

**VALUE CHAIN ANALYSIS OF THE TROPICALLY ADAPTED IMPROVED
CHICKEN IN LINDI RURAL AND MASASI DISTRICTS, TANZANIA**

NJILE ISACK

**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN
AGRICULTURAL AND APPLIED ECONOMICS OF SOKOINE
UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.**

ABSTRACT

Providing agro- ecologically adaptive, low-inputs and high productive chickens in terms of eggs and meat remain critical to transform smallholder chicken farmers in developing countries from subsistence to commercial production. The provision of such chickens will ultimately bring diverse benefits such as increased income and improved nutrition to the society. This study was aimed at analysing the value chain for agro-ecologically adaptive, low inputs and productive chicken in Lindi Rural and Masasi Districts. The aforementioned districts are amongst the districts provided with the tropically adapted improved chicken in Tanzania. Specifically, this study intended to map and characterise actors in the tropically adapted improved chicken value chain, to determine gross margin of different actors along the chicken value chain and to analyse factors influencing gross margin at farm level. Data were solicited from 140 chicken value chain actors using a structured questionnaire and checklist. Subsector mapping analysis was used to map actors along the chicken value chain and the main actors were smallholder chicken farmers, retailers largely small shops, chick and feed suppliers and service providers such as credit and veterinary services. Further, gross margin analysis was used to determine profitability of actors in the chicken value chain in which the average gross margin of smallholder farmers was 308.8TZS per egg and for retailers it was 108.7TZS per egg. Multiple linear regression model was used to determine factors influencing gross margin of smallholder farmers in the study area, in which three factors *viz.*, education level, access to market information and number of laying hen were found to be statistically significant. Further, there were numbers of challenges including limited value addition, weak vertical and horizontal coordination and diseases that inhibit the sustainability of chicken value chain. The study recommended measures to solve these challenges in order to establish a sustainable chicken subsector.

DECLARATION

I, Njile Isack, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

Njile Isack

(M.Sc. Candidate)

Date

The above declaration is confirmed by:

Dr. Jeremia R. Makindara

(Supervisor)

Date

Dr. Said H. Mbaga

(Supervisor)

Date

COPYRIGHT

No part of this dissertation may be reproduced, stored in any retrieval system, or transmitted in any form or by any means without prior written permission of the author or Sokoine University of Agriculture in that behalf.

ACKNOWLEDGEMENTS

This dissertation is a part of my three years study as a Collaborative Masters in Agricultural and Applied Economics (CMAAE) student at the Department of Agricultural Economics and Agribusiness (DAEA) of the School of Agricultural Economics and Business Studies (SAEBS) at Sokoine University of Agriculture (Tanzania) in collaboration with the Department of Agricultural Economics, Extension and Rural development of the University of Pretoria (South Africa). This work would not have been completed without valuable input rendered by many institutions and individuals.

First, I wish to thank my supervisors, Dr. Jeremia Makindara and Dr. Said Mbaga for their tireless efforts and for dedicating their time and guiding me through each and every step of this work. Secondly, I wish to thank Dr. Daniel Ndyetabula and Dr. Damas Philip for reading this work several times and assisting untiringly. Thirdly, I acknowledge the CMAAE Program and Africa Economic Research Consortium (AERC) which sponsored a large part of my studies and the research work. Fourthly, my gratitude goes to the respondents (smallholder farmers, traders, extension officers and consumers in the study area) for providing valuable primary data most of which was used in the analysis.

My parents and brothers will not be forgotten for their prayers, encouragement and financial support at each stage of this study. May God grant them long life.

Above all I say thank you to the Almighty God for giving me the energy and good health during the entire period of my studies at Sokoine University of Agriculture and University of Pretoria. All glory and honor are unto His holy name.

DEDICATION

I dedicate this dissertation to my beloved parents Isack Shashi and Flora Gerald, my brothers Captain Sayi Shashi, Martin Shashi, Emmanuel Shashi and Daniel Shashi“For you gave it all so that I could get it all”. God bless you always.

TABLE OF CONTENTS

ABSTRACT	ii
DECLARATION	iii
COPYRIGHT	iv
ACKNOWLEDGEMENTS.....	v
DEDICATION	vi
TABLE OF CONTENTS.....	vii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF APPENDICES.....	xiv
LIST OF ABBREVIATION AND SYMBOLS.....	xv
CHAPTER ONE.....	1
1.0 INTRODUCTION	1
1.1 Background Information	1
1.2 Problem Statement and Justification	5
1.3 Objectives.....	7
1.3.1 Overall objective	7
1.3.2 Specific objectives.....	7
1.4 Hypotheses	7
1.5 Research Questions	7
1.6 Significance of the Study	8
1.7 Organization of the Dissertation.....	8
CHAPTER TWO.....	9
2.0 LITERATURE REVIEW.....	9
2.1 Definition of Terms and Concepts	9

