteristics of community-based PAR?

One of the defining characteristics of community-based participatory action research (CBPAR) is its emphasis on shared understanding and mutual commitment between researchers and community members. This collaboration enhances motivation for collective and coordinated action (Dick, 2003). Such a feature makes CBPAR

particularly suitable for exploring livelihoods and livelihood strategies, such as indigenous chicken rearing, to identify related challenges and opportunities for socioeconomic transformation.

In Kenya, similar participatory approaches were implemented from the 1970s through the 1990s. The Farming systems approach was dominant in the 1970s, but was later criticized for its reductionist nature, as it focussed on a limited number of farming systems at a time and was deemed unsuitable for addressing the complex challenges of diverse agricultural systems in a cost effective manner (Conroy & Sutherland, 2004). Over time, this approach began to compete for research resources with Participatory technology development, which placed greater emphasis on farmer participation. However, both approaches were criticized for targeting only a small number of farmers, despite using substantial resources that might have had broader impact if applied more widely (Conroy & Sutherland, 2004). As a result, their adoption remained limited. While participatory approaches have been faulted for their limited scalability due to their intensive nature, they are nonetheless credited with fostering technological change, albeit within a relatively small geographical scope.

In a study conducted in Kenya's Rift Valley and Central provinces using a participatory approach, Ndegwa et al. (2013) reported that farmers were able to implement various interventions using their own resources to improve indigenous poultry farming. This finding suggests that the sharing of information, knowledge and experiences was instrumental in understanding local challenges and formulating effective solutions. Although initially perceived as having limited outreach and high costs, the participatory approach appears effective for scaling up technologies, knowledge, and information. This

could be particularly beneficial for indigenous chicken farming which is faced by various challenges.

The indigenous chickens (*Gallus domesticus* L.), accounts for approximately 80% of the total poultry population in Kenya (Macharia et al., 2022). Their products, especially meat and eggs, are an important source of protein for both rural and urban populations (Njuguna et al., 2017). Current estimates suggest there are about 21 million indigenous chickens in Kenya, though most exhibit low productivity. Studies in Machakos and Makueni counties have identified diseases, pests and limited capital as major challenges to indigenous chicken production (Wanjugu, 2013; Mutua, 2013). Additionally, Ipara et al. (2023) cited poor nutrition, disease prevalence and poor management practices as key constraints. Magothe et al. (2012) further noted that erratic and unpredictable markets pose significant challenges for small-scale poultry producers in the country.

Various research sources suggest that indigenous chicken production in Kenya faces numerous challenges that adversely affect its contribution to the livelihoods of smallholder rural communities (Ndegwa et al., 2013). Despite these challenges, the approximately 21 million chickens in the country play a vital role in supporting the livelihoods of many resource-poor households (Tenza et al., 2024). These households are typically characterised by low levels of income, limited access to goods and services, and are often located in disadvantaged areas (Kenya National Bureau of Statistics & Society for International Development, KNBS & SID, 2013).Indigenous chickens continue to hold special significance for these households.

In Kenya the demand for indigenous chicken products is increasing (Njuguna et al., 2017; Uzundumlu & Dilli, 2023). However, the challenges associated with the indigenous poultry sub-sector directly affect rural livelihoods. As noted by Wong et al. (2017), small stock such as poultry is crucial for the economic wellbeing and nutritional needs of rural communities. In2018, Kenya's poultry subsector produced substantial quantities of eggs, all of which were consumed domestically (FAO, 2019). This underscores its importance in food and livelihood security, particularly in high potential areas, such as the warm upper midland zones of Ainamoi in Kericho County, among others. This study partly targeted these zones based on their agro-ecological potential and indicators of wealth and prosperity.

Conventional indicators of poverty, such as inadequate housing, reliance on natural sources for energy, and low levels of social capital (e.g. education), are common in poorly resourced communities and were relevant in this study (KNBS & SID, 2013). While such indicators provide a general overview of socioeconomic conditions, research using participatory methodologies with community involvement in naturalistic studies offers a more accurate and context-specific understanding of the livelihoods (Bergold & Thomas, 2012). Through this approach, new skills and practices are introduced to community members (Reason & Bradbury, 2020), allowing the use of experiential knowledge to address local issues and develop alternative solutions (Kanyagui et al., 2023).This approach was considered suitable for understanding both livelihood dynamics and indigenous chicken productivity challenges in Kericho County.

Indigenous chickens constitute approximately 84% of the total poultry flock in Kericho County (Too et al., 2019) and play a significant role in supporting low-resource

households. Demand for indigenous chicken and their products remain high, with 76% of participants in the study reporting increased consumption. As a low-input livelihood strategy, the indigenous chicken value chain holds considerable potential for enhancing the resilience of resource-disadvantaged households.

National data indicates that some areas within Kericho County are disadvantaged according to conventional livelihood indicators (KNBS, 2013). For instance, Ainamoi ward exhibits several socioeconomic indicators that fall below the county average, as illustrated in Table 1.1. The table shows that 72.6% of households in the ward use corrugated iron sheets for roofing, compared to a county average of 83.2%. Similarly, only 15.5% of households in Ainamoi use cement for flooring, compared to 34.4% across the county. Electricity coverage in the ward stands at just 2.8%, far below the county average of 10.6%. Additionally, the use of bricks or stone for wall construction is 5.8% in Ainamoi, compared to a countywide figure of 20.6% (Table 1.1).

These relatively low socioeconomic indicators underscore the need for a deeper understanding of livelihoods in the area. A participatory livelihood analysis framework (Anirudh, 2005) in which community members are actively engaged in identifying and generating relevant indicators, would provide a more context-sensitive and inclusive basis for addressing local challenges.

Table 1.1

Livelihood Indicators, Kericho County average and Ainamoi ward

Description (Indicators)	County Average %	Ainamoi (%)
1. Roofing :		
• corrugated iron sheets	83.2	72.6
• Grass thatching	13.4	22.9
2. Floor material		
• Earth	64.2	84.0
• Cement	34.4	15.5
3. Lighting fuel		
• Electricity	10.6	2.8
• Lantern lamp	51.1	51.6
• Tin lamp	35.1	43.1
4. Wall material		
• Mud/wood	53.2	65.3
• Bricks & stone	20.6	5.8
5. Employment:		
• Employed in family Agricultural Holding	41	47.1
6. Education:		
• No formal education	15.9	17.0
7. Cooking fuel		
• Firewood	84.1	96.9

Source: KNBS and SID (2013)

This study aimed to understand the livelihoods of rural communities in Kericho County and the role of indigenous chicken within those livelihoods, using a community-based participatory action research (CBPAR) approach. This approach emphasizes experiential knowledge and community involvement. The research focused on identifying challenges and opportunities in the indigenous chicken subsector and collaboratively planning actions to address priority issues. Indigenous chicken production is vital to the food and livelihood security of smallholder farm households in developing countries (Padhi, 2016;

Sariyev & Zeller, 2023). However, the sector faces numerous challenges that require identification and collective action to improve livelihoods.

Livelihood strategies such as chicken rearing aim to help households achieve self-defined outcomes like food and income security. Households generally expect these strategies to meet their basic needs and help them build assets over time (Morse, 2025). However, when faced with significant challenges, these strategies may fail to deliver the desired outcomes. This study focused on the knowledge pooling process in identifying problems and generating innovation strategies among indigenous chicken producers. It posited that any agricultural innovation strategy must meaningfully contribute to improved livelihood outcomes for rural households.

1.3 Statement of the Problem

Rural households in developing countries largely depend on farm-based livelihoods, making agricultural productivity central to their wellbeing. Globally, about two-thirds of the poorest households live in rural areas and rely primarily on agriculture (Famuyiwa et al., 2017). However, productivity remains persistently low despite sustained government and development efforts (Ministry of Agriculture Livestock and Fisheries Kenya; MOALF, 2017). In Kenya, extension services have promoted interventions such as improved nutrition, vaccinations, chick-rearing equipment, brooders and enhanced housing for indigenous chicken. Yet adoption and impact remain limited (Ipara et al., 2023). Indigenous chicken, a low-input and adaptable resource (Leele & Chidera, 2020), plays a crucial role in food and income security. Although it can produce up to 180 eggs annually, actual output averages only 40-53 eggs (Cheruiyot & Adhiaya, 2021). Internal factors such as housing, hygiene and nutrition, along with external constraints like poor

market access (Onono et al., 2017) and limited market information (Too et al., 2019), contribute to this underperformance.

These persistent challenges highlight the need for research and extension approaches that better reflect smallholder realities. While participatory approaches have proven effective in generating context-specific knowledge (Ndegwa et al., 2015), they remain underutilized. Productivity constraints are often context-specific, varying across regions and communities, making uniform, nationally designed interventions less effective.

Existing studies on rural livelihoods and indigenous chicken production mostly employ conventional quantitative and qualitative methods, overlooking participatory inquiry that engages farmers directly in identifying and addressing productivity constraints. Understanding livelihood strategies through participatory methods is essential for developing interventions that are contextually relevant, sustainable, and aligned with local priorities. Addressing this methodological gap is critical to improving the productivity and socioeconomic wellbeing of rural smallholders in Kenya.

1.4 Purpose of the Study

The purpose of this study was to conduct a participatory analysis of livelihood determinants, indigenous chicken productivity, and innovation strategies in rural communities of Kericho County, Kenya.

1.5 Specific Objectives

This research study was guided by the following objectives:

i) To examine the socio-economic determinants of livelihoods, through a participatory analysis, among rural communities in Kericho County

ii) To analyze, through a participatory approach, the patterns of livelihood strategies among rural communities in Kericho county

iii) To investigate, through a participatory approach, the latent roles of indigenous chicken in the livelihoods of smallholder farmers in the rural areas of Kericho County

iv) To examine through participatory analysis the socio-economic determinants of indigenous chicken productivity among smallholder farmers in Kericho County

v) To determine the relationship between indigenous chicken productivity and livelihood outcomes, through a participatory approach, in the rural areas of Kericho County

vi) To evaluate, through a participatory approach, the efficacy of the indigenous chicken value chain practices among smallholder farmers in Kericho County

vii) To formulate, through a participatory approach, potential social innovation strategies for indigenous chicken productivity enhancement in Kericho County

1.6 Research Questions

The study sought to answer the following research questions:

i) What are the socio-economic determinants of livelihoods, as examined through participatory analysis, among the rural communities in Kericho County?

ii) What are the patterns of livelihood strategies, as analysed through a participatory approach, among the rural communities of Kericho County?

iii) What are the latent roles of indigenous chicken on the livelihoods of the smallholder farmers in the rural areas of Kericho, as established through a participatory approach?

iv) What are the socio-economic determinants of indigenous chicken productivity, as established through participatory analysis among smallholder farmers in the rural areas of Kericho?

v) What is the relationship between indigenous chicken productivity and livelihood outcomes in the rural areas of Kericho County, as determined through a participatory approach?

vi) What are the efficacies of the indigenous chicken value chain practices among the rural communities of Kericho County, as evaluated through a participatory approach?

vii) What social innovation strategy can be formulated for indigenous chicken productivity enhancement in Kericho County, through a participatory approach?

1.7 Justification of the Study

This study adopted a community-based Participatory Action Research (PAR) approach to examine context-specific factors influencing the livelihoods and productivity of smallholder livelihood strategies, with a particular focus on indigenous chicken production. Indigenous chicken farming plays a significant role in rural livelihoods but continues to face multiple challenges that constrain its productivity and contribution to household welfare. The study was considered critical as it sought to provide a deeper understanding of local livelihoods within the broader context of persistent threats to

income and food security, as reflected in conventional measures of living standards (KNBS, 2013).

By employing a contextually grounded framework, the study explored the contribution of indigenous chicken rearing to livelihood outcomes from the perspective of those engaged in the practice. It further sought to collaboratively formulate strategies to address identified challenges and constraints through participatory engagement. In Kericho County, approximately 577,000 indigenous chickens, representing about 83.6% of the total poultry population, were reported in 2019 (KCSAP, 2019). The rising demand for indigenous chicken products is attributed to shifting dietary preferences toward naturally produced foods, population growth and urbanization.

Despite their potential for rapid turnover under relatively simple management systems, indigenous chickens often exhibit low productivity, primarily due to sub-optimal management practices. Through active community participation and knowledge creation, this study aimed to empower participants to identify challenges, co-develop strategies, and pursue self-defined livelihood goals. The participatory framework adopted was particularly valuable in providing an authentic and situated understanding of social realities, grounded in Lewin's (1946, as cited in MacDonald, 2012) proposition that "you cannot understand a system until you try to change it."

The analytical relevance of the study lies in its focus on indigenous chicken production as a livelihood strategy from both innovation and value chain perspectives. Building on Schure's (2014) application of value chain frameworks in participatory research, the present study integrated the sustainable livelihoods and innovation perspectives to

provide a comprehensive understanding of rural livelihoods and the productivity of local agricultural resources. While previous research has often relied predominantly on quantitative and qualitative survey methods, participatory methodologies remain underutilized; where they have been applied, they frequently concentrate on isolated value chain segments (Relucio, 2021). This study therefore contributes an alternative participatory and systems-oriented approach for understanding smallholder livelihoods.

1.8 Significance of the Study

The findings of this study are expected to contribute to scholarly and practical discourses on agricultural development by elucidating the constraints, opportunities and adaptive strategies of resource-poor farmers engaged in indigenous chicken value chains. The community-based participatory action research approach, grounded in principles of participation, collaboration, and empowerment, enhanced the capacity of local actors to diagnose their challenges and design contextually relevant interventions.

Insights derived from the collaborative innovation platform established during the study may inform future research and development initiatives in similar socio-economic contexts. The study's three-tier analytical framework, comprising livelihood analysis, value chain analysis, and innovation facilitated the systematic integration of participants' experiential knowledge into the research process. Consequently, the outcomes of this study hold potential to inform participatory development planning and to advance alternative approaches for understanding and strengthening communities whose livelihoods are dependent on natural resources.

1.9 Scope of the Study

This study focused on livelihoods and the role of indigenous chicken as a livelihood strategy among the rural population in Kericho County. It collected in-depth, context specific data on livelihoods and the indigenous chicken, shaped by both local and external factors.

1.10 Limitations of the Study

The scope of the community-based participatory action research was confined to the specific community in which it was implemented. As noted by Cargo and Mercer (2008), findings derived from participatory action research are context-dependent and reflect the situated expertise of participating communities; thus their generalizability to other socioeconomic settings should be approached with caution. Nonetheless, the frameworks developed in this study may be adaptable to other tropical contexts characterized by comparable agro-ecological and socio-economic conditions.

While participatory research offers the strength of active community engagement, it also presents potential limitations. The perspectives of selected community representatives may not fully capture the diversity of views within the wider population. To mitigate this limitation, extensive knowledge mobilization and triangulation techniques were employed, allowing for cross-verification of information from multiple sources (Cargo & Mercer, 2008).

The study generated knowledge that is both situated and socially influenced, underpinned by a critical realist ontological assumption. According to Braun and Clarke (2013), critical realism posits that while knowledge is socially constructed and only partially accessible, it nonetheless reflects an underlying reality that emerges through contextual

interactions. Consequently the validity of the knowledge generated in this study is inherently context-specific, safe for the frameworks that may be applied to other similar contexts.

1.11 Assumptions of the Study

This study assumed that the community representatives were honest and truthful throughout their engagement and that their input reflected their real-world experiences. It was also assumed that working closely with them did not raise their expectations despite deliberate efforts to manage this during the initial community entry phase. It was further assumed that they did not present a distorted view of the local situation due to any misconceived expectations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature relevant to the study. It begins with a review of empirical research on livelihood strategies in rural societies and the role of indigenous chickens in the livelihoods of smallholder households. It then discusses previous studies on IC value chains in Kenya. The chapter also highlights the importance of participatory and collaborative approaches in research. Additionally, it reviews the theoretical foundations of the study, including Grounded Theory (GT), the Value Chain model, and the General Theory of Innovation (GTI). A framework for analyzing livelihoods is presented as part of the study's conceptual framework. The section concludes with a summary of the revised literature and the identified research gaps.

2.2 Review of Related Literature

2.2.1 Determinants and Patterns of Livelihood Strategies in Rural Societies

In developed economies such as that of the United States of America, globalization has had its impact on rural livelihoods. Rural livelihoods in such economies rely on non-metropolitan employment from commercialized agriculture, rural processing, packaging and tertiary sectors such as transportation and communication (Vias & Nelson, 2006). The livelihoods in most developing countries have in the past relied largely on natural resources and farming, however, in the 21st century, World Bank (2025) has observed that lives and livelihoods in the rural areas were getting increasingly delinked from farming due to the expansion of diverse non-farm opportunities. It has been suggested that there could be further divorce of livelihoods from the reliance on farming fueled by

the increasing levels of mobility of the rural dwellers. In many developing countries, however, livelihoods are still derived mostly from natural resources and labour resources. In India for example, according to Acharya (2006), a large proportion of small-scale marginal farmers gain livelihoods from agricultural production practiced on small pieces of land and from the sales of their labour. Those who have land derive livelihoods from agricultural production and the landless rural households derive livelihoods by selling their labour. The households that derive their livelihoods from manual labour can be regarded as vulnerable since their livelihoods are dependent on external factors such as the demand for labour, the prevailing wage rates and the prices of food in their markets. The Indian case presents a third category of livelihood which is based on markets. Market-based livelihoods involve households that are largely engaged in trade of farm and non-farm goods. In such cases the stability of the marketing system determines their livelihoods. A fourth category is composed of households without income-earning assets and without able-bodied individuals who can sell their labour; this category relies on social safety nets, either from the government social security funds or remittances from their relatives (Acharya, 2006), suggesting a high level of reliance on external sources. This case study implies that there is a high heterogeneity of rural livelihood systems in developing countries.

The observation suggesting that rural communities engage in diverse non-farm activities (World Bank, 2025) is negated by a study conducted in Nepal by Bhandari (2013). The study on rural livelihood change from agrarian to non-farm activities observed that the availability of household labour, land for cultivation and livestock assets prevented a shift of livelihoods from agriculture-based to non-farm activities. Although the study was

conducted in a rapidly transitioning poor rural agrarian context, livelihood transitioning to non-farm activities was said to have been slowed down by the availability of human resources, natural resources and assets; particularly the labour, land and livestock. This case suggests that populations tend to remain static on their livelihood strategies depending on the assets already at their disposal. On a global level, the demographic transition from natural-resource based activities to non-agricultural activities has been motivated by macro-economic factors such as the expansion of the markets, and the improvement of infrastructure and communications as reported by Loison (2015). According to the author these trends which have been observed mostly in the west appears not to be the case in Sub Saharan Africa. In Sub Saharan Africa, as opposed to what is observed in the west, the rural population is expected to increase further by 2050; thus, suggesting a continued dominance of agriculture-based livelihoods in the region. This observation by Loison (2015) has implications for land use and the productivity of livelihood strategies among rural households, going into the future.

In rural societies which are mostly agrarian societies, the land on which they live serves as the main means for generating livelihoods, for accumulating wealth as well as transferring it between generations (Tuyen, 2014). In view of its role in providing shelter and food, land has been regarded as a basic asset in developing countries. But, what aspects of land in the context of the study area is a determinant of livelihoods? This is what the current study envisaged to unearth. The use of land through selling or leasing has been reported as providing safety-nets for those who are unable to cultivate the land themselves (Tuyen, 2014). This view suggests a need to look at land, rather not from its uses in farming, but from a broader perspective of its extended uses and properties. An

in-depth analysis in this study yielded some data that can aid in the full understanding of livelihoods.

Despite the reliance of agrarian societies on land for livelihoods, Tuyen (2014) further suggests that land shortage may have driven many households into non-farm activities, particularly in situations where there is some growth in urbanization and industrialization. This study was conducted in a rural society with access to a large urban centre as well as in an area with limited access, what could be the trends? Could there be a move from agrarian patterns to non-farm activities due to proximity to urban markets? Could there be what Tuyen (2014) has referred to as de-agrarianization? Or could urbanization have encouraged agrarianism by providing markets? Whatever the livelihood strategies adopted by the rural population, nevertheless, such livelihoods ought to be sustainable.

When the concept of sustainable livelihood is viewed as the maintenance of an adequate stock and flow of food and cash within a household to meet the households' basic needs as explained by Acharya (2006), it implies that emphasis needs to be placed on the resource-poor households in developing countries who in most times are faced with challenges of maintaining the flow. In a case reported from India for example, low rainfall in non-irrigated areas accounted for the highest proportion of resource-poor households. Whereas environmental contexts, resource use economics and social goals are the pillars of sustainability in developments, at the household levels, the ability of households to meet their basic needs without having to resort to the environment is what has been regarded as livelihood sustainability (Rahman & Hickey, 2020). This intersection between sustainability of development with sustainable livelihood suggests that in both cases there are trade-offs between satisfying the present needs of the

resource-poor and that of the future generations by maintaining the environment. This is to suggest that sustainable livelihoods and sustainable development are intricately linked to the natural environment.

In Kenya, Greiner and Sakdapolrak (2013) observed in a study report that there were distinct relationships between migration, agricultural change and the environment. These relationships were mediated by socio-economic factors such as remittances, social status, and loss of labour and cultural factors. Their study suggested a strong interaction between migration and the natural resource base. The migration patterns that were reported suggested there was a relationship between the migration and the productivity of the natural resources. Immigration was in the direction where the natural resources were more productive. This observation logically suggests an out-migration of populations from low agricultural productivity areas to areas of better potential.

The smallholder rural economy in sub Saharan Africa has continued to suffer from persistently low agricultural productivity and chronic food insecurity (Loison, 2015) implying a low productivity of the natural resource base. Whereas incomes from non-farm sources have grown in importance, some studies suggest that it only accounts for about 35% of rural household incomes in sub-Saharan Africa compared to about 50% in Asia and Latin America (Loison, 2015). This implies that the diversification into non-farm activities by agrarian societies in sub Saharan Africa may be constrained by a lack of feasible opportunities as rural populations continue to rely on agricultural productivity for sustainable livelihoods. The household economic model which operates on the assumption that households are the production units suggest that diversification is a function of returns to labour.

Despite the diversification of livelihood strategies that are prevalent among rural households, probably based on the returns to their labour, rural livelihoods have been described by Scoones (2009) as complex and intersecting with political, economic and environmental processes. According to the author, what really makes the livelihoods sustainable in rural environments is its ability to recover from shocks and stresses whenever they occur. This view is captured in a study conducted in China by Peng et al. (2019) which demonstrated a complex relationship between agrarian livelihoods and the environment. In the study, rural livelihood strategies were associated with the flows of labour, capital, ecosystem services and other processes between rural and urban areas, making the livelihood strategies highly dynamic and location-specific.

The geographical location of a household is one determinant of the livelihood strategies adopted as it influences a number of factors. The location influences resource endowments, location-based physical constraints, and the access to ecosystem services such as from natural forests (Peng et al., 2019). The authors have cited risks from the environment as an important consideration for households as they locate their residence. The other considerations pertain to the social relationships to be maintained and whether to engage in agriculture or not. The risks cited by Peng et al. (2019) in their study included declining soil fertility due to soil erosion, natural disasters, decreases in agricultural biodiversity, scarce water and increased scarcity of cultivable land. Some of the risks and vulnerabilities cited by the authors were found to be associated with climate change. These climate-related risks similarly influenced household strategies further accelerating the dynamics of livelihoods.

According to Peng et al. (2019), socio-economic factors also play a critical role in the choice of livelihood strategies. The influential socio-economic factors included household structure, gender and health, inheritance, access to education and credit facilities. The presence of networks and social relationships are also important social capital factors that influenced livelihood strategies (Peng et al., 2019). Urban growth and related demand for labour also influenced the quantity of off-farm employment, even in peri-urban environments. Greater participation in the markets is also enhanced by the presence of access roads. Elsewhere in Bangladesh, gender and household size were determinants of livelihood diversification. Household assets and remittances had negative influence on the diversification of livelihoods (Ahmed et al., 2018). In the Kericho context these were factors that needed to be investigated to ascertain the real socio-economic factors at play. Socio-economic factors appear to have a critical role to play in sustainable livelihood outcomes.

According to Dolan (2002), agricultural change from one of subsistence to a commercial one for the purposes of improving livelihoods has at times been faced with many challenges. The author reported a rise in witchcraft in some parts of Kenya, where women used witchcraft as a tool to level intra-household income disparities when horticulture was commercialized through contract farming. The social costs of agrarian transition were reportedly high according to the study conducted in Meru, Kenya. There were struggles between gender over land, labour and the increased income in the face of transition to commercial production. This externality suggests there was a scarcity of the resources on which livelihoods are based on leading to struggles over the resources and resulting in undesired social costs.

The dynamism of the agrarian livelihoods in developing countries therefore appears to be complex and are influenced by a number of factors; both internal within the household and external, making its understanding equally complex and context-specific. Within the rural societies themselves there are formal and informal barriers to accessing productive resources, markets and services (IFAD, 2015). The geographical remoteness of some areas, agro-ecology and crop or livestock specializations of households separates rural societies in their livelihood strategies (IFAD, 2015). The crop or livestock specializations of households in a given geographical area may lead to the emergence of farmer's cooperatives which ultimately also influence the livelihood strategies of communities within, as reported in one study conducted in Zimbabwe (Mhembwe & Dube, 2017). Since cooperatives involve pulling effort for joint agricultural activities, the cooperative society becomes an important source of social capital, thus changing the livelihood dynamics.

The dynamism in livelihood strategies appears to be closely related with the complexity and diversification of livelihoods. The occupational diversification means that households add new activities to their livelihood strategies while maintaining existing ones or dropping others and thereby changing their livelihood portfolios. In Africa, it has been estimated that roughly 50% of rural household incomes are generated from non-farm activities (Ajani & Igbokwe, 2014). The author has observed that the non-farm strategies are supported by existing infrastructure such as roads, communication and power as well as the presence of social services such as education and health. Equally important is the information required. The information is obtained from various sources in the form of ideas, radio broadcasts, televised information and newspaper information that enables the

diversification and mobility to take place (Ajani & Igbokwe, 2014). The mobility of labour is also at times halted by external factors, for example, de Brauw (2019) observed cases of increases in rainfall resulting in decreases in out-migration of labour. This observation suggests that the drivers of livelihood diversification are complex.

The drivers of livelihood diversification strategies include both push and pull factors that determine the levels and types of diversification, depending on the farmers' endowments and off-farm opportunities as well as other exogenous factors. The key push factors that drive households towards diversification includes; managing risks such as market and price risks and income variability risks. The other push factors include adapting to heterogeneous agro-ecological conditions and adapting to changing climatic conditions (Asfaw et al., 2015). Potential opportunities such as access to good markets and infrastructure, as well as proximity to urban areas, are the pull factors that are associated with diversification patterns. Higher wage returns to entrepreneurial activities are also an important pull determinant to diversification of livelihoods as observed by Asfaw et al. (2015). Ajani and Igbokwe (2014) also points out that non-agricultural wage employment, in the context of Africa, is more remunerative compared to self employment on farm activities and thus contributes to driving households away from farm to non-farm activities. This assertion suggests a link between African farms and low productivity.

In Kenya, agriculture provides livelihoods, employment, income and food security needs to over 80% of the Kenyan population (FAO, 2019). However, as in the year 2019, an estimated population of 46% were said to be food insecure (FAO, 2019), suggesting that Kenya`s agriculture is not meeting the country's' livelihood needs. Land parcels in high potential areas were rapidly decreasing in size courtesy of population increases. The

drier, more marginal areas are being brought under cultivation where increased vulnerability is observed (FAO, 2019). In the prevailing circumstances there is a need to look into rural livelihood strategies that are not entirely reliant on large farm sizes. The case for indigenous chicken rearing and ensuring its productivity may be one way out in contributing to the sustainability of agrarian population livelihoods.

2.2.2 Understanding Socioeconomic Determinants of Livelihoods

The Socio-economic determinants of Livelihoods have been widely analysed through the Livelihood Framework Approach (Scoones, 2009), which identifies human, social, and financial capitals along with physical and natural resources as key features. The availability and accessibility of these resources are recognized as primary drivers of livelihood strategy choices. In many developing countries, rural livelihood largely depends on natural resources and farming. However, land shortages often push households away from traditional agrarian livelihoods towards non-farm activities (Tuyen, 2014). This shift is increasingly influenced by urbanization. Additionally, environmental conditions, resource use economics and social features play a crucial role in shaping livelihood choices(Rahman & Hickey, 2020).

With respect to natural resources, Mwatuet al. (2021) highlight land size of households as a significant determinant of livelihood choices, underlining the importance of both access to and the quantity of available resources. Market availability and accessibility are important and critical economic factors that also play a role in shaping livelihood strategies. Furthermore, access to credit facilities has been identified as a key driver of livelihood diversification (Ahmad & Afzal, 2024). On the social front, membership in social organizations, such as Cooperative societies has been found to influence livelihood

choices by providing support network and economic opportunities (Asfir, 2016; Ahmad & Afzal, 2024).

Socio-demographic features also play a significant role in shaping livelihood strategies. The education level of the household head, age and family size have been identified as key determinants (Asfir 2016; Ahmad & Afzal,2024). Age in particular influences livelihood patterns. Mbewana and Kaseeram (2024) observed that younger individuals were more likely to migrate to urban areas in search of off-farm employment while older adults tend to remain engaged in rural agriculture. This shift reflects broader trend in employment accessibility and generational livelihood transitions.

Although much of the existing research of livelihood strategies is framed within the five capitals of the livelihood framework approach, livelihood choices are dynamic and context-specific. People constantly adapt their strategies and responses to changing socio-economic conditions and environmental conditions. Rural livelihoods, while heavily dependent on natural resources and supportive infrastructure, are complex and vary across different contexts. As such, a more context-specific approach to studying livelihood determinants is essential. Importantly, previous research has often overlooked the perspectives of the rural communities themselves, despite the fact that development policies and projects are designed primarily for them.

Given that the rural poor constitute a significantly large proportion of the population compared to the urban poor (Famuyiwa et al., 2017**)**, understanding the determinants of their livelihood choices is crucial. A deeper exploration of these factors can inform the development of theory, targeted development policies and interventions aimed at

fostering socio-economic equity and improving rural livelihoods.This study specifically adopted community-based participatory action research techniques in which there is integration of community experiences in the research process (Kumar, 2019).

One of the objectives of this study was to examine the socio-economic determinants of the livelihoods among rural communities in Kericho County, through a participatory analysis. The study adopted a research methodology which fosters active participation of the researched community for indepth understanding of the subject (Uwe, 2017). It focused on the subject of livelihoods and indigenous chicken rearing.

2.2.3 Role of Indigenous Chickens on Livelihoods

Chickens are the most popular poultry worldwide and across all regions irrespective of the culture and religion prevailing in a region (Padhi, 2016). There were about 23.2 billion chickens worldwide in 2017, the figure rising to 23.7 billion in 2018 as captured in Table 2.1 (FAO, 2020). Chicken eggs produced were about 1.27 billion in 2017, rising to about 1.37 billion in 2018, and chicken meat amounted to 0.1 billion tons in 2014, rising to 0.114 billion tons in 2018 (FAO,2020). The progressive growth in chicken eggs and chicken meat production over the years is expected to improve human nutrition, particularly in developing countries (Uzundumlu, &Dilli, 2023).

Table 2.1

World and Regional Live Chicken, Eggs and Chicken Meat Production 2014-2018

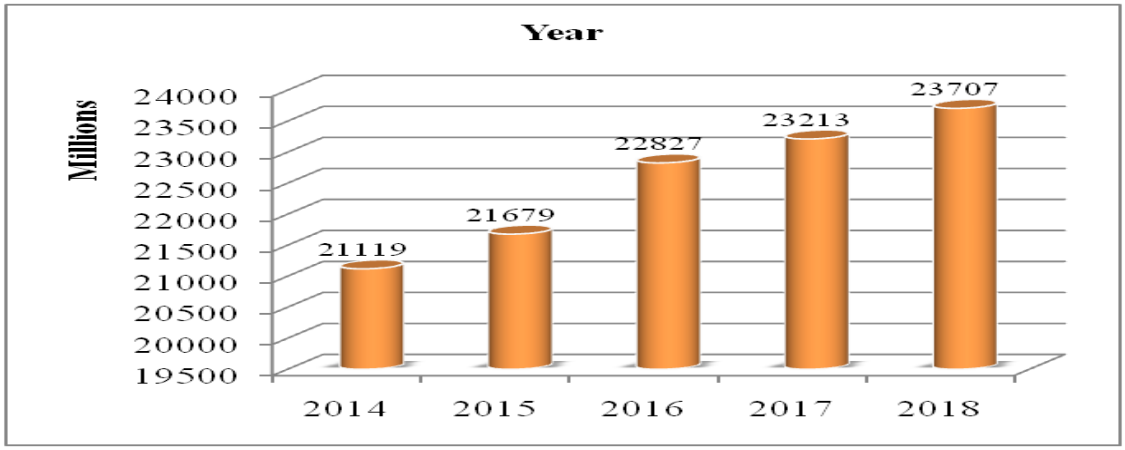
Description	Year/Region	2014	2015	2016	2017	2018
Live	World	21119	21679	22827	23213	23707
Chicken	Africa	1786	1819	1877	1897	1882
Numbers	East Africa	355	357	373	381	384
(Millions)	Kenya	42	41	44	48	49
Number of	World	1273862	1279150	1318734	1340376	1378037
eggs	Africa	66651	64214	62781	65087	65165
produced	East Africa	9289	9432	9561	9581	9998
(millions)	Kenya	1297	1409	1530	1588	1857
Chicken	World	100438	103740	106639	110238	114267
meat	Africa	5282	5430	5361	5517	5748
(million	East Africa	651	703	696	769	834
tons)	Kenya	22	26	26	30	30

(Source: FAO, faostat, 2020)

The statistics gathered from FAO sources suggest that there has been an annual growth rate of chicken population of about 2% between 2014 and 2018 as illustrated in Figure 2.1. There were about 21.1 billion chickens in 2014, rising to 23.7 billion by 2018 as illustrated in Figure 2.1.

Figure 2.1

Global chicken population (2014 -2018)



(Source: Compiled from FAO, faostat, 2020)

What are the roles of indigenous chicken parse? The chickens have a particularly important role to play in human nutrition through the provision of meat and eggs. The world chicken meat production has been on the rise, from an average per capita production of 9.8 kg in 2001 to 15 kg in 2018 and projected to increase to 17 kg in 2025 (Uzundumlu & Dilli, 2023).

The indigenous chicken (*Gallus domesticus* L.) in Kenya constitutes about 80% of the entire population of poultry (Macharia et al., 2022). Their products, particularly meat and eggs, are an important source of protein for rural and urban populations (Njuguna et al., 2017). As of 2017, there were about 21 million indigenous chickens in Kenya. The major roles of indigenous chickens are in the provision of subsidiary income and as a source of nutritious chicken eggs and meat (Padhi, 2016). It is recognized, however, that there are some other roles of native chickens such as socio-cultural roles, including their use in traditional ceremonies. Importantly, it has been argued that indigenous chicken plays a role in the improvement of the socio-economic conditions of rural populations at a low cost. The cost of inputs and labour for indigenous chicken production is relatively low.

The progressive growth in the per capita chicken meat production over the years is expected to improve human nutrition, particularly in developing countries (Uzundumlu & Dilli, 2023). The statistics gathered from FAO sources suggest that there has been an annual chicken population growth rate of about 2% between 2014 and 2018 as illustrated in Figure 2.1. According to Padhi (2016), the native breeds of chickens in particular have a major role to play for the rural poor and marginalized communities. The role of chicken in the provision of subsidiary income and as a source of nutritious chicken eggs and meat are suggested as the major roles of indigenous chicken worldwide (Padhi, 2016). Apart

from income and food, the IC have other roles to play, in Vietnam for example consumers of IC prefer some indigenous chicken ecotypes because of the yellow colour of their feathers and skin; features that are favoured for the frequent spiritual festivals held in the country and for family offerings; suggesting an important socio-cultural role. Some indigenous breeds are even raised for specific purposes; *Choi* and *Tre* breeds are reared predominantly for entertainment in village cockfights, and another type for making traditional tonics to benefit people who are old or sick (Jensen, 2013). Its meat quality is recognized in many countries. The chicken population increases over the years as illustrated in Figure 2.1 indeed carries the population of chicken bred for a variety of reasons.

The slow-growing indigenous chickens have been associated with higher meat quality in certain regions of the world. The slow-growers and poor feed converters tend to be associated with superior meat quality. In some countries such as Bangladesh, the native chickens are kept in free-range semi-scavenging systems, maintained mainly by women and children. Some authors have argued that a good quality, cheap source of protein can be produced by a semi-scavenging bird that is only fed on kitchen wastes and some left-over cereals (Das et al., 2008 as cited by Padhi, 2016). In view of this, indigenous chicken plays a role in improvement of the socio-economic conditions of rural populations at low cost; low inputs including feeds and low labour. Women empowerment has also been cited as an important role of indigenous chicken. It also has a role in creating a balanced farming system where it provides for emergency cash income. However, the contribution of indigenous chickens to the socio-economic

improvements in agrarian societies is often hindered by low productivity of the germplasm of the breeds reared (Padhi, 2016).

The provision of emergency cash income as an important role of indigenous chicken has been emphasized by Ellis (2004) who observed that the factors that threaten return of households to poverty are countered by first selling the chickens before moving on to sell other assets such as goats, cattle and land. According to Ellis (2004), the indigenous chickens contribute to families moving out of poverty, a process that is achieved in tiny increments (Ellis, 2004). With regard to response to climatic shocks, a survey conducted in South Africa reported that there was an increased reliance on poultry due to the unpredictability of crop performance. The observations suggest an important role played by indigenous chicken in the resilience of livelihoods to climate changes (Olson et al., 2014) thus making a useful contribution in times of emergency; a role that can be regarded as an insurance against risks. The insurance seems to come at a fairly low cost.

Low cost investment in small scale livestock keeping, such as keeping of a few chickens, also offer opportunities for women to increase household income and to control a larger portion of the household income. It has been argued that this kind of dynamic effectively reduces gender inequality (Swanepoel et al., 2010). In a study conducted in Bangladesh on the impact of a livestock development project that targeted women and girls as beneficiaries, chicken production significantly went up, although this did not translate into higher consumption of chicken and eggs (Swanepoel et al., 2010). The authors found that the chicken and eggs were sold and the proceeds used to purchase fish, a preferred animal protein-source by the community; based on their cultural norms. This observation suggests that there was an indirect link between the IC value chains with the nutrition

security of the households. Indigenous chicken productivity thus, has both direct and indirect implications on livelihoods. Chickens seem to have hidden or latent roles.

2.2.3.1Understanding the Latent Roles of Indigenous Chickens

Improved productivity of indigenous chicken has implications on human nutrition status of communities as reported by Swanepoel *et al.* (2010), but such association may not be linear as demonstrated by the case in which an increase in chicken productivity did not result in an increase in chicken and egg consumption. However, the chicken and eggs indirectly contributed to increased fish consumption, thus playing a key role in providing cash income for purchase of the preferred foodstuff. The provision for dietary preference by the poultry value chain indirectly through fish may suggest a complex role played by indigenous chicken in the livelihoods of rural societies. In the grounded theory thinking this presents a 'latent' reason for the indigenous chicken livelihood strategy; an underlying reason for the IC livelihood strategy. The current study probed through a participatory analysis to investigate the latent roles of the indigenous chickens in a rural set up.

The role of the indigenous chicken is commonly understood from the perspective of the 'outsiders' (Chambers, 1986) as a source of nutrition and income for rural households. Many studies report income and food security as the main roles for Indigenous chicken rearing among rural households in developing countries. The real underlying reasons for indigenous chicken rearing is hardly studied in-depth. There is indeed a complex role played by indigenous chicken in the livelihoods of rural societies, probably more complex than the food security, income, and socio-economic development linear roles. The grounded theory approach appears an appropriate methodology for understanding the

latent facts on the roles of indigenous chickens in rural societies. Indigenous chicken rearing is a common livelihood strategy across many socioeconomic categories and is probably influenced by the socioeconomic factors of households.

2.2.4 Role of Socioeconomic Factors in Indigenous Chicken Value chains

2.2.4.1Indigenous Chickens as a Livelihood Strategy

Rural poultry rearing is a common practice worldwide, primarily conducted as backyard activity, and it is especially prevalent in developing countries (Ahuja, 2013; Lesley, 2023). In Kenya, backyard poultry rearing is a livelihood opportunity for households with limited access to large productive land, it can thus be regarded a resource-poor friendly livelihood strategy. The indigenous chicken constitutes 80% of the entire poultry population (Macharia et al., 2022) and serves as a vital asset for resource-poor households in rural areas, especially in developing countries (Sariyev & Zeller, 2023). However, Ahuja (2013) observed that in recent years the livestock subsector, including poultry, has increasingly been blamed for the emergence of human diseases, global warming, and environmental pollution. Furthermore, the rapid increase in chicken populations has been implicated in food insecurity and deprivation due to competition for feed resources with humans (Govoni et al., 2021). This observation presents a paradox, as inadequate protein intake remains widespread among children in developing countries, a challenge that could partially be mitigated through chicken-rearing. These conflicting perspectives underscore the need to enhance the productivity of indigenous chickens to promote sustainable food security.

2.2.4.2 Productivity of Indigenous Chicken Value Chains

The indigenous chicken value chains in many developing countries appear to suffer from low productivity (Bett et al., 2014; Manyelo et al., 2020). A study conducted in South and South East Asia by Bett et al. (2014) highlighted a scenario, common in many developing countries, where chickens are raised under free range systems with limited shelter and protection. In some countries such as Bangladesh and Sri Lanka, these free-range systems extend into the night, exposing the birds to poor feeding conditions and predation risks. The free-range systems are characterized as low input-output systems with high mortality rates. Productivity, particularly in terms of egg-laying, varies widely across countries. Bett et al. (2014) reported a rate of egg production ranging from 6 to 20 eggs per clutch, with 2-5 clutches per year depending on the chicken ecotype. On average, laying rates of 12.9 to 23.9 eggs per clutch for 3.1 to 4.2 clutches per year were recorded in Sri Lanka and Pakistan.

In Kenya, Cheruiyot and Adhiaya (2021) found that indigenous chickens in western regions of the country produced an average of 53 eggs per hen annually, based on 3.6 clutches and 14.8 eggs per clutch. In Bangladesh, Shahjahan and Bhuiyan (2016) reported an average productivity of 13.5 eggs/clutch and 2.75 clutches/year. These findings suggest significant variation in the productivity of indigenous chickens across developing countries. Such variation may be attributable to a range of factors, both technical and non-technical, a subset of which are the focus of this thesis.

2.2.5 Efficacy in the Indigenous Chicken Value Chain Practices

In addition to the variation in egg-laying attributed to chicken ecotypes and other factors, the production stage of the indigenous chicken value chain is also constrained by factors

that suggest low efficacy of the indigenous chicken value chain practices. These include high mortalities caused by predation, diseases, poor nutrition and inadequate husbandry practices (Bett et al., 2014; Habte et al., 2017; FAO, 2018; Kumilachew, 2021; Ipara et al., 2023). Despite these challenges, indigenous chickens are recognized for their natural efficiency in disease resilience, heat tolerance and ability to utilize poor quality scavenged feeds. These attributes makes indigenous chicken a sustainable, viable livelihood strategy in developing countries.

According to FAO, poultry production systems can be classified into three broad categories. The first is the intensive system, which includes industrial, integrated and highly commercial types of production. The second is the sub-intensive, characterized as a low commercial production system. The third is the extensive system, encompassing village or backyard production (Gentile et al., 2024). Backyard production systems are marked by low inputs, including minimal healthcare (Gentile et al., 2024), which often results in low productivity. The focus of this study was on these backyard chicken production systems.

These systems require little investment in costly infrastructure such as roads or electricity, and are prevalent in remote areas where chickens are primarily free-range during the day. The breeds or ecotypes in these systems are typically native or indigenous, well adapted to environments with minimal inputs. A significant proportion of poultry is raised under such low-input systems, especially in developing countries (Afolabi et al., 2019). Approximately 80% of Africa's poultry population is raised through traditional backyard production systems where they are well adapted (Afolabi et al., 2019).

Despite their adaptability, backyard chickens face productivity challenges due to their scavenging nature, inconsistent nutrition, poor health management and fluctuating environmental conditions (Habte et al., 2017). These challenges likely vary across the socio-economic profiles of smallholder chicken producers. Understanding these linkages is crucial for designing sustainable interventions to enhance indigenous chicken productivity. But, what are the long-term benefits of pursuing indigenous chicken productivity?

Arguments have been advanced that the indigenous chicken has the economic advantage of being a low-cost production system. Although they tend to have low feed efficiency compared to commercial systems (Bwalya & Kalinda, 2014), their low production costs is of significant importance as a livelihood strategy for resource-poor households. Indigenous chicken act as a safeguard in ensuring sufficient food supplies and cash flow for essential household needs (Anyona et al., 2023), playing a vital role in supporting sustainable livelihoods. Unlike the commercial broiler systems where feed purchases constitute over half of the cost of production in some countries; 65% reported in Zambia, indigenous chicken survives mostly on scavenging (Bwalya & Kalinda, 2014; Duguma, 2020).

Indigenous chickens have important roles to play among rural households. However, its productivity continues to face many challenges, some of which have been documented broadly using different analytical approaches (Bett et al., 2014; Afolabi et al., 2019; Kanyagui et al., 2023). Qualitative and quantitative approaches have been applied to understand the challenges in indigenous chicken value chain. Poor feeding and predation at production node have been reported as impediments to productivity, high chicken

mortalities and diseases have been blamed too (Bett et al., 2014). Diseases, poor nutrition and inadequate husbandry management thus appear to contribute to low efficacies in the smallholder farmers' practices, yet indigenous chicken have crucial socioeconomic roles, particularly in resource limited households (Tenza et al., 2024). The indigenous chicken, however, is naturally efficient at disease resilience, heat tolerance and ability to utilize poor quality scavenged foods, attributes that smallholders can leverage on for productivity.

The productivity and sustainability of the indigenous chicken value chain can be assessed by evaluating the effectiveness of practices at each segment of the value chain. While an ideal value chain operates efficiently and benefits all actors equitably (Zamora, 2016), the degree of effectiveness in reality varies depending on geographical context and livelihood strategies of households and communities. Studies on the indigenous chicken value chain have highlighted challenges that compromise the effectiveness of practices and processes in promoting productivity and sustainability. At the primary production stage, challenges such as high cost of feeds, poor healthcare and high mortality rates have been reported (Wambua et al., 2022). Additionally, infrastructural issues including inadequate roads, energy, housing, water supply and markets further constrain productivity (Kirori, 2015).

At the marketing stage, however, the demand for indigenous chicken products remains high. Indigenous chicken also has the advantage of being able to scavenge for food with minimal food supplementation. This low-input livelihood strategy offers significant opportunities, especially for poor and marginalized populations (Abbasi et al., 2023). To effectively enhance productivity and sustainability, activities and processes must be tailored to the specific socioeconomic and demographic conditions of the context.

This study investigates the indigenous chicken value chain through the lens of contextualism, emphasizing the generation of context-specific knowledge that aligns with local conditions. One of the objectives of this study was to assess the efficacy of indigenous chicken value chain practices among smallholder farmers in Kericho County, Kenya, using a participatory approach.

2.2.6Role of Socioeconomic Factors in Indigenous Chicken Value Chain Practices

Astudy conducted by Wanjugu (2015) in Machakos, Kenya, suggests that while farmers complain of poor farm-gate prices offered by middlemen for indigenous chicken, low volumes supplied to the market was a more important drawback to their participation in the market. This argument brings to light the need for aggregation of the live birds so that they can be delivered to the market in bulk. Could membership to groups or cooperatives make a positive contribution to the productivity of the IC? Socio-economic factors have been reported as influencing the performance of the indigenous chicken value chain. A study conducted in Makueni, Kenya suggests that demographic factors such as age of the farmer had an influence on marketing practices. Additionally, education levels, participation in a group, and the size of the flock reared affected the decision by farmers to participate in high value markets (Ayieko et al., 2015). Too et al. (2019) reported access to market information as a constraint to indigenous chicken productivity in Kericho County, Kenya.

2.2.7 Understanding the Determinants of Indigenous Chicken Productivity

The literature reviewed suggests that both internal factors; within the household, such as resource-endowments and external factors; outside the producer's immediate environment such as market access, present challenges to indigenous chicken

productivity in Kenya and yet research tended to overlook socioeconomic contexts, often biased towards technical issues (Hailemichael et al., 2017). There is some neglect of household underlying motivations (Daphne, 2013). The role of the immediate environment suggests a need for context-specific studies in order to understand the context-specific problems associated with indigenous chicken productivity. The productivity of indigenous chickens in the study area had not yet been documented through a context-specific process, such as a participatory approach. Several studies address technical challenges hindering indigenous chicken productivity; such as housing, diseases and nutrition (Bett et al., 2014, Habte et al., 2017; FAO, 2018), but often overlooking socio-economic contexts (Hailemichael et al., 2017).

Socio-economic factors may significantly impact the technological and management practices of chicken producers. The current study focused on this potential impact in one of its objectives. This study, through a participatory approach, explored both internal and external factors that may influence the productivity of indigenous chickens in the area. The study is grounded in the philosophy of contextualism, which holds that knowledge is specific to the socio-economic context in which it is produced. In this approach the community serves not only as the subject but also actively participate in creating this knowledge (Uwe, 2017). This study, further explored the nexus between socio-economic factors, indigenous chicken productivity and community-defined livelihood outcomes among rural communities in Kericho County, Kenya.

2.2.8 Collaborative Action in Indigenous Chicken Productivity Improvement

Initiatives of the people and the local knowledge they have are an important ingredient in the livelihood strategies that enhance resilience of livelihoods to shocks and stresses; the

kind of livelihoods that can be regarded as sustainable (Scoones, 2009). Scoones (2009) upheld the view that if livelihoods are to be enhanced, future pathways should be identified and different interventions formulated, suggesting that maintaining current interventions cannot be expected to lead to improved livelihood outcomes. In this study the collaborative research was intent on identifying social innovation strategies within the indigenous chicken value chain for productivity enhancement.

The indigenous chicken production system has long been characterized by low productivity. The low productivity emanates from such factors as poor management, poor nutrition, lack of disease and pest control measures, inappropriate housing, lack of knowledge and negative attitudes (Ndegwa et al., 2015). Collaborative action through research and implementation is a useful tool for technology testing and transfer. It is a quick and effective way of generating and disseminating information. Ndegwaet al. (2015) carried out participatory research and interventions involving 200 farmers to improve on housing, feeding and parasites control. The collaborative action between the researchers and farmers raised the average flock sizes from 10-20 birds per farm to 20-30 birds in 15 weeks. The change that was experienced suggests that the technologies were successfully transferred to the farmers. The authors recognized that the farmer participatory research was a quick and effective means of generating and transferring technical information.

In a similar undertaking in Bangladesh, a semi-scavenging poultry model was promoted through collaborative action between Government departments, NGOs and farmers. The collaborators were placed in three categories based on their experiences; production, supply and service categories. The production category included breeders, hatcheries,

rearing farms and smallholder producers. The supply one included feed sellers, suppliers of vaccines, breeding stock suppliers and egg collectors, while the service category included NGOs involved in group formation and training, microcredit institutions and public extension services (Jensen, 2013). Through the collaboration an environment was established for others to establish themselves within the poultry business. Following the collaborative work, the smallholders' standard of living increased suggesting viability of the poultry holdings. The use of poultry as an income generating activity was appreciated and replicated in other areas (Jensen, 2013).

To improve on the productivity of village poultry in Vietnam, where chickens predominantly rely on scavenging for feed from their natural environment, the need for feed supplementation was addressed collaboratively. This led to considerable improvement in the nutrition of village chicken (Jensen, 2013). In Mozambique where indigenous chicken productivity was also low mostly due to breeds and incidences of Newcastle disease, Anjos and Alders (2013) reported that collaborative effort distributed cross-bred chicken in peri-urban areas for productivity enhancement. A local veterinary department in collaboration with NGOs distributed Newcastle disease vaccine through a cost-recovery program (Anjos & Alders, 2013).

In a farmer participatory research project conducted in Kenya in five agro-ecological regions, implementation of a variety of management practices was carried out through the use of local resources and the participation of the farmers. Monitoring and evaluation was done jointly by farmers and the research team. Farmers implemented a variety of interventions from a basket of options at their own pace with their own locally available resources. Creation and enhancement of social capital was realized by bringing together

individual farmers and the research team to interact and share information, knowledge and experiences (Ndegwa et al., 2013).

In another collaborative project, the Centre of African Bio-entrepreneurship, CABE (2019) reported a positive impact of a collaborative project on IC production and marketing in Busia, Kenya mostly involving awareness creation, collective marketing and improved management practices. The marketing chain was improved through collaboration of CABE, public extension service and producer organizations. However, the authors reported that a challenge of lack of credit facilities still persisted at the end of the 3-year project period.

2.2.9 Summary of Empirical Literature

The literature reviewed suggests that the livelihoods of rural populations in developing countries are diverse; ranging from a total reliance on natural resources and farm activities on land to non-farm activities facilitated by infrastructure and the dynamics of modernization. However literature in on-farm goods that are least demanding on the need for land such as indigenous chicken is minimal. Much of the literature on IC suggests scavenging systems which may be requiring more land and unsuitable in situations of increased land scarcity with population increase.

Literature on collaborative projects indicates successes in the pooling of effort between development agents and the farmers. However, literature on collaboration for long term sustainability of the projects is not clearly highlighted. A number of projects suggest the involvement of the farmers but is deficient in details. The procedures used in developing linkages between external researchers and the farming community are not adequately

elaborated to facilitate trials in other similar contexts. This study documents the steps involved in the integration of livelihood framework, value chain model and innovation platform in a participatory action research process.

This research study sought to involve the farming community in the analysis of their situation and based on the analysis, mount collaborative action in a democratic, fairly egalitarian process where social power differences within the innovation platform is brought to a minimum through empowerment of the community representatives. The literature reviewed suggests that gaps exist in the analysis of social capital generated through participatory projects. Many of the projects report on physical successes such as more chickens raised but are deficient on the social linkages that may have been created. The focus of the current study is partly on building social capital through social linkages for social actions; linkages within the community and linkages with the outsiders. This study is based on a theoretical framework that integrates community knowledge with that of researcher and key stakeholders.

2.3 Theoretical Framework

Grant and Onsaloo (2014) explain that theoretical framework is a structure that guides research by relying on a formal theory or theories. The theoretical framework provides the theoretical assumptions to guide data analysis and interpretation (Kivunja, 2018). It serves to articulate the variables to be analysed. Consequently, it enhances the credibility of qualitative data and the internal validity of quantitative data (Kivunja, 2018). Glesne (2011) as cited by Collins and Stockton (2018) contend that every research study is informed by a higher-level theory, which is sometimes not explicit to the researcher but is embedded in assumptions about the nature of reality and knowledge. The theoretical

framework and its related concepts are therefore needed to structure the methodology and analysis of a research study (Grant & Onsaloo, 2014). It makes the sense-making process more explicit and makes the explanation of phenomena logical and meaningful (Collins & Stockton, 2018). The current study is founded on a mix of theories; it is based on Grounded Theory, Value Chain model, Theory of innovation and the Sustainable Livelihood model.

2.3.1 Grounded Theory

The Grounded Theory can be viewed as a research method that develops concepts based on data and connects them around a central theme to form a theoretical framework. It is a qualitative research methodology used to understand underlying facts for a given phenomenon. The development of concepts and theories are grounded in the data collected during the research process. The theory is utilized to understand how and why communities experience and respond in certain ways to events, challenges or problematic situations (Corbin, 2011). This study which purposely delved into the challenges and opportunities for livelihood enhancement found the theory appropriate as a framework for understanding constructs from the community participants.

Grounded theory was first advanced by Glaser and Strauss in 1967 as an argument against what they called “arm chair” theorizing and against the positivist approaches to theory development and research. The scholars urged the researchers to get out to the field and develop theory that is grounded in naturalistic data (Corbin, 2011). These views of the proponents of the theory were deemed appropriate for this study which hinges on participation and collaboration of the community being studied. The theory is based on a philosophy of generating theory or constructions from data provided by participants. The

data provided is interpreted, framed and retold by researchers (Corbin & Strauss, 2008 as cited by Corbin, 2011).

In the Grounded Theory, data are analysed by asking and finding answers to a sequence of questions that are context-based. In the theory, a sequence of questions; *what, when, where, why, how*? Lead us to ask the last question; with *what consequence*? The question *what*? Will lead us to identify a category for the phenomenon under study, the questions when? Where? Why? Lead us to understand the contextual conditions and the boundaries. The ultimate question is; *with what consequence?* This last question gives us a tight, concise, clarifying concept or the overall meaning of the entire category (Redman-MacLaren & Mills, 2015). In this study the sequence of questions that were asked relate to the livelihood strategies adopted by the community, the roles of indigenous chicken and the productivity of the indigenous chicken as a livelihood strategy. The goal of the Grounded Theory is to arrive at the third level of conceptual analysis through three steps; first collecting data, then generating categories and then discovering a core category which organizes the other categories (Glaser, 2002). Through the creation of categories and detailing their properties, dimensions and relations emerges a substantive theory.

The substantive theory, as referred to in grounded theory thinking, is a theory related to a specific problem; a substantive context. It is a theory that tries to explain a certain phenomenon from a certain context (Roman et al., 2017). It has been explained that an investigation through Grounded theory goes beyond descriptive into developing a context-specific theory. The substantive theory is distinguished from formal theories in that the substantive theory is specific, while formal theories are less specific and can be

applied to a wider context. This study generated a set of interrelated concepts on livelihoods and indigenous chicken productivity in a context-specific environment to inform future interventions in similar contexts.

2.3.2 Value Chain Model

The value chain model is based on the thinking that a firm is not composed of randomly operated processes but rather is based on an arrangement of inputs into systems that are capable of producing something of value to users of the output. Consequently, a value chain has been described as a series of activities and services that brings a product or a service from conception to end-use and beyond. It is referred to as a value-chain since value is being added to the product or service at each step to consumption and waste utilization (Fabe et al., 2014).

The value chain analysis, based on the value chain model, can be viewed as an analysis that traces product flows along a series of nodes where value is added at each of the nodes while identifying key actors and their relationships with other actors in the chain. The aim of the analysis is to reveal bottle-necks in the value chain for corrective action (FAO, 2009 as cited by Makhoha et al., 2020). The current study focused on the indigenous chicken value chain nodes that are of relevance to the small-scale farmers in the area of study. Bottle-necks in their value chains are expected to be understood as constraints and challenges that make their indigenous chicken livelihood strategies less productive. What are the implications of the productivity on its contributions to livelihood outcomes? Moreki and Dikeme (2011) as cited by Bwalya and Kalinda (2014) for example suggest that indigenous chicken has a role in the stages-of-progress towards prosperity among smallholder farmers. It is the first step in the process of acquiring larger

livestock such as goats and cows for smallholder resource-poor farmers. What is its role elsewhere, like in Kenya? The present study purposed to analyze indigenous chicken value chain in Kericho County on the basis of this understanding and on the basis of the value chain framework as advanced by Porter in1985, integrated with the general theory of innovation.

2.3.3 General Theory of Innovation

The General Theory of innovation was put forward by Greg Yezersky in 1987 based on an analysis from history on how systems evolve (Jamal, 2014). The basic components of the theory are that all systems evolve in a predominant direction; they are systems, they evolve and the evolution is in a certain predominant direction (Jamal, 2014). The view held by the theory is that all man-made systems, no matter how complex or simple they may be, must evolve. Just like natural evolution the theory suggests growth and expansion as explained by Yezersky in 1988; this implies there is an irreversible change in form (Jamal, 2014). An innovation in this case may be regarded as an object, a practice or an idea that is perceived by a group of individuals or an individual as new in accordance with the definition by Rogers (1983) as cited by Jamal (2014). This theory on innovation as a process of value-creation (Yezersky, 2007), has an important role to play in collaborative action for enhancement of indigenous chicken productivity.

In 1989 a multiple source of innovation framework was proposed (Biggs, 1989 as cited by Anandajayasekeram, 2011). The framework emphasized that innovations come from several sources; it does not only come from researchers, but it comes from practitioners as well. This framework has been viewed as better fitting to the process of agricultural research and development compared to the earlier diffusion of technology model which

focused on researchers as the only source of new innovations (Anandajayaserekeram, 2011). Since then, the role of diverse actors in the process of generating knowledge and transforming the knowledge through an interactive process has been appreciated due to their interdependence and potential to complement each other. Anandajayasekeram (2011) has referred to this model as an interactive model for technical change, probably due to its advantage of pooling knowledge from diverse actors, including the ultimate users. This study recognized and was planned to utilize the practitioners' knowledge as well as that of other collaborators to innovate strategies for enhanced productivity of the Indigenous Chicken value chain.

In the innovation systems perspective, the functions of innovation process are shared among the actors in the innovation ecosystem based on the actual conditions in each case; the context. The innovation ecosystem is composed of interacting individuals and resources to bring about advancement. The innovation process thus may be integrated into the value chains where innovation may take place anywhere in the value chain nodes. Bean and Radford (2002) have defined innovation in the value chain nodes as any economically successful use of a solution to a problem. Separate from the economic use of an innovation as emphasized by Bean and Radford (2002), additionally, is the other dimension of social use which is also very important as captured by GFRAS (2015). Consequently, beneficial economic and social use by the end users of the innovation can be regarded as the pillars of the innovation perspective. This is quite an appropriate framework and in tandem with the current study which sought to identify opportunities for positive livelihood outcomes in Kericho County. The opportunities were discussed

and examined for potential productivity-enhancement innovations in an innovation platform as affirmed by the innovation system perspective framework.

2.3.3.1 Interrelationships in the Innovation Platform

The innovation platform can be viewed as a learning and knowledge co-creation platform. According to Hermans et al. (2013), the platform provides an organized system for vertical and horizontal linkages. This means that researchers and development agents are vertically linked to practitioners, while at the same time the platform facilitates horizontal linkages among practitioners and among development agents. The horizontal linkages are concerned with connecting the different types of organizations, the vertical linkages connects actors along the hierarchy, thereby providing support to the platform at all levels. The innovation platform uses the systems-thinking approach (Markard, 2020). It therefore focuses on the interrelatedness of many factors; technical, social, political, institutional and other context-specific factors. The wide range of linkages proposed by the framework poses challenges of managing power relationships among the players in the platform.

Eidt, Pant and Hickey (2020) have observed that power relationships are a potential source of impediment to the full participation of disadvantaged members of the community. The various stakeholder groups even interpret the 'innovation' differently from their own vantage points. Such power relationships need to be carefully managed as they may act to the detriment of sustainable farmer-driven innovations. This study envisaged a situation of carefully managed power relationships in the platform to facilitate formulation of broadly-owned sustainable innovations.

2.3.4 Sustainable Livelihoods Model

The concept of the sustainable livelihood approach in the analysis of human development emerged in the 1980s following the shift from the focus on economic growth as an indicator of prosperity of a country to a focus on the well-being of humans and the sustainability of the resultant prosperity (Solesbury, 2003).The approach identifies natural, material, human, financial and social assets that determine the people's livelihoods in the context of their environment. The approach recognizes that the utilization of the resources for livelihoods is influenced by policies and institutional developments. Through the livelihood approach, the process of change in a community is analysed based on the physical assets in use and the processes used in transforming the assets into outcomes that can be regarded as sustainable. The sustainability element means that consideration of social and ecologic factors is given weight. In practice, the framework relies on the active participation of the affected community in identifying their resources and the ways in which they combine them to meet their livelihood goals. This practice has given rise to flexible Participatory Livelihood Analysis tools that can be deployed in research to understand the livelihood dynamics of a community (ICRAF, 2008; Cheruiyot, 2020). The primary purpose of participatory livelihood analysis based on the framework is to generate an agenda for action. The approach does not look for problems or constraints per se, but rather looks for opportunities from what the communities are already engaging in.

Morse and McNamara (2013) have referred to what the people are doing without external intervention as "immanent" development and this is what the people would continue doing for the purposes of meeting their self-defined benefits for their livelihoods even

without external intervention. In this study, rather than adopting the five capitals as determinants of livelihoods, we used a participatory analysis to establish the determinants of livelihoods among rural households as experienced by the community members.

When viewed through an analytical framework, livelihood analysis is a method for examining how households or communities respond to specific conditions or experiences. Livelihood systems may be analysed by assessing the coping and adaptive strategies pursued by households and communities as a response to problematic situations such as food insecurity. There is, however, an important distinction between coping and adaptive strategies. Coping strategies are often a short-term response to a specific shock, such as drought while adaptive strategies entail a long-term change in behavior patterns as a result of a shock or stress (Goswami & Paul, 2016). This study sought to understand the long-term change in behavior patterns in response to shocks associated with livelihood and food insecurity and to understand the role of indigenous chicken, if any, in the responses. How was this study conceptualized?

2.4 Conceptual Framework

According to Kivunja (2018), the conceptual framework of a study represents the practices that will be undertaken in the entire study as thought out at the planning stage. Thus, it is the logical conceptualization of the entire research. It answers questions of what a study wants to do, why, how it will be done and how the data will be interpreted in a summarized logical master plan (Kivunja, 2018). It can therefore be viewed as the logical master plan for the entire study. The conceptual framework of this study was largely based on the sustainable livelihood approach which identifies five dimensions critical to sustainable livelihood. The five dimensions of; natural, physical, human, social

and financial capitals, form either internal or external factors that influence the livelihood strategies adopted by households for their livelihood goals. Such self-defined livelihood goals centre on positive livelihood outcomes. To achieve the goals, however, the livelihood strategies chosen have to be productive for them to contribute positively to the livelihood outcomes as illustrated in Figure 2.2.

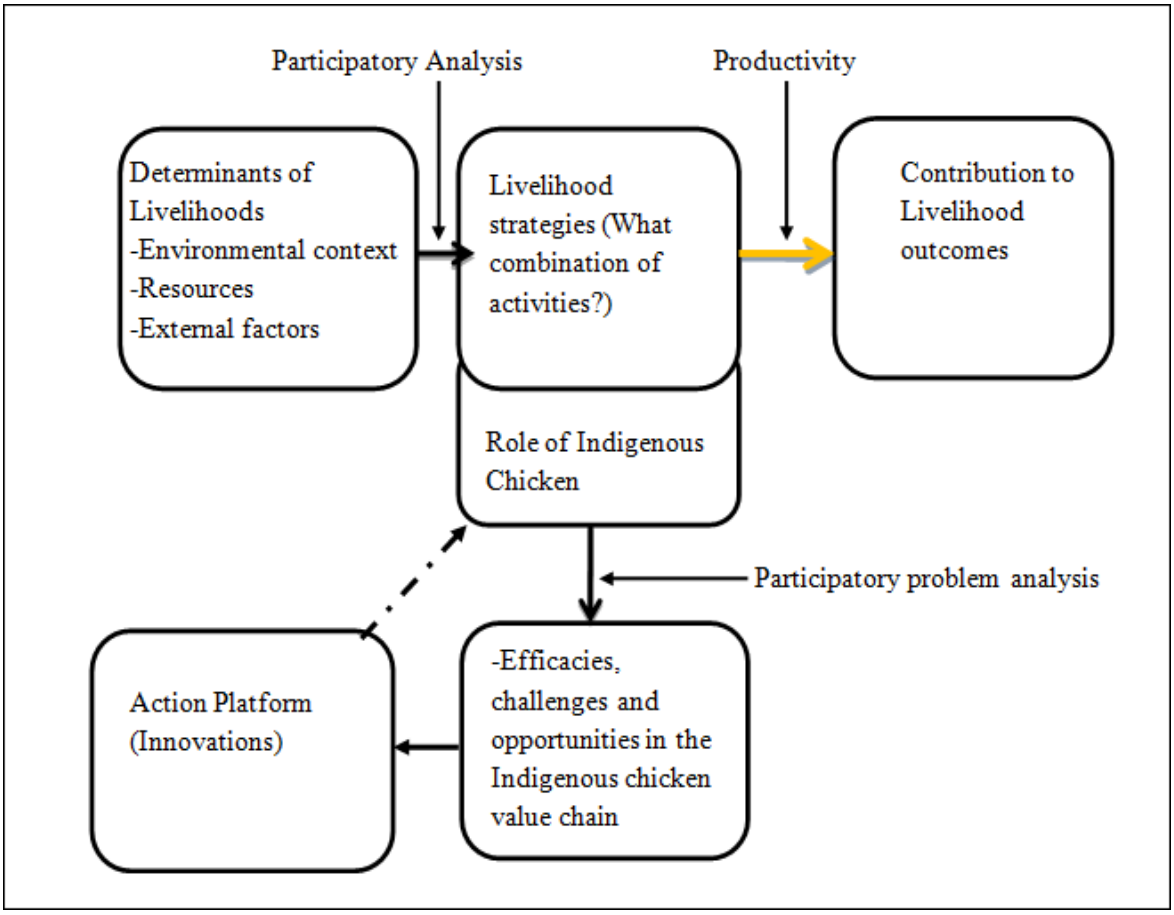
This thesis argues that integrating participatory approaches in analyzing livelihoods and indigenous chicken productivity harnesses the insights of those directly affected, generates in-depth knowledge, and incorporates local experiences into poultry management interventions, thereby enhancing livelihood outcomes for rural communities. The thesis is based on the premise that the productivity of the livelihood strategies affects their contribution to livelihood outcomes. The efficacies, challenges, and opportunities within livelihood strategies influence household-livelihoods. When the existing opportunities for livelihood strategies such as indigenous chicken are exploited through participatory social innovations, the contribution of the livelihood strategies to the livelihood outcomes is increased. The study analysed the linkage between the livelihood strategies and livelihood outcomes with a focus on indigenous chicken as a potential livelihood strategy. The linkages were analysed through a participatory analysis process in which the community members are fully engaged. Participatory Livelihood Analysis tools were deployed in understanding the linkages. The contribution of indigenous chicken, which is a low input livelihood strategy suitable for a majority of socio-economic categories in the society (Onono et al., 2017) was analysed for its contribution to livelihood outcomes. Its' contribution to livelihood outcomes was analysed based on the livelihood framework. Productivity, efficacies, challenges and

opportunities in indigenous chicken rearing were understood based on the value chain model. The challenges and opportunities identified for productivity enhancement were addressed through an innovation platform as suggested by the innovation system perspective. The innovation platform entailed collaborative action among the stakeholders.

The study specifically adopted a community based participatory action research approach to implement a research-education-and-action framework. The study presents the integration of the sustainable livelihood framework, value chain analysis model and the innovation system perspective as used to understand the determinants of livelihoods and indigenous chicken productivity and their linkages in the study area. The conceptual framework is as depicted in Figure 2.2.

Figure 2.2

Conceptual Framework on Participatory Analysis of Livelihoods and Action for Innovation in Indigenous Chicken Value Chain



2.5 Identification of Knowledge Gap

The literature reviewed on the livelihoods in rural areas of developing countries suggests the presence of diverse natural resource-based livelihoods dominated by agricultural resources, but also with non-farm activities. However, literature on the use of livelihood perspective to establish patterns of livelihoods in rural areas is scanty. Some literature seem to indicate growth in the role of non-farm incomes; however, the methodology in establishing the livelihood patterns fails to take into consideration the perspective of the people who live it. The current study in Kericho County was based on the perspective of the people who live it (Table 2.2).

The role of indigenous chicken in the livelihoods of the rural communities is mostly documented based on its important role in food, nutrition and cash income. The present study searched for an understanding of the underlying roles based on grounded theory in order to establish and document its links with livelihood outcomes from the perspective of the community (Table 2.3).

On indigenous chicken value chains, the indigenous chicken value chains in Kenya are many and mainly documented at the macro level; mostly based on regions. However, the challenge with the macro level data is that the details on the challenges and opportunities for upgrading the value chains are missed out; particularly community-based. The quest for this study was to understand the efficacies, challenges and opportunities in the indigenous chicken value chain based on the grounded theory that seeks underlying reasons for issues and problems and based on the value chain approach that seeks understanding of a value chain from inception to consumption as well as use the innovation system perspective to identify new products, processes or ideas that can be effectively used to upgrade the IC value chain at the production node.

Several authors have documented collaborative action for value chain upgrading in rural communities. Various approaches in collaboration have been used to foster community participation. In some cases two frameworks for collaborative action have been used simultaneously such as livelihood and value chain perspectives (Schure, 2014) or value chain analysis and innovation perspective (Anandachayasekeram, 2011). The current study is based on grounded theory in a three-tier framework of sustainable livelihood, value chain and innovation system perspectives as an approach to research and community development practice for productivity improvement (Table 2.4).

Table 2.2

Gaps in the Determinants of Livelihoods and Livelihood Strategies

	Objective	Authors	Methodology	Gap
i	Examine socio-economic determinants of livelihoods through participatory analysis	World Bank (2025); Acharya (2006); Tuyen (2014); Loison (2015); Peng et al. (2019) FAO (2019).	Quantitative and qualitative approaches used	Rural livelihoods viewed as largely derived from natural resources and labour resources; but there are conflicting reports suggesting diversity into non-farm and off-farm activities. There is inadequate understanding of determinants of the complex nature of rural livelihoods from a broader perspective. Little input from the people who live it. None of the researches reviewed suggest the use of participatory approaches to understand the determinants of livelihoods.
ii	Analyze the patterns of livelihood strategies through a participatory approach	Peng et al. (2019); Mhembwe & Dube (2017); Ajani & Igbokwe (2014)	Conventional quantitative and qualitative approaches used	Patterns towards sustainable livelihoods little- documented from the perspective of the rural people themselves. Dynamism of rural livelihoods little understood from the rural-dwellers themselves.
iii	Investigate the latent roles ofindigenous chicken in the livelihoods of smallholder farmers in the rural communities	Padhi (2016); Olson et al.(2014) Swanepoel et al. (2014) Magothe et al. 2012)	Positivist paradigms	Role of indigenous chicken in human nutrition and as source of income is clearly articulated in many research reports.The latent roles of the indigenous chicken aslivelihoodstrategy have not been documented from grounded theory analysis perspective.

Table 2.3

Gaps in the Determinants of Indigenous Chicken Productivity Studies

	Objective	Author	Methodology	Gap
iv	Participatory analysis of the socio-economic determinants of indigenous chicken productivity	Bett et al. (2014) Afolabi et al. (2012)	Quantitative and qualitative approaches	Participatory analysis approach has not been utilized for understanding of the determinants of productivity from the smallholder IC value chain players' perspective.
v	Determine relationship between indigenous chicken productivity and livelihood outcomes	Desta (2020)	Conventional Quantitative approaches	Contribution of IC to livelihood outcomes is widely understood through its contribution to nutrition and income. The current studyfocuses on an in-depth analysis in collaboration with the rural communities on the links between IC productivity and livelihood outcomes. Positive livelihood outcomes will be understood from the perspective of the rural communities.
vi	Evaluate the efficacies of practices in the indigenous chicken value chain	Bett et al. (2014) Afolabi et al. (2019) Bwalga&Kalinda (2014) Ayieko et al. (2015) Desta (2020), Kanyagui et al. (2023)	Quantitative and qualitative approaches	Knowledge that is grounded on the data generated collaboratively with the rural communities in Kenya is lacking. The application of experiential knowledge in addressing local issues and generating alternative solution is scanty. .

Table 2.4

Gaps in Community-Based Collaborative Actions for Innovation

	Objective	Authors	Methodology	Gap
vii	Formulate through a participatory approach potential social innovation strategiesfor indigenous chicken productivity enhancement in rural areas of Kericho County	Ndegwa et al. (2015) Jensen (2013) Ndegwa et al. (2013) Desta (2020), Mulugeta et al. (2022)	Quantitative and qualitative	Reference is made to the sustainable livelihoods analysis and use of local initiatives and local knowledge as important ingredients for sustainable livelihoods in many research reports. Its application in real –world situations is, however, scanty. Particularly in use of value chain and innovation platform frameworks. Where such approaches have been used, it has only been used to address limited technical challenges. Cases of its use in developing and disseminating adapted improved breeds of chicken exist; for example; Mulugeta et al., (2022). The current study looks at the subject with a target of social innovation strategy that is context-specific.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a guiding research philosophy and a research design that was deemed appropriate for this study. The chapter begins by describing the research philosophy behind the research design, the philosophy of contextualism, and then gives a brief description of the design; community-based participatory action research. The chapter specifies the location of the study, the target population, sample size and the sampling procedures that were used in the study. The data collection instruments and data collection procedures are also presented and subsequently the section presents the techniques that were adopted for data analysis. It ends with a presentation on how ethical issues in the study were addressed.

3.2 Research Design

In the social sciences research design is often guided by a philosophy. The philosophy of science is concerned with the underlying logic of the scientific method used in knowledge generation. It consists of two parts, namely: ontology; what exists and epistemology; what can be known and how (Somekh & Lewin, 2011). Between the two ontological positions of realism and relativism, lies a third ontological position of critical realism. Critical realism assumes that knowledge is socially influenced and can only be partially accessed. It assumes that our understanding of the reality is mediated by our perceptions and interpretations. Critical realism posits that reality exists but, the reality is not limited to human interpretation or construction; there is a truth, but it cannot be known in its entirety (Braun & Clarke, 2013). It holds the world-view that there are three

aspects of reality; empirical or what is expressed, actual events and real or underlying mechanisms (Redman-MacLaren & Mills, 2015). Critical realism holds that culture and history situates knowledge; knowledge is socially, culturally and historically bound (Redman-MacLaren & Mills, 2015). Comparable to critical realism is an epistemological position of contextualism (Braun & Clarke, 2013). This epistemological position sees knowledge as emerging from contexts. It does not assume a single reality and argues that no single method can get to the truth (Braun & Clarke, 2013). The current study recognized the existence of multiple realities and used multiple flexible methods to generate new knowledge. This study deviates from the more common constructivist and positivist viewpoints.This philosophy shaped the approach to the research, guided the researchers' actions, and played an important role in the design of the study.