2.1.1	Value chain concept	9
2.1.2	Value chain analysis	10
2.1.3	Value chain mapping.....	11
2.1.4	Marketing and marketing channels	12
2.2	Theoretical Framework	13
2.2.1	Theory of profit maximazation.....	13
2.2.2	Transaction costs economics theory.....	14
2.3	Review of Empirical Studies.....	14
2.4	Opportunities in Chicken Subsector in Tanzania.....	16
2.5	Analytical Review	17
2.5.1	Sub sector mapping analysis	17
2.5.2	Gross margin analysis	17
2.5.3	Regression analysis	18
2.6	The Conceptual Framework	19
	CHAPTER THREE	21
3.0	METHODOLOGY.....	21
3.1	Description of Study Area and Justification for Selection	21
3.2	Research Design.....	22
3.3	Sample and Sample Size	22
3.3.1	Selection of smallholder farmers.....	22
3.3.2	Selection of traders and consumers	23
3.4	Sampling Procedure	24
3.5	Data Collection.....	24
3.6	Data Analysis	25
3.6.1	Sub-sector mapping analysis.....	25
3.6.2	Gross margin analysis	26

3.6.3	Determinants of factors influencing farmers' gross margin.....	26
3.7	Limitation of the Study	27
CHAPTER FOUR		29
4.0	RESULTS AND DISCUSSION.....	29
4.1	Socio-economic and Demographic Characteristics of Smallholder Tropicallly	
	Adapter Improved Chicken Farmers in the Study Area	29
4.1.1	Age of the respondents	29
4.1.2	Sex of respondents	29
4.1.3	Education level of the respondent	30
4.1.4	Experience of the respondent in chicken keeping.....	30
4.1.5	Marital status of household head.....	30
4.1.6	Household size of the respondent.....	31
4.1.7	Households main occupation	31
4.1.8	Chicken breed, flock size and production system	32
4.1.8.1	Chicken breed kept.....	32
4.1.8.2	Chicken flock size	33
4.1.8.3	Chicken production system	33
4.1.9	Smallholder farmers access to extension services, credit, market information and membership	34
4.1.9.1	Access to extension services	34
4.1.9.2	Access to credit	34
4.1.9.3	Access to market information.....	35
4.1.9.4	Membership to farmers' association	35
4.2	Eggs Price Determination in the Study Area.....	36
4.3	Socio-economic and Demographic Characteristics Retailers in the Study Area	37
4.3.1	Age of retailers	37

4.3.2	Sex of retailers.....	37
4.3.3	Education level of retailers.....	37
4.3.4	Household size of retailers	38
4.4	Mapping and Characterization of the Tropically Adapted Improved Chicken Value Chains.....	38
4.4.1	Actors in the tropically adapted improved chicken value chain	38
4.4.1.1	Smallholder chicken farmers.....	40
4.4.1.2	Traders/Retailers	40
4.4.1.3	Consumers.....	41
4.4.1.4	Input suppliers/Supporting services	41
4.4.2	Value addition of eggs.....	41
4.4.2.1	Eggs value addition at farm level.....	41
4.4.2.2	Eggs value addition at retailing level	42
4.4.3	Analysis of the marketing channels.....	42
4.4.3.1	Channel I: Smallholder farmers- consumers.....	43
4.4.3.2	Channel II: Smallholder farmers- retailer- consumers.....	43
4.4.4	Value chain linkages	43
4.5	Gross Margin Analysis.....	44
4.5.1	Gross margin at smallholder farmers' level	44
4.5.2	Gross margin at retailer's level	45
4.5.3	Comparison of gross margin along the eggs value chain.....	46
4.6	Factors Influencing Chicken Farmers Gross Margin	47
4.6.1	Regression model accuracy.....	47
4.6.2	Regression analysis results.....	48
4.7	Challenges Facing Actors in the Tropically Adapted Improved Chicken.....	49
4.7.1	Challenges facing smallholder chicken farmers.....	49

4.7.1.1	Marketing challenges	50
4.7.1.2	Production challenges	50
4.7.2	Challenges facing retailers in the value chain	51
4.8	Summary of Findings and Testing of Hypotheses	52
	CHAPTER FIVE.....	53
5.0	CONCLUSION AND RECOMMENDATION.....	53
5.1	Conclusion.....	53
5.1.1	Actors along the value chain for tropically adapted improved chicken	53
5.1.2	Gross margin of actors along the value chain	54
5.1.3	Factors affecting gross margin at farm level	54
5.1.4	Challenges encountered in the production and marketing of eggs.....	55
5.2	Recommendations	56
5.2.1	Recommendation for smallholder farmers	56
5.2.2	Recommendations for policy makers	57
5.3	Areas for Further Research.....	59
	REFERENCES	60
	APPENDICES	71