A study design has been viewed as an overall strategy adopted in a study for the purposes of collecting, measuring, analyzing and interpreting data (Kothari, 2010). It forms a large part of the research methodology. According to Braun and Clarke (2013) a research methodology refers to the framework within which the research is conducted and consists of theories and practices of how we go about conducting the research. It is a theory of how research needs to proceed to produce valid knowledge (Braun & Clarke, 2013). This study was underpinned by an epistemological assumption of contextualism.

Kothari (2010) opines that a good research design should facilitate efficiency in the use of time and money. It is an advance planning of the method to be adopted for collecting the relevant data and the techniques that will be used in their analysis. This study adopted a Grounded theory approach and a community based participatory action research (CBPAR**)** design. In this design participation plays a central role in the research process;

the subjects are active participants in the creation of context-specific knowledge. Chambers (1999) as cited by Franz et al. (2010) explains that participatory action research design combines local insights of community members with the technical expertise of the researchers to explore mutual interests and issues. The research process is democratic, it is collaborative and non-hierarchical in approach in the sense that power is shared among the participants and researchers. This approach increases the validity and the application of research results since the community is included as co-researchers (Franz et al., 2010). The design was deemed appropriate for this study since action research has been recognized as an effective technique for the betterment of intergroup relations, particularly among resource-poor groups as a research method which will help the practitioner or the subjects. It sits well with the notion that experiential knowledge generates context specific solutions to problems.

The CBPAR methodology is pivoted on the good-will and readiness of the community to confront their problems openly and to do something about it. Transforming the goodwill that exists into organized, efficient action is the focus of the design. The Methodology is premised on three principal questions; what is the present situation? What are the risks? And what shall we do? Whereas the first question is synonymous with situation analysis to understand the community resources and opportunities, the second question on risks are in reference to the major barriers or challenges that the community encounters in their livelihoods. The third question relates to action for social change. In this study the present situation is broadly one of low productivity of livelihood strategies, the risks are the constraints and challenges and what to do is the need for collaborative action to bring about social change. These are the questions that were pursued in the present study to

establish the actual situation, the constraints and challenges and the actions that can be implemented for social change.

Participatory action research is participative and collaborative where the researcher is a co-worker with and for the people in the community of interest. The CBPAR design incorporates the active participation of farmers and their advisors and works in the context of the farmers own farming practices. The approach is practical; the results and insights gained serve a dual purpose of advancement of knowledge and leads to practical improvements of the community during or after the research process (Carberry, 2010). The research is also viewed as emancipatory; all those concerned are equal participants in the inquiry. The research approach is also critical; participants act as critical change agents. The participants change the environment and are changed in the process. The critical action research cycle is an iterative cycle of planning, action, observation, reflection and re-planning. The process has been referred to as a pluralistic, participative paradigm (Carberry, 2010). These attributes of CBPAR made it a fitting approach for the current study to understand the determinants of livelihood, productivity of indigenous chicken and implementation of collaborative action for productivity improvement in rural communities. While adopting the philosophy-guided design of community based participatory action research the study utilized both qualitative and quantitative approaches to data collection and analysis.

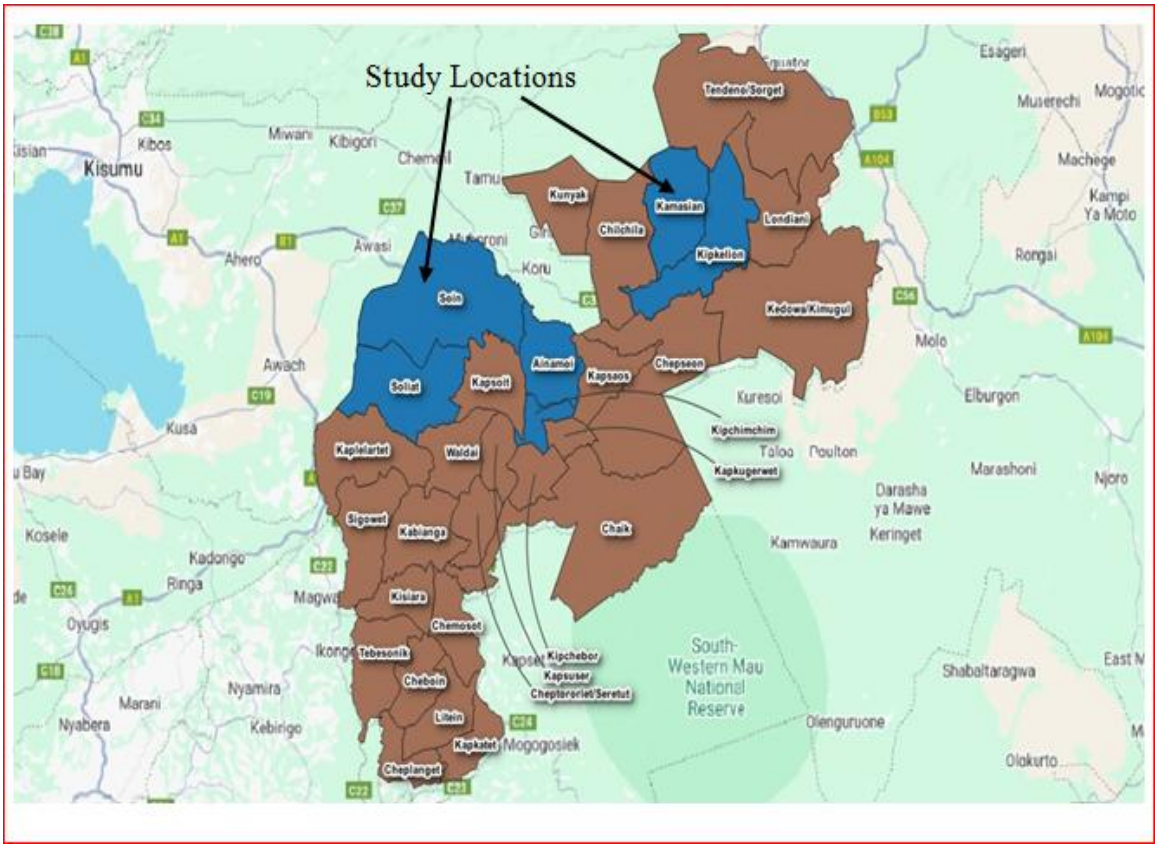
3.3 Location of Study

The study was carried out in the rural areas of Kericho County (Figure 3.1). Kericho is one of the 14 Counties in the Rift Valley region of Kenya. It lies between longitude 35º

02’ and 35º 40’East and between the equator and latitude 0 23’South. The county borders Uasin Gishu to the North, Baringo to the North-East, Nandi to the North-West, Nakuru to the East and Bomet to the South (Figure 3.1). On its South-Western border are Nyamira and Homa Bay counties and to the West is Kisumu with its boundaries as captured in Figure 3.1.

Figure 3.1

Map of Kericho County, Kenya, Showing Study Location



(Source: Google maps, 2020)

Kericho County covers a total area of 2,479 km^2. This study was carried out in three of the six Sub counties in the county. The study was carried out in Ainamoi, Kipkelion West and Soin/Sigowet Sub Counties (Figure 3.1). Ainamoi and Kipkelion West Sub-counties

were purposively selected for the study due to their proximity, or lack of it, to large urban markets which are thought to have an influence on indigenous chicken productivity. The three Sub counties represent the diverse conditions in the county. Soin/Sigowet was chosen for its potential in indigenous chicken due to its upper midland agro-ecological zone. Ainamoi with lower highland zones, enjoys proximity to urban market infrastructure, while Kipkelion West and Soin/Sigowet Sub counties are typically rural with 92% and 84% of its households respectively, engaged in farming (KNBS, 2019). Ainamoi covers an area of about 241 km^2, it had a population of about 170,625 persons and 44,246 households in the year 2019 with average household size of 3.8 and a population density estimated at 709 persons per Km^2 (Kenya National Bureau of Statistics, KNBS, 2019). The high population density is largely attributed to its urban population in Kericho town. Kipkelion Sub-county covers an area of about 350 km^2; it had a population of 122,530 persons and 24,688 households in the year 2019, with an average household size of 5.0 and a population density of about 350 persons per Km^2 (KNBS, 2019).Soin/Sigowet covers an area of about 466 Km^2, has a population of 126,500, a population density of 271 persons per Km^2 and an average household size of 4.6.

3.4 Target Population

The target population for this study was all the rural-based indigenous chicken farmers of Kericho County. The farmers constitute a rural population outside of the urban areas. The target population therefore excluded urban-based households in Township Location of Ainamoi. There are 71,678 households engaged in the rearing of indigenous chicken in Kericho County (KNBS, 2019). Out of this, there are about 61,278 rural-based

households who are engaged in indigenous chicken rearing. Consequently, the target population for this study was estimated at 61,278 households. The population of indigenous chicken in 2019 was estimated at 577,529 (KNBS, 2019), implying that each chicken-rearing household had an average flock of 8 birds. The average flock size for Ainamoi was 9, while for Kipkelion and Soin/Sigowet was 7 and 7.2 respectively. The farmers in the target area predominantly rely on farming for their livelihoods and are therefore largely an agrarian community.

3.5 Sample Size and Sampling Procedures

3.5.1 Sample Size

Sampling is the process of selecting a few individuals from a bigger group to form the basis of estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding the larger group (Kumar, 2019). The main reason for sampling is because the logistical resources of studying the entire larger population are saved while still being able to get valid information about it. To achieve the validity, three principles in sampling are significant; one is to sample in such a way as to minimize difference between sample statistic and population statistic through randomization; two, the greater the sample size the more accurate the estimate and third is the consideration of the variance of the variable under study; the greater the difference in the variable the greater the difference between sample statistics and the true population statistics (Kumar, 2019).The three principles of sampling were catered for in this study.

The determination of sample size differs depending on research design. In the current research design that plans to collect both qualitative and quantitative data from a large

population whose sampling frame is not available, Cochrans' sample size formula for large populations as suggested by Singh and Masuku (2014) is one alternative:

$n = Z^2pq/e^2$, is the sample size formula

Where, n = Sample size

Z = standard normal deviate at 95% confidence interval,

p = the population proportion that is assumed to have the characteristic of interest (it is assumed to be 0.5 in this study so as to provide a maximum sample size),

q = the population proportion without the desired characteristic (1-p) and

e = the margin of error that can be tolerated in the study (a conventional 5% or 0.05 was adopted for this study).

According to Singh and Masuku (2014) three criteria usually will need to be specified; the level of confidence or risk, the level of precision (sampling error) and the degree of variability in the attributes measured. Consequently, the author argues that the more heterogeneous the population is, the larger the sample size. This study assumed high heterogeneity among smallholder farmers in Kericho County and utilized the equation developed for large population (Cochran, 1963 as cited by Singh & Masuku, 2014). A large population has been defined by some authors as a population with over 10,000 research units (Mugenda & Mugenda, 2010). Thus the population estimated at 61,278 households in the present study was regarded as large. The sample size (n) for the study, based on the assumption of large population of indigenous chicken producers in Kericho County was worked out from the formula (Z^2pq/e^2) to be 385 smallholder farmers; $n = (1.96^2 \times 0.5 \times 0.5)/0.05^2 = 385$.

The other alternative to work out on the sample size for both qualitative and quantitative data is the Yamane formula: $n = N/ (1+N (e)^2)$, where n is the sample size, N is the target population and e is the margin of error (in this case 5% or .05).Based on the target population N of 61,278 indigenous chicken farmers, the sample size is worked out based on the Yamane formula to be 398. The larger sample size of 398, based on the Yamane formula was adopted for the current study, since an increased sample size is expected to lower sampling error (Ikehi et al., 2019).

3.5.2 Sampling Procedures

Sampling has been explained as a method that allows research to infer information about a population based on results from a subset of the population. In this regard, it is important that individuals selected to form a sample are indeed representative of the whole population targeted for study. In some cases, like in the current study, it may involve reaching some hard-to-reach individuals (Barratt &Shantikumar, 2018) such as those who rarely attend public meetings. Some individuals in the society, particularly the vulnerable and marginalized individuals are easily forgotten and unperceived (Chambers, 2006).

Chambers (2006) advocated for experiential and direct learning in a face to face interaction with the poor and the marginalized people in their own settings. The author challenged development actors to practice a responsible pro-poor professionalism. In conforming to this valid argument, this study assumed the existence of a vulnerable disadvantaged group which is likely to be forgotten and employed a sampling procedure suitable for capturing all segments of the society including the hard-to-reach populations. Participatory research approaches have been developed partly as a response to conditions

of exclusion and marginalization and to compensate for limitations of traditional research methods whose findings were little used (Freire, 1970 as cited by Tiffany, 2006). In this regard attention was paid to the inclusion of all socio-economic categories during the sampling process.

Field research in situations of high heterogeneity may be viewed as composed of both easily accessible populations and hard-to-reach populations. The hard-to-reach populations are the marginalized, vulnerable groups who have weak social networks outside their geographical area and hard to reach for the outsider researcher. To access all the socio-economic categories in the community an inclusive sampling procedure was adopted for the study.

The study adopted multi-stage sampling techniques to select participants for the study. Multistage sampling is useful while collecting data from a geographically dispersed population (Sedgwick, 2015) as in the current study. The multi-stage sampling technique involves inclusive primary sampling units and secondary and subsequent units that are sub-groups of the primary sampling units. Individuals are selected from different stages (Singh & Bajpai, 2009). In this study administrative locations were utilized as the primary sampling units. There are eleven administrative locations in Ainamoi Sub county; four to the west, four to the south-west, two centrally located and one to the east. One Township location was purposely omitted from consideration in the study as the target population was the rural dwellers of the Sub County. Two locations from among the 10 were randomly selected to participate in the study. The two administrative Locations served as the primary sampling units. Another two Locations were similarly randomly selected from among the 18 Locations in Kipkelion Sub-County. The last two

locations were similarly selected from Soin/Sigowet from a total of 13.To achieve the sample size of 398 a total of 67 farmers were selected from each of the six Locations. Smallholder indigenous chicken producers were randomly selected to participate in the study based on the sub locations in each of the six locations in a second stage of the multistage selection process. Simple random sampling was conducted to select one Sub location in each location. The local administrators' official record on population was used to allocate the proportion of study participants from each village. Smallholder indigenous chicken producers were randomly selected to constitute the proportion allocated to each village in a third stage sampling. According to Nguyen et al. (2019) stratification places the sampling items of the population into relatively uniform groups before selecting the samples. In the current study, the grouping variable used was the geographical location of the sampling units.

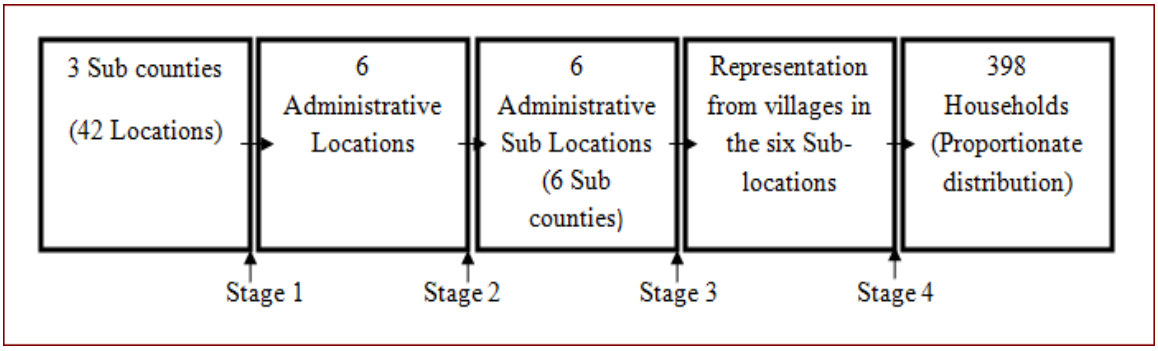
Multistage sampling entails two or more stages of random sampling based on some hierarchical structure within the population (Sedgwick, 2015). Its final stage involves choosing a random sample of the people at the penultimate stage. In this study the first stage of random sampling involved a random selection of two Locations from each of the three Sub-counties. The second stage involved sampling of six Sub-locations; one from each selected Location. The third stage was a selection of the villages to participate in the study and the fourth; the ultimate stage is a random selection of 398 households from the villages on a ratio based on the village populations. Each village in the selected Sub-location contributed participants based on their proportions in the total population. A complete list of the village households with indigenous chicken was used to randomly select the participants for the study. This approach was expected to give equal chance to

all the village households to participate; including the hard-to-reach, vulnerable or marginalized households.

Figure 3.2 presents the sampling scheme employed in this study. Three sub-counties were purposively selected to reflect variations in agro-ecological zones and socioeconomic conditions. Within each sub-county, two administrative locations were randomly selected, resulting in a total of six locations. From each location one sub-location was further randomly selected, yielding six sub-locations for inclusion in the study. Indigenous chicken farmers were then randomly sampled from villages within these sub-locations to attain the required sample size of 398 households, as illustrated in Figure 3.2.

Figure 3.2

Diagrammatic Representation of the Sampling Procedure Used



Whereas quantitative research is guided by the desire to select a random sample, qualitative research is guided by judgment as to who is likely to provide the required information, where such information is collected until a data saturation point is reached; a point at which no new information is forthcoming (Kumar, 2019). This study employed a philosophy-guided participatory action research design to collect both qualitative and quantitative data. Whereas quantitative data requires a predetermined number of people for its validity, qualitative data is based on a researchers subjective saturation point or as

diverse information as possible (Kumar, 2019). This study purposed to collect both quantitative and qualitative data and utilized a predetermined number of people for quantitative data validity and collected qualitative data from as diverse information sources as possible.

3.6 Data Collection Instruments

In order to collect qualitative and quantitative data from the participants through a participatory approach, participatory action research tools were be used. There are two fundamental principles in action research; subjectivity and reflexivity. Whereas subjectivity suggests we pay attention to the research participants' perspectives during the process, reflexivity requires a critical reflection on the knowledge we produce (Cirgin Ellett & Beausang, 2002). In order to collect data from the participants and to reflect on the process collectively with the subjects, various tools were used at different stages of the participatory action research process (Tables 3.1 and3.2).

The participation of all research partners is the fundamental guiding principle for community-based PAR, this need for participation makes the details in the design and the tools used dynamic based on the dynamism of the social actions involved (Bergold& Thomas, 2012).Based on the needs of a convergence of science and practice and further because the research participants are change agents in a process where democracy is a pre-condition for action, the tools were of necessity dynamic (Bergold& Thomas, 2012). The action research borrowed from Participatory Rural Appraisal (PRA) family of tools which were adapted to the context of the target population.

Different tools were used at different stages of the iterative process of planning-action-observation-reflection and re-planning (Carberry, 2010).Such tools included;

interviewing, observation, focus group discussions, analysis of artefacts and participatory tools that require participants to take action. The community-based PAR mostly employed interviews as informal conversations and discussions rather than as question-and-answer situation and the outcome was validated through triangulation; a process of cross checking with many sources.

Interviewing has the advantage of providing the researcher with an opportunity to gain perspectives of other individuals and the opportunity to explore alternative explanations of what is seen (Glesne & Peshkin, 1992 as cited by Kolb, 2012).

The participatory analysis on livelihood strategies and indigenous chicken productivity was facilitated by participatory tools such as participatory livelihood analysis, problem tree analysis, objective tree analysis and matrix ranking. Collective reflection, learning and action were also facilitated by participatory tools such as focus group discussion guide, informal interview guides and observation checklists.

3.6.1 Observation Checklist

Observing participants in action is a common way to collect data in action research. In order to remember the observations a research diary and photographed samples using a digital camera were utilized during reconnaissance survey. A checklist on the inventory of stakeholders was also developed to capture all stakeholders prior to a key stakeholders' inception workshop.

3.6.2 Research Diary

Somekh and Lewin (2011) describe a research diary as an external memory used by researchers in many disciplines for recording their daily observations in the field and for recording conversations with key informants, individuals or groups. The data that was

obtained through observations, interviews and informal conversations as well as threaded or focus group discussions were captured in the research diary items.

3.6.3 Focus Group Discussion Guide

As a way of bringing together the multiple views of the research participants, focus group discussions were organized from inception of the process (Table 3.1). The focus group discussion involved interviews of small groups of people; about six to eight, on a specific topic as recommended by Uwe (2017). They are methods where data are collected from multiple participants at the same time and therefore some social interaction among the group members is central (Braun & Clarke, 2013). It is the social interaction that distinguishes the focus group discussion from other methods such as interviews and surveys. Gatekeepers can play a key role in setting up of focus groups. In this study the focus group discussants were guided by a focus group discussion guide as they deliberated on issues. This was utilized particularly during joint problem identification and joint problem solving. Since a focus group is grounded on the voices of the people (Somekh & Lewin, 2011) the guide was formulated to facilitate an open ended exchange.

According to Braun and Clarke (2013) focus groups have been seen as one way of gaining accounts that are naturalistic as individuals ask each other questions, challenge each other, disagree or agree making the product of the conversation non-artificial. Uwe (2017) suggests that focus group is a highly qualitative data collection technique where participants tend to provide checks and balances on each other and therefore weed out false views while at the same time generating diverse perspectives. These attributes made the tool appropriate for this study which sought to understand the livelihood patterns,

livelihood strategies and their productivity. The tool was deployed at stakeholders' meetings and at community-level meetings for data collection as illustrated in Table 3.1.

Table 3.1

Data Collection Instruments During Planning and on Determinants of Livelihoods

Activity Description	Data collection instruments
Literature Review	Checklist
Stakeholders inception workshop	Discussion guide (For Focus group discussions)
Reconnaissance survey	Checklist, Area map, interview guide, Research Diary
Community entry meeting: public meeting to create awareness and conduct election of community representatives	Checklist, Discussion guide, Area map, Research Diary
Planning meeting (Innovation platform)	Discussion guide, Research Diary
Participant recruitment	Checklist
Zonal meetings for capacity building and data collection on livelihoods (Zones clustered during community entry public meeting; *baraza*)	Focus group discussion guides and Household interview schedule, Participatory Livelihood Analysis
Data compilation and Participatory analysis meeting (Reflection)	Group discussion guide, observations made, Participant-written cases

3.6.4 Ranking and Scoring Matrix

The use of matrices to prioritize among identified choices or alternatives were used where a group had identified a list of possible issues or problems and needed to prioritize which issue must be addressed first (Krishnaswamy, 2004). According to Swathi lekshmi et al. (2017), ranking and scoring is also referred to as matrix ranking and is commonly

deployed to analyze information on community resources, problems, opportunities and needs. It is an important tool in knowing the preferences of households for different activities, resources or items and the reasons or criteria for preference. The matrix ranking is part of a family of tools used in PRA. The tool enables a range of items to be assessed against a selected criterion. In this way a matrix ranking tool provides an opportunity to understand why people prefer one possibility over another. The tool was used during value chain players and value chain actors meetings to solicit information as captured in Table 3.2.

3.6.5 Interview Guide

The community based participatory action research process mostly employed interviews as informal conversations and discussions rather than as question and answer situation. The directions of the interviews were by an interview guide. The participatory action research tools (Tables 3.1 and 3.2) constitutes a family of participatory tools that were utilized not only for data collection, but a number of them were used as relationship building tools in order to pave way for active participation and collaboration.

Table 3.2

Data Collection Instruments on IC Value Chain and Collaborative Action

Activity Description	Data collection instruments
Planning meeting for participatory interviews of actors in IC value chain	Group discussion guide(for interview schedule development on efficacies, challenges, opportunities), VC Ps inventory
Data collection from value chain players by innovation platform members	Interview schedule, Focus group discussion guide, Ranking matrix
Data compilation and analysis(reflection)	Problem tree
Community action plan development	Objective tree techniques, Group discussion guide (format)
Community action plan presentation to community (open)	Community action plan, Research Diary
Collaborative action on IC productivity	Action plan, Action trials
Review meeting by innovation platform (Reflection)	Checklist
Participatory data analysis by innovation platform/research team	Field notes, Research Diary entries
Report writing	Draft reports

3.6.6 Uses of the Research Instruments

The expected outputs from the deployment of the data collection instruments beginning from the planning to the collaborative action on indigenous chicken productivity can be summarized as a ten-step process. Literature review was undertaken, secondly a stakeholders meeting was held and data collection tools harmonized, thirdly community entry meetings were convened, challenges and constraints to livelihood strategies identified and zones identified for further action. The identification of zones or villages to facilitate a further deployment of multi-stage sampling was based on a criterion jointly developed during the meeting to cater for all production clusters within the location. The

fourth output is that the zonal meetings were held and livelihood analysis carried out by deploying an offspring of the PRA family of tools; the Participatory livelihood analysis.

The Participatory livelihood analysis is a discussion tool which facilitates community to develop their criteria for measuring prosperity in their livelihoods (ICRAF, 2008). The community was thus guided through discussions to develop their stages-of-progress towards their desired livelihood outcomes (Krishna, 2005). The analysis mapped out the livelihood strategies deployed by households in the locality, the resources used and the constraints and challenges faced. The researcher compiled the information and generated sub-categories and categories based on grounded theory thinking and the constant comparative analysis methodology.

The categories developed at this stage were used for quantitative data collection in the succeeding stages. The fifth stage in the data collection process is that a planning meeting was held. The planning meeting discussed data collection tools that incorporated the input from the community as captured in the first phase. The data collection tools that incorporated the challenges and constraints and the livelihood strategies deployed by households sought to understand further livelihood strategies, challenges, constraints, efficacies and opportunities at the household level. Data at this stage were collected from 398 households and the data singled out indigenous chicken as a livelihood strategy for a detailed analysis. The sixth stage in the process was to collect household data on livelihood strategies and indigenous chicken productivity through interviews. The data captured production levels; quantities, challenges and potential solutions to the challenges from the perspective of the households. The seventh step was to convene a value chain players' focus group discussion to map out the entire indigenous chicken

value chain from production to marketing, identify what works well in the value chain (efficacies), challenges and required improvements.

The eighth step was to develop a community action plan that addresses the challenges and constraints identified during the household interviews and during the value chain players' focus group discussion. The value chain players transformed to Innovation Platform (IP) and prioritized actions for indigenous chicken value chain improvement. The objective tree techniques were deployed to identify the core problems to be addressed. Matrix ranking was used to identify priority strategies to be deployed by the innovation platform (IP). The ninth step in the process was collaborative action as informed by the community action plan on indigenous chicken value chain. Few action trials were conducted and review discussions made on the innovation strategies. The innovation platform was left to regularly collect data on the implementation process.

The tenth stage was a zonal presentation of report, continually compiled by the researcher on to a zonal meeting for validation. The zonal presentation of the findings served as a validation meeting and a dissemination meeting on the efficacies and opportunities in the IC value chain. The zonal meeting served to validate the data through triangulation as suggested by Hope and Waterman (2003) and as a peer review forum as suggested by Ozanne and Saatcioglu (2008).

3.6.7 Validity of the Research Instruments

According to Reason and Bradbury (2020) validity in action research is about the quality of participation and relationships between the researchers and the co-researchers. According to the author, even the term validity in itself should not be used in action

research as it does not account for the participation and collaboration. The author suggests that the term validity is only relevant for positivist approaches. Ozanne and Saatcioglu (2008) argues similarly and has identified five types of validity in PAR; outcome, democratic, process, catalytic and dialogic validity. The outcome validity emphasizes on knowledge for action while democratic and process validity are focused on participation and relationships respectively. Catalytic validity looks at how collaborators are invigorated to understand and change social reality beyond the research study (sustainability) whereas dialogic validity focuses on peer reviews through debates.

In the current study, every activity undertaken was considered an opportunity for active participation and building of relationships between the researcher and the co-researchers in order to guarantee faithfulness to the study and therefore guarantee quality outcome. Participatory tools were employed throughout the study period and all actions were reflected upon by the stakeholder team in order to make prompt corrective actions where required. Two experts competent in the area of PAR were requested to evaluate the tools for outcome, democratic, process, catalytic and dialogic validity. Their comments were incorporated into the instruments.

3.6.8 Reliability of the Research Instruments

In this study reliability of the data was based on convergence of different sources of data among the participants. This process of triangulation sought regularities in data by comparing different participants, settings and activities to identify recurring results. The corroboration strengthens the reliability of the results. Interviews, Observations, focus group discussions and different sources of data were matched; thus, using different data sources to arrive at convergence of the data. The triangulation approach helped in

obtaining a complete picture, cross checking information and reducing biases as much as possible (Wang et al., 2018). Hope and Waterman (2003) assert that credibility in action research is achieved through member checks and triangulation. The use of member checks to achieve credibility of findings has also been cited as an advantage of the use of focus group discussion during which members cross check on one another during discussions (Uwe, 2017).

3.7 Data Collection Procedures

The community based participatory action research involved key stakeholders in the data collection and action processes. Key stakeholders were identified by the local leaders and community representatives based on the organizations they have previously interacted with. The stakeholders were identified based on the services or support they provided in agricultural value chains to the target population. Stakeholders were identified among institutional change agents, commodity interests, business interests and local leadership. Those affected by the research were also identified during the preliminary phase of collecting secondary data. A checklist was used to confirm representation of all categories of stakeholders and to ensure that no key stakeholder was left outwithout representation. Representatives from each of the categories were invited to an inception meeting.

The inception meeting was planned to harmonize the approaches to be used for the education, research and action on livelihood strategies and indigenous chicken production. The researcher facilitated the discussion in the initial stages, but gradually allowing for other facilitators from among the participants to take the lead. Participatory approaches were harmonized through presentations on relevant tools from a family of

participatory rural appraisal tools. Relevant tools were used in developing innovative community action plans. The inception meeting culminated in the formulation of a schedule of activities to be undertaken from reconnaissance survey to participatory analysis. Data collection and action was carried out in two phases; first phase focused on livelihood strategies while the second concentrated on indigenous chicken value chain and innovations where both qualitative and quantitative data were gathered.

3.7.1 Observations, Interviews and Focus Groups

During the reconnaissance survey, community assessment was undertaken by the stakeholders divided into smaller teams of between 5 and 8. A checklist was used to capture livelihood strategies, challenges and opportunities as observed. Interview guides facilitated gathering of data from sample households during the reconnaissance. Natural resources, Physical, Institutional resources were captured as field notes. The findings provided a basis for discussions during the open public meeting.

During the public meeting (community entry meeting) the stakeholder members created awareness on the planned activities to be undertaken in the community. A discussion guide was used to guide the presentations and discussion with the community. A checklist was used as developed by the stakeholders to elect community representatives based on zones (clusters). The criteria for identifying clusters to represent indigenous poultry farmers from specific geographical zones were developed by the stakeholders. Fifteen (15) community representatives were elected and tasked to recruit other participants for the study with the guidance of the researcher. The fifteen community representatives formed part of the innovation platform at a later stage (Table 3.3). The community representatives underwent training as co-researchers. Each zone had

organized meetings on days agreed upon by consensus and such meetings were organized by the trained community representatives.

The community representatives were carefully taken through the interview schedules during training to build their confidence and skill in carrying out the field research (Nanok et al., 2005). The training was necessary so as to make them become familiar with research tools. The co-researchers practiced the interview with each other through role play during the training. Nanok et al. (2005) reported effective use of school children as co-researchers interviewing their parents in Zimbabwe.

Table 3.3

Composition of Innovation Platform

Category	Number of representatives
Community representatives	15
Extension agents	3
Key stakeholders	6
Researcher	1
Total	25

The zonal meetings held were used to educate the community members on aspects of livelihood strategies in which they engage in. Attention was paid to productivity enhancement for their livelihood strategies. Focus group discussion guides were used to identify priority livelihood strategies, challenges and opportunities. Matrix ranking was used to rank the livelihood strategies based on their contribution to livelihood outcomes and based on their productivity. Household interview schedules were utilized to collect qualitative and quantitative data on livelihood strategies and indigenous chicken production from the participating households (Appendix 5).

The livelihood strategies were prioritized by each household based on its contribution to positive livelihood outcomes. Projective techniques such as the use of a number of small stones (say 50) to represent overall livelihood requirements, so that the 50 stones are distributed among the livelihood strategies to facilitate ease of ranking even for household heads with low literacy levels was applied. Sizing *chapati* was similarly used to illustrate the relative importance from low to high. The livelihood strategies were ranked by every participating household on the basis of their contribution to positive livelihood outcomes. Only key livelihood strategies as perceived by the households were ranked to guard against tiring participants during the process.

3.7.2 Innovation Platform and Value Chain Data

The second phase of data collection was preceded by a planning meeting. The data collection team was transformed into an innovation platform. The platform members collected data from value chain players through focus group discussions and the use of interview schedules. The discussions and interviews were guided to generate data on the efficacies, challenges and opportunities in upgrading the indigenous chicken value chain.

The innovation platform developed an action plan for collaborative action between the team and the community. Innovation strategies identified to address constraints and for upgrading of the value chain were discussed and partially implemented through partnerships with the community. Quantitative data were collected from the social innovation trials on chicken healthcare.

Informal interviews were conducted in six selected sites in the county by a team composed of researcher (1), community representatives (15), Extension agents (3) and other key stakeholders (6). The informal interviews were conducted both at group level

and at household level. The household level interviews captured information on both the factors under study; livelihoods and indigenous chicken productivity.

Different participatory data collection tools such as projective techniques, participatory resource map drawing were utilized to help the innovation platform team visualize the lived experience of the agrarian population of the county. The study used the problem tree and objective tree analysis for participatory problem diagnosis and identification of opportunities available to address key productivity problems in the indigenous chicken value chain. The facilitator encouraged farmers to identify innovation options to address productivity constraints.

3.8 Data Analysis and Presentation

According to Bhattacherjee (2012), all scientific research is an iterative process of observation, rationalization and validation. The research designs vary based on whether the research starts at observations and attempts to rationalize the observations or starts with a theory or a rationalization and attempts to validate the theory. When a research design starts at observation or data collection and progresses to rationalization and validation it uses inductive logic. Theory or hypothesis testing on the other hand is a deductive research. This study uses both inductive and deductive logic in data analysis. The data gathered through sustainable livelihood, value chain and innovation system perspectives were subjected to qualitative and quantitative analysis techniques. Quantitative data were analysed with the aid of Statistical Package for Social Sciences; SPSS version 27 for windows. Qualitative data were analysed by Grounded theory method, based on inductive thematic analysis.

3.8.1 Determinants of Livelihood Strategies

The determinants of livelihood strategies adopted by households in the community were discussed in participatory focus groups. For an in-depth understanding, the determinants for each of the livelihood strategies were discussed separately and rich qualitative data collected from each of the focus discussion groups. This was expected to yield rich qualitative data. The qualitative data was transcribed and analysed thematically based on grounded theory linked constant comparative analysis using inductive techniques. Inductive thematic analysis techniques were used to generate sub categories and categories on the determinants of livelihood strategies in the study area. The analysed qualitative data are presented in themes and narrations while the descriptive statistics are presented in tables and figures.

3.8.2 Patterns of Livelihood Strategies

To establish the patterns of livelihood strategies, constant comparative method (Nelson, 2015) was adopted to analyze data to obtain patterns. The first step involved coding and placing data in categories. Coding procedure included categorizing, summarizing and accounting for each piece of data by sorting them based on shared characteristics and properties.

The second stage of the constant comparative method involved comparing categories to identify linkages or interactions between them. Thirdly is the establishment of a saturation point at which all categories have been established, linked and concepts have emerged. The fourth stage is the capture of the set of concepts, categories and their interactions to provide higher level linkages. Scott and Howell (2008) propose that the investigator constantly compares the categories in order to construct the

interrelationships. The process starts through open coding and maintains a constant comparative questioning.

The constant comparative analysis has been explained as an analytical process used in grounded theory for coding and category development (Tie et al., 2019). According to Tie et al. (2019), the initial stage compares incident to incident. Comparison is a dominant principle in the analysis process in the traditions of qualitative research including in grounded theory thinking. It has been argued that comparison is the main intellectual activity that underlies all analysis in grounded theory (Boeije, 2014). In the constant comparative method there is no prior coding system, each piece of data must be compared with every other piece of relevant data (Boeije, 2014).

It has further been explained that the Grounded-theory-linked constant comparative analysis methodology uses multiple stages of collecting, refining and categorizing the data (Kolb, 2012). The researcher develops concepts from the data by coding and analyzing at the same time. The constant comparative methodology consists of four stages; firstly, comparing incidents applicable to each category, secondly integrating categories and their properties, thirdly delimiting the theory and fourth writing the theory. The entire process is about reducing the data into manageable units (Kolb, 2012). Data collection and data analysis occur simultaneously throughout the duration of study. This data analysis procedures are summarized by Corbin and Strauss (2008) as cited by Kolb (2012) into three stages; open coding, axial coding and selective coding. Open coding involves identification of different categories, properties and dimensions and the second stage of axial coding is where categories are linked together through a process of relating sub categories to a category by use of inductive and deductive thinking. The final stage of

selective coding involves identifying and choosing a core category and connecting it to other categories and validating their relationships. A theory emerges after the integration of all the major categories into the selected core category. In this study, qualitative data was gathered on the determinants of livelihoods; the various factors identified by participants as contributing to specific livelihood strategies were categorized at a broad level with involvement of the participants and sub-categorized further at a later stage based on the constant comparative analysis methodology.

3.8.3 Roles of Indigenous Chicken in Livelihoods of the Rural Population

The roles of indigenous chicken in the livelihoods of the rural or agrarian society were captured qualitatively as narrated by the participants and subjected to thematic analysis. According to Braun and Clarke (2013) thematic analysis is a method for identifying themes and patterns of meaning across a dataset in relation to a research objective. The current study applied an inductive thematic analysis whereby the analysis is not shaped by existing theory. According to Uwe (2017) inductive thematic analysis involves six steps; familiarizing with the data, generating initial codes and searching for themes are the first three steps. According to the author, themes refer to something relevant to the research question which can be seen in the dataset as a pattern of responses. Inductive thematic analysis develops codes and themes from the data. The next three steps in inductive thematic analysis according to the author is to review the themes, define the themes and finally made generalizations based on comparisons of cases and groups in the form of a report (Uwe, 2017, p.421-422).The themes generated were coded. The themes were identified in a data-driven bottom-up way based on what is in the data (Braun & Clarke, 2013).

3.8.4 Socio-economic Determinants of Indigenous Chicken Productivity

The data on the socio-economic variables such as literacy levels and access to information were measured on an ordinal scale. The productivity of the indigenous chicken was measured either on a continuous or on a ranking scale; based on selected productivity indicators. The associations between the variables were tested using Spearman's Rank Correlation analysis. Welch ANOVA was used for the analysis of continuous data and Eta squared to estimate the strength of relationship between the variables. The data were analysed with the aid of SPSS version 27 for windows. Measures of relationships are presented in tables and discussed accordingly.

3.8.5 Indigenous Chicken Productivity and Livelihood Outcomes

The indigenous chicken productivity was measured by use of proxy indicators on a ranking scale and on a continuous scale. Livelihood outcomes were measured by use of indicators generated by the community based on the Participatory Livelihood Analysis stages-of-prosperity indicators. Tests for association and the strength of association between indigenous chicken best-practices and livelihood outcomes were tested by use of Goodman-Kruskall's gamma analysis. The strength of relationship between the attributes was measured by gamma coefficient (G) derived from the formula; $G = (Ns - Nd) / (Ns + Nd)$ where Ns is the number of concordant pairs and Nd is the number of discordant pairs. The Gamma coefficient analysis was carried out with the aid of SPSS versions 27. Differences in indigenous chicken productivity between the stages of prosperity as defined by the community were tested by Welch ANOVA. Strength of relationships was estimated by Eta squared (η^2). The statistical coefficients are presented in tables and discussed accordingly in chapter four.

3.8.6 Evaluation of Efficacy of the Indigenous Chicken Value Chain Practices

Data on the efficacies, challenges and opportunities in indigenous chicken value chain were captured qualitatively from the perspective of the producers and other value chain players. The grounded theory linked constant comparative analysis methodology (Kolb, 2012) was employed to generate categories on the efficacies, challenges, and opportunities in the indigenous chicken value chain. In grounded theory analysis, qualitative data is broken down into themes through a hierarchical and logical process. Raw data is deconstructed into smaller components through open coding. These open codes are then grouped based on their relationships into broader categories known as axial codes. Finally, an overarching category is developed from the axial codes, through a process of selective coding (Braun & Clarke, 2013). The resultant selective codes are higher level concepts that comprehensively describe the phenomenon being studied (Braun & Clarke, 2013). Descriptive statistics such as frequencies have also been used; to a limited extend, to aid in full description of the variables in this study.

3.8.7 Participatory, Collaborative Action for Innovation Strategies

The seventh objective of this study was to formulate a potential social innovation strategy, through a participatory collaborative action, for indigenous chicken productivity enhancement. Focus group discussions were to generate value chain constraints through a problem tree analysis and generate opportunities through an objective tree analysis. Cause effect relationships were established through Constant Comparative Analysis methodology with the involvement of the participants. The Constant Comparative method involved comparing categories to identify linkages or interactions between them.

Matrix ranking on the challenges identified at each node was used to prioritize the challenges requiring interventions.

One of the suggested innovation strategies was implemented. The data collected before implementation by a group of the participants was tested for differences with the data collected after the intervention. Tests for differences between the period before and after were analysed using McNemar's test. The test is suitable for paired observations such as before and after intervention on the same group of participants. The test is based on the proportions of individuals showing a specific property or lack of it. This is a test on a 2by 2 contingency table (Before & After, for low and high or yes and no). The test is based on Pearson's' Chi square and is worked out from the formula; $\chi^2 = (b - c)^2 / (b + c)$, where b and c are discordant cells in a 2 by 2 contingency table. Computation was done with the aid of SPSS version 27.

3.9 Ethical Considerations

Ethical guidelines for research seek to work towards protecting the individuals, communities and environments involved in the studies against any form of harm, manipulation or malpractice. A research permit was secured from the National Commission for Science, Technology and Innovation (NACOSTI) prior to carrying out this research. The participants were requested for their participation at least two weeks prior to the start of the action research process. Individual consent was sought before administering the research tools.

The selected participants for the study were assured of their anonymity and confidentiality in the handling of the information gathered from them and they were

informed on the information which will be used for community knowledge. They were assured that their names will not be used anywhere in the research report, but they were also informed that their comments and village names may be used in public documents, but without any reference to individual names or household names. To ensure confidentiality of the specific households or villages under study, codes were used rather than real names to conceal their identity. Part of the capacity building for the community representatives in the research team was devoted to confidentiality in the handling of information gathered. In accordance with research ethical standards, the resulting research document was scanned using appropriate software to prevent plagiarism.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the study findings based on the collected data as aligned with the study objectives.It presents the results on the determinants of livelihood strategies, the pattern of livelihood strategies, the roles of indigeneous chicken and the socio-economic determinants of their productivity. The chapter further presents findings on the established relationships between indigenous chicken productivity and livelihood outcomes. The efficacies in the indigineous chicken value chain and potential social innovation stategies, as observed through the application of experiential knowledge and the participatory analysis approach, are presented and discussed.

4.2 Determinants of Livelihood Strategies

The first specific objective of this study was to examine the socioeconomic determinants of livelihoods through participatory analysis in rural communities of Kericho County. To achieve this, qualitative data were collected through participatory focus group discussions. The rich data obtained were then analysed thematically using grounded theory methods. This section presents the results and discussion related to this objective.

The determinants of livelihood strategies were explained to the participants as those factors that influence the choices that individuals of the community make in order to sustain their livelihoods. Such influential elements in the community, as presented, were quite diverse. All the narratives about the influencers of decisions in regard to livelihood strategies were captured by the researcher. They were initially captured in random

version and in its rudimentary form as narrated by the participants. The participants were asked to write down their opinions on post-cards as individuals; others explained them as it was written for them on post-cards. The post cards were later put together during a focus group discussion so as to group similar ones. The participants came up with determinants that could be grouped into different categories. They were later analysed through grounded theory analysis methodology to establish patterns and the underlying core categories. The core categories and examples of the associated raw dataare captured in Table 4.1 and are explained in the succeeding sections.

Table 4.1 presents a summary of the analysed data on environmental, economic, and social factors that interact to influence decisions regarding livelihood strategies. The results suggest that these strategies are shaped by the interplay of environmental suitability, perceived economic value, and social dynamics. Specifically factors such as land suitability for particular strategies, the perceived economic benefits of those strategies, and social influences, such as participation in farmers groups, appear to interact in shaping livelihood choices as illustrated in Table 4.1.

Table 4.1

Analysed Data on Environment, Economic and Social Factors in Livelihood Choices

Raw data (examples)	Open codes	Axial codes	Selective codes
Our land is suitable for sugarcane growing so it is our main livelihood	-Sugarcane as a livelihood strategy -Land suitability as an incentive	-Land suitability as primary driver of livelihood choice -Dependency on natural resources	-Livelihood strategies shaped by environmental / economic factors interaction
Our parents educated us from this sugarcane and we have found it worth to continue with it.	-Inheritance -Perceived success (worth continuing) -Beneficial education funded	-Intergenerational continuity -Cultural and social influence -Perceived worth	-Livelihood strategy driven by perceived economic value and inherited knowledge
I engaged in indigenous chick rearing because I had someone who regularly brought my produce at fair prices	-Market access (availability of buyer) regularity of demand -Buyer influence price motivation	-Market access and demand -Influence from external actors -Dependency on a constant market	Role of market access and economic incentives -Marketness (market-based strategies)
We engage in several livelihood activities so that when one fails you still have something to eat	-Diversification of livelihood activities -Risk management -Food prioritized	-Livelihood diversification -Risk mitigation -Food security as core motivation	-Desire for Resilience-Building
We formed a group and we decided to venture into indigenous chicken rearing because it was possible for all our members even those who did not have land	-Croup formation -Inclusivity -Collaboration -Resource limitations -Feasibility	-Collective action -Inclusive livelihood strategy	Leveraging social capital
When I got a small loan from my employment, I decided to venture into dairy farming. There is high demand for milk around here.	-Financial capital -Entrepreneurial action -Market opportunity	-Access to financial capital -Entrepreneurship -Market opportunity	-Leveraging external resources to exploit local opportunities (Marketness)

4.2.1 Environmental/Economic Factor Interactions

In one notable case, a respondent judged; **"***Our land is suitable for sugarcane growing…."* This anecdote highlights on the importance of the natural environment as a determinant of livelihood strategies. Although the participant seemed to emphasize on the specific livelihood strategy, sugarcane, a further probe revealed that the area suitable for sugarcane was equally suitable for other crops such as fruit trees. But why choose sugarcane specifically? "*We have factories that are established, where we can readily sell our produce*" was the response. This additional information suggests an interaction between the land and an enabling economic condition; access to markets.

Implicit in the statement is an assumption that the sugarcane growing is economically advantageous owing to the availability of market and processing facilities. The phrase "*our land"* indicate access to land and "*suitable*" indicates its qualities in regard to sugarcane growing. This observation suggests that access to land and its quality is a significant determinant of livelihood strategy choices.

4.2.2 Perceived Economic Benefits and Inherited Knowledge

"Our parents educated us from this ....." as explained by a participant highlights the significance of perceived benefits in the sustenance of livelihood strategies. The inherited livelihood strategy has had a long-term impact providing for the education of household members. The impact from the past seemed to contribute to some inertia towards-change. There was no indication among the participants that they had subjected the livelihood strategy to some cost-benefit analysis, but only relied on its past records for its evaluation.

4.2.3 Market-based Livelihood Strategy Decisions and Market Incentives

Participants emphasized that access to markets, demand, and pricing are crucial factors influencing their livelihood choices. One participant emphasized this, "*I had someone who regularly bought my produce….*" highlighting the importance of a consistent buyer. During plenary sessions participants indicated that market access, demand, and prices play pivotal roles in livelihood decisions. This reflects the concept of marketness, which describes how economic activities are governed by market principles such as competition and price mechanisms (Storbacka & Nenonen, 2011).

In this context, having a consistent buyer and stable demand as a prerequisite in engaging on a livelihood strategy suggests a high degree of marketness, where market factors significantly influence livelihood decisions. However, relying on a single market can pose risks, if that market fails, producers without alternatives may face economic challenges. This underscore potential vulnerability associated with dependence on a single market outlet.

4.2.4 Resilience-building

The community members engaged in the diversification of livelihood strategies, primarily as a means of mitigating risks. As one participant explained, "*We engage in several livelihood activities so that when one fails, you still have something to eat".* This highlights that diversification was intended as a form of insurance against food security risks.

Livelihood diversification activities included growing crops and raising livestock such as chickens and goats. Additionally, some participants operated small businesses, including

trading in farm produce as a way to diversify their income. These efforts to expand both food and income sources align closely with the concept of resilience-building.

4.2.5 Leveraging Social Capital

Social networking among community members played a significant role in livelihood strategy decisions. One participant shared, "*We formed a group and decided to venture into indigenous chicken rearing because it was possible for all our members, even those without land*". This anecdote highlights how collective actions and collaborations influenced the livelihood choices of households. It suggests that leveraging social capital is crucial in shaping these decisions. The participants seemed aware of the diversity within their social groups, particularly regarding resource availability and chose livelihood strategies that promoted inclusivity. In this case the limitations of land were overcome by selecting a strategy that required minimal land.

4.2.6 Leveraging External Resources to Exploit Local Opportunities

Some farmers obtained off-farm credit facilities to invest in on-farm livelihood strategies. One participant for instance shared, "*I got a small loan from my employment and decided to venture into dairy farming, there is high demand for milk around here*". This highlights the importance of external financial capital in taking advantage of local market opportunities. The anecdote suggests that livelihood strategy decisions were influenced by access to financial capital, entrepreneurial mindset and the presence of an exploitable opportunity. Overall, it can be seen as a case of leveraging external resources to capitalize on local opportunities.

4.2.7 Social Learning, Access to Natural Resources and Family Dynamics

Some community members made important livelihood decisions based on motivation from fellow farmers. As one participant shared, "*One time we visited central province and I was inspired by a farmer who was producing a lot of milk from a small piece of land. From then, I decided to engage in dairy farming, as I had sufficient land to rear upto five dairy cows*". This example highlights the significance of exposure and motivation through peer interactions. The farmer adopted dairy farming upon realizing the potential to effectively utilize their land for dairying. This case illustrates how external influence, specifically social learning, plays a critical role in livelihood strategy decisions. The combination of social learning and access to resources, such as land, ultimately led to the decisions to invest in this livelihood strategy.

In a related example, another participant stated, *"I encouraged my children to raise chicken because I had seen my neighbour making money from the activity*." This underscores how farmers often learn through social interactions with peers. Interestingly, the participants added, "*When my children left for college and work outside, I had to take it up. I find it profitable*" This observation introduces another important factor influencing livelihood strategies; family dynamics. It reflects how roles and knowledge are shared among family members, shaping decision-making processes and contributing to the sustainability of livelihood strategies. In yet another case of leveraging on the existing natural resources, a participant stated, "*We keep chicken because our warm weather throughout the year is good for them*" In this case the livelihood strategy was linked to biophysical environment suitability.

4.2.8 External Interventions and Capacity-building

Participation in external interventions and capacity-building activities influenced the decisions on livelihood strategies by community members. One participant highlighted this impact, explaining, "*We had a project in our area promoting chicken rearing. I joined the project and got trained and that is when I started expanding on the chicken rearing".* This anecdote demonstrates how external interventions and capacity-building facilitated knowledge transfer and inspired the adoption of a more commercial approach to chicken rearing as a livelihood strategy.

The projects' presence indicates a deliberate effort to address identified problems through a series of targeted activities over a specific period. This distinguished these interventions from tangible external resources previously referenced. The interventions focused on intangible resources such as training and mentoring which constitute knowledge and information resources.

4.2.9 Climate-driven Livelihood Decisions

Climate-driven decision making was evident among the participants. Crop selection, diversification of crop enterprises and backup strategies in the event of drought were key considerations in their livelihood strategies. One farmer highlighted, "*Our weather conditions oscillate between wet and dry, making coffee growing an important livelihood strategy*". This observation underscores the significant role of climate in shaping livelihood decisions.

Regarding climate change, another participant noted, *"In these days of climate change, one has to select the right crops to grow. You also have to keep livestock, such as*

chickens, so you have something to fall back on when crops fail, especially during droughts". These accounts reveal that livelihood diversification and risk management are central to smallholder farmers' decision- making processes. Such behaviours align closely with the need to build resilience to climate change.

In some cases, social learning combined with access to natural resources, appeared to influence livelihood strategy choices. Certain datasets indicated that social learning was a critical determinant in these decisions. This process was often assisted by additional pull factors, such as the availability of natural resources and the suitability of the biophysical environment for specific livelihood strategies, as detailed in Table 4.2.

Table 4.2

Analysed Datasets for Selected Raw Data on Social Learning and other Push Factors

Raw Data	Open codes	Axial codes	Selective codes
One time we visited central province and I was motivated by a farmer who was producing a lot of milk from a small piece of land, and I decided to engage in dairy farming. I had sufficient land to rear up to 5 cows.	-External exposure -Motivation by others -Land availability -Adoption of dairy farming	-External influence/social learning -Adoption based on observation -Land resource -Viability (observed)	Social learning and access to natural resources
I encouraged my children to raise chicken because I had seen my neighbor making money from the activity. When my children left for colleges and work, I had to take it up. I find them profitable.	-Encouragement -Observation of others -Household dynamics -Knowledge transfer -Profitability	-Observational learning -Changing household dynamics -Adoption of a livelihood strategy -Perceived profitability	-Social learning, entrepreneurship and family dynamics
We keep chicken because our warm weather, throughout the year is good for them, so they grow fast and lay eggs. The only and major problem we have is predators ***(****Chagau*).	-Climate dependent livelihood -Adaptability of chickens -Sustainability of practice	-Livelihood choice linked to climate -Environmental compatibility -Chicken as climate sensitive	-Leveraging Biophysical Environment suitability
We had a project in our area promoting chicken rearing. I joined the project and got trained and that is when I started expanding on it.	-External intervention -Participation -Capacity building -Realization of potential adoption	-External interventions -Capacity building and knowledge transfer	-Leveraging External interventions -Training & capacity-building
Our weather conditions oscillate between wet and dry this makes coffee growing our important livelihood strategy	-Weather conditions -Coffee growing -Weather suitability	-Environmental determinants of livelihoods -Climate-driven decision making	Adaptation to environmental conditions

Social learning is known to be a powerful method for adult learners to adopt new practices. According to the theory of social learning, learners retain beneficial knowledge from peers much more compared to when they are taught by outsiders. The Farmer Field School approach in which learners gain much of the knowledge from peers is based on this principle of social learning and social influence (Asare-Nuamah et al., 2025). Comments such as "*I had seen my neighbour making money….*", as narrated by one participant suggests a significant role of social learning in livelihood choices.

4.2.10 Social Embeddedness

Tradition and heritage play a significant role in the selection of livelihood strategies among the community members (Table 4.3). Inherited practices are perpetuated across generations. As one participant noted, "*We raise livestock for our livelihood. This is how we found it. It served our parents and grandparents well and we will continue with it*". This demonstrates that adapting to and trusting established practices are crucial factors in livelihood choices. Generational continuity contributes significantly to these decisions. The practice appears deeply rooted in social networks, tradition and cultural ties within families and communities. This behaviour aligns well with the concept of social embeddedness, where activities are interconnected with socio-cultural networks (Grannovetter, 1985).

The findings on social embeddedness have significant implications for agricultural development. On the positive side it facilitates the transmission of traditional practices and knowledge across generations, contributing to sustainable agriculture. However, social embeddedness can also act as a barrier to the adoption of new, potentially superior technologies and management practices.

4.2.11 Leveraging Education in Livelihood Strategies

Educational background among household members appeared to play a critical role in livelihood development (Table 4.3). For instance, one study participant stated, "*The poultry project I have was initiated by my son when he left college and could not secure formal employment*". While not explicitly stated, the sons' educational background appeared to play a significant role in initiating the project. From a grounded theory perspective, this suggests a push factor in livelihood decision-making: the lack of formal employment after college drove the decision to start the poultry project. However, the sons' education likely contributed valuable knowledge, benefiting the projects development. This illustrates how education can be leveraged in livelihood strategies.

In another similar case, a participant narrated "*My child initiated an aquaculture project when he left college*", suggesting that the son's formal education may have provided him with the necessary knowledge and skills for the project. Similarly, another participant stated, "*My son has a diploma in Agriculture and he helped us develop our dairy farming*", indicating a direct contribution of formal education to livelihood development in rural areas.

4.2.12 Age Influences Livelihood Strategy Decisions

Table 4.3 presents data analyzing the influence of the household head's age and education level on livelihood strategy choices. The findings suggest that these choices may reflect a desire for generational continuity, with younger households often pursuing the same livelihood strategies as their parents. The data also indicate that educational background plays a role; college graduates, particularly youth, appeared to engage in

farming strategies with support from their parents. These findings are detailed in Table 4.3 and discussed further in the following subsections.

Age appears to play a significant role in livelihood decisions. One participant noted, "*The sheep on my farm belong to my son. I don't like sheep much; they tend to finish grass at the expense of cattle.*"This suggests intergenerational differences in livelihood strategies, as shown in Table 4.3. While the farmer's son preferred keeping sheep, the farmer was more attached to cattle, indicating that age may influence these strategic choices.

Table 4.3

Grounded Theory Analysed Data on Age and Education Influences

Raw data	Open codes	Axial codes	Selective codes
We raise livestock for our livelihoods. This is how we found it. It served our parents and grandparents well, and we will continue with it.	-Tradition & heritage -Sustained practice -Generational continuity -Adaption and trust in practice	-Generational continuity and tradition -Community and cultural continuity	-Social embeddedness (rooted in social networks, traditions and cultural ties of family and community)
In these days of climate change, one has to select the right crops to grow. You also have to keep some livestock such as chickens and goats so that you have something to fall back to when the crops fail especially during droughts	-Climate change -Crop selection -Farm diversification -Drought -Back up strategy	-Climate change and adaptation -Livelihood diversification and risk management	-Building climate change resilience
The poultry project I have was initiated by my son when he left college and could not get formal employment. I supported him to expand the activity	-Educational background -Non- formal employment -Parental support -Youth entrepreneurship -Unemployment (push factor)	-Education and opportunity creation -Gap between education and formal job opportunities -Family dynamics	-Intergenerational collaboration (family dynamics) & -Leveraging education in livelihood development
The sheep belongs to my son, I don't like sheep so much, they tend to finish the grass at the expense of cattle	-Ownership (the young) -Personal preference -Resource competition -Conflict between livelihood priorities	-Intergenerational differences -Challenge of limited resource (competition) -Traditional association with cattle -Adaptation to conditions (son)	-Intergenerational shift in livelihoods -Compromise in household Livelihood decisions (family dynamics) -Age influences livelihood strategy decisions

The age structure of the household also appeared to influence its livelihood choices. Children and youth sometimes provided labour on neighbouring farms, while the elderly primarily took care of livestock within homesteads. One participant noted. "*Children go for labour wages in maize weeding during the weeding season and sometimes for coffee picking. It raises some money for their small items like clothes, so they do not have to ask for it so much*". This suggest that household heads encouraged children to engage in hired labour to reduce their financial dependency and contribute to household income.

The age structure also played a role in determining livelihood choices in one location where sugarcane was a dominant economic activity. As one participant explained, "*Many youths are engaged in cane cutting; they are contracted by sugarcane factories to cut and load cane onto tractors for transportation. They are paid on a weekly or sometimes monthly basis*". This highlights age-based labour intensive livelihood strategies as youth were engaged in this task due to their physical strength and energy.

In other cases, older adults relied on their offspring for financial support, as one participant shared," *My son who works in town contributed some money to help me construct a dairy unit*". This highlights the importance of off-farm income in meeting household needs. It also reflects on intergenerational shift, where a son now provides for his father, who previously managed his own livelihood.

These findings suggest that socio-demographics such as age and education of the household head have a critical role to play in livelihood strategy choices. These findings are consistent with the arguments that age and education have significant role to play in

adoption of new technologies. Older farmers generally are less likely to adopt new livelihood strategies (Chepchirchir et al., 2023; Omondi & Gido, 2024).

4.2.13 Summary of Livelihood Determinants derived from Grounded Theory Themes

Table 4.4 presents several socioeconomic determinants of livelihoods as identified during the study. This study reveals a number of socio-economic determinants of livelihood strategies, including reactions to interaction between environmental and economic factors, perceived economic values, inherited knowledge, degree of marketness and resilience-building motives. Additionally, other determinants include leveraging social capital and external resources, social learning, access to natural resources especially land, and external interventions such as capacity building. Key drivers also encompass response to climate driven changes, social embeddedness as reflected in traditional practices, age and intergenerational shifts, family dynamics and the roles of formal education as detailed in Table 4.4.

Table 4.4

Thematic Summary of Drivers of Livelihood Strategy Decisions

No	Drivers of livelihood decisions (Broad theme)	Specific livelihood strategies choices based on:
1	Environment /Economic factor interactions	Access to land, Land quality (soils & climate), Proximity to water source
2	Perceived Economic value	Measured in terms of previous benefits, based on history such as facilitated payment for education
3	Inherited knowledge	Utilization of inter- generational knowledge
4	Degree of marketness	Access to markets, high demand, pricing, consistent market
5	Resilience-building	Diversification of farm- based livelihood strategies, Diversification of income sources, including off-farm trade
6	Leveraging social capital	Collective decisions in social groups, group-based interventions
7	Leveraging external resources to exploit local opportunities	Off-farm credit facilities to invest in farm-based livelihood strategies
8	Social learning (External influence)	Motivation from others, inspired by what they observe from others; in their neighborhood or during visits &tours, supported by access to land
9	Family dynamics	Engaging family members with different roles (gender), sharing roles & knowledge among family members, shared roles tend to lead to diversified livelihood strategies
10	Leveraging External interventions	Participation in externally supported projects, training, capacity-building received through participation in projects and programs
11	Climate-driven decisions (Building resilience to climate change)	-Crop selection for adaptation, diversification of crop enterprises, backup strategies in the event of drought
12	Social embeddedness	Inherited practices perpetuated across generations, Livelihood activities rooted in social networks, traditional and cultural ties within families and communities
13	Leveraging Education	Application of knowledge and skills acquired from education system, Entrepreneurship skills
14	Intergenerational collaboration	Parental support, Family as an economic unit
15	Age (intergenerational shifts)	-Livelihood preferences based on age dynamics

Education has a role in livelihood strategy choices as revealed by the current study. Mbuthia (2018) reported similar results on age and education. Age is a critical factor in regard to sale of labour for livelihood (Acharya, 2006). Age as a factor in livelihood strategy choices is similarly reported in other works. Mbewana and Kaseeram (2024) found that younger individuals tended to migrate to urban areas for off-farm labour. Other similar findings have been reported by Mwatu et al. (2021). Access to land likewise influenced livelihood strategy choices (Mwatu et al., 2021), a factor viewed in the current study as part of environment/economic factor interaction. Land appeared to serve as the main means for generating livelihoods as argued elsewhere by Tuyen (2014). Risks from the environment are an important consideration (Peng et al., 2019). Environmental conditions, resource use economics and social factors play critical role in shaping livelihood choices as reported in Rahman and Hickey (2020). In particular some authors have found that land size is a significant determinant of livelihood choices in rural set ups (Mwatu et al., 2021). Further, as in the current study, studies elsewhere have found that social networking influenced livelihood choices (Ahmand & Afzal, 2024), a factor appropriately referred to as social embeddedness in the current study.

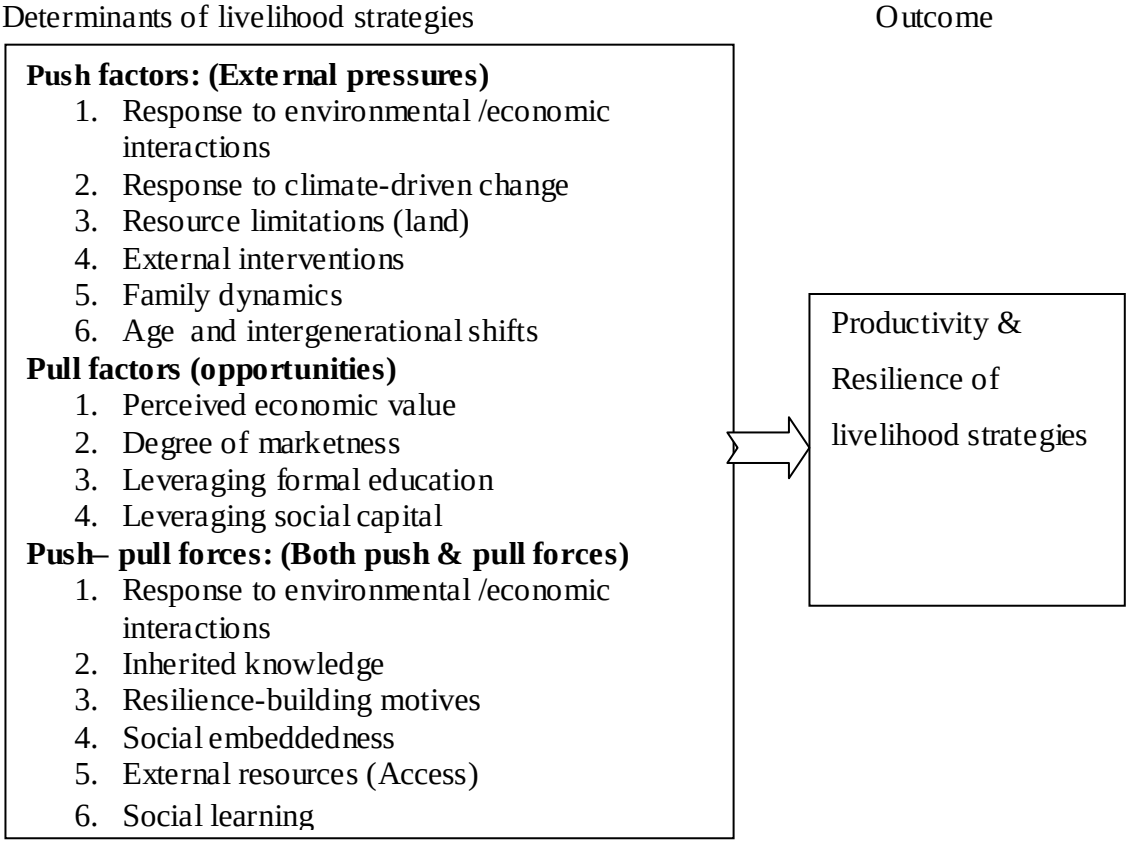
Summary

In summary, the socioeconomic determinants of livelihood strategies identified by this study appear to operate through push, pull, and push-pull dynamics as illustrated in Figure 4.1. Push factors such as response to climate-driven changes, resource limitations, external interventions, family dynamics, and age and intergenerational shifts force individuals to adjust their livelihoods in response to external pressures.

In contrast, pull factors, such as perceived economic benefits, market access, formal education and social capital, attract individual towards more promising livelihood options. Some factors, including response to environmental-economic interactions, inherited knowledge, resilience- building motives, social embeddedness, external resource access, and social learning, function as both push and pull forces, simultaneously presenting constraints and opportunities. Recognizing these interlinked drivers is essential for designing policies and interventions that enhance rural household resilience and productivity. Figure 4.1 presents a summary of these socioeconomic factors identified as influencers of livelihood strategy choices by exerting push or pull pressures.

Figure 4.1

Determinants of Livelihood Strategies as Analysed by Grounded Theory



The push factors appear to operate as external pressures. A response to climate change was a critical push factor among the determinants of livelihood strategy choices. Resource limitations particularly land was another. Age and intergenerational shifts could also be regarded as push factors as well as unavoidable family dynamics. Response to environmental and economic interactions appeared to be both a push (an external force) as well as pull (opportunity) factor. These findings are consistent with FAO (2016) report which cites climate-change as an important push factor in livelihood choices among rural communities. Adger et al. (2021) similarly identifies environmental factors and climate extremes as primary push factors in rural livelihoods. Climate shocks, as critical determinant of livelihoods is also reported in Nawrotzki and De Waard (2016). Further, in the current context, age is viewed as a push factor in that elderly household heads tended to confine themselves to sedentary farming within their homesteads, while the youth provided labour for wages in neighbouring farms and in urban areas. Whereas the elderly are forced (a push factor effect) to confine themselves into farming within their homesteads, the youth had the opportunity (a pull factor effect) to seek wage-labour off-farm.

In conclusion, the socio-economic determinants of livelihoods among rural households in the study area encompassed factors such as economic conditions, market participation, human capital, responses to environmental and climate-related factors, access to natural resources and social structures. There was a dominance of agriculture-based livelihoods with many socioeconomic factors at play. This dominance of agriculture-based livelihoods in rural set ups has been reported elsewhere by Loison (2015).

4.3 Patterns of Livelihood Strategies

The second objective of this study was to analyze, through a participatory approach, the patterns of livelihood strategies among rural communities in Kericho County. This objective was addressed using qualitative data gathered through interactive focus group discussions. The data were analysed thematically using grounded theory and the constant comparative method.

To accomplish this objective a participatory assessment of livelihood strategies was undertaken, based on the sustainable livelihood framework approach (SLFA). Rather than concentrating on the five capitals based on the SLFA, the current study focused on contextual factors based on the lived experiences of the community members. Interactive qualitative accounts (Cohen et al., 2007) from the community members were leveraged for in-depth understanding of the patterns of livelihood strategies and the underlying reasons on why they were embraced.

Patterns of livelihood in this study were understood to mean recurring trends observed regarding how people earn a living. It includes the activities, resources and combination of resources that households engage in to sustain themselves economically. To vouch for a common understanding among the participants, livelihood strategy was explained as what individuals or households do for a living.

All the livelihood strategies incorporating agricultural activities, all forms of employment, dependence on natural resources and dependence on social networks for support were captured in details as narrated by the participants in focus group

discussions. The narratives were analysed for their deeper meanings using grounded theory analysis. The succeeding sections provide results on the emerging themes.

4.3.1 Farm-based Livelihood Strategies

Table 4.5 presents analysed data on farm-based livelihood strategies as captured from the participants and analysed through grounded theory approach. The data is presented in its raw form as well as in its deconstructed form to yield open codes and axial codes based on grounded theory approach. The selective codes derived suggest that households largely practiced integrated farm-based livelihood strategies as illustrated in Table 4.5.

The observed farm-based livelihood strategies encompassed a wide range of activities including diversification of crops, livestock rearing, value adding, direct marketing from farm-gate and participating in farmers' cooperatives. Several observations can be made in regard to the dominant patterns. Maizecrop and cattle ownership were a significant rural livelihood strategy. There was cash-crop farming and household food security trade-offs, dual land use strategy for cash income and subsistence crops as food safe-guards, market oriented and subsistence farming co-existence, tree-based cash economy and environmental sustainability trade-offs, diversification of livelihood strategies for economic resilience, and Integration of commercial and subsistence production as revealed through selective coding by grounded theory analysis as detailed in Table 4.5.

Table 4.5

Patterns/Recurring Trends in Farm-based Livelihood Strategies

Raw Data	Open Codes	Axial Codes	Selective Codes
"*In our area, it is important that you have maize and at least a cow for some milk"*- Ainamoi	-Local expectations (Maize & Livestock) -Essential role of maize & Livestock -Maize as staple crop, milk for nutrition	-Maize and milk suggests subsistence based economy -Reliance on crops and livestock -Shared understanding (in our area)	-Maize and cattle ownership as a significant part of rural livelihood strategies
"Our area is suitable for Sugarcane. Many people grow sugarcane and leave a small portion of land for cows or goats. Sometimes we have to buy maize from the market for our consumption"	-Crop suitability -Sugarcane widely cultivated -Farmers prioritize sugarcane -Cows and goats as part of farming system	-Sugarcane for income -Limited land forces trade-offs -Market dependency for maize a potential source for vulnerability	-Cash crop farming and household food security trade-offs.
"Coffee is our main source of income, but we spare some land for food crops such as maize and sorghum."- Kipkelion	-Cash crop dominance -Land allocation strategies -Balance market-oriented agriculture with household nutritional needs	-Economic necessity vs food security -Diversification -Intentional reservation of land for staple food -Market integration &self-sufficiency.	-Dual land use strategy -Cash income & food crops for subsistence (safeguards)
People in this location grow many crops and keep livestock. Wehave coffee, bananas, avocados, vegetables including local types, sorghum and millet. We alsokeep cattle, goats,sheep and chicken -Ainamoi	-Crop diversification -Livestock integration -Home consumption crops (Millet, sorghum) -Crops for sale-Coffee -Commercial and traditional	-Diversification for resilience -Household income-food security balance -Global market-local consumption balancing	-Market-oriented, subsistence farming co-existence
Some people rely on trees such as eucalyptus and grevillea. People like them because of the fast-growth - Soin/Sigowet	-Tree-based livelihoods -Rapid maturity key factor -Practical uses (Implicit)	-Economic dependence on fast-growing trees -Exotic vs slow-growing native trees (Implicit) -Demand (Implicit)	-Tree-based cash economy vs environmental sustainability
Some farmers set aside a portion of their land especially along rivers for beehives. Honey production is increasing, just the way people have also ventured into fish farming- Ainamoi	-Bee keeping as a livelihood strategy -Dual purpose; income &household consumption -Diversification into pond fish production. -Strategic land use; bees near rivers.	-Diversification Leveraging natural resources(rivers) -Economic resilience and nutritional security -Shift towards commercialization and non-traditional income sources	-Diversification for economic resilience -Integration of commercial and subsistence

The overarching theme derived from these sub-themes seemed to be the balancing of economic strategies, food security and environmental sustainability in rural livelihoods. Each of the sub-themes appears to reflect the need to navigate economic opportunities while ensuring food security.

Maize and cattle ownership as key livelihood assets support both food security and income. Cash-crop farming and household food security trade-offs highlight economic pressures with an impact on food security. Market-oriented and subsistence farming co-existence demonstrate integration of economic and survival strategies. Tree-based farming system underscores the balance between economic gain and ecological impact. Diversification ensures adaptability in changing economic and environmental conditions, and integrating of commercial and subsistence production underscores the blending of economic and sustainability priorities.

These findings suggest a pattern in which households engage in delicate balancing between internal and external pressures. Whereas internal pressures include the need to provide for household food security and income security, external pressures include the need to conserve the environment.

The need for cash-income drives households to commercialize their activities and explore non-traditional income sources, such as pond-fish production. Livelihood strategies are shaped by a dynamic interplay of social, environmental and economic factors, as noted by Peng et al. (2019). This interplay helps minimize income variability risks, as highlighted by Asfaw et al. (2015).

4.3.2 Off-farm Livelihood Strategies

The observed off-farm livelihood strategies were dominated by small scale trading, wage labour and employment. An analysis based on grounded theory revealed that there was blending of farm production with small-scale trade (Table 4.6), short-term public employment as shown in Table 4.7, non-agricultural skilled labour, off-farm livestock trade and strategies to bridge seasonal income gaps. Additionally, some farmers blended their income with salaried employment as revealed in Table 4.8.

Table 4.6 consists of data in which farm-based livelihoods are augmented with off-farm trade. The livelihood strategy choices are a blend of farm-production with small scale trade, apparently with a goal of ensuring income security as demonstrated in Table 4.6.

Table 4.6

Synergizing Farm-based Livelihoods with Small-scale off-farm Trade

Raw Data	Open Codes	Axial Codes	Selective Codes
Apart from farming, I also engage in trade. I sell fruits and vegetables at the local market, some I buy from my neighbours, and others I harvest from my own farm.	-Diversification of income -Market participation -Social network (buys from neighbours) -Economic interdependence with neighbours -Entrepreneurship	-Farming and trade for income -Social capital -strong local relationships -Vertical integration (taking own produce to market)	-Blending farm production with small scale trade for income security
I buy chicken from my neighbours and sell them to other traders and consumers in town	-Informal poultry trade (buys locally) -Intermediary between rural producers and urban buyers -Trading as source of earnings -Local interaction (community trade networks)	-Bridging: rural production and urban demand -Off-farm entrepreneurship (business venture) -Income diversification through trade	-Bridging rural production and urban markets through small scale poultry trade -off-farm poultry trade to enhance livelihood security
I operate a tree nursery. I sell my seedlings to farmers during market days in the urban centers around	-Tree nursery operation -Seedling production -Selling to farmers -Sales opportunity (Market days, Urban centres)	-Entrepreneurial activity -Distribution strategy -Market dynamics (timing) -Customer base (farmers)	- Off-farm entrepreneurial ventures
I trade in sweet potatoes, some of which I produce from my farm, others I buy from neighbours	-Sweet potato trade -Own farm production -Purchasing from neighbours -Blending production with trade --Local sourcing -Entrepreneurial initiative -Value chain participation	-Mixed livelihood activity -Value addition through trade -Economic linkages with neighbours -Expanding beyond own production	-Hybrid strategy of production and trade

Blending farm-based livelihoods with off-farm trade appeared to be common among the rural participants. When probed as to why farmers did not specialize solely on farming, several reasons emerged. A commonly cited explanation was that "*When crops are not ready, one needs something for daily needs and school fees*". This anecdote suggests that total reliance on farm-based income would likely expose the households to income insecurity.

Peng et al. (2019) argued that urban growth led to increased off-farm engagements. In the authors' view, the presence of access roads encouraged greater participation in trade. Elsewhere, Asfaw et al. (2015) observed that the presence of off-farm opportunities in trade enhanced diversification of income sources. Higher returns from off-farm trade, in particular, incentivized diversification away from farm-based livelihood strategies (Asfaw et al., 2015).

Table 4.7 captures analysed data on how households synergize farm production with off-farm seasonal employment wages for livelihoods. The blending of farm-work with short-term employment appeared to be a coping strategy among some households with an ultimate goal of having some income stability as detailed in Table 4.7

Table 4.7

Synergizing Farm Production with off-farm Seasonal Employment Wages

Raw Data	OPEN CODES	AXIAL CODES	SELECTIVE CODES
I was hired last year in a community project on soil conservation to excavate soil conservation terraces; these types of project occasionally augment our household income.	-Temporary employment (occasional) -Employment from local development initiatives -Involvement in soil conservations efforts -Earning as supplement (not primary source)	-Off-farm labour for additional income -Periodic employment from community projects -Work supports community and livelihood	-Blending farm work with short term public employment for income stability (diversifying rural livelihood through periodic off-farm employment)
Apart from farming I also work as an artisan, earning additional income from construction work. This helps me cover my daily expenses.	-Multiple income sources -Skilled labour use -Financial diversification (daily expenses)	-Income diversification stability -Skilled labour as an asset -Balancing farm and non-farm activities	-Blending farm work with non-agricultural skilled labour
Occasionally I receive an allowance for serving as a board member in two schools, which helps cover expenses when my crops are not yet ready for sale	-Occasional income -Non-agricultural earnings -Financial buffer (when farm income is unavailable) -Institutional affiliation	-Alternative revenue stream -Bridging financial gaps -Community engagement(schools)	-Bridging seasonal income gaps

Off-farm wages appeared to be common, particularly among younger farmers. Some explained that they *"go out there to work so as to get some income to enable them to purchase inputs for their farms."* This indicates synergy between farm-based livelihood strategies and wage labour among able-bodied individuals. While the two livelihood

strategies seemed complimentary, the evidence also suggests that farming primarily contributed to food security, whereas off-farm income was used to meet other household needs. Employment for seasonal wages appears to be a dominant livelihood strategy among rural households. Off-farm and on-farm wage employment as livelihood strategies have been reported elsewhere in Gui et al. (2024).

Table 4.8 shows data on livelihood strategies in which households integrate agricultural production with formal employment. Raw data was analysed using grounded theory approach to yield its components as deconstructed into open codes, axial codes and selective codes. Integration of agricultural production with formal employment appeared geared towards income stability as analysed by grounded theory methods exhibited in Table 4.8.

Table 4.8
Integrating Agricultural Production with off-farm Formal Employment

Raw Data	**OPEN CODES**	**AXIAL CODES**	**SELECTIVE CODES**
Apart from farming I have also been earning some income from contract work as a community health promoter hired by the Government	-Farming as a primary activity -Earning additional income, contract work -Government employment (public) -Dual livelihood	-Livelihood diversification -Off-farm employment (non-agricultural income source)	-Integrated livelihood strategy -Economic necessity and opportunity
I do farming and I am also employed. I work as a teacher, employed by the Teachers Service Commission	-Farming activity -Formal employment -Teaching -Employee -Dual roles	-Dual livelihood strategy -Institutional employment -On-farm and off-farm integration -Income stability	-Integration of public sector employment and farming (state income and land production)
Apart from being a farmer I work with national government as an administrator	-Farm production -Employee -Dual livelihood strategy (administrator/farmer)	-Livelihood diversification -Dual identity -multiple income sources	-Farming integrated with employment

It was challenging to discern whether formal employment or farm-based livelihood strategies played the more critical role in sustaining livelihoods. Participants indicated that individuals with supplementary income from salaried employment were able to "*hire permanent farm workers and encountered no constraints in acquiring farm inputs"*. Consequently, their farms exhibited higher levels of productivity. This observation suggests that resource-poor individuals faced significant limitations in maintaining the productivity of their agricultural resources. It appears to reflect a vulnerability trap, wherein the limited productivity of resources among the more vulnerable members of society further exacerbates their socioeconomic vulnerability.

These findings have important implications for rural development initiatives, highlighting the need for community-based funding models that specifically target and support vulnerable households. In contrast, individuals with salaried employment were advantaged by their ability to finance farm operations through employment earnings, which also served as collateral for obtaining farm development loans.

Formal employment generates off-farm income; a prevalent phenomena in many developing countries. The dual livelihood strategy in which agricultural production is blended with employment appears to be common among rural households not only in the study area, but elsewhere as well. A study by World Bank (2018) covering Ethiopia, Malawi, Nigeria, Tanzania and Uganda found that about 44% of rural residents engaged in off-farm employment, suggesting a high prevalence of off-farm employment in Sub-Saharan Africa, despite the dominance of farm-based livelihood strategies. Elsewhere in the Brazilian Amazon, off-farm work contributes nearly half of rural households' income in subsistence farming communities (Van Wey & Vithayathil, 2013).

4.4 The Latent Roles of Indigenous Chickens

The third objective of this study was to investigate, through a participatory approach, the latent roles of indigenous chicken in the livelihoods of smallholder farmers in rural areas of Kericho County. Qualitative data were gathered from participants during interactive focus group discussions. The data were analysed inductively using thematic analysis based on grounded theory methods.

The initial coding of the qualitative datasets, based on grounded theory analysis, identified 15 categories related to the roles of indigenous chickens. These categories coalesced around themes such as: food supplies, use of existing natural resources, use of existing skills/knowledge, cleaning environment/waste management/waste utilization, combating food insecurity, alleviating poverty, engaging youth, involving women, providing cash for various needs, managing livestock parasites, balancing household diets, generating wealth, as a way of life, enhancing beauty/aesthetics, and meeting emergency needs. A constant comparison of the emerging themes from the data gave rise to further categories: Food security roles, income security roles, utilization of existing resources, waste management, parasite control, contribution to poverty reduction/wealth creation, aesthetic reasons, engagement of youth/provide occupation, engagement of women labour/occupation for women, nutrition security, and emergency situations/medical, unannounced visitors.

Upon closer scrutiny, the generated categories seemed to adopt a higher conceptual or theoretical perspective. In grounded theory, each observed datum is underpinned by an underlying concept or theory. The researchers' role in the grounded theory approach is to uncover these underlying concepts and theories through continual scrutiny of the data

(Corbin, 2011). When a community or individuals for example indicate access to food, access to nutritious food and access to income in case of emergencies, the overarching role of the indigenous chicken appears to be one of insurance against some form of risk, food related or income related. Following a constant comparison method as advocated by the grounded theory, the following higher order concepts have been thought to explain the roles of indigenous chicken in the community studied; insurance, marketness, instrumentalism, ecologic, immanence, ladder-of-change and household functionalism. The others are dietary roles, and facilitating interpersonal connectedness among community members.

In this thesis, it is argued that the roles of indigenous chicken as captured from the data-driven research appeared to form a nonagon of concepts that explain the hidden roles of the chickens beyond the common descriptions. The set of concepts broadly explained the underlying roles of the indigenous chickens among rural households. Each of the nine concepts and its links to the raw datasets are explained in the succeeding sections.

4.4.1 Insurance Roles

The data gathered among the native-chicken farmers in the rural setup of Kericho County suggests that chicken rearing was highly regarded as a form of insurance against unforeseen shortages, shocks or unexpected events. In the words of one participant "*We keep chicken to be able to sell to cater for small-small things which may be needed urgently when you have no money*". With the word small repeated, it seemed to emphasize the subsistence nature of the livelihood strategy and '*needed urgently'* broadly speaking thus appears to be a case of insurance against unforeseen demanding events but

such events are not necessarily economic. The rural households appeared to transfer the risks of unexpected small events to the indigenous chicken.

The Indigenous chicken livelihood strategy can provide a safety net against various risks such as health issues or loss of income. As clearly stated by one participant who explained; "*my chickens were very useful to me when I had no income during the dry season due to a decline in milk production as a result of drought*". This observation suggests that the indigenous chicken contributed to the overall financial well-being of the households; a case of insurance against financial downturns for households. The risk of unexpected events such as 'unexpected visitors,' as narrated by another participant, was also cushioned by slaughtering readily available chicken. Visitors who arrived unannounced or at an inconvenient time in terms of food and cash availability tended to disrupt routines as households re-arranged their schedules to provide hospitality, depending on the relationship with the visitors as explained by a participant. This underlying role of indigenous chicken was recognized in a study conducted elsewhere by Udo and Bassey (2004) on the role of chicken farming as a safety-net for rural families in Nigeria. Similarly, the role of chickens in risk management was identified by Msoffe et al. (2010) in a study conducted in Tanzania and further by Odeyemi andOjo (2015) emphasizing its role as a livelihood safety-net. In the absence of such unforeseen circumstances, necessitating sudden adjustments, the Indigenous chicken served another role of a household cash economy through trade, largely determined by market prices and demand, a case of marketness.

4.4.2 Response to Market Factors/Marketness

Analysis of the accounts provided by the participants showed that raising indigenous chickens for cash income was a significant activity within households. As narrated by one participant "*We keep chicken because when you take care of them properly you can sell each one for up to one thousand shillings within a short period of time, like eight months*". The participants' statement regarding chicken prices suggested that market demand and market prices influence the choice of indigenous chicken as a livelihood strategy. This observation aligns well with Block's concept of 'marketness', which refers to the extent to which an economic activity is influenced by market factors such as price and demand (Thornburg, 2013). In the current scenario, indigenous chickens seem to fulfil market demands, capitalize on market prices and thereby generate cash income for rural households. Market factors heavily influence household decisions regarding chicken rearing. This research employs the concept of *marketness* to elucidate this phenomenon.

The indigenous chicken livelihood strategy enables households to respond to market factors, resulting in cash earnings. According to some participants, the income they earned allowed them to "*change their way of life*," suggesting a behaviour driven by self-interest. This indicates that pursuing self-interest goals plays a significant role in chicken rearing as an economic activity. We consider the concept of economic instrumentalism crucial for explaining this phenomenon.

4.4.3 Instrumentalism

Is it that some individuals in the community engage in chicken rearing as an instrument to achieve their desires? The concept of economic instrumentalism helps explain to what extent the choice of a livelihood strategy is motivated by the desire to achieve self-

interests rather than fulfilling other economic and non-economic roles. The concept evaluates the motives of economic actors (Thornburg, 2013). It entails the nature of individual motivation in an economic action (Ament et al., 2022).According to some participants the indigenous chickens are also "*beautiful when they are in the compound*". This indicates that chicken served different purposes among the participants, in this regard, the aesthetic value chickens have in the compound, is a non-economic reason that serves individual interests.

The practice of chicken rearing as a livelihood strategy was sometimes pursued independently, without external pressures or demands. In such cases, chickens served a non-economic role, as there was no consideration of market demand, pricing, sales logistics or specific target consumers. This practice appears to cater solely to individual preferences that are non-economic. In another instance, indigenous chickens served households in both economic and non-economic roles, such as contributing to ecological services.

4.4.4 Ecological Roles

The ecological roles of indigenous chicken as derived from the data appeared to be both economic and non-economic. "*Indigenous chickens are very good in removing ticks from cattle, so we don't have to use a lot of chemicals to control the ticks*", This statement from one of the participants suggests that the ecological roles of indigenous chickens help to reduce costs in pest control, while also reducing chemical usage. An observation by one of the research participants that, ''*Chickens assist in mixing manure on farms while ground-scratching for food*" was similarly interpreted as an ecological role. Ground-scratching and ground-browsing by chickens help them to find a variety of foods

including insects, seeds and small animals (Lesley, 2023). The research participants appeared to appreciate the ground-browsing and scratching behaviour of chickens for their ecological roles. As one participant stated; "*The top-dressing fertilizer I had applied on my tea was spread very well on the farm as my chickens were fending for their feeds*". The participant seemed to refer to an ecological service from the browsing and scratching behaviour of chickens.

Another participant commented further that, "*The chickens are useful in utilizing feeds that could go to waste such as waste from the kitchen"*. Although this appeared to be a case of supplemental feeding, it could largely be viewed as a case of waste management role; an ecological role. Scratching and pecking on the ground is an instinctive behaviour of chickens that seems to play an important role in soil aeration and soil structure modification (Biswas & Mukherjee, 2016). As one participant commented; "*my soils became more cultivable when I introduced chicken into my homestead, they help to loosen the soils*". The participant appeared to refer to the ground-scratching and sand-bathing natural behaviours of the indigenous chickens. These ground-scratching and sand-bathing behaviours of chickens appear to have a direct impact on the soil texture and structure. Comments like "*they enrich the soils with their manure*," significantly featured among several participants. Chicken manures were regarded highly by several participants.

The ecological benefits of chicken rearing were further highlighted when a participant mentioned that his cows "*produced more milk after grazing in an area previously fertilized with chicken droppings*". This data indicates that the nutritional quality of livestock forage likely increased when fertilized with chicken droppings.

4.4.5 Immanence

The rearing of indigenous chickens involved utilizing existing household resources. Some participants indicated that they kept chicken because "*it is easy to keep, it does not require much from outside the farm", "it is of low cost", "it does not require a lot of capital since you just leave it to roam freely in search of its food"*. These observations indicate that the indigenous chicken has a role in utilizing the existing resources, circumstances and skills. Interestingly, upon closer examination of the data, the idea of inherent livelihood strategies appears to explain the role of indigenous chickens in utilizing existing resources and capabilities. Such livelihood strategies that are inherent or intrinsic to the local context have been described by Morse and McNamara (2013) as immanent livelihood strategies. Immanence underscores the importance of considering local conditions, resources and capabilities in livelihood strategies. The concept of immanence in livelihood strategies aligned well with the overall role of indigenous chickens in utilizing existing resources, without relying on external inputs as explained by Morse and McNamara (2013).

The phrase "*it does not require much from outside*," suggests that participants engaged in indigenous chicken rearing as a livelihood strategy without relying heavily on external interventions. Indigenous chickens played an 'immanent' role as a livelihood strategy deeply integrated within the household's existing context, resources and capabilities. They utilized available resources and local knowledge effectively. Importantly, by leveraging these resources and capabilities, Indigenous chickens contributed to wealth accumulation for individual households, thereby fostering socio-economic change.

4.4.6 Ladder-of-change

The contributions of indigenous chickens to the socio-economic growth of individuals were highlighted by participants. They explained "*Indigenous chicken rearing is where we started from before we could afford to buy a cow*," This indicates that Indigenous chickens played a role in the ladder-of-change in the community's socio-economic prosperity. By using "*we*", participants likely referred to many community members who progressed to the point of affording to buy cows. In this context, ladder-of-change signifies how individuals transition from one livelihood strategy to another over time, representing steps towards greater socio-economic prosperity (Anirudh, 2005). It involves steps or stages representing different levels of socioeconomic prosperity, represented as rungs in a ladder-of-change. Each rung of the ladder signifies a progression towards greater socio-economic prosperity.

Another participant commented, "*Chickens are an important way of saving small money so that in future you can afford something bigger*". This statement seemed to imply two things in one; savings and growth, but savings for what? The plausible interpretation, in this case, is that the low-valued chicken relative to other assets presents an easier investment for a lowly endowed individual on his way up the ladder of change. In grounded theory thinking the underlying role of the chicken is its contribution to the socio-economic ladder of change. The concept of ladder-of-change was first coined by Anirudh (2005) to explain the stages of prosperity through which low-resourced individuals go to ultimately get out of deprivation. The ladder-of-change concept explains how individuals or communities' transition from one livelihood strategy to another over time. In this regard, the indigenous chicken appears to play a key role in the lower rungs

of the ladder. Each rung of the ladder signifies a progression towards greater income security and well-being. The Indigenous chicken appears to play an important role by occupying the lower rungs of the ladder of change. Interestingly, when asked to indicate the livelihood strategies from the lowest to the highest rungs, all focus group discussants placed Indigenous chicken within the lowest three rungs.

One elaborate data source stated that "*People who are still struggling for wealth own between two to three chickens only. When the number they own increases they can be able to sell and purchase a goat and eventually a cow*". This text from a participant was interpreted to mean that for livestock-based livelihood strategies, the Indigenous chicken was a starting point in the ladder-of-change. Vulnerable individuals or communities who face significant livelihood risks and uncertainties often adopt less risky livelihood strategies due to their limited endowments (Chambers & Conway, 1992). The high frequency with which indigenous chickens appeared in the lower rungs of the ladder-of-change indicates that the community viewed the chickens as a less risky livelihood strategy compared to other forms of livestock. Such livelihood strategies that are less risky contribute to overall household livelihood security. On a similar note, Abbasi et al. (2023) observed that indigenous chickens are valued as a resource in many African countries, Kenya included. They observed that chickens play an important role in empowering disadvantaged groups, such as the poor, by offering income, food security and social recognition. In the current study, however, the view held is that the indigenous chicken has an additional specific role as a driver of socio-economic change in the ladder of socio-economic prosperity.

4.4.7 Household Functionalism

The household livelihood security ensures that members have access to food, shelter and other necessities. "*The indigenous chicken we keep engages the youth and women well"*. This narrative from a participant was interpreted to mean every member of the household has to contribute to the necessities of the household. It indicates that indigenous chickens had a role to play in the household's overall operation and well-being. When a household or family is viewed as a system with various parts working together, the concept of household functionalism as described by Talcott Parsons (Ormerod, 2019) seems to explain the allocation of roles among household members. If the youth and women are allocated the role of caring for the chicken to contribute to livelihood security, then the indigenous chicken livelihood strategy may be regarded as a significant player in household functionalism. One comment by a participant thus went, "*It is for the children to have something to do*". This observation seems to lend credence to the concept of household functionalism as the household heads tended to encourage their young ones to engage in chicken rearing. But, why is it so? "*The young ones can afford to buy young starter flock*", commented one participant. This view suggests the significance of the low capital input required for indigenous chicken production.

The perception that Indigenous chicken rearing is a low-input livelihood strategy enables the household members to allocate the socio-economic activity to the less-resourced youth and women, ultimately contributing to household functionalism. In this paper, we argue that the underlying reason for engaging the youths and women through chicken rearing is one of household functionalism. This is closely tied to provisioning for the household needs such as income and dietary needs.

4.4.8 Dietary Roles

The dietary role of indigenous chicken was exemplified in responses such as "*so that we can eat well", "for our protein", and "for meat"*. These were some of the roles indicated by the respondents which appeared to focus on the dietary roles of indigenous chicken. Although the word diet was not mentioned by the participants, the mention of some keywords such as *protein, meat, diversified meal supplies, and white meat*; all seemed to indicate the significance of the role of indigenous chickens among the rural households in provisioning for their diets. "*The yellow-fleshed chicken is particularly tastier*", as commented by one participant, seemed to introduce an aspect of tastes and preferences; another dimension of human dietary needs. Kennedy et al. (2005) discussed this subject, suggesting that preferences for poultry skin colour vary by region and by colour. The author noted the influence of feed on the skin colour of the chickens; with yellowness largely attributed to a diet rich in plant carotenoids. Another view from the participants that; "*Whenever we have visitors, we can have some meat to serve, even when we have no money to buy from the butchery*" emphasized on a dual role. This statement from one participant suggests that Indigenous chicken served as a vital source for urgent dietary requirements within the household and impacted their interpersonal connections as well.

4.4.9 Interpersonal Connectedness

The indigenous chicken appeared to have an underlying social role of fostering interpersonal connectedness from statements gathered from the participants; words such as "*catering for visitors"* appeared to feature several times. The term interpersonal connectedness is chosen to explain the apparent closeness and emotional bonding (van Bel et al., 2008) that seems to characterize the relationship between the visitors and the

host. From this finding, it is argued that indigenous chicken has a role to play in fostering social relationships. In a similar case, a statement from one participant "*chicken are good gifts during ceremonies*", is an indication that indigenous chicken may be reared to take care of obligations associated with social ties.

4.5 Socio-economic Determinants of Indigenous Chicken Productivity

The fourth objective of this study was to examine, through participatory analysis, the socioeconomic determinants of indigenous chicken productivity among smallholder farmers in Kericho County. To achieve this, both quantitative and qualitative data were collected through interviews and interactive focus group discussions. Socioeconomic variables were measured categorically, while proxy indicators of indigenous chicken productivity were measured using ranking or continuous scales. Three indicators of indigenous chicken productivity (egg production rate, chick survival rate and perceived profitability) were tested for their potential relationship with the farmers' socio-economic factors. The potential relationships were tested using correlation analysis and Analysis of Variance (ANOVA) techniques. Data analysis was conducted using SPSS version 27. The results are reported in the succeeding section.

4.5.1 Farmers' Socioeconomic Factors and Egg Production Rate

Grouped socio-economic categories were tested for mean differences in egg production rate through Welch Analysis of Variance (ANOVA) and the strength of relationship was assessed using Eta squared (η^2). The results are as indicated in Table 4.9.

The mean differences in egg production rate between socio-economic categories, as detailed in Table 4.9 showed significant differences ($p < .05$). Egg production rate differed significantly between genders ($p < .05$). Females reported significantly higher

production compared to males. This was an interesting observation suggesting that women probably invested more time in the routine management of the chickens for better productivity. This observation aligns well with the comments made by men during focus group discussions to the effect that "*the chickens are mostly meant to engage the youths and women",* an indication that the youths and women probably have gained experience with this kind of exposure.

Gender, formal education, access to information, self- reported knowledge in indigenous chicken rearing, market access, group membership and main occupation showed significant differences in chicken productivity as measured by egg production rates ($p < .05$) as detailed in Table 4.9 and discussed further in the succeeding sub-sections.

Table 4.9

Differences in Egg Production Rate between Socio-Economic Categories

Socioeconomic factor	df_1	df_2	F- value	p - Value	Eta^2 (η^2)
Gender	1	384.127	4.814	.029	.012
Formal Education	3	73.858	9.669	<.001	.094
Access to information	4	62.842	12.376	<.001	.107
Knowledge in IC rearing	3	50.353	3.843	.015	.016
Market Access	4	50.928	2.625	.045	.033
Group membership	2	60.013	66.848	< .001	.103
Main occupation	2	14.039	20.155	< .001	.037

Spearman's rank correlation coefficient was used to examine the possible relationships between selected socio-economic factors, measured on a continuous scale, and the chicken egg production rate. The assumption of a monotonic relationship between

variables was assessed using scatter plots before conducting Spearman's rank correlation analysis, following the guidance of Laerd (2018). The results are as indicated in Table 4.10.

Egg production rate as an indicator of productivity showed mixed responses across socio-economic categories. Age of the household head showed no correlation with egg production rate (p>.05). Similarly distance to market did not show any significant relationship with egg production rate (p > .05). However, farm size, enterprise diversification, flock size, and household size showed significant relationship with egg production rate (p< .05) as detailed in Table 4.10 and discussed in subsequent sub-sections.

Table 4.10

Correlations of Socio-Economic Factors with Egg Production Rate

Socioeconomic factor	Statistic (r_s)	P value	Interpretation
Age (years)	.002	.963(NS)	No relationship
Farm size (Acres)	.156**	.002	Weak
Enterprise Diversification	.190**	< .001	Weak
Flock size	.107*	.032	Weak
Household size	.117*	.020	Weak
Distance to market (km)	-.022	.669 (NS)	No relationship
No. of groups affiliated	.266**	< .001	Moderate

4.5.2 Farmers Socioeconomic Factors and Chick Survival Rate

Differences in chick survival rates across socio-economic groups were analysed using Welch's ANOVA and the effect size measure, eta squared (Table 4.11).

Table 4.11 shows the results for test for differences in chick survival rates across socio-economic categories. Gender did not show any significant differences in Chick survival

rates, suggesting that male and female farmers posted similar chick survival rates. Chick survival rate did not differ significantly based on the main occupation of the participants ($p > .05$). There were significant differences on chick survival rates based on formal education of the farmers, access to information, knowledge on indigenous chicken rearing, market access and group membership ($p < .05$) as detailed in Table 4.11 and discussed further in subsequent sub-sections.

Table 4.11

Mean differences in Chick survival rate between socio-economic categories (N =398)

Socioeconomic factor	df_1	df_2	F- value	p - Value	Eta^2 (η^2)
Gender	1	391.379	0.749	.387(NS)	.002
Formal Education	3	77.481	10.762	<.001	.066
Access to information	4	72.594	8.271	<.001	.032
Knowledge in IC rearing	3	48.082	8.231	< .001	.049
Market Access	4	52.875	3.152	.021	.022
Group membership	1	67.638	88.668	< .001	.107
Main occupation	2	40.448	.903	.414 (NS)	.005

4.5.2.1 Gender

Chick survival rates did not differ significantly between genders ($p > .05$), suggesting that chick losses were comparable for both male and female groups. Productivity differences existed between genders as measured by egg production rate (Table 4.9). Females reported significantly higher production ($p < .05$) compared to males. This is an interesting observation suggesting that women probably invested more time in the routine

management of the chickens for better productivity. This observation aligns well with the comments made by men during focus group discussions; "*the chickens are mostly meant to engage the youths and women"*. This statement seemed to suggest that the care and monitoring of chicken was largely left to the women. "*Feeding and cleaning the chicken house is the work of women*," this statement from another focus group discussion further suggests that women tended to have better experiences with the chicken rearing best-practices compared to the men.

In a case from Ethiopia, Sariyev and Zeller (2023), found better adoption of technology in chickens by women than men, and they observed that women tended to concentrate on the low-input livelihood strategy since they were constrained in other productive livelihood options. Birhanu et al. (2021) similarly reported that there were gender disparities in productivity of the traditional village chicken. A previous study by Duguma (2020) revealed that the feeding of chickens was largely a preserve of women and children. This study concurs with the authors' assertion. The allocation of chicken-rearing tasks to women within socio-cultural practices may have enabled them to gain practical knowledge, contributing to improved chicken productivity.

4.5.2.2 Formal Education

Based on the computed eta squared value (η^2), about 9.4% of the variation in egg production was attributed to farmers' level of formal education. This observation suggests that there was a link between formal education and the acquisition of relevant information and knowledge to foster chicken productivity. Similar findings have been reported elsewhere by Daphne (2013). Education levels have been shown to influence farmers' willingness to incur costs for technologies that promote chicken health (Terfa,

2015). This suggests that better educated members of the community possess higher information literacy, which can enhance chicken productivity (Sang & Cheruiyot, 2021).

4.5.2.3 Access to information and knowledge

The self- reported access to information and knowledge in chicken rearing showed significant links with egg production rate and chick survival rate. About 10.7% of the variation in egg production rate could be attributed to access to information and about 1.86% to level of knowledge in chicken rearing. The farmers interviewed were from diverse backgrounds, whereas some had been exposed to trainings organized through existing donor-funded extension projects and programs, some had not. As commented by some participants, "*some of us have not had a chance to participate in those agriculture projects found in some locations*". The variation in productivity across groups based on self-reported levels of access to information and knowledge underscores the significance of information-inputs in chicken productivity. One of the challenges cited during participatory focus group discussions emphasized on this; "*we lack the technical know-how for chicken production*". Lack of information and technical know-how were cited as major challenges during focus group discussions. It was interpreted broadly as epistemic challenges that contribute to reduced chicken productivity. The technical problems like poor nutrition and disease control were linked to these epistemic challenges. Elsewhere, this challenge has been attributed to inadequate extension services (Ipara et al., 2023).

4.5.2.4 Market access

Farmers who reported favourably on market access appeared to have the incentives to improve their egg production and chick survival rates compared to others ($p < .05$). This observation indicates that access to market aided the management of the chicken flock for

enhanced productivity. It is possible that access to ready markets motivated the farmers to invest in better practices. This aligns well with a participants' statement "*when you have a poor market you may not get the money to buy feeds*". This implied that there was poor-feeding of the chicken due to a lack of market for eggs and chicken. What if the smallholder farmers formed social networks through Farmer Producer Organizations?

4.5.2.5 Group membership

There was a significant difference in egg production and chick survival rates ($p < .05$) between categories based on membership to farmer producer groups. About 10.3% of the variation in mean egg production could be attributed to group membership and a similar proportion of 10.7% of variation in chick survival rate. This moderate strength of connection (Cohen, 1988) between group membership and chicken productivity indicates significant benefits attributed to the collaboration among the producers. Collaboration among smallholder farmers fosters adoption of best-practices through reciprocal learning, joint actions such as inputs-purchase and marketing (Cheruiyot & Kibett, 2024). Membership to farmer producer groups enjoys benefits associated with social capital; particularly where such groups are built on social trust and adherence to society expectations (Tristan, 2021). Similar beneficial effects of farmer producer groups have been reported elsewhere (Cheruiyot &Ngetich, 2022). This finding was corroborated by the participants who observed that "*We benefited from group trainings which were conducted by ASDSP in 2019*". These participants were referring to a program run by the government as an Agriculture Sector Development Support Programme (ASDSP) intended to offer capacity building to smallholder farmers through a value-chain approach (ASDSP, 2019).

In the current context, the significant difference in indigenous chicken productivity associated with membership to farmer producer group has implications for future Agricultural extension policies and strategies. It suggests that smallholder IC farmers improve their capabilities by cooperating and collaborating among themselves. Productive cooperation and collaborations, however, require investments in bonding among the members and bridging relationships with relevant stakeholders. Bonding among the members requires building of mutual trust, setting and adhering to social rules, social norms, positive networking for mutual benefits (Tristan, 2021), and exchanging mutual interests (Chen & Li, 2024). Furthermore, it requires demonstrating positive attitude towards others and their actions (Robison, 2023). These attributes are likely built over time by groups and requires capacity-building by relevant stakeholders.

4.5.2.6Main occupation

Through an unstructured question, the participants were asked to state their main occupation. The occupations were later classified into one of three categories; farming, businesses/trade or employment. Egg production rates varied significantly across these categories ($p< .05$), but chick survival rates did not significantly differ ($p>.05$). Those identified primarily as business-oriented had a significantly ($p< .05$) higher mean egg production rate than the other two groups. This suggests that individuals in the business category may view indigenous chicken farming as an agribusiness opportunity, applying entrepreneurial skills to achieve higher productivity. This observation has implications for agricultural extension services, suggesting a need for entrepreneurial training for smallholder farmers to enhance their agri-preneurship and productivity. During focus group discussions it emerged that most farmers did not practice basic entrepreneurial

skills such as record keeping and setting prices based on production costs. In one notable case, a farmer explicitly stated, *"I don't want to keep records, it will discourage me"*, implying that the farmer might have been incurring losses and preferred to avoid knowing about them, as keeping records would likely expose such losses.

The socioeconomic factors of the participants which were measured on a continuous scale were tested for their relationship with indigenous chicken productivity. Table 4.12 shows results for the test for correlations between socio-economic factors and chick survival rates as measure of productivity. Results revealed an insignificant relationship between chick survival rate and household size, and distance to market ($p > .05$). Age of the farmer, farm size, enterprise diversification, flock size and number of groups to which the farmer was affiliated showed significant relationship with chick survival rate as detailed in Table 4.12 and discussed further in the succeeding sub-sections.

Table 4.12

Correlations of Socio-Economic Factors with Chick Survival Rates

Socioeconomic factor	Statistic (r_s)	P value	Interpretation
Age (years)	-.190**	< .001	Weak negative
Farm size (Acres)	.187**	< .001	Weak
Enterprise Diversification	.157**	.002	Weak
Flock size	.374**	< .001	Moderate
Household size	-.075	.137 (NS)	No relationship
Distance to market (km)	.058	.247 (NS)	No relationship
No. of groups affiliated	.248**	< .001	Moderate

4.5.2.7Age of the farmer

There was no significant relationship between respondents' age and egg production rate ($p > .05$), but age showed a significant negative relationship with chick survival rates ($p < .05$). Terfa (2015) reported similar findings. This suggests that older farmers tended to report lower chick survival rates, possibly indicating that they provided less care to the chicks than younger farmers. This observation is supported by insights from participatory focus group discussions, which noted that, socio-culturally, chicken rearing tasks are primarily assigned to women and youth. The experience gained by young people may contribute to better chick care and survival rates, along with the energy they bring to these tasks compared to elderly farmers.

4.5.2.8 Farm size and Enterprise Diversification

Farm size showed a significant relationship ($p < .05$) with egg production and chick survival rates (Tables 4.10 and 4.12). Similarly, enterprise diversification exhibited a significant ($p < .05$) positive relationship with egg production and chick survival rates. This suggests that the larger farms tended to provide for optimal conditions for the productivity of the chicken. As observed during focus group discussions "*Indigenous chicken requires some large area in which to scavenge so that they can lay more eggs*", the participants were of the view that free-range chickens were more productive than chicken confined for most of the day. Some farmers, probably with small pieces of land, reported that "*we confine our chickens for most of the day to prevent them from straying to our neighbours*". This confining may have been more prevalent among farmers with small plots, creating situations of discomfort and poor feeding.

Farm enterprise diversification tended to benefit chicken productivity, probably attributed to diverse feed resources for the free-range indigenous chickens. Chickens benefited from diverse conditions created through a variety of crops and livestock. As comments by some participants suggest; "*when you keep goats and pile up their wastes, chickens benefit by feeding on the maggots that grow on it*". Additionally, some observations were made to the effect that "*there is plenty of feed for the chicken during grain shelling. The chicken benefits from feeding on the wastes"*. These observations suggest that diversity in farm enterprises is beneficial to chicken nutrition. Enterprise diversification where multiple agricultural activities like crops, livestock and trees are undertaken, probably allowed for increased foraging options for the chicken.

4.5.2.9 Flock size

Flock size had a significant ($p < .05$) positive relationship with egg production and the chick survival rates. This indicates that as flock sizes increase, there was an increase in the number of eggs laid; $r_s(398) = 107$, $p = .032$ and the number of chicks surviving; $r_s(398) = .374$, $p < .001$. This suggests that farmers with larger flocks were able to provide better care for their chickens, likely due to having more resources to invest in productivity enhancements. This argument emerged during focus group discussions, where participants noted that individuals with fewer resources in the community kept only a few chickens and tended to invest in larger flocks as their wealth improved. This implies that larger flock sizes are associated with relatively wealthier individuals in society.

Previous research has also shown that small flock sizes limit the technical efficiency of indigenous chicken production (Birrhanu et al., 2021). This suggests that small flock

sizes are unsuitable for households intending to rely on indigenous chicken as a viable livelihood strategy. A similar study conducted by Cheruiyot and Adhiaya (2021) in the Western parts of Kenya reported a significant correlation between flock size and egg production rate. This similarity points to a general situation in which larger flock sizes are associated with better management practices and higher productivity.

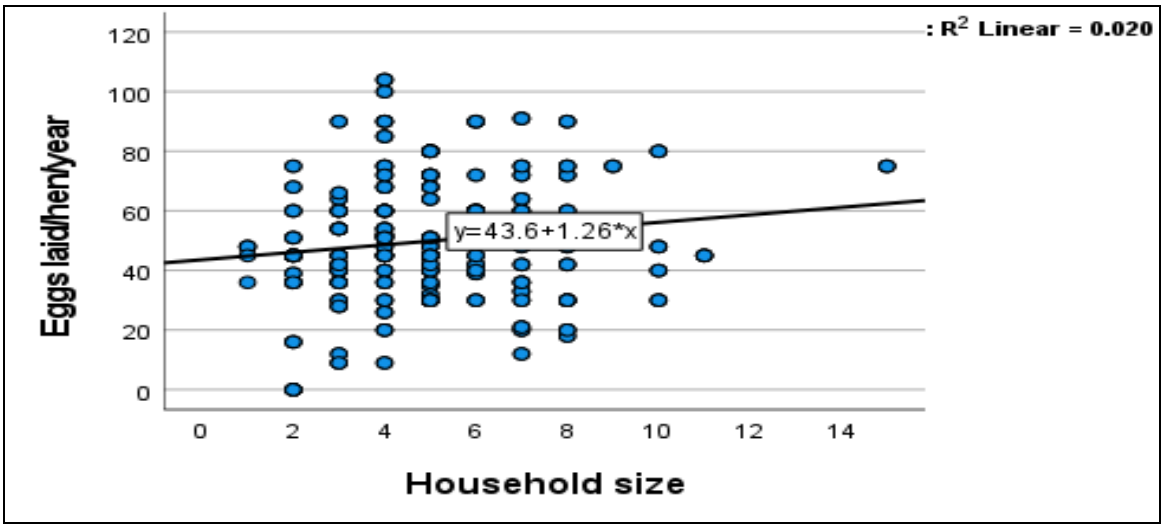
4.5.2.10 Household size

Household size did not exhibit any significant correlation with chick survival rate ($p > .05$) but showed a significant, though weak, correlation with egg production rate, r_s (398) =.12, p =.020. This suggests that the number of household members had a modest influence on the productivity of indigenous chickens, as measured by their egg production rate (Figure 4.2).

Figure 4.2 shows the relationship between the respondents' household size and egg-production rate as an indicator of productivity. The figure reveals existence of some correlation between household size and egg production rate. About 2% of the variation in egg production rate could be attributed to household size (R^2 = .02) as illustrated in Figure 4.2.

Figure 4.2

Relationship between Respondents' Household Size and Chicken Egg-Laying Rate



The number of household members had a modest influence on the productivity of indigenous chicken. But why is this so? Larger households tended to have more labour and chicken management tasks were better distributed. Children were readily assigned tasks, suggesting none of the tasks for productivity enhancement were neglected. Larger households probably had family members of different ages, education levels and experiences, facilitating knowledge sharing for better productivity. As reported in Wambua et al. (2022), larger households can deploy more labour and resources leading to higher productivity.

Similar findings on the influence of household size on productivity were reported by Daphne (2013) and Hailemichael et al. (2017). The increased productivity with household size is likely attributed to increased labour, knowledge and skills for chicken husbandry practices.

4.5.2.11 Distance to market

The distance to the main market did not show any significant link with the productivity indicators (p>.05). This suggests that market access or remoteness had no significant incentives or disincentives for productivity enhancement.

4.5.2.12 Number of Groups Affiliated

The number of groups to which the farmer was affiliated showed a moderate strength of association with egg production rate, rs (398) = .266, p< .001. This finding suggests that farmers with extensive social networks with other farmers and stakeholders reported higher egg production rates. There was also a significant association with chick survival rate, r_s (398) = .248, p< .001. Affiliation to groups probably aided the farmers' productivity through the associated social capital; the tangible and intangible resources linked to social relationships (Tristan, 2021).

4.6 Indigenous Chicken Productivity and Livelihood Outcomes

The fifth objective of this study was to determine the relationship between indigenous chicken productivity and livelihood outcomes, through a participatory approach, in rural areas of Kericho County. To achieve this both quantitative and qualitative data were collected. Indigenous chicken productivity indicators were measured using ranking or continuous scales, while livelihood outcomes were assessed using indicators generated by the community during interactive participatory livelihood analysis discussions. These were described and measured on a categorical scale. Correlation analysis and Analysis of Variance (ANOVA) techniques were employed to examine associations between livelihood outcome indicators and indigenous chicken productivity. The results are presented in the immediate succeeding sections.

4.6.1 Community Definition of Livelihood Outcomes and Measurements

A Participatory Livelihood analysis, based on the Ladder-of-change and the stages of prosperity as described by Anirudh (2005), was used to describe the livelihood strategies and livelihood outcomes of the community from the perspectives of the participants.

4.6.1.1 Stage 1

From this perspective the most vulnerable members of society (*translated as resource-disadvantaged*), were described as households who owned a few chickens, do not own land or own very small plots, do not own any cattle, live in small huts, often survive with less than three meals a day and the meals are simple; mostly starches (maize flour) and vegetables. Vegetables used are mostly local, collected from volunteer crops in farms and from the wild. Wild edible mushrooms enriched their meals. The edible mushrooms were particularly reported in one location. According to the participants, the focus of this category is on subsistence or survival.

4.6.1.2 Stage 2

The second stage was composed of individuals transitioning out of poverty, working towards commercializing. Unlike the first stage, they owned small plots of land, were able to access three meals a day and to send their children to fairly good schools. Their focus was on working towards basic commercialization. They owned a few livestock, including chickens and cattle; up to 3 cows. Unlike the first stage they owned a fairly large flock of chicken and at least a few cattle. They own a house and a kitchen and produce their own food, including vegetables from home gardens and chicken raised in their backyards for eggs, meat and for cash income.

4.6.1.3 Stage 3

This stage had individuals who were more focused on engaging in commercial activities and building their assets. They own land and can access a balanced diet. They are able to regularly access meat, fruits and a variety of vegetables. They are able to send their children to private schools. They own a number of chickens and other livestock and produce surplus for the markets. Their income sources are diversified; crops such as sugarcane and coffee are grown in small scale for cash income.

4.6.1.4 Stage 4

They were described by participants as a group of people who have worked their way to prosperity. They owned cars, large plots of land, permanent houses and a variety of businesses. Their children attended good private schools. They are able to access a balanced diet. They owned improved livestock such as dairy cattle breeds and large farms planted with commercial crops such as coffee, tea and sugarcane. They have diverse income sources and often relied upon by the community to support other members of the society in emergency cases.

4.6.1.5 Stage 5

The fifth stage was described as the *wealthy*. This category was described as individuals that have accumulated assets, including land, livestock and buildings. They own buildings not only in their rural farms but also owned businesses in urban centres and cities away from their rural homes. Their commercial activities were supported by local and external markets; they produced both for local and external markets. This category however was described as having very few members in the community.

The discussion on these categories among the participants was done in an open environment where all the participants felt comfortable airing their views. The facilitator provoked the participants occasionally to encourage free participation from all members. For the rest of the time the facilitator was an active listener and keen to ensure that the views of everyone were heard. These community-defined livelihood outcomes were used as livelihood-outcome measurements in subsequent data gathering exercise to identify the individual respondents by their stage-of-prosperity. These community-defined socio-economic stages of prosperity were readily owned by the participants since they had participated in their creation.

On completion of the categorization and the quantitative data collection, analysis revealed that a majority of the participants were in *stages 2* (44.7%) and *3* (47.5%). A fairly small proportion of 4.5% of the participants were in *stage 1* and 3.3% in *stage 4*. As expected, none of the participants was captured in *stage 5* since they form a category that largely operates outside their rural homes, and were less likely to attend village meetings. Did these categories have significant links with the indigenous chicken practices?

4.6.2 Stages of Prosperity and Best Practices in Indigenous Chicken Management

Potential links between the stages-of-prosperity with the indigenous chicken practices and challenges were explored by running Goodman-Kruskals Gamma test for associations (Table 4.13). It showed a moderate strength of relationship with reported incidences of indigenous chicken diseases. Community members in higher stages of prosperity were more likely to report chicken disease incidences, $G = 308$, $p < .001$, $N = 398$. This finding may be attributed to larger flock sizes kept by more prosperous

individuals, resulting in a faster spread of diseases within their large flocks. Additionally, chicken de-worming was more likely to be carried out by individuals in higher socio-economic stages of prosperity compared to lower categories, $G = .346$, $p<.001$, N = 398, suggesting better poultry healthcare practices among more prosperous community members.

Regarding the socio-economic attributes of participants such as information-seeking behaviour and participation in producer groups, individuals in higher socio-economic stages of prosperity were more likely to seek technical advice on indigenous chicken rearing, $G = .381$, $p< .001$, $N = 398$, and to affiliate with farmer producer groups, $G = .278$, $p< .001$, $N = 398$. There were significant differences in information-seeking and social networking behaviours across socio-economic categories. They suggest that more socio-economically prosperous members had the resources needed to invest in information-seeking and to build social capital through active participation in social groups. Other best practices and challenges tested for potential associations with socio-economic stages of prosperity showed negligible or small associations as displayed in Table 4.13.

Table 4.13

Community-defined Stages-of-Prosperity and its Correlations with Indigenous Chicken Practices, and Challenges

No	Attribute	Gamma coefficient	P-value	Strength of association
1	Disease incidences	0.308	.003	Moderate
2	Chicken house cleaning	0.238	<.001	Small
3	Chicken vaccination	0.194	.059	Small
4	Chicken de-worming	0.346	<.001	Moderate
5	Advice –seeking	0.381	<.001	Moderate
6	Knowledge in IC rearing	-0.180	0.094	Small
7	Information access for IC rearing	0.149	.064	Small
8	Group membership	0.278	< .001	Moderate
9	Number of groups affiliated	.337	< .001	Moderate
10	Predator incidences	-0.109	.136 (NS)	Small
11	Lack of markets for eggs	0.096	0.195 (NS)	Negligible
12	Lack of markets for chickens	0.151	.031	Small
13	Poor access roads	0.067	.310(NS)	Negligible
14	Profitability of IC	0.168	.073	Small

The community-defined stages of prosperity showed significant correlations with the reported disease incidences in chicken ($p < .05$) as measured by Gamma coefficient. There was also significant correlation between the community-defined stages ($p<. .05$) with other IC rearing practices such as chicken house cleaning, chicken deworming, advice seeking, group membership, number of groups affiliated and reported lack of markets for chickens as detailed in Table 4.13. Other practices such as chicken vaccination, knowledge in chicken rearing, reported predator incidences, lack of markets and poor access roads did not show significant correlations with community-defined stages of prosperity ($p>.05$) as detailed in Table 4.13. Reported profitability did not correlate to the stages of prosperity ($p>.05$).

4.6.3 Community-defined Stages of Prosperity and Indigenous Chicken Productivity

The community-defined stages of prosperity were tested for differences in the productivity of their indigenous chicken. The results are as indicated in Table 4.14.

Table 4.14

Mean Differences for Productivity between Community-defined Livelihood Stages

No	Productivity indicator	df_1	df_2	F-statistic	P	η^2 and (ε^2)
1	Eggs laid per hen per year	3	38.310	15.680	<.001	.124 (.117)
2	Chicks survived per hen per year	3	36.545	34.875	<.001	.197 (.191)
3	Reported profitability of IC rearing	df 3		*H*-statistic 6.732	.081	(.01)

The mean differences between the community-defined groups were significant ($p < .05$) in two cases; egg production rate and chick survival rate. Egg production rate differed significantly across the community-defined stages of prosperity ($p< .05$) as tested by Welch ANOVA. With an eta squared value of 0.124 and epsilon squared value of 0.117 as indicated in Table 4.14, this meant that about 12% of the variation in egg production rate could be attributed to the stages of prosperity as estimated by eta squared (η^2) and Epsilon squared (ε^2). The community-defined livelihood stages showed even stronger effect size on chick survival rate of about 19% (η^2 =.197, ε^2 = .191). These two observations suggest that there were significant influences of stages of prosperity on indigenous chicken productivity. However, reported profitability rating did not show significant differences across groups; H (3) = 6.732, p =.081, ε^2 = .01. The self-reported profitability rating was not significant across the stages as tested by Kruskal Wallis test (p = .081). With an epsilon squared (ε^2) value suggesting that only 1% of the variation could

be attributed to the stages of prosperity, this effect size is negligible (Lakens, 2013), as discussed further in the subsequent sub-sections.

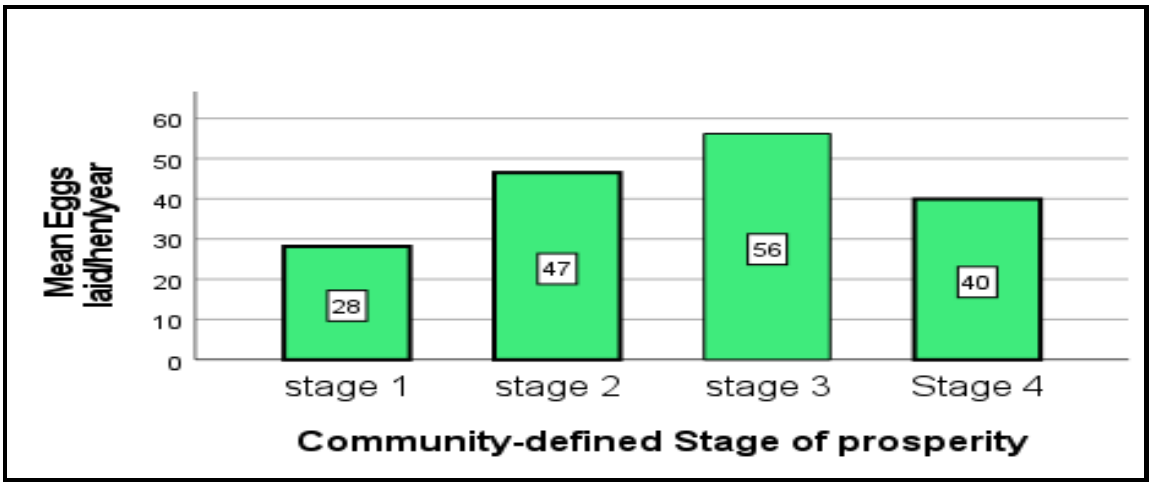
4.6.3.1 Egg Production Rate

The egg production rate differed significantly between the community-defined stages-of-prosperity, Welch ANOVA; F (3, 38.310) = 15.680, $p < .001$, $\eta^2 = 0.124$. There appeared to be an increase in egg production rate with increased prosperity from stage 1 to 3, but there was a significant decline ($p < .05$) between stage 3 and 4 (Figure 4.3). This observation indicates that the productivity of the indigenous chickens differed between socio-economic prosperity groups. The strength of relationship at 12.4% as measured by eta squared (η^2) indicates that about 12.4% of the variation in productivity was attributed to socio-economic stage-of-prosperity of the smallholder farmer. The variation in productivity based on the stages-of-prosperity seemed linked to the association between the stages-of-prosperity with certain best-practices such as information-seeking, disease control and de-worming of chickens (Table 4.13). There is thus a nexus between the socio-economic factors, farmers' practices, the productivity of the indigenous chicken and the community-defined socio-economic livelihood outcomes.

Figure 4.3 shows the mean egg production rate per community-defined stage of prosperity. The findings reveal a pattern in which the middle level categories reported higher egg-production rate compared to the lowest and the highest stages of prosperity, as displayed in Figure 4.3 and discussed further in subsequent sub-sections.

Figure 4.3

Mean Egg Production Rate per Community-defined Stage of Prosperity



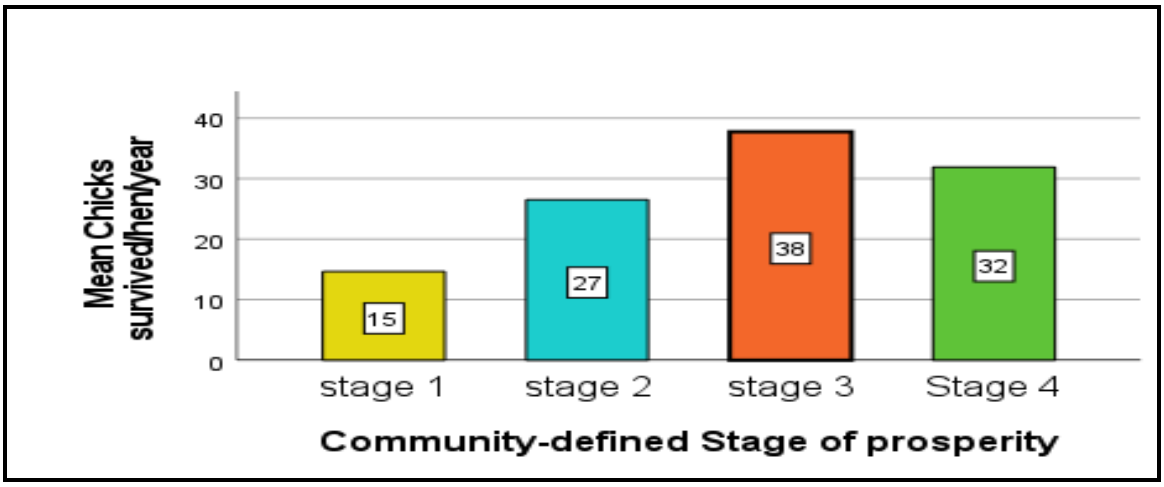
4.6.3.2 Chick Survival Rate

Figure 4.4 shows the mean chick survival rate for each community-defined stage of prosperity. This figure exhibits a pattern in which the middle level stage of prosperity reported higher chick survival rate.

The chick survival rate differed significantly between the community-defined categories; Welch F (3, 36.545) = 34.875, $p < .001$, $\eta^2 = .197$. The 19.7% eta squared value suggests a large strength of relationship between the two variables (Lakens, 2013). About 19.7% of the variation on chick survival was attributed to the socioeconomic stage-of-prosperity of the producer. There appeared to be an increase in chick survival rate with increased prosperity from stage 1 to 3, but no significant difference (p> .05) between stage 3 and 4 as displayed in Figure 4.4.

Figure 4.4

Chick Survival Rate per Community-defined Stage of Prosperity



The current findings in regard to chick survival rates suggest that the community's' less well-off members provided less care for the chickens. Sariyev and Zeller (2023) argued that wealthier households were more likely to adopt best practices in poultry because they had the necessary resources. The current findings seemed to lend credence to this argument.

4.6.3.3 Reported Profitability

The reported profitability rating of the Indigenous chicken enterprise did not differ significantly ($p > .05$) across groups; H (3) = 6.732, p = .081, ε^2 = .013. The observed relationship size of about 1.3% is negligible (Lakens, 2013).

While indigenous chicken rearing is accessible to the poorest members of society (Fattah, 1999), its productivity seems to be constrained by limited resources. Esatu (2015) observed that access to resources enhances productivity. The wealthiest individuals in the current study showed lower productivity in their indigenous chicken-raising activities,

likely because they dedicated more resources to larger ventures, such as cattle-rearing, which they prioritized over indigenous chickens. Responsibility for these chickens was often passed on to less-resourced family members, particularly children.

Further, findings from the focus group discussions suggest that "*wealthier households in the community tend to own more livestock assets, particularly cattle"*. These households are likely to invest more resources in enhancing the productivity of their larger livestock, rather than on low-output indigenous chicken rearing. Esatu (2015) found that livestock income negatively impacted the adoption of technology for indigenous chicken farming, indicating that farmers may have been reinvesting their income into other livestock-based livelihood strategies, overlooking the less productive indigenous chicken.

4.6.4 Nexus between Socioeconomic Factors, Chicken Productivity and Livelihood Outcomes

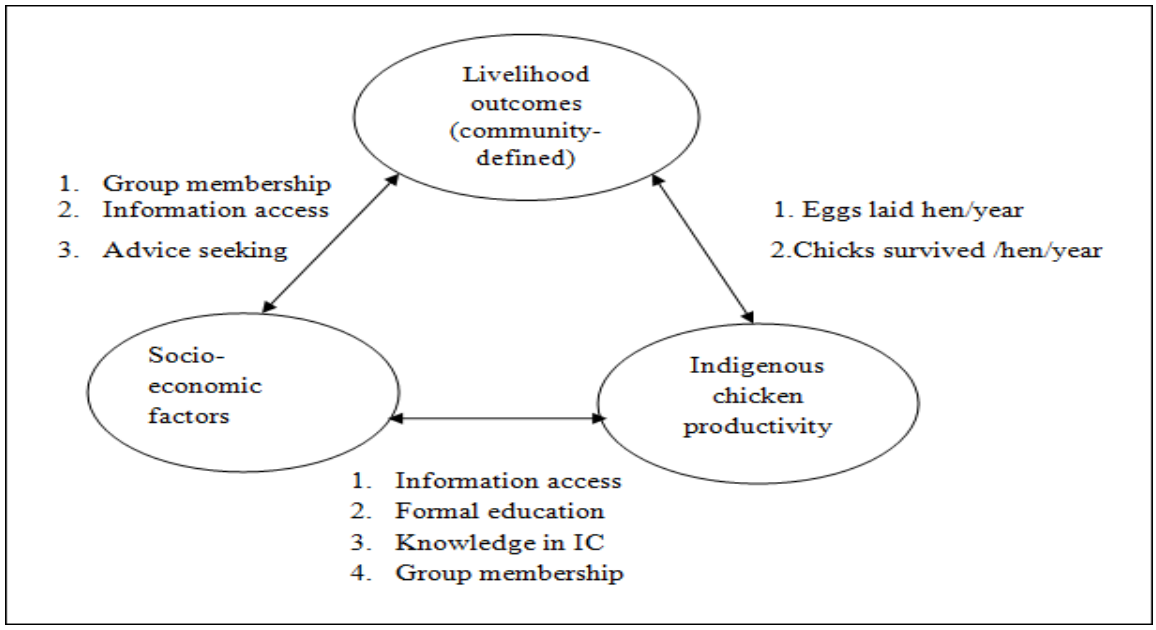
Some socio-economic factors showed significant association ($p< .05$) with livelihood outcomes as measured by the community-defined stages-of-prosperity. The socio-economic factors included gender, participation in groups, information access, education, advice seeking, and knowledge levels in chicken rearing. Group membership, information access and advice seeking similarly showed significant links with livelihood outcomes (Figure 4.5). On the other hand, the livelihood outcomes showed significant links with productivity of the indigenous chicken.

Some of the socio-economic factors investigated had strong links with indigenous chicken productivity, two of the three indicators of indigenous chicken productivity showed a strong link with the community-defined stages-of-prosperity indicating a nexus

between the three attributes of socio-economic factors, indigenous chicken productivity and livelihood outcomes as illustrated in Figure 4.5.

Figure 4.5

Nexus between Socio-Economic Attributes, Livelihood Outcomes and Chicken Productivity



4.6.5 Challenges in Indigenous Chicken Value-chain and their Links to Socioeconomic Factors and Chicken Productivity

During Participatory focus group discussions, Newcastle Disease was highlighted as major issue affecting indigenous chickens. "*Sometimes we lose the entire flock to diseases. If you had 50 chickens you might end up saving only 5 when diseases strike,*" commented one participant. On further probing as to why diseases were widespread, the participants retorted; "*you know vaccines are sold in doses for 100 chickens and this makes vaccination difficult*". This indicates that the real problem was in lack of control measures, but why? As indicated by the participants there seemed to be an economic

inability to purchase the 100 doses at one time; a case interpreted to mean some form of economic powerlessness. What of purchasing vaccines as a group of farmers? To this probing question the farmers responded: "*Our schedules are different"* and another, "*there is hardly time to go and look for a neighbour to cost-share*". These comments were interpreted to mean there was weak social capital among the farmers to facilitate joint actions (Cheruiyot & Kibett, 2024) such as chicken vaccination. While the problem of vaccination initially seemed technical, it was evident that a socio-economic issue was also at play. The weak social capital ultimately resulted in loss of chickens for lack of vaccination.

A problem-tree analysis, part of PRA tools, revealed that the prevalence of predators, high cost of feed, climate change subjecting chickens to prolonged cold periods, stunted growth associated with poor feeding; particularly during periods of shortage of feeds especially before harvest of grains, poor housing due to lack of materials and skills, pests such as fleas, low market prices for eggs and chicken, and respiratory problems associated with cold weather were largely associated with *economic powerlessness* and *weak information seeking behaviour*. These socio-economic attributes ultimately contributed to a decline in chicken productivity.

4.7 Practices within the Indigenous Chicken Value Chain and their Efficacies

The sixth objective of this study was to evaluate, using a participatory approach, the efficacy of indigenous chicken value chain practices among smallholder farmers in Kericho. Qualitative data were collected from participants' perspectives. The first step involved mapping the entire value chain through participatory focus group discussions. The value chain approach to analyzing indigenous chicken productivity was introduced to

the participants as part of a broader participatory research analysis during a community workshop. A learning-by-doing approach was adopted. The facilitator explained the concept of value creation, tracing it from the acquisition of inputs for chicken production to the point when the consumer accesses the product for ultimate use. The participants were then asked to outline the main activities of the indigenous chicken value chain as it applied to their community. Subsequent participatory focus group discussions yielded rich qualitative data on the practices and challenges along the value chain. A grounded theory approach, using constant comparative analysis, was then applied to break down the data into themes through a logical process.

4.7.1 Participatory Indigenous Chicken Value Chain Mapping

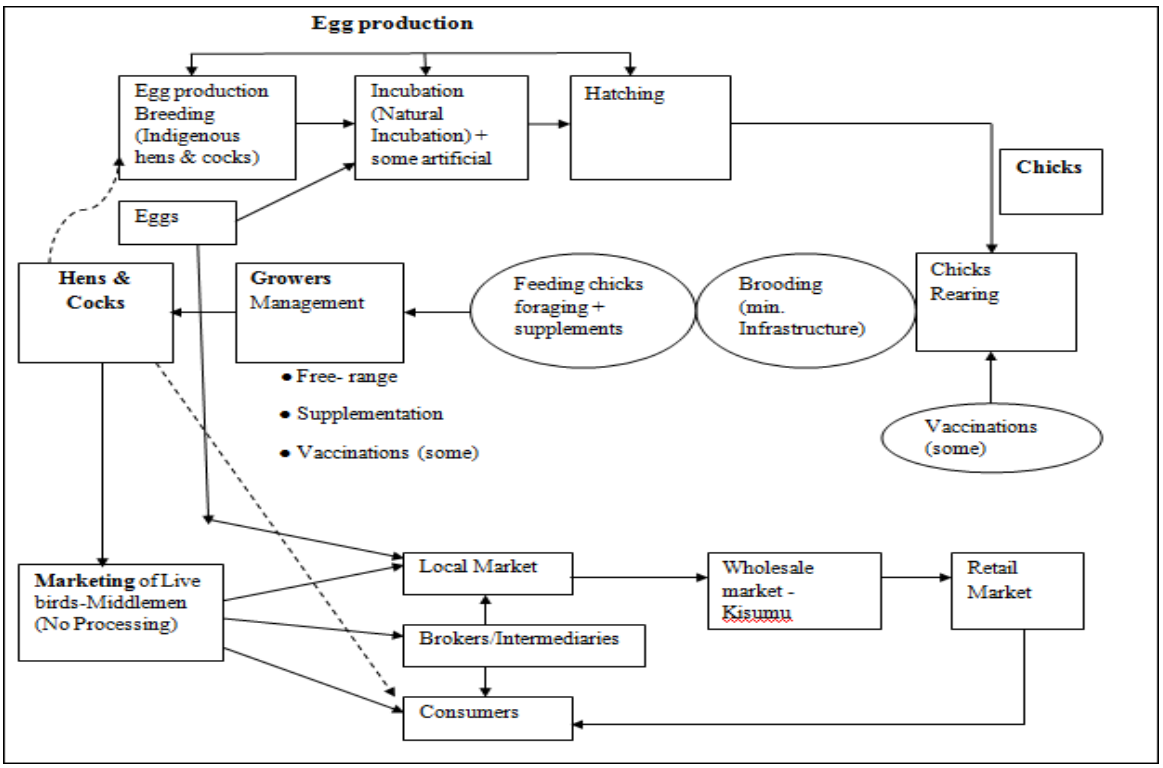
Through focus group discussions and consensus-building, the participants developed a value-chain framework which is shown in Figure 4.6. The segments identified included breeding for egg production, egg incubation and hatching, chick brooding and rearing, flock management, and marketing. Each segment was then discussed in relation to the farmers' practice. The following sub-section provides a discussion of the outcome.

Figure 4.6 displays the indigenous chicken value chain segments as identified by the participants. The mapping of the indigenous chicken value chain by the participants commenced with the egg-production segment. Within this segment key activities were identified including egg production from a parent flock of hens and cocks, incubation, hatching, chick brooding and rearing and the management of growers through free-range and supplementary feeding systems. This sequence culminates in the rearing of mature hens and cocks for breeding purposes. At the marketing node, participants highlighted the sale of eggs and live birds through various channels, including local markets, direct

sales to consumers, intermediaries and both wholesale and retail outlets, as illustrated in Figure 4.6.

Figure 4.6

Indigenous Chicken Value-Chain Segments as Identified by the Participants



The value chain map developed by the participants emphasized producers and marketing nodes, service providers such as veterinary and extension agents received minimal attention. Similarly the input suppliers received minimal attention. There was also no mention of processors in the value chain map. This observation suggests that the indigenous chicken rearing did not rely much on external inputs. Formal processing remained largely absent. Similar findings have been reported by Omondi (2022) who reported that there was minimal or informal processing of indigenous chicken products in a study conducted in Thika and Kisumu, Kenya.

4.7.2 Breeding for Egg Production

During the focus group discussions, it was revealed that breeders were selected based on their *"foraging habits and resistance to diseases"*. The pullets were mainly kept outdoors to forage freely, scavenged feeds were supplemented with kitchen waste, including maize flour crumbs and vegetables. One participant observed, "*The pullets have the energy to scavenge and find plenty of feed compared to the chicks and hens*". The pullets were only confined at night. Pullets were selected for breeding based on their feeding behaviours and the performance of their parents. As one participant stated, "*We select those that are aggressive during feeding because they tend to grow faster and are more likely to lay more eggs*".

The participants further noted that the selection of indigenous chickens for breeding is primarily based on productivity. One group observed: "*we select the hen that takes good care of the chicks for breeding",* while another mentioned, "*we choose chickens that are good at foraging, and such hens are often good layers and grow quickly"*. These views suggest that production performance was a key trait in the traditional selection of the breeding flock.

The selection of breeding flock based on perceived egg-laying potential align with those reported in Ethiopia by Bekele et al. (2020), where most farmers prioritized egg production traits when selecting their breeding flock. Additionally, body weight and plumage colour were other criteria considered in their study. Tunsisa and Reda (2022) similarly reported that farmers mostly selected for breeding based on body weight and reproductive performance. Desta and Wakeyo (2024) observed a similar behaviour amongst producers who selected breeding hens based on maternal instincts and laying

performance. These practices align with FAO (2004) recommendations for natural incubation where large body size for breeding hens is a desirable trait.

When asked why improved breeds were not common, participants explained that "*improved breeds are more susceptible to diseases*" and "*require higher levels of management*". These responses indicate a preference for resilient breeds that are less resource-demanding. Traditional breed selection practices among these rural communities focused on key aspects of productivity and adaptability, attributes that seemed effective in promoting sustainability. However, the reliance on experiential knowledge passed down through generations, without support from technical knowledge in genetics and breeding, limited their potential to achieve an optimal sustainable livelihood strategy (Bekele et al., 2020; Kanyama et al., 2024).

The view that cross-bred chickens require higher levels of management indicates a certain level of resistance to change, reflecting some reluctance to invest further in this livelihood strategy. On the positive side, this behaviour has the advantage of preserving the genetics of the indigenous chickens. As argued by Demissu and Ebisa (2024), genetic diversity and preservation is vital for the sustainable utilization and advancement of indigenous chickens. This view is emphasized in Kpomasse et al. (2023).

On chicken housing, simple wooden structures were the most common chicken houses observed during transect walks across villages. Some of these structures lacked adequate ventilation and many were rarely cleaned, resulting in the accumulation of chicken waste. Quantitative data from cross-sectional surveys confirmed that only a few farmers cleaned their chicken houses regularly; 5% reported cleaning 'always' while about 50% cleaned

"sometimes". This suggests that insufficient cleaning may have contributed to the high prevalence of chicken diseases reported by participants. Munazir et al. (2024) points out that chicken house cleaning and disinfection is important in poultry farm bio-security and a major contributor to prevalence of infectious diseases in developing countries.

Regarding housing design, one participant commented, "*No one has given us the right design for chicken houses"*. This suggests a dual challenge: a knowledge gap and a tendency for producers to expect knowledge to be provided, rather than actively seeking it; an information seeking behaviour issue. Another participant noted, "*We construct chicken houses based on the skills of our local artisan*". This indicates that chicken houses were constructed based on the carpenters previous experiences without technical specifications from animal production experts.

The current findings suggest that indigenous chicken producers in the study area paid insufficient attention to the design and maintenance of chicken houses in line with best practices. Similar findings have been reported in Milkias et al. (2019), in their findings chicken housing was reported as the second most important challenge after diseases. Neglected housing conditions lead to the proliferation of external parasites. Providing suitable housing for indigenous chickens to protect them from adverse weather conditions, theft and predators (Tenza et al., 2024) is crucial for enhancing productivity and ensuring the sustainability of this livelihood strategy. In another study conducted in Zambia, Chebo et al. (2024) observed that some indigenous chicken producers allowed their chickens to rest in designated areas within family houses and kitchens. This practice similarly reflects a lack of attention to proper housing requirements for the chickens, likely attributable to limited resources and knowledge gaps.

4.7.3 Egg Incubation and Hatching

The participants highlighted that the most common method of incubation is the natural method, where brooding hens sit on the eggs until they hatch. The nesting areas varied, ranging from well prepared nests in the chicken coop to the use of old car tyres surrounded by clothing and in some cases a secluded spot in the living room or kitchen. While a few participants owned electric incubators, these were primarily used for incubating eggs from improved cross-breeds (*Improved kienyeji*), while indigenous chicken eggs were incubated using the natural method.

Using modern incubators for egg incubation initially seemed like a strange topic to the participants. One participant asked, "*Is that necessary for our indigenous chickens, which can brood their own eggs?"* The others generally agreed that it didn't seem necessary. However, one group member argued that electric incubators would allow more chicks to hatch because the hen could start a new laying cycle sooner with methods available to stop her broodiness. In the end, the group appeared convinced by this perspective. These observations suggest that many participants faced knowledge gaps regarding egg incubation and hatching methods beyond natural approach; a need for capacity-building.

In another study conducted in Ethiopia, Tunsisa and Reda (2022) reported 100% reliance on the natural incubation by hen. The incubation was timed to coincide with a period of feed availability, implying that the egg-brooding frequency was compromised. This suggests that the natural incubation had other associated challenges that adversely affected productivity.

4.7.4 Chick Brooding and Rearing Practices

During focus group discussions, the chick rearing segment of the value chain emerged as a critical area. One participant noted: "*This is the stage where we lose most of our poultry*"; indicating that mortalities were higher at this stage than any other. When asked for reasons, participants explained that '*young chicks are fragile and vulnerable to diseases and predators*. This response suggests that diseases and predation were key factors affecting chick survival. The issues of diseases and predation were then probed further. Newcastle diseases and respiratory illness were cited as the most common diseases, with all participants appearing to agree. In another study, Macharia et al. (2022) similarly identified chicken diseases as the greatest impediment to productivity.

A question posed to the focus group about farmers' practices regarding vaccination against immunisable diseases such as Newcastle disease received varied reactions. A few reported following the recommended vaccination schedules. Others noted challenges such as "*sometimes vaccination schedules are due when we have no money to undertake the activity*". Some participants also complained that "*the vaccines are sold in doses of 100 birds, while we only need something like 20 doses*". These responses highlight several issues, first there were very few adopters of the recommended vaccination schedules; second, economic constraints hindered timely vaccination and third, there was a lack of social networking, which could otherwise enable farmers to collectively purchase and share 100-dose vaccine packages. The third issue points to weak social capital within the rural communities studied, as argued in Cheruiyot and Kibett (2024). Could some of the chick mortalities be related to brooding management?

According to one focus group discussion, "*the hen provides the necessary warmth to the chicks, adequate for their survival."* Chick shelters were typically temporary structures, such as simple wooden frames and woven baskets. Some farmers also used wooden crates to protect the chicks from predators. Brooding was mainly done indoors at night and during bad weather. However, on warm sunny days, it was carried out out-doors in makeshift shelters. This frequent movement of chicks between locations required significant labour, but who does that? The task was largely managed by women and children.

Regarding improved brooding facilities such as the use of infra-red electric bulbs, participants agreed that they were rarely used for indigenous chicks. Such facilities were primarily adopted by a few farmers for brooding cross-breed, commercial layers, and broiler chicks. The natural warmth of a hen is more sustainable, for small scale indigenous chick-rearing but negatively impacts overall chicken productivity (Tunsisa & Reda, 2022).

A brooding hen focuses on raising chicks instead of laying eggs which could otherwise increase productivity if artificial brooders were used. Moreover during adverse weather conditions as reported by some participants, a hen may fail to provide adequate warmth to all chicks since the hen can only brood on limited number of chicks at a time. This practice is untenable for the commercialization of the indigenous chicken farming, particularly for medium and large scale production (Boleli et al., 2016). This presents an opportunity to build the capacity of farmers, particularly those aiming to commercialize, by introducing contemporary chick brooding techniques to enhance sustainable productivity.

4.7.5 Flock Management

Chickens were housed in a variety of structures, including grass-thatched buildings with mud walls and houses constructed from timber. Some participants indicated that they sheltered their chickens in kitchens overnight, explaining that "*the kitchen is warm and helps prevent respiratory diseases in chickens*". Few farmers had constructed chicken houses according to recommended designs, citing reasons such as a "*lack of materials*", "*lack of skilled artisans*" and "*lack of knowledge*" about the proper designs. These observations suggest little attention was paid to the housing of the chickens. This challenge of housing conditions appears widespread; it has been reported widely in other studies (Abbasi et al., 2023; Ariffin et al., 2024; Chebo et al., 2024; Tenza et al., 2024).

During the day, chickens roamed freely in search of feed. Some were allowed to scavenge for the entire day, while others were confined for over half a day before being released in the afternoons to prevent them from "*straying into neighbours' farms*." Their diet was supplemented with kitchen wastes, and occasionally grains when available, particularly during the harvest season. During this time, surplus or discoloured maize unsuitable for human consumption was commonly used as a supplement. This observation suggests that maize shelling waste was a significant source of supplemental feed for free-range chickens.

Only a few farmers reported using commercially-formulated "*kienyeji mash*" feeds. For most, the chickens' diet primarily came from natural foraging, including insects, grains and greens. One innovative practice mentioned by participants involved "*partially covering cow dung with polythene sheets to encourage worm growth"*. When ready, the worms were uncovered and fed to young chicks.

In regard to pest control, the farmers reported that they cleaned their chicken houses to control pests such as fleas. However, the majority appeared unaware that chickens also required regular deworming. One participant remarked, "*So even chickens need deworming like cattle*?" This observation highlights a gap in awareness among some farmers regarding this practice. As for vaccinations, only a few farmers carried them out. Several others lamented poor access to vaccines, which were often sold in large doses suitable for 100 chickens, far more than their small flocks required. Consequently, disease outbreaks, such as Newcastle disease, sometimes decimated their flocks. These accounts point to significant losses in chicken productivity among rural communities and underscore the inefficacy of their current pest and disease management practices.

Some participants indicated that they relied on traditional herbs to treat common chicken diseases. One participant remarked, "*We take chances and use herbal remedies because we cannot vaccinate once they become infected*". This suggests that herbal medication was primarily used as a complementary treatment. However, the same participant noted, "*sometimes some recover, others do not",* highlighting the significant losses incurred despite the use of alternative remedies. Similar findings on use of herbal medications for chicken healthcare were reported in South Africa (Tenza et al., 2024).

Some farmers coped with diseases by reducing flock sizes, as explained by another participant, "*We do not keep very many chickens because if diseases break out, the loss will be heavy*". This illustrates a strategy where farmers limit flock sizes to mitigate potential losses from anticipated disease outbreaks rather than investing in preventive measures such as vaccinations. This practice has direct implications on productivity.

Quantitative data further supports this observation, showing a prevalence of small flock sizes, with a mean of 26.1 ± 24.9, and a high coefficient of variation of 95.3%. This high variability may partly reflect risk-averse behaviour, as some farmers prefer smaller flocks to reduce potential losses. Additionally, it could also indicate differing purposes for keeping chickens, with commercial farmers tending to keep larger flocks compared to those raising chickens for home consumption.

The breeding system adopted by indigenous chicken farmers was characterized by random mating, where chickens mated freely within the flock. In most cases "*we have 2 to 4 cocks within a flock of up to 30 chickens*", observed one participant. However, this random mating included an element of selection. Participants noted that "*most farmers select fast-growing cockerels to be raised as roosters*", suggesting some degree of selective breeding. This practice likely contributed to maintaining genetic diversity within the indigenous chicken population.

Quantitative data revealed significant variation in the number of roosters kept by participants. Some farmers reported having one rooster for as many as 26 hens, while others maintained a ratio of 1 rooster to 8-10 hens. This wide variation likely reflects different farming objectives, including efforts to enhance genetic diversity and for market-driven motives. One farmer commented, "*Cocks grow faster and fetch more money during periods of high demand, such as Christmas*". This highlights a market-driven motive among farmers keeping many roosters, reflecting a degree of market embeddedness in their farming practices (Granovetter, 1985).

Maintaining a large number of roosters can lead to infighting, which negatively impacts egg fertilization. Conversely, too few roosters can also result in reduced egg fertility (Molapo & Kompi, 2015). Striking a balance in rooster-to-hen ratios is therefore crucial to achieving optimal fertility and productivity. A similar observation has been reported in Oyasere et al. (2020), recommending a cock: hen ratio of 1:10.

4.7.6 Marketing Practices

The indigenous chicken value-chain actors identified by the participants at the marketing segment included producers, middlemen and retail traders. The middlemen acted as intermediaries purchasing chickens and eggs from the farmers and selling them to retail traders and consumers mostly in urban centres. Some farmers sold their produce directly to traders in urban centres and consumers such as local hotels and individuals (Figure 4.6).

The middlemen seemed to play a crucial role. *"We usually sell them to middlemen who come to our door steps. This saves us the risk of transporting chicken for long distances, only to find that there are low prices at the market. You would rather negotiate for a better price when you are still at home"*. This account from a producer suggests that the farmers would rather off-load marketing risks to middlemen at farm gate than risk market losses exacerbated by transport costs incurred.

Another participant commented further that, "*Sometimes you get to the market and you find that it is like all the buyers have agreed on ceiling prices. A hen that would fairly be priced at about 800 shillings, you get an offer of 500 and all the potential buyers are offering the same, until you give up and just sell at the low price"*. This anecdote from a farmer in Ainamoi suggests the presence of market cartels at the trading centres. It

indicates existence of a high degree of price-fixing behaviour among the middlemen in open markets that are expected to offer competitive prices. The price-fixing behaviour was said to be common during festive seasons when the demand for chicken is high, suggesting the middlemen intended to benefit maximally from the high demand at the expense of the producers by collaborating among themselves.

This marketing behaviour highlights significant inefficacies at the marketing segment of the value chain. Producers bear the brunt of these inefficiencies, with middlemen benefitting disproportionately. These low levels of understanding between actors indicate a weakness in the chain (Nguyen & Nguyen, 2021). To address this, farmers proposed formation of producer organisations. Forming and strengthening producer organizations enable collective bargaining and enhances producers' negotiation power.

This marketing behaviour where intermediaries dominate has been reported elsewhere in India (Chengappa, 2018). In another study, Zamora (2016) observed that in the value chain network, certain members hold more significant influence in shaping its structure, while others play smaller roles and are more influenced by the network itself. It is indicative of a weak value chain network similar to that reported in Abbasi et al. (2024). In the current context, farmers appear to be controlled by a network of middlemen within the value chain. The distribution of benefits seems to disproportionately favour marketing agents over producers.

4.7.7 Processing

The current study did not identify processors actively collaborating with producers and intermediaries. Nearly all live chickens and eggs were sold through intermediaries who in turn sold to, "*customers in towns, urban centres and to travelers in highways*". This

contrasts with other regions where producers have established links with processors. For instance, in India, Gulati and Juneja (2023) reported that consumers preferred freshly slaughtered meat from open or wet markets, indicating significant processing activity. However, fully processed chicken meat accounted for only 7-10% of processed chicken market, wet markets dominated. The wet markets, however, posed challenges in hygiene and safety (Gulati &Juneja, 2023).

Findings from the current study suggest a lack of established links between indigenous chicken producers, intermediaries and processors. The ultimate buyers are predominantly local consumers, urban residents and travelers, excluding processors from the supply chain. The formation of cooperatives, as suggested by the participants, aligns well with key preconditions for smallholder producers to achieve economies of scale in many aspects, including capacity to process on their own; a producer-oriented model.

This producer-oriented business model, originating upstream in the chain, enhances access to broader markets and higher prices (Chengappa, 2018). Contract farming with processors is made possible and vertical relationships within the value chain enhanced, fostering a system where all actors benefit proportionate to their contributions. This will improve the value chain and place all the chain actors in an improved position (Bammann, 2007).

4.7.8 Practices within Indigenous Chicken Value Chain

In summary, a community-based participatory process identified several farmers' practices that contributed to the long-term sustainability and productivity of indigenous chickens as displayed in Table 4.15. These practices, derived from the participants' perspectives, could be grouped into eight higher level concepts;

(i) *Genetic diversity preservation*: Achieved through selection and random mating of breeders.

(ii) *Resilience-building*: Derived from adaptation to local conditions such as disease resistance through selection of resistant breeding flock.

(iii) *Rational decision-making*: evident in strategies to address resource constraints.

(iv) *Productivity-orientation*: Enhanced by diversifying diets using local resources.

(v) *Self-sufficiency system*: Promoted through low reliance on external inputs and customizability, evident in the producers' ability to adapt by constructing chicken houses with locally available materials and tailoring designs with the help of local artisans.

(vi) *Traditional Bio-economy*: Evidenced by utilizing biological resources such as worm-culturing, minimizing wastes and addressing economic constraints.

(vii) *Complementary healthcare:* Implemented through traditional flock health management practices, such as use of herbal remedies.

(viii) *Market embeddedness*: Shown by the participants' market-driven motives in raising fast-growing, heavier chicken breeds to achieve better market prices.

Table 4.15

Open, Axial, and Selective Codes for Efficacies in Indigenous Chicken Rearing and Marketing Practices Based on Grounded Theory Analysis

Practice (open codes)	**Axial codes**	**Selective codes**
Selection of breeding flock	Random flock mating	Genetic Diversity Preservation
Breeder selection based on foraging behaviour and Disease Resistance	Adaptation to local conditions	Resilience
Free foraging with little	Low input system Cost-	Rational Decision-making in

supplements from local resources	effectiveness	response to resource constraints
Free foraging plus purchased commercial supplements	Higher input system	Productivity-orientation
Free foraging, kitchen waste, fermented grains for feeds	Diversified diet , Cost reduction strategies	Self-sufficiency system
Free foraging only	Low input -Low productivity, Knowledge gaps	*Epistemic challenges
Free foraging plus worm-culturing, termite culturing	Local resource-use innovations	Traditional Bio-economy
Disease management with herbal medications	Cultural flock health improvement Information-seeking behaviour	Complementary healthcare *Epistemic challenges for rigour
Low adoption of vaccination schedules	Knowledge gaps Economic constraints	*Epistemic challenges *Economic powerlessness
Egg incubation and hatching by use of broody hens	Knowledge gaps on alternatives, Low input system	*Epistemic challenges *Economic powerlessness
Chick brooding by hens only	Natural brooding Knowledge gaps	*Market ecosystem
Farmer designed low cost chicken houses	Localized solutions Knowledge gaps	Customizability *Epistemic challenges
Rearing many faster growing roosters for market	Market-driven production	Market embeddedness
Sale of live birds to middlemen at farm gate	Power imbalances in value-chain, market access challenges	*Market ecosystem
Middlemen: We sell chickens and eggs to our customers in towns, some on the highway and they end up in different destinations	Fragmentation in value chain, localized and informal markets, no mention of processing or higher-end markets, need for market coordination	*Market ecosystem challenges (Lack of integration, weak value addition, organizational challenges)

***** Identified challenges within the practice

4.7.9 Challenges Affecting Efficacies of Indigenous Chicken Value-Chain Practices

An open question on the hindrances to indigenous chicken productivity was posed to the participants during group participatory informal discussions. This approach answered the question; what are the challenges in the IC value chain? At the community level, there were diverse barriers to indigenous chicken rearing, based on open codes, this included; limited access to markets, lack of organized marketing channels, geographical isolation

captured in some locations, poor access roads, limited access to information, and lack of resources to facilitate acquisition of breeding flock.

These initial primary categories were further categorized into broader axial codes: Market-related constraints, Poor access to financial services, Un-employment and weak resource base, Poor access roads, lack of organized markets, Risks associated with disease outbreaks, Lack of knowledge and knowledge gaps, Limited access to information, social norms, Lack of appropriate technologies, Weak extension services, Unemployed youths fearing to take risks, and Lack of incentives due to poor prices.

A closer scrutiny of the axial coded categories from the focus group discussions revealed a pattern in which all the categories could be clustered to form five higher order concepts through selective coding, namely; Epistemic limitations, Risk aversion and Inertia-towards-change, Economic powerlessness, market ecosystem challenges and Infrastructure related barriers.

4.7.9.1 Epistemic Limitations

Table 4.16 displays the results on epistemic challenges as cited by the participants and interpreted by the grounded theory approach. It reveals that the epistemic limitations centered on a lack of information and knowledge regarding chicken husbandry practices.

A closer examination of challenges such as lack of knowledge to undertake commercial indigenous chicken rearing, insufficient information, skills, limited access to education and traditional practices hindering the acquisition of new knowledge broadly indicates the epistemic limitations faced by smallholder chicken producers. In this context, epistemic limitations refer to all constraints related to information and knowledge, examples of which are indicated in Table 4.16.

Table 4.16

Raw Data on Epistemic challenges and their interpreted Axial Codes

	Descriptive Raw Data	Axial code category
a	*"I have not been able to access information on how to control common diseases in my chickens".*	Limited access to information
b	"*You know..., me I did not go to school much, I just use my own knowledge, the ones who went to school, maybe they are better.....*"	Limited access to new knowledge/awareness on basic husbandry
c	"We *just leave our chickens to fend for themselves, that is the knowledge we have*"	Limited knowledge
d	"I *learnt of some herbs one can use to control chicken diseases from my neighbour but they do not help much when there is an outbreak*"	Reliance on traditional knowledge/Limited knowledge
e	"*I got some information from a local agro-vet shop on what to use to control diseases, but it did not work, maybe I used it when it was too late*".	Lack of knowledge/Weak Extension services

The epistemic limitations centred on a lack of information and knowledge regarding chicken husbandry practices, with a notable emphasis on responses related to disease control. Another notable concern among the participants was regarding chicken nutrition. One participant suggested that indigenous chicken manage to "*find sufficient food when they fend for themselves"*. This datum indicates insufficient knowledge of the nutritional requirements of chickens for optimum productivity. Indigenous chicken that are left to scavenge take longer to reach maturity and produce less compared to those fed additional supplements (Alene et al., 2023).

4.7.9.2 Risk aversion and Inertia-towards-change

Table 4.17 displays raw data on risk aversion and inertia towards change. The attitude of inertia-towards-change among participants was detected as they tended to insist that their past practices have always "*served them well"*. Lack of adequate exposure to information may have contributed to the attitude. As one participant put it "*we rarely have any one from outside talking about how we should keep chickens; our veterinary officer often attends to our cows but no one talks about chicken."* This statement indicates not only lack of information to initiate change but also an epistemic limitation in facilitating chicken productivity. It is plausible that the lack of information contributes to inertia-towards-change and epistemic limitations regarding indigenous chicken productivity.

Table 4.17

Raw Data Examples in Risk Aversion and Inertia towards Change

	Descriptive raw data	Interpretation
1	*We have always done this (housing structure) and it has served us well*	Rigidity
2	*We have not been told by our extension officers, ...*	Poor information-seeking behaviour, (Lack of willingness to source for information?)
3	*We keep small flock of chicken to avoid, to avoid high losses in case of disease outbreaks*	Risk aversion (Prioritizing minimizing of potential losses)

4.7.9.3 Market Ecosystem Challenges

Table 4.18 displays part of the data to describe ecosystem challenges as identified by the participants and analysed by grounded theory methods.

Table 4.18

Raw Data on Market Ecosystem Challenges and Their Interpreted Axial Codes

	Descriptive Raw Data marketing	Interpretation
1.	*"sometimes the buyers lie to us that the prices in the main markets have dropped, but when you check you find that the prices are good where they are selling"*	Information asymmetry
2.	*"chicken weights are estimated by hand weighing, hanging and estimating weight*"	Lack of standards
3.	"*There is one middle man who comes around looking for chicken in our village, when we need to sell we call him to come cover"*	Few buyers/weak demand
4.	*"I once sold a number of chickens to a trader, when I counted the money and compared with the chickens I had sold, I was so disappointed"* (Exploited, No market valuation)	Exploitation/Lack of market valuation
5.	*"We have many problems with selling our chicken products i once lost a whole tray of eggs when my motorbike hit a rock" (*Infrastructural barriers?)	Infrastructural barriers
6.	*"I sell my chicken to travellers. Whenever i need to sell i take them to the roadside, stand there shortly and i will get some travellers to buy"*	Informal marketing
7.	*"We sell it at the same price whether we sell it at home or at the shopping centre"*	Expense without value-creation

A market ecosystem concept was thought to describe a situation that prevails when producers are connected to marketers and consumers of a given product. It is used in reference to the interactions that influence supply, demand, pricing and competition among players (Zhang & Watson, 2020). This concept was evidently in play when respondents refer to "*Lack of organized markets for chickens and eggs*," an indicator of a poor market ecosystem in which there is a lack of structure.

Lack of rules or standards often characterize a lack of market structure, leading to inconsistent practices. "*We sell at the price offered by the chicken trader....*" this datum suggests that there is no negotiation between the producer and the trader; the producer paints the picture of being a price-taker. There was some consensus among focus group participants that selling chicken and chicken products tended to rely on the pricing set by the traders. In this scenario buyers may offer farmers prices that are below fair market value or below the cost of production. "*They sometimes lie to us that the prices of chicken are very low in big towns like Kisumu*". This datum from one of the participants indicates two things; one is the dishonesty on the part of the trader and secondly is the lack of price information on the side of the producer. There is an element of information asymmetry in the marketing of the chickens; the buyers appeared to control information on the market prices.

In regard to a question on how the chickens were priced, some participants indicated that the buyers "*estimated chicken weights by hanging with his hands*"; this indicating that there was lack of standardized pricing mechanisms. The estimates by hand weighing suggests a value chain that lacks access to technology or simply has not embraced it.

Further, an observation from one participant that, "*we get good prices during Christmas season, but when it comes to January, we get the opposite*", indicates a market ecosystem with inconsistent market demands.

The market ecosystem challenges appeared to be quite diverse in the area. In one case a participant stated; "*I once sold a number of chickens to a trader and when I reflected on the amount received after selling a large flock of my chicken, I was disappointed*". This datum suggests that the producer had no prior expectation, had not established the worth or fair market value for his chicken before deciding to sell. It may also indicate that the producer was in dire need of cash and had to sell anyway, in which case; he/she was prone to exploitation. Overall this problem is broadly a market ecosystem challenge which poses barriers to efficient functioning of the market.

4.7.9.4 Economic Powerlessness

Table 4.19 shows some raw data that suggests economic powerlessness as interpreted by grounded theory approach. The results captured reveal that limited financial resources tended to limit participation in the indigenous chicken value chain.

Table 4.19

Economic Powerlessness and Interpreted Axial Code Categories

	Descriptive Raw Data	Interpretation
1	*"I wanted to vaccinate my chicks, they were many, I delayed because I had many other things to do and I did not have enough money. They all later died, I regretted I should even have borrowed money to vaccinate them"*	Poor access to financial services/ Indecisiveness
2	*"I am unemployed, I wanted to start rearing chicken, I am still looking for some finances to construct a chicken house and buy chicks"*	Resource-poverty/Lack of initial capital
3	*'Everything requires money, even starting with one chicken"*	Lack of initial capital
4	*"Vaccines for Newcastle disease is sold in doses for 100 chicken, I wish there were doses for 10 chicken"*	Scale of operation
5	*"predators went with many of my chicken, I could not afford to enclose them in a fence"*	Financially unattainable

Limited financial resources and other systemic problems that tended to limit participation in indigenous chicken value chain as an economic activity was interpreted to mean economic powerlessness among the participants. Poor access to financial services for improvement of chicken housing, inability to handle risks associated with disease outbreaks, unemployed youths fearing to take risks and lack of incentives due to perceived poor chicken prices were viewed as broadly contributing to economic powerlessness.

In the current context, economic powerlessness is used to refer to a situation in which individuals lack the ability to improve their social-economic status. The focus is on limited financial resources and inability to access credits. In one case, a participant narrated that he had not been able to construct a better coop for the chickens because he had no finances. *"I had many other financial obligations like paying fees for my children"*. This datum suggests a failure of the participant to improve on the productivity

of the chicken through better housing, ostensibly because of financial constraints; a case of economic powerlessness.

4.7.9.5 Restrictive Infrastructure

According to the participants, infrastructure significantly contributed to losses in indigenous chicken productivity. Participants highlighted various challenges, including the lack of nearby markets and poor road conditions. For example, one participant stated: "*We often travel long distances on rugged roads, even to sell a few chickens. There is no market nearby*." This observation underscores the dual challenge of inadequate market infrastructure and the difficulties caused by bad roads.

Another participant provided further clarity: *"Our roads are impassable. We would rather sell our chickens to a middleman so that he struggles with it, than transport them all the way to market through bad roads."* This statement reflects a sense of resignation among producers, who prefer offloading the burden of transportation to middlemen. It also indicates that middlemen are more willing to assume the risks associated with transport.

Beyond road conditions, participants also raised concerns about market infrastructure. One producer shared: "*we travel about 30km to our major open-air market on Tuesdays and Fridays whenever we have something to sell. The market has no shelter or storage facilities, so we have to sell our produce quickly*."This lack of market amenities exposes producers to adverse weather conditions and leaves them vulnerable to hurried sales at poorly negotiated prices.

4.7.10 Opportunities for Upgrading the Value Chain

The participants were guided by facilitator to identify actions that could transform the challenges into opportunities using problem tree analysis techniques. The highlights of the focus group discussions are summarized below.

4.7.10.1 Capacity-building and Extension services

Cognizant of the limited knowledge among producers regarding chicken management practices, the participants seemed unanimous in agreeing on the need for, "*enhancing farmers training, supporting farmers through awareness creation on best practices, and strengthening extension services"*. The overarching theme for this intervention was capacity-building and Extension services.

4.7.10.2 A Community-Based Financial Model

In light of the apparent economic challenges faced by farmers due to financial limitations, the consensus among the focus group participants centered on two main ideas. One key point of agreement was that, "*the government needs to establish friendly credit facilities to assist smallholder farmers invest in their chicken projects*". This view highlights several important components: the government's role as a key actor, the need for affordable financial support, and a focus on improving the livelihoods of smallholder farmers. The central theme emerging from this viewpoint is the facilitation of access to affordable credit.

The second key point raised by participants was the importance of strengthening community groups to foster savings and lend to members in need. Participants suggested, "*We need to strengthen our community groups to make savings so as to lend out to its*

members in need, to invest in their projects". This emphasizes aspects of community empowerment, collective finance mobilization, internal financial support for members, and facilitating productive ventures. The overarching concept here is a community-based financial model, where leadership comes from the community, with input from the government and other stakeholders. This model aligns well with the principles of sustainability.

4.7.10.3 Institutional Framework for Coordination of the Value chain

The indigenous chicken value chain was highly disintegrated, with input suppliers, producers, marketers, distributors and customers all acting independently. Producers, the key actors in the value chain voiced their concerns, in one case they pointed out that:

> *"We do not have an integrated value chain for indigenous chicken, every producer acts on his/her own. Even our self-help groups are not specialized on any specific livelihood strategies. Sometimes we receive support from projects, but on a short-term basis."*

This dataset highlights several challenges: the lack of an integrated structure among actors, the absence of focused strategies within self-help groups, dependency on short term external interventions, and the limitations of these interventions. The central issue identified is the absence of an institutional framework to coordinate and integrate actors within the indigenous chicken value chain. Similar findings have been reported elsewhere in Abbasi et al. (2023), Abbasi et al. (2024) and Ariffin et al. (2024). The current finding points to an opportunity, as identified by the participants, to enhance coordination by forming and/or strengthening producer organizations and linking them with other actors in the value chain.

4.7.10.4 Risk aversion and cooperative marketing

Farmers' unwillingness to take risks, particularly marketing risks, was identified as a key barrier to improving indigenous chicken productivity. Farmers often offload marketing risks to intermediaries, resulting in revenue losses. When asked why they did not venture into joint marketing, they explained, "*We cannot venture into joint marketing; there are other risks. Suppose we aggregate our produce and miss a market – everyone will lose*". This data reflects a lack of collective planning, weak cooperative marketing, concerns about market access, and fear of collective failure. Axial codes derived from this data include risk perception, lack of confidence in markets, and fear of failure in joint initiatives. Together, these factors point to the overarching theme of reluctance to participate in collective actions due to perceived risks, and probably other reasons such as insufficient social capital (Cheruiyot & Kibett, 2024).

This reluctance reveals a case of risk aversion among smallholder farmers, which limits their ability to access better markets. However, it also suggests an opportunity for government service providers and other stakeholders to build farmers competence and confidence in cooperative marketing, addressing the barriers to collective action and unlocking better market opportunities.

4.7.10.5 Partnerships for Infrastructure Development

Weak infrastructure was identified as a significant impediment to indigenous chicken productivity, particularly in the marketing segment of the value chain. During a focus group discussion, one participant remarked, "*We mostly sell our produce to middlemen who come to our homes to avoid transporting the produce on rugged roads and risking losses, such as egg breakages*". Other participants echoed these sentiments.

From a grounded theory perspective, this anecdote highlights key themes, including reliance on middlemen, the preference for convenience selling, the impact of rugged roads on marketing decisions, and a general tendency toward risk avoidance. The axial codes derived from this data included infrastructure challenges, transportation risk concerns, and dependence on intermediaries. The dependence on intermediaries leaves the producers vulnerable to exploitation. This productivity-limiting environment tends to empower intermediaries to exploit the situation at the expense of the producers (Kirori, 2015). Physical infrastructure such as roads and markets is crucial for agricultural productivity (Macharia et al., 2022).

What action is required? When the participants were asked about their strategies for addressing these challenges in the future, they emphasized the need for collaboration with local authorities, particularly county government, to improve road and market infrastructure. Such partnerships present an opportunity to enhance the productivity of farmers and strengthen their livelihood strategies as illustrated in Figure 4.7.

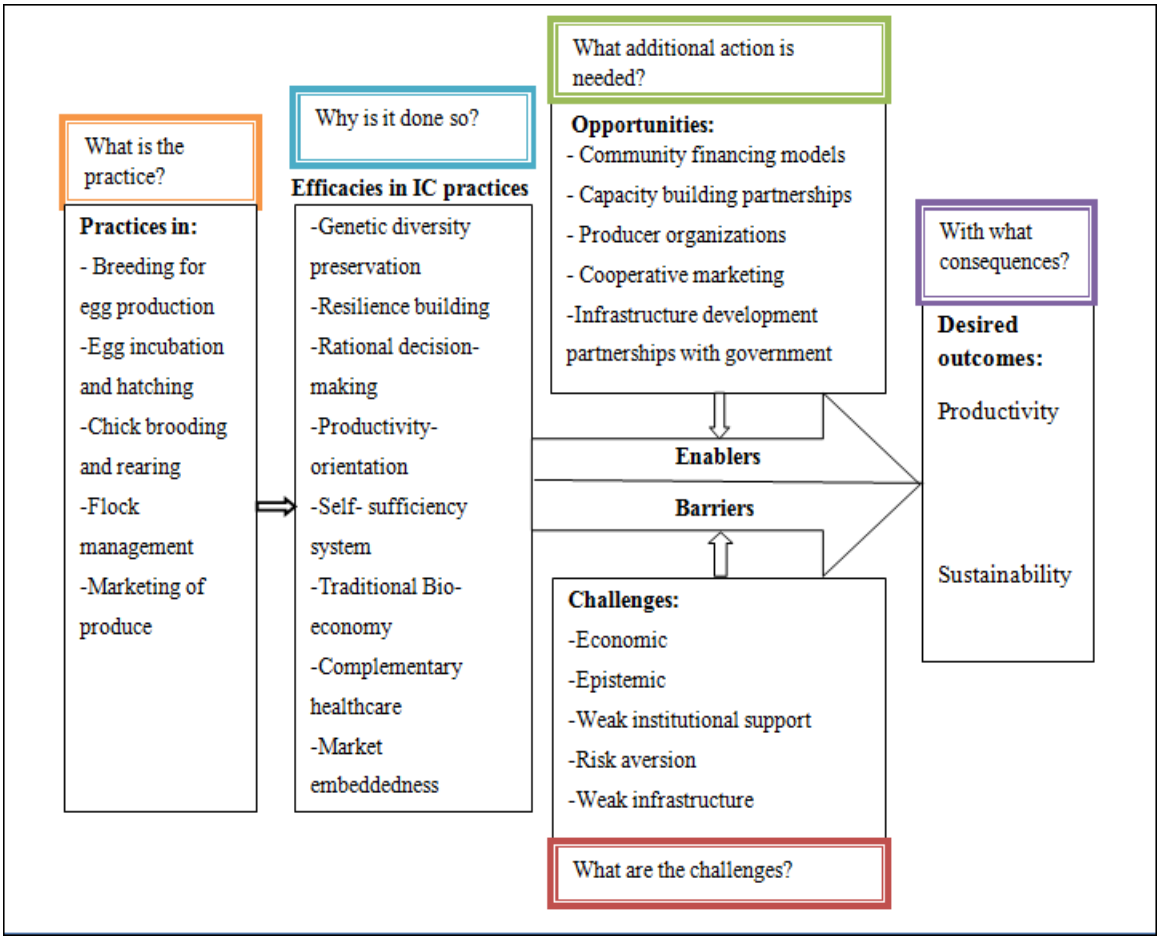
4.7.11 Framework for Upgrading the Value Chain

Figure 4.7 displays a framework developed in this study for understanding the indigenous chicken value chain and optimizing its productivity. The community centered framework is based on grounded theory analysis.

This study initially identified through a participatory approach the current practices in what can be regarded as participatory situational analysis. The goal was to answer the questions; what is the practice, from the perspective of the participants? A further probing question sought to answer the questions; why is it done so? What are the challenges? What additional actions are needed? What are the desired consequences? This was achieved through a participatory questioning process in which the community was rigorously involved. These steps are as outlined in Figure 4.7.

Figure 4.7

Community-Centred Indigenous Chicken Productivity Optimization Framework Based on Grounded Theory Analysis



Complexity theory, which advocates for multiple causality and diverse research perspectives; such as participatory research, suggests that phenomena should be examined holistically, incorporating the viewpoints of as many stakeholders as possible to drive societal change (Cohen et al., 2007). Participatory research is largely grounded in interactionist qualitative approaches that enable in-depth knowledge acquisition. Aligned with this perspective, the current study investigated the indigenous chicken value chain, primarily leveraging interactionist qualitative methods to foster change. As a result, the study developed a framework for understanding the value chain and optimizing its

productivity and sustainability as a livelihood strategy. In this framework, change; synonymous with value chain upgrading, is based on the following facets:

1. In-depth understanding of producers' practices and
2. Assessment of their efficacy in driving productivity and sustainability
3. Analysis of challenges through active community involvement
4. Survey of the community and its environment to identify opportunities
5. Fostering outcomes that enhance productivity and sustainability as summarized in Figure 4.7

4.8 Potential Social Innovation Strategies for Indigenous Chicken Productivity

The seventh and final objective of this study was to formulate potential social innovation strategies for enhancing indigenous chicken productivity in Kericho County, using participatory approach. Interactive focus group discussions were used to identify value chain constraints through a situational analysis. Rich qualitative data were gathered and analysed using grounded theory methods. Quantitative data were collected both before and after implementation of one of the social innovation strategies. McNemar's test was conducted in SPSS to determine whether there were any significant differences between the pre and post intervention data.

4.8.1 Participatory Situational Analysis

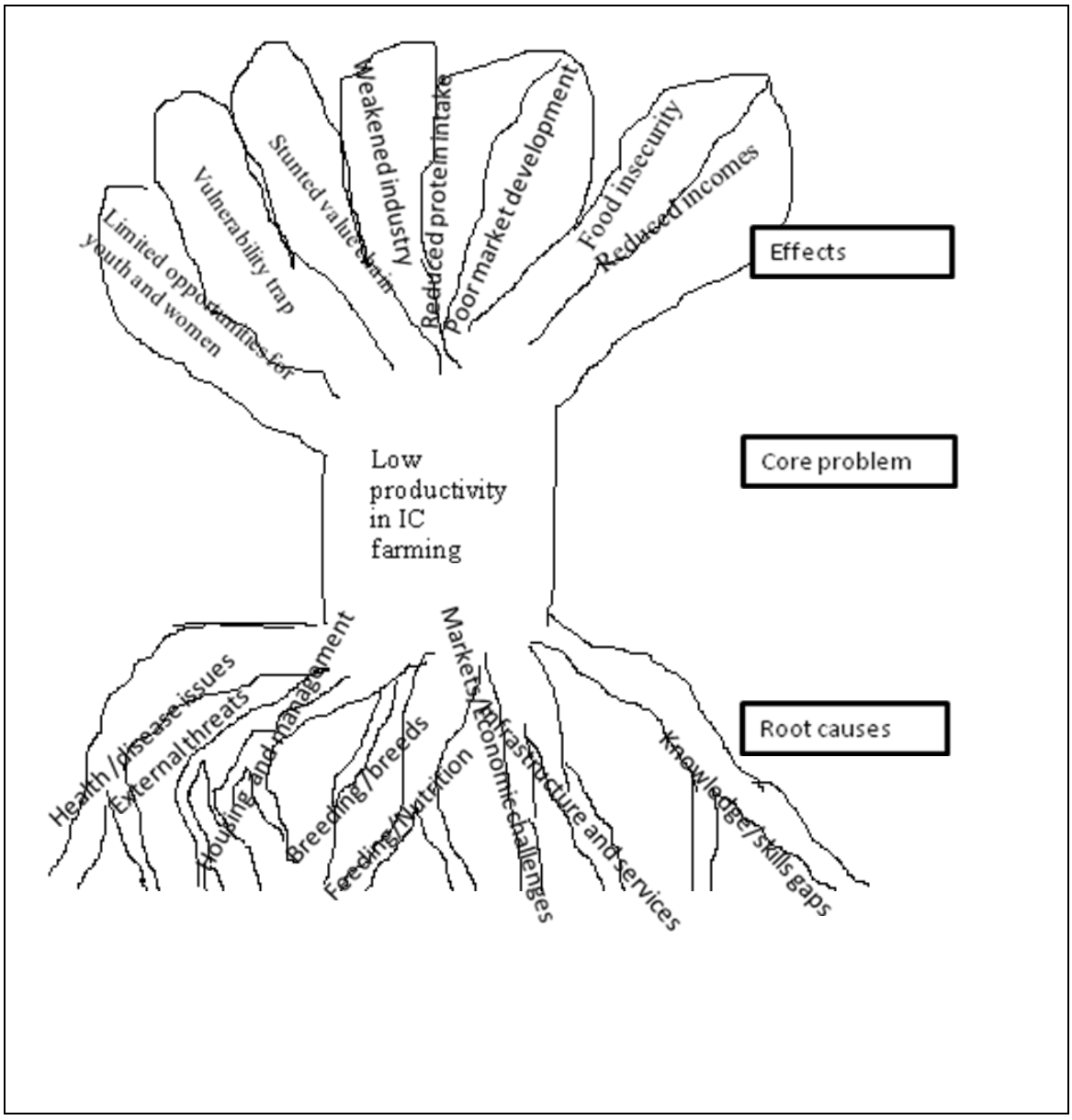
Figure 4.8 displays the participants' perspectives on indigenous chicken productivity challenges as analysed through the problem tree analysis. A question was posed to the participants regarding constraints in the indigenous chicken value chain. They listed down various challenges randomly as they were mentioned, including diseases such as Newcastle, pests, poor quality of feeds, high feed costs, poor chicken house hygiene, low

egg production, small sized breeds, and lack of knowledge among others. After extensive discussions, participants identified low productivity as the core problem resulting from these challenges. Through Participatory plenary discussions, constraints that were merely effects of other challenges were eliminated, leaving only the root causes of low productivity. The root causes were further analysed using a participatory problem tree analysis, which helped identify the root causes, core problem (low productivity) and its effects.

According to the participants, the core problem of low indigenous chicken productivity stems from both internal and external factors. The immediate root causes identified include gaps in knowledge and skills, weak infrastructure and services, challenges related to feeding and nutrition, issues in breeding and health management, and external threats such as theft and predators, as illustrated in Figure 4.8.

Figure 4.8

Participants' Perspectives on Indigenous Chicken Productivity Challenges Based on Problem Tree Analysis



The identified root causes were prioritized based on their severity using a participatory matrix ranking analysis. The participatory matrix ranking tool was introduced to the participants by using examples from elsewhere to rank problems based on their severity in the community. When they had fully understood the use of the tool, they were asked to

rank the eight primary challenges identified earlier through the problem tree analysis: chicken health and diseases (D), breeding and productivity (B), housing and management (H), market access and economic constraints (ME), infrastructure-related challenges (I), external threats such as predators and theft (ET), and knowledge related challenges or knowledge gaps (KG). The results for the three sites are as indicated in Table 4.20. A priority list was subsequently developed for all the sites.

Through the participatory constant comparative analysis during problem tree analysis and the subsequent prioritization through participatory matrix ranking, the following priority themes were derived from the list of eight challenges identified by the participants; [1] Health and diseases, [2] feeding and nutrition, [3] Breeding and productivity, [4] Knowledge and skills gaps, and[5] External threats. These emerging five priority challenges were examined for potential social innovation strategies in further focus groups formed from an innovation platform, based on the innovation systems framework. Each theme alongside the potential social innovation strategies is highlighted in the succeeding sections.

4.8.2 Health and Diseases

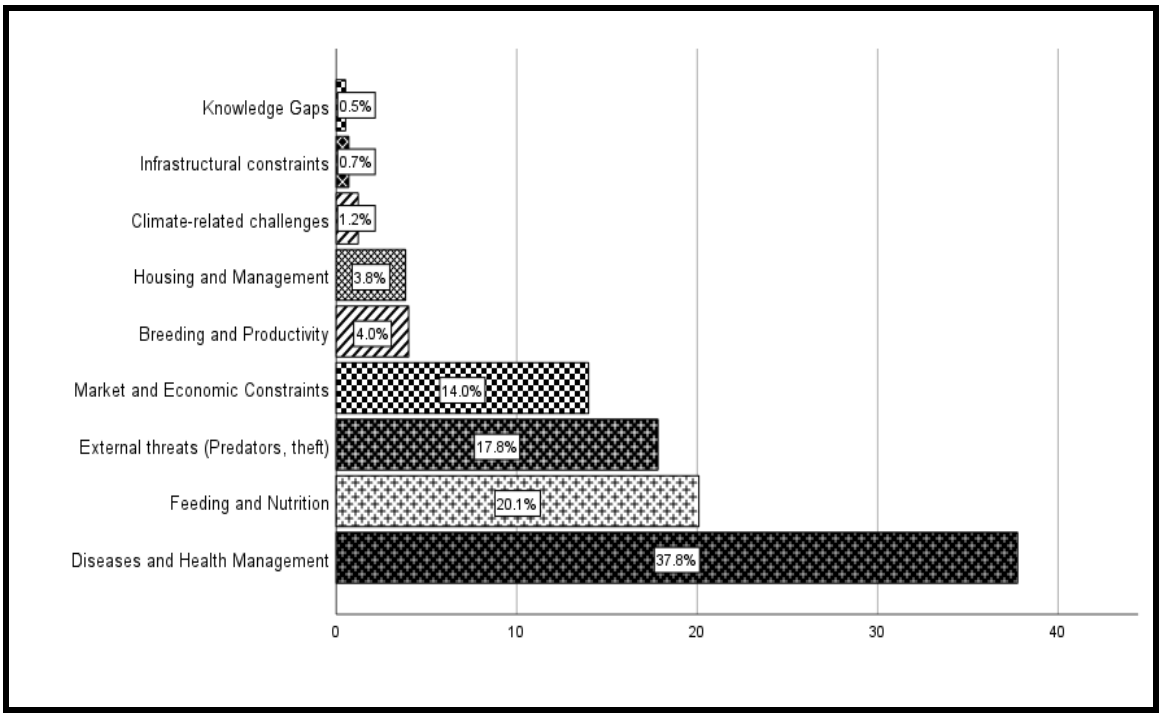
During the focus group discussions, participants deliberated on the identified challenges for potential interventions. The data collected indicated a high prevalence of diseases; this observation is triangulated with the household quantitative data (Figure 4.9).

Figure 4.9 shows the challenges in indigenous chicken value chain as cited by the participants. Their frequency of occurrence is based on the numbers of households reporting the challenge as captured through interview schedules. The results indicate a

high prevalence of disease and health management challenges, with a frequency of occurrence at 37.8%. Feeding and nutrition challenges had a prevalence of 20.1% and external threats such as predators and theft at 17.8%. The other challenges were market and economic constraints (14%), breeding and productivity issues (4%), housing and management (3.8%), climate -related challenges (1.2%), infrastructural constraints (0.7%) and knowledge gaps (0.5%) as indicated in Figure 4.9.

Figure 4.9

Challenges in Indigenous Chicken Value Chain as Cited by Participants



In one group a participant remarked "*diseases are very common, we have to do something about it".* Through grounded theory analysis this statement was deconstructed into its components as shown in Table 4.20. It highlighted the urgent need to address the issues caused by disease outbreaks. There was inadequate disease control and loses associated

with chicken worms were undervalued. It was also noted that "*there is poor access to veterinary services*", suggesting a need for interventions to improve veterinary outreach.

4.8.2.1 Strategy for Chicken Health Improvement

A key question arose regarding the role of farmers' common interest groups in the aspects of chicken health. This led to a suggestion to initiate communal action through the creation of "*Community chicken Health champions* (CCHC)." These would be youth groups trained by veterinarians to perform basic tasks, such as raising awareness about chicken health and encouraging the community to vaccinate, deworm and maintain proper housing hygiene for their chickens.

This innovative strategy was initially planned to be implemented through a volunteer group, but later discussions tasked them with starting a chicken deworming campaign for a fee to cover costs. The focus was on deworming because most farmers appeared unaware of its value and it required minimal training from veterinary experts. This strategy was later adopted at a site in Ainamoi. It was implemented for a period of 3 months before a mini-assessment was conducted to evaluate its potential.

Table 4.20

Chicken Health' Selected Challenges Identified in an Innovation Platform and Analysed by Grounded Theory Method

Raw data	Open codes	Axial codes	Selective codes
"*Diseases are very common; we have to do something about it.* *A time comes when they are wiped out by diseases"*	-Prevalence of diseases -Frequency (cyclical) -Urgency -Need for intervention -Total loss	-Problem -Impact -Action required -Economic losses	-Addressing the prevalence of chicken diseases -Bio-security challenges (Training on Bio-security)
"*Even deworming of chicken which we rarely do"*	-Limited practice -Lack of awareness -Needs to be done	-Cause: lack of awareness -Effect: low deworming -Need for intervention	-Under valuation of effects (Low deworming)
"There is poor access to veterinary services"	-Barriers -Healthcare support	-Cause: lack of vets -Effect: Limited disease prevention	-Limited disease control -Intervention required on improving vet out-reach
"We need artisans who can designproper chicken house; structures that are easy to maintain cleanliness"	-Skilled labour needs -Proper housing -Hygiene -Health risks	-Cause-poor designs -Effects-poor hygiene -Consequences; Mortalities	-Trained artisans essential for disease prevention

4.8.2.2Evaluation of CCHC potential

A mini-assessment was conducted to evaluate the potential for CCHC to influence chicken health management practices. Data was collected on chicken health practices prior to implementation of the strategy from a group of farmers in the site that had decided to implement the strategy. Similar data was collected three months later to test

for any potential differences in the practices. Temporal differences were tested by McNemar's test (pre and posttest) with the aid of SPSS version 27. Data collected on chicken deworming before and after the intervention (three months later), showed a significant positive change in the number of farmers reporting that they had carried out deworming of their chickens: χ^2 (1) = 5.44, p = .020, g = 0.25. The influence of the chicken health champions on the chicken deworming was significant ($p < .05$). The effect size was measured using Cohen's g; g = (b-c)/b+c, where b = Yes to No (worsened) and c = No to Yes (positive impact). This test was conducted among a sample of 40 participants. The medium effect size, based on Cohen's g, suggests that the social intervention has a potentially meaningful effect in the long run when cascaded into the entire community.

4.8.3 Feeding and Nutrition

Table 4.21 displays feeding and nutrition-related challenges as identified by the participants. The feeding practices for indigenous chickens did not vary widely among the participants. The majority reported allowing their chickens to scavenge freely for food, with minimal supplementation from grains and kitchen waste. One participant in a focus group commented, "*We leave our chickens to scavenge for food. When we have some maize grains or kitchen leftovers we add them to their feed, and they lay eggs well*". Other participants appeared to unanimously agree, suggesting this was a common practice. A further analysis of this anecdote, based on grounded theory analysis, is as indicated in Table 4.21.

Table 4.21

Feeding and Nutrition-Related Select Challenges Identified in an Innovation Platform and Analysed by Grounded Theory Method

Raw data	Open codes	Axial codes	Selective codes
We leave our chickens to scavenge for food. When we have some maize grains or kitchen leftovers, we add them to their feed and they lay eggs well	-Scavenging -Supplementation -Feed availability	-Scavenging primary feeding method -Supplementation based on household food availability -Perceived outcome -Egg production	-Subsistence-based poultry feeding practices (feeding is informal, inconsistent, availability dependent)
"When you supplement with kienyeji mash you get more eggs, but it is quite costly, so we do it once in a while"	-Commercial feed improving egg production -High cost limits regular use -Occasional supplementation -More eggs with supplementation	-Cost benefit trade-off -Irregular supplementation -Feeding linked to egg yields	-Economic constraints on optimal poultry nutrition -Financial accessibility

4.8.4 Breeding and Productivity

Table 4.22 shows data on breeding challenges as identified by the participants and analysed by grounded theory methods. Participants identified several breeding and productivity management challenges that contribute to low productivity and profitability in the indigenous chicken value chain. Key issues included low egg-laying rates and inadequate hatching and incubation techniques. In focus group discussions, participants highlighted concerns about body size and productivity. One participant noted, "*Most of our chicken breeds have small body sizes and tend to lay small eggs",* while another observed "*Many people enjoy indigenous chicken meat, but our breeds produce small*

portions". Grounded theory analysis, as displayed in Table 4.22, suggests that small body size is a dominant breed trait linked to smaller eggs and lower meat yields, both of which affect overall productivity. Participants associated these issues with inbreeding and emphasized the need for breed improvement.

Table 4.22

Grounded Theory Analysis Output on Breeding Challenges Based on Selected Data

Raw data	Open codes	Axial codes	Selective codes
"*Most of our chicken breeds have small body sizes and tend to lay small eggs"*	-Small body size -Small sized eggs -Genetic limitation -Traditional breeding	-Small body size likely linked to genetics -Small eggs might fetch lower prices -Small meat portions	-Selective mating to enhance body size. -Genetic improvement & diversity needs.
"Many people enjoy indigenous chicken meat, but our breeds produce relatively small portions"	-Preference for indigenous chicken meat -Meat yield is low	-High preference for IC meat and constraints of small portions -Need to explore breed improvement	-Breed selection; growth traits -Selection for higher meat yields without compromising taste
"*The naked-neck chicken is a good egg-layer, but it is susceptible to cold conditions, so I stopped rearing it"*	-Naked-neck recognized for laying well -Cold susceptibility -Management challenge -Decision to stop	-High egg-laying rate desirable -Resilience prioritized -Environmental influence -Practical considerations	-Trade-off between productivity and adaptability

Participants brainstormed the challenges associated with indigenous chicken breeding in their localities, with the aim of developing social innovation strategies to address these challenges. One innovative strategy discussed and adopted for improving breeds was a village-based exchange of roosters. Under this approach, producers carefully select large-sized roosters from high performing parents for breeding. To prevent inbreeding,

they exchange these roosters with neighbours. This community-driven approach relies on mutual trust and aims to enhance chicken size, egg-size, egg-laying rates and overall productivity.

4.8.5 Knowledge and Skill Gaps

Table 4.23 displays data concerning knowledge gaps, derived from participants' input and analysed via grounded theory methodology. Knowledge gaps among indigenous chicken producers were identified as one of the primary causes of low productivity and profitability during participatory problem tree analysis sessions. This issue was further ranked highly in participatory matrix ranking analysis, underscoring its significance as a major impediment to the indigenous chicken value chain. In several instances, "*lack of knowledge*" was cited as the main reason for non- adherence to best-practices, such as chicken vaccination, proper chicken coop design and deworming. One participant remarked, "*I didn't know that chicken need deworming*", suggesting a knowledge gap in best practices for chicken rearing. While discussing with an Extension agent, another participant commented, "*You need to train us on how to do everything, especially on how to control chicken diseases. There are times our chickens are swept away by diseases*."

Further analysis of these insights suggests a strong need for knowledge transfer, particularly in diseases control. The devastating effects of poultry diseases, which can wipe out entire flocks and cause severe financial losses, were a recurring concern. Overall, knowledge gaps appeared to be the root cause of many productivity challenges. These underscore the importance of targeted interventions to bridge these gaps.

In another instance, a participant noted, "*Sometimes when you deworm the chickens, they lay eggs well,*" suggesting that while deworming improves productivity, other factors may also be limiting chicken performance, as revealed in Table 4.23.

Table 4.23
Grounded Theory Analysis of Selected Data Relevant to Knowledge Gaps

Raw data	Open codes	Axial codes	Selective codes
Sometimes when you deworm the chickens they lay eggs well	-Deworming -Egg production influenced by deworming	-Health and productivity links -Variability in outcomes	-Poultry productivity influenced by deworming but outcome depends on other interacting factors
"Once in a while you remember that the chickens should be vaccinated"	-Irregularity (once in a while) -Memory-based decisions (remember) -Health risks (irregular vaccination)	-Lack of vaccination schedules -No fixed routine -Memory-based decision making -Inconsistency -Lack of awareness -Potential losses	-Irregular vaccination attributed to lack of awareness -Need for capacity building on economic benefits of vaccination -Need for scheduled vaccinations
I didn't know that chickens need deworming like cattle	-Knowledge -Deworming -Comparison -Cattle; more familiar	-Knowledge lacking -Comparatively more knowledge on larger livestock	-Knowledge gaps on chicken health hindering implementation of best practices
In regard to chicken records: "*We use the calendar to know when the chicks were hatched"*	-Use of the calendar -Record keeping (visual, marked on the calendar)	-Record keeping practices (temporary) -Use of external tools (calendar)	-Record keeping efficiency and decision making -Provides an entry point for capacity building
Female respondent: "*Indigenous chickens are good. They scavenge around and still lay eggs. You cannot suffer lacking sugar for tea when you have them"*	-Survive on scavenging -They still produce eggs despite scavenging only -Eggs sold for cash to buy sugar -Provides for household subsistence	-Resilient livelihood strategies -Household stability -Low input -Subsistence nature	-Integrating better feeding and health - care can boost productivity -Need for capacity – building on better feeding while leveraging their natural resilience -Transition from subsistence to commercializing

Deliberations among the participants on the challenges associated with knowledge gaps culminated on the need for an integrated approach to capacity-building. A key question then arose; who should lead these capacity-building efforts?

After extensive deliberations in focus group discussions, participants proposed and adopted a community-driven training model. Under this innovative social strategy, the community itself would take the lead. Members would first elect officials responsible for coordinating and mobilizing farmers for training. These officials would also invite relevant facilitators, such as Agricultural Extension officers, cooperative officers, social development officers and NGO's, based on the community's specific training needs.

To ensure long-term impact, producers would also undertake collaborative efforts, including joint vaccinations and follow-up training activities. This model not only empowers the community but also fosters sustainability by promoting shared responsibility in knowledge dissemination and best-practice adoption.

4.8.6 External Threats to Indigenous Chicken Rearing

Table 4.24 presents selected data on external threats to indigenous chicken rearing as captured from the participants and analysed via grounded theory methodology. Predators, pests and theft were commonly identified as major external threats to indigenous chicken rearing. These threats were particularly pronounced in Soin/Sigowet, where participants reported frequent attacks by bush- dwelling predators, likely due to dense vegetation and nearby sugarcane plantations. Pests, especially mites and fleas, were also highlighted as a significant impediment to productivity.

During participatory matrix ranking analysis, these external threats were ranked as the third- most critical challenge in Soin/Sigowet area, indicating their substantial impact on productivity losses. One participant noted, "*Our location here has many chicken predators in the bushes. We don't let our chickens scavenge feely, we erect fences, but we still lose some".* This observation suggests that while farmers recognize the risks and take mitigation measures, challenges persist as displayed in Table 4.24.

Table 4.24
Grounded Theory Analysis of Selected Data on External Threats to Indigenous Chicken Rearing

Raw data	Open codes	Axial codes	Selective codes
"*Chickens are sometimes preyed upon by bush-dwelling predators"*	-Predation (sometimes) -Surrounding environment (bushes) -Predators within; natural	-Risks of predation (prey- chicken) -Economic losses due to environmental factors (threats)	Conflicts with the environment that require adaptive strategies
"*This area of ours has many chicken predators in the bushes, we don't leave our chickens to scavenge freely, we erect fences around, even though we still lose some"*	-Chicken predators in the environment -External risks recognized -Preventive strategies developed (fences) -Strategies not full proof -Ongoing conflict with predators	-Environmental risks and threats -Protective strategies and adaptation -Challenges and losses persist	-In environments with persistent threats farmers engage in continuous adaptation -Need for continual improvement on risk management
Sometimes you have a number of chicks; like 12, then within a few days they have been preyed upon and you are left with only 4"	-Initial abundance (high number of chicks) -Good hatching -Optimism in flock size -Rapid predation -Environmental threat -Rapid losses	-Cause – predation -Effects – chick losses -Risk high early in chick's lifecycle (within a few days) -Predator presence in the environment	Predator- induced productivity losses (External threats impact overall output)

Given the persistent challenges of external threats as revealed by this study, the next step was to explore, through a participatory approach, viable solutions to address the menace. Focus group discussions were organized using an innovation system perspective to identify social innovations for mitigating external threats. Participants unanimously agreed to assign the issue of theft to the local administration and village elders who would coordinate community- based security measures.

Regarding predators and pests, initial discussions leaned towards technical solutions such as trapping and poisoning. However, when encouraged to consider sustainable, community-driven approaches, participants proposed an integrated social strategy. They agreed that constructing strong predator-proof chicken coops through cooperative efforts would be a more effective solution. The plan involved engaging an animal production expert to train a local artisan in coop construction. Community members would collectively acquire materials in bulk to reduce costs. These well-designed coops, would not only protect chicken from predators, but also provide a hygienic environment, reducing pest infestations.

To enhance chicken protection against predators and theft, participants adopted a dog-geese guarding strategy. Through cooperative efforts, households would be encouraged to invest in guard animals, particularly dogs and geese which were identified as effective deterrents.

4.8.7 Summary on Social Innovation Strategies for Indigenous Chicken Productivity

This objective of the study aimed to co-create social innovation strategies to enhance indigenous chicken productivity. To achieve this, the innovation systems perspective

was applied, emphasizing multi-stakeholders' collaboration in generating and sharing knowledge that is new and beneficial to the end-users, the community. The social innovation strategies focused on addressing key challenges identified through a participatory problem tree analysis and prioritized using participatory matrix ranking. Health and disease management, breeding and productivity constraints, feeding and nutrition issues, knowledge gaps in best-practices for chicken rearing and external threats such as predation, pest infestation and theft were rated as the most severe.

Through focus group discussions within the innovation platform, the following social innovation, strategies were formulated:

Community chicken health champions: Establishing local advocates for chicken health promotion, with a flagship initiative on routine deworming and disease awareness campaigns.

Community-driven feed formulation and learning centre: Developing a cooperative – based feed production unit to enhance access to affordable, locally formulated chicken feeds. This includes exploring black soldier fly farming as a sustainable protein source for chicken feed.

Village based-rooster exchange program: Facilitating the systematic exchange of roosters for improved genetic diversity and reduction of inbreeding related effects.

Community-driven training model: Implementing a local farmer-led training framework where community members organize and coordinate village- based capacity-building, extension services and cooperative management.

Collective actions for predator control: Encouraging cooperation among producers to build predator-proof coops and implement a dog-geese guarding strategy to mitigate losses from predators, pests and theft.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the thesis. This thesis argued that incorporating insights from community members and other key stakeholders into the understanding of livelihood strategies offers a deeper understanding of value chains, particularly low-input value chains such as indigenous chicken farming, which are accessible to all socioeconomic groups. In the summary section the chapter outlines the study's' objectives, methodology and key findings. In the conclusion section, the chapter presents the conclusions drawn from the study's seven specific objectives. Finally it offers recommendations for practitioners and policy-makers and suggests areas for further research.

5.2 Summary

This study acknowledged that socio-economic prosperity in rural areas is largely contingent upon the productivity of agricultural resources. It argued that conventional socioeconomic indicators of development such as lighting and energy sources often fail to capture the realities and priorities of rural communities. Such indicators hardly take into consideration the perspectives of the rural dwellers. The resource-poor households in particular largely rely on low-input strategies such as indigenous chicken rearing for their food and livelihood security. These Indigenous chickens have many roles, but its productivity is faced with many challenges, some of which have been researched on, mostly through quantitative and qualitative surveys, with minimal input from the rural

communities. This study employed participatory methods, leveraging insights from the community members and key stakeholders to explore how indigenous chicken contributes to livelihoods of rural smallholders. Grounded theory, the value chain model and the general theory of innovation formed the theoretical foundations of this study.

The objectives of the study were; to examine the socioeconomic determinants of livelihoods, analyze the patterns of livelihood strategies through a participatory approach, investigate the latent roles of indigenous chicken (IC) in the livelihoods of the community and examine socio-economic determinants of its productivity. Further, the study objectives were to determine the relationship between IC productivity and livelihood outcomes, evaluate the efficacy of the IC value chain practices, and formulate potential social innovation strategies for enhanced IC productivity. This study adopted a philosophy-guided community-based participatory action research design. The study was conducted in Kericho County, in rural set-ups of three purposively selected sub counties from the six in the county. The three Sub counties represented diversity in the county based on agro-ecological zones, and socioeconomic factors. The sample size was determined by Yamane's formula and multi-stage sampling techniques were used to sample 398 households from a target of 61,278 rural-based IC producers, spread across six administrative locations. Participatory rural appraisal family of tools was used to collect data through focus group discussions, observations and interviews. Quantitative data were collected using interview schedules. Data were validated by cross-checking with different sources. The qualitative data were analysed for themes by grounded theory method. Quantitative data were analysed by use of descriptive and inferential statistics with the aid of SPSS version 27.

The results of the study revealed diverse roles, challenges and efficacy in indigenous chicken value chain practices. This study concluded that livelihood strategies were shaped by socioeconomic push and pull factors, including economic conditions, market participation, human capital, and climate responses. Livelihoods were mainly farm-based, supplemented by off-farm trade, informal wages, and salaried jobs. Indigenous chicken supported diverse household goals; economic, ecological, socio-cultural, and nutritional. Their productivity was influenced by household socioeconomic factors, including information-seeking behaviour and participation in social networks. Community-defined indicators of wellbeing were established through a participatory livelihood analysis approach. This study found significant association between the indicators and IC productivity ($p < .05$).

Despite challenges in IC rearing – diseases, feeding and nutrition gaps, external threats such as predators and theft, market and economic constraints-, the rearing practices supported genetic diversity and household resilience. The value chain was weak, particularly lacking processing segment. The study recommended strengthening actor capacity and coordination to develop a functional inclusive indigenous chicken value chain, through inclusive participatory approaches.

5.3 Conclusions

This study investigated the socioeconomic determinants of livelihoods. In conclusion, the socio-economic determinants of livelihoods among rural households in the study area encompassed factors such as economic conditions, market participation, human capital, responses to environmental and climate-related factors, access to natural resources and social structures. Specifically, based on grounded theory analysis the determinants

encompassed; household reactions to interaction between environmental and economic factors, perceived economic values, inherited knowledge, market integration and resilience-building motives. Additionally, other determinants include leveraging social capital and external resources, social learning, access to natural resources especially land, and external interventions such as capacity building. Key drivers also encompass response to climate driven changes, social embeddedness as reflected in traditional practices, age and intergenerational shifts, family dynamics and the role of formal education.

The second objective of this study focused on the patterns of livelihoods among households. This study concludes that there is a complex interplay between income generation, the pursuit of food self-sufficiency, and integration of environmental sustainability considerations. The emerging pattern is one of integrated farm-based livelihood strategies where rural households continuously balance economic, food security and environmental considerations in their decision-making. This pattern reflects a dynamic, adaptive approach where rural livelihoods are not rigid but fluid and responsive to economic, environmental and food security challenges.

The third objective of this study focused on understanding the latent roles of indigenous chicken from a grounded theory approach in which inductive reasoning starts with specific observations or data, to build substantive theory or concepts. It involves the creation of concepts that explain phenomena observed in data. This study concludes that, in the context of the rural households in the study area, there were underlying concepts or theories that explain the roles of indigenous chicken. Indigenous chicken has; Insurance, marketness and Instrumentalism roles for individuals to achieve their desired economic

and non-economic outcomes. The indigenous chickens have vital Ecologic roles, Immanence roles in utilizing existing resources and human capabilities, and a role in the Ladder-of-change as people transition from one livelihood strategy to another in their socio-economic progress. Indigenous chicken contributed to Household functionalism by engaging the less resourced youth and women in the households and had a vital role in provisioning for dietary requirements of households and for Interpersonal connectedness through gift exchange and its association with social events and ceremonies.

In pursuit of the fourth and fifth objectives, this study finds that indigenous chicken productivity is significantly influenced by various socioeconomic factors. These include access to information, knowledge-seeking behaviour, social net-working, farm enterprise diversification, household size, and flock size. Market access also had a modest impact on chick care, as reflected in chick survival rates. Additionally, the age of the farmer proved to be a significant factor in indigenous chicken productivity. Community-defined livelihood outcomes showed some relationship too. The community-defined livelihood outcomes were significantly positively linked to the productivity of indigenous chickens. This study thus revealed a nexus between the community-defined livelihood outcomes, household socio-economic attributes, and the productivity of indigenous chickens.

Further, as the sixth objective this study evaluated the efficacy of indigenous chicken value chain practices among smallholder farmers using a participatory approach. The findings reveal that farmers' practices made significant contributions to the productivity and sustainability of indigenous chickens. These contributions include genetic diversity preservation, resilience-building, rational decision- making, productivity-orientations,

self-sufficiency systems, integration of bio-economies, complementary healthcare, and market embeddedness.

Despite these strengths, the study identified key challenges that limited the effectiveness of these practices. These challenges, as analysed through grounded theory approach, include epistemic gaps, economic powerlessness, risk aversion amongst producers, weak institutional support, and restrictive infrastructure.

This community-based participatory action research effectively identified key challenges hindering indigenous chicken productivity. Through a collaborative and inclusive approach, to address the seventh objective, this study facilitated the development of context-specific social innovations. This included community chicken health interventions, structured community learning platforms, a village-based rooster exchange system to improve genetic diversity, a community-driven training framework, and coordinated efforts to predator control. Collectively these social innovations represent sustainable strategies aimed at enhancing productivity and resilience within indigenous chicken systems.

5.4 Recommendations

This study delved into the latent roles of indigenous chicken using grounded theory thinking, emphasizing the importance of context. The hidden, not immediately apparent roles become evident upon closer examination of their contributions to the economy, ecology, culture and being a food source. Additional studies in various contexts, focusing on indigenous chicken-rearing households are recommended to further develop the underlying theories and concepts explaining the roles of Indigenous chickens among rural

households in developing countries. This in-depth understanding has implications in the formulation of strategies by agricultural development agents for sustainable indigenous chicken production.

This study revealed a nexus between the community-defined livelihood outcomes, household socio-economic attributes, and the productivity of indigenous chickens. These findings have implications for agricultural extension agents, highlighting the need for targeted interventions tailored to households' socio-economic stages. This study also has implications for strengthening social capital among smallholder farmers, alongside enhancing their access to information and encouraging knowledge-seeking behaviour.

The study recommends that stakeholders and policy-makers support the integration of farmer producer groups into larger networks, such as an indigenous chicken association, to encourage collaborative efforts for enhanced productivity. This study was based on the philosophy of contextualism, where knowledge generated is specific to the context. It is recommended that similar studies be conducted in the future under comparable socio-economic conditions to deepen understanding of rural communities' livelihood strategies and productivity.

To address the production challenges and enhance the indigenous chicken value chain, the study recommends that Service providers address epistemic challenges by strengthening agricultural extension services. This will improve farmers' knowledge, skills and practices, fostering greater productivity and sustainability. Further, build the capacity of producers to form and strengthen their organizations, enabling collective actions and improving access to quality markets through better market integration.

Inclusion of risk management strategies in capacity-building is recommended. It is recommended that policy makers prioritize the development of infrastructure, particularly roads and market facilities, to support the productivity and sustainability of value chains.

5.5 Suggestions for Further Research

This study examined the efficacy of farmers' practices within a specific socioeconomic context. To advance knowledge and theory related to indigenous chicken productivity and sustainability in developing countries future research should investigate practices across diverse socioeconomic and cultural environments to understand contextual adaptations. Additionally, examine the integration of modern technologies with traditional practices to identify hybrid solutions which can be up-scaled for resource-constrained farmers.

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APPENDICES

Appendix I: Focus Group Discussion Guide on Determinants of Livelihoods

Determinants of livelihood as interpreted locally	Livelihood strategy (For which livelihood strategies?)	What are the challenges/Constraints
1.	1. 2. 3. 4. 5.	
2.	1. 2. 3. 4. 5.	
3.	1. 2. 3. 4. 5.	
4.	1. 2. 3. 4. 5.	

Appendix II: Matrix Ranking Tool for Focus Groups on Relative Importance of Determinants of Livelihoods, Livelihood Strategies, Productivity, Relative Profitability, Challenges and Opportunities

	A	B	C	D	E	F	Score	Rank
A								
B								
C								
D								
E								
F								

Appendix III: Challenges and Opportunities Identified By Focus Group Discussion and Households

Livelihood strategy	Benefits derived from the strategy	Constraints/ Challenges	How are the challenges addressed?	What additional action is needed?

Appendix IV: Value Chain Actors Checklist for Focus Group Discussions

Category	Inventory	Key representative
1. Research		
2. Inception		
3. Inputs		
4. Production		
5. Support services - Extension agents - Market development (Local, External)		
6. Political and policy		
7. Consumption		

Appendix V: Household Interview Schedule on Indigenous Chicken Productivity

We are conducting a survey study on the Productivity of indigenous chicken in Kericho County**.** The results of the study will be used for improving Indigenous Chicken (IC) production and marketing systems by stakeholders and for academic work. All the information collected will be treated confidentially. No names of individuals will be used anywhere in the reports. We are kindly asking for your consent to be part of the study. If you are in agreement, kindly provide your honest answers to the questions asked in this schedule.

Variable **A. Demographics**	Response (Please tick or write in the box)
1. Respondent Number	
2.Household Head: a) Gender b) Level of Formal Education c) Age (Years) d) Household size (Number of members in the household)	 ☐Male, Female☐ ☐ None ☐Primary ☐ Secondary ☐ Tertiary
B. Farm Characteristics	
3.Land: Farm size (Acres)	
4. List key Farm crop enterprises (Crops, Trees etc, List all)	Enterprises 1. 2. 3. 4. 5. 6. Others (specify)
5.Livestock Farm enterprises (List all key livestock types kept eg cattle, goats, sheep, ducks, guinea	Types 1. 2.

fowl etc)	3. 4. 5. 6. Others (specify)
6. Organizations a) Do you belong to any group? b) If yes, how many Groups? c) If NO, why?	☐ Yes ☐ No
C. Flock Structure and output	
7.Number of Indigenous chicken/ products: a) Number of Chicks b) Number of Pullets c) Number of Hens d) Number of Cocks	a) b) c) d)
e) Number of eggs laid per clutch/hen	e)
f) Number of clutches per year	f)
g) Number of chicks hatched per clutch h) Number of chicks survived/clutch	g) h)
8) Output per year (Reference year 2021) a) Hens sold during the year b) Cocks sold during the year c) Eggs sold during the year d) Manures sold (estimated in kg) e) Number of chickens slaughtered for home consumption	Number Price for each

f) Number of chicken donated (gifts)	
9) Benefits (roles)-What key benefits do you get from rearing chicken (List all, probe; if sold for income, how is the income used, List all uses)	1. 2. 3. 4. 5. 6.Others (specify)
D. Flock Management	
10) Challenges: -What are the main constraints in Indigenous Chicken rearing according to you? (explain)	1. 2. 3 4. 5. Others (specify)
11) Among the challenges mentioned which one is the main one? (**only one** considered main)	1.
12) Adopted Solutions: -How do you address the major challenges	1. 2. 3. 4. 5. Other minor ones (specify)
13) List in order of priority;what additional action is required to address the challenges	1. 2. 3. 4. 5.Other ways
14) List in order of priority, what actions should be implemented?	1. 2. 3.

	4. 5.Other ways (specify clearly)
15) Feeds used for the Chicken: What are the main sources of feeds for your chicken?	i) Scavenging only ii) Scavenging + Kitchen left-over iii) Scavenging + Cereals iv) Scavenging + Commercial feeds v) Commercial feeds only vi) Others (specify)……
16) Housing: i) Where do your birds rest at night? ii) How many times do you clean their resting place in a month? iii) Are diseases common? iv) If Yes, which one (Local name) v) Have you carried out vaccination? vi) Have you carried out deworming? vi) Do you seek any advice on Poultry farming? If Yes, from whom? If NO, why?	☐ Yes ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐
17) How do you rate your knowledge on Indigenous Chicken rearing?	☐ Very low Low ☐ Medium ☐ High ☐ Very High ☐
18) What types of Indigenous Chicken do you keep mostly? (Interviewer to assist in identification)-(Tick one)	☐ Dwarf ☐ Long legs Naked-necks Frizzled- feathered Barred Feathered ☐ Known by a local name……. (state)
19) How do you rate the availability of information to assist in chicken-	☐ Very poor ☐ Poor ☐ moderate ☐ Good ☐ Very good

farming?	
20) How do you rate the availability of market for indigenous chicken?	☐ Very poor ☐ Poor ☐ Fair ☐ Good ☐ Very good
21) What is the estimated distance to your main market (km)?	
22) How do you rate the profitability of indigenous chicken?	☐ Very Low ☐ Low ☐ moderate ☐ High ☐ Very high
23) Other than farming, do you have any other source of income? If yes, which ones?	Yes ☐ NO ☐

24) Rate the following challenges as it applies to you:

	Not there	Not serious	Slightly serious	Quite serious	Very serious
Predators of indigenous chicken					
Chicken diseases					
Lack of markets for eggs					
Lack of market for chickens					
Poor market prices for eggs					
Poor market prices for eggs					
Poor road infrastructure					
High cost of chicken feeds					

25) Please indicate the stage of prosperity category for the household as agreed during participatory Focus Group Discussions ……....

26) Do you have any other comments?

.....
.....
.....
.....

Thank you very much for sparing your time to provide the responses.

Appendix VI: Focus Group Discussion Guide on Indigenous Chicken Value-Chain

Activity (Tasks)	Who does it?	How is it done?	Why is it done that way?	What is the result?	What are the challenges?	What improvements are required?
Production						
Support services						
Processing						
Market development						

Which activities work well? (Ranking matrix)

Which activities present the biggest challenge? (Ranking matrix)

Which activities present the biggest opportunity for improvement? (Ranking matrix)

Appendix VII: Observation Checklist on Farm Practices by Research Team/ Innovation Platform

Description	
1. Hatching, Brooding, Brooding housing	
2. Management of chicks	
3. Management of mature flock	
4. Housing	
5. Feeding	
6. Flock health and hygiene	
7. Marketing, Handling, transportation, processing, storage	

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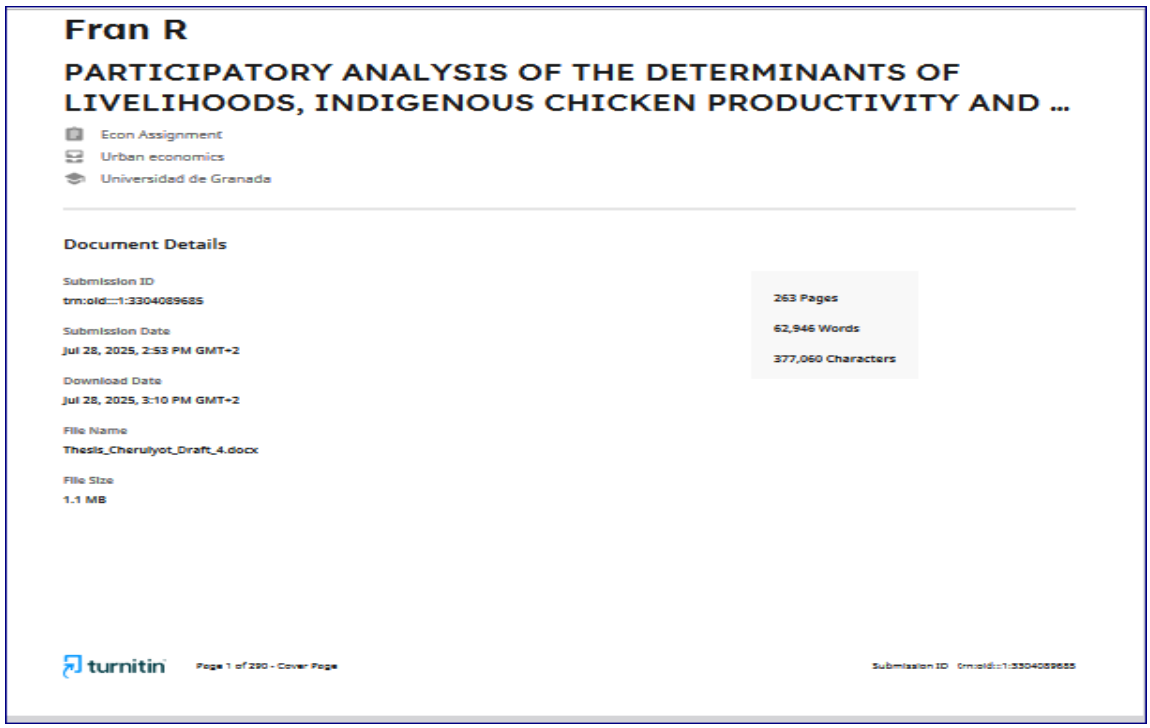
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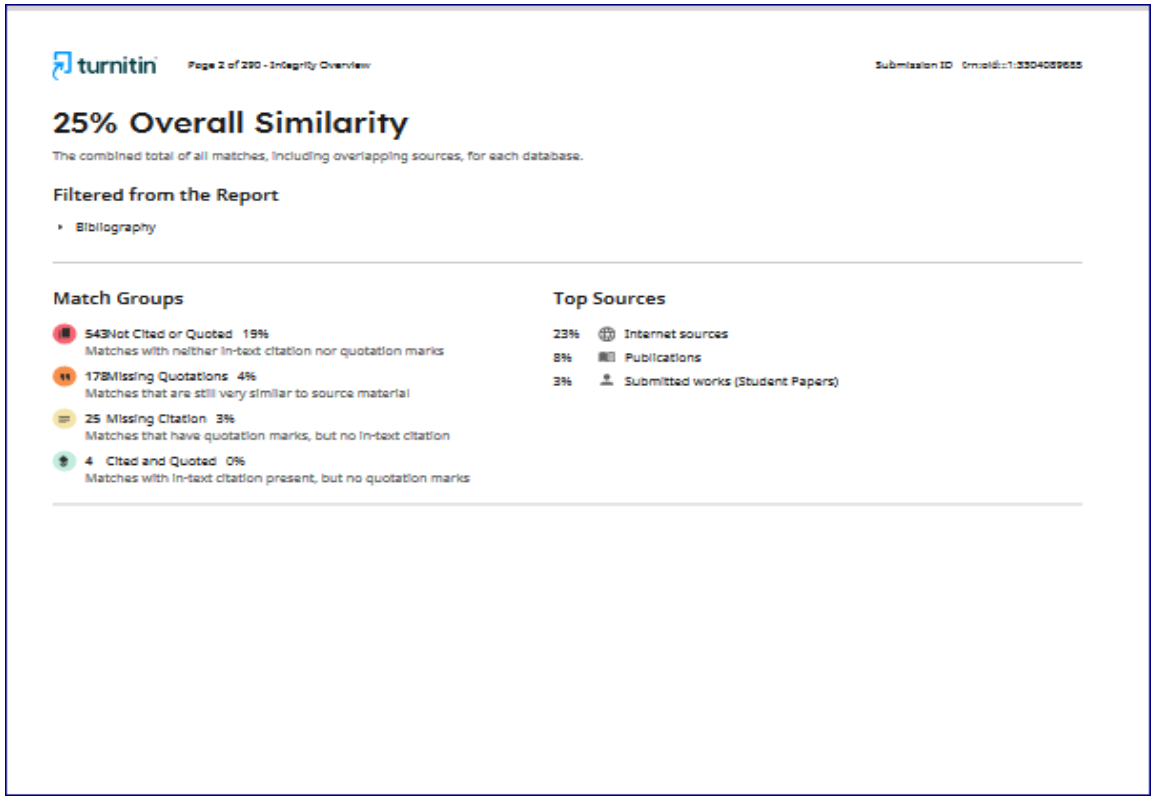
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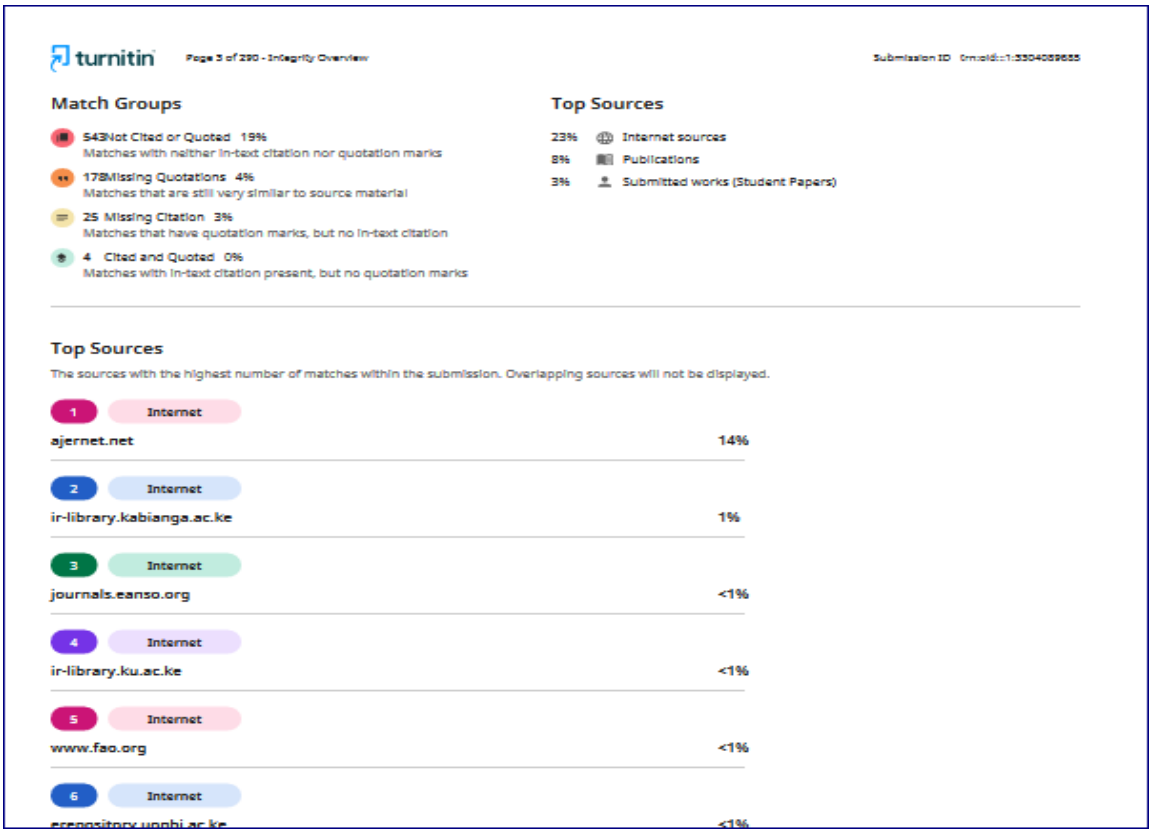
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EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

Exploring the Latent Roles of Indigenous Chickens among Rural Households in Kericho County, Kenya: A Grounded Theory Approach

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Article DOI: https://doi.org/10.37284/eajis.8.1.2653

Date Published: *29 January 2025*

Keywords: *ASGM, Indigenous Chickens, Latent Roles, Ladder of Change, Grounded Theory, Community-Based Participatory Action Research.*

ABSTRACT

Chickens are the most popular poultry worldwide. About 23.7 billion chickens globally in 2018 were reared mainly for their eggs and meat products. Indigenous chickens in Kenya constitute about 70% of the poultry population. Their role in rural livelihoods is widely understood in terms of provisioning for nutrition and household income. This study aimed to investigate, through a community-based participatory process, the latent roles of indigenous chicken (IC) in the livelihoods of smallholder farmers in rural areas of Kericho County, Kenya. This study adopted a Grounded Theory Approach and a Community-based Participatory action research design. Six sites in three out of six sub-counties were selected for the study based on their agroecological zones and administrative locations. Data were collected through focus group discussions and interviews. Community-based participatory action research tools; focus groups, resource mapping, role plays, and community workshops, were used to encourage participation and knowledge sharing. Data were collected through note-taking and group presentations. The data were analyzed using the grounded theory constant comparative method. Analysis revealed that the higher order concepts and theories that could explain the latent roles of indigenous chickens were1insurance against shocks, 2marketness; sales for income, 3instrumentalism; as an instrument for personal motivations, 4ecological functions and5immanent roles; to utilize existing resources and capabilities. It has roles as a socio-economic 6ladder-of-change, contributes to 7household functionalism by engaging youth and women and household 8dietary needs, and social roles in 9interpersonal connectedness. In conclusion, indigenous chickens had roles in the economy, ecology, socio-culture and food supplies. This understanding has implications in formulating strategies by development agents, for sustainable IC production. Further research in different contexts to build on the in-depth understanding of the IC roles is recommended.

Vol. 6 (Iss. 1) 2025, pp. 845-862 African Journal of Empirical Research https://ajernet.net ISSN 2709-2607

Participatory Assessment of the Efficacy of Indigenous Chicken Value Chain Practices Among Smallholder Farmers in Kericho County, Kenya

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https://doi.org/10.51867/ajernet.6.1.72

Submitted: 28th February 2025 Accepted: 10th March 2025 Published: 29th March 2025

ABSTRACT

Indigenous chickens play a vital role in rural livelihoods, particularly in developing countries. However, their productivity faces challenges such as poor feeding, housing, healthcare, and inadequate husbandry practices. While research has explored these issues using qualitative and quantitative methods, underlying contextual factors are often overlooked. Guided by the Value chain model and Grounded theory, this study evaluated indigenous chicken value chain (VC) through a contextual lens, emphasizing context-specific knowledge. The objective was to assess the efficacy of the indigenous chicken VC practices in Kericho County, Kenya, through a participatory approach. A community-based participatory action research design was employed, with samples drawn using purposive and multistage sampling techniques. Based on Yamane's sample size formula, a sample of 398 farmers was drawn from among rural-based indigenous chicken farmers. 15 key stakeholders also participated in the study. Data collection focussed mostly on qualitative approaches, using participatory rural appraisal tools like focus group discussions, observation during transect walks and community workshops. Quantitative data were collected using interview schedules. Data were analyzed using Grounded theory methods and descriptive statistics. The study identified five segments in the VC: breeding for eggs, incubation and hatching, chick brooding and rearing, flock management, and marketing. However, the chain lacked processing segment, with most products reaching consumers through intermediaries. There was weak integration of actors within the VC. In conclusion, producers' practices contributed to efficacies in the indigenous chicken VC through: genetic diversity preservation, resilience-building, rational decision-making, self-sufficiency, bio-economy, complementary healthcare, and market embedded practices. Challenges included economic constraints, epistemic limitations, weak institutional support, weak infrastructure, and risk aversion. To enhance the productivity of the VC, community financing models, capacity-building, formation and strengthening of producer organizations, cooperative marketing, and partnerships with local government for infrastructure development are recommended.

Keywords: Community Based Participatory Action Research, Grounded Theory Analysis, Indigenous Chicken, Participatory Rural Appraisal Tools, Value Chain Segments