LIST OF TABLES

Table 1:	Explanatory variables of multiple linear regression and prior expectation.....	27
Table 2:	Socio-economic and demographic characteristics of tropically adapted improved chicken smallholder farmers in the study area.....	32
Table 3:	Chicken breed, flock size and production system	34
Table 4:	Smallholder farmers' access to extension, credit, market information and membership	36
Table 5:	Price determination for eggs in the study area	36
Table 6:	Socio-economic and demographic characteristics retailers in the study area	38
Table 7:	GM at smallholder farmers' level (n = 97)	45
Table 8:	GM at retailers level (n = 23).....	46
Table 9:	An independent T-test between the mean differences in gross margins of the smallholder farmers and retailers	46
Table 10:	Regression results for factors influencing chicken farmers' GM.....	49
Table 11:	Marketing challenges facing smallholder farmers	50
Table 12:	Production challenges facing smallholder farmers	51
Table 13:	Challenges facing retailers in the study area	52

LIST OF FIGURES

Figure 1: The Conceptual Framework.....20

Figure 2: Value chain map of eggs in the study area.....39

LIST OF APPENDICES

Appendix 1: Questionnaire for smallholder chicken farmers.....71

Appendix 2: Traders survey questionnaire74

Appendix 3: Consumers questionnaire.....76

Appendix 4: Checklist for extension staffs.....77

LIST OF ABBREVIATION AND SYMBOLS

ACGG	African Chicken Genetic Gain
AERC	African Economic Research Consortium
AMP	Agricultural Marketing Policy
ASDP II	Agricultural Sector Development Programme II
DOC	Day Old Chick
FAO	Food and Agriculture Organisation of United Nations
GM	Gross Margin
GMA	Gross Margin Analysis
ILRI	International Livestock Research Institute
LSDS	Livestock Sector Development Strategy
NBS	National Bureau of Statistics
NLP	National Livestock Policy
OLS	Ordinary Least Squares
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
SSA	Sub Saharan Africa
TZS	Tanzania Shillings
UNIDO	United Nation Industrial Development Organisation
URT	United Republic of Tanzania
VIF	Variance Inflation Factor
%	Percent

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Globally, poultry subsector plays a key role to many households. It makes a significant contribution to poverty alleviation, food security and women empowerment (Mottet and Tempio, 2017; Zezza *et al.*, 2016; Macleod *et al.*, 2013). The poultry subsector consists of different domesticated birds ranging from ducks, turkeys, guinea fowl and chickens. However, chickens dominate and constitute about 90% of the global poultry population, and by far the most popular source of food (eggs and meat) and income generation entity to many households (FAO, 2014a; ILRI, 2012; Al-Nasser *et al.*, 2007).

In Sub Saharan Africa (SSA), chicken keeping is a common activity in rural, peri urban and urban areas with local chicken keeping dominating (Queenan *et al.*, 2016; Mapiye *et al.*, 2008). Furthermore, Hagan *et al.* (2013) argued that chicken production in Africa is mainly based on scavenging local chickens in almost all households. This is consistent with the seminal work of Pym *et al.* (2006) who argued that local chicken stock comprises as much as 90% of the poultry population in developing countries. More specifically, Aboe *et al.* (2006) argued that local chicken constitutes about 60-80% of the total chicken population in Ghana.

Furthermore, according to Okello *et al.* (2010) local chicken comprises of 70% of domesticated chicken in Kenya. A study by Simainga *et al.* (2011) revealed that local chicken account for over 95% of the total chicken stock in Zambia. Additionally, in Uganda a study by Natukunda *et al.* (2011) revealed that, local chicken account to over

80% of the total chicken population. This implies that, the local chickens are predominant and widely kept in many areas in African countries.

In Tanzania like any other African country, chicken rearing is a common activity to many rural poor, peri-urban and urban households (NBS, 2012; Goromela *et al.*, 2007). The National Bureau of Statistics (NBS) (2016a), argued that local chicken account for about 97% of the total chicken stock in Tanzania. The Bureau further claimed that, commercial chicken breeds specifically layers and broilers account for about 3% of the total chicken stock. Local chicken breed is dominated by many different breeds such as *Kuchi*, *Sasamala*, *Mtewa* and Necked neck (*Kishingo*) and the common commercial chicken breeds include White Leghorns, Rhode Island Red and Light Sussex (Komwihangilo, 2015; URT, 2010).

Studies by Khobondo *et al.* (2015), Pym (2013) and Goromela *et al.* (2007), revealed that local chicken dominate in many areas due to *inter alia*, the high degree of adaptation to a wide range of environments, scavenging abilities and disease tolerance. The aforementioned abilities have implication on costs specifically costs associated with investment in veterinary support services. In that regard, these birds have economic advantages by requiring less investment thus are being widely kept by many rural and peri-urban poor households in Tanzania. However, despite the adaptability and predominance, productivity of the local chickens remain low due to the low genetic potential (FAO, 2014a; Pym, 2013; Lwelamira, 2012).

The continued low productivity in terms of egg and meat production from the local chickens, that is 70 eggs per chicken per year and low growth rate, has initially called for the introduction of commercial chicken breeds (Dessie, 2015). The introduced chicken

breeds *viz.*, commercial layers and broilers are more productive in terms of eggs and meat production, that is over 250 eggs per year (*ibid*). In that regard, there has been a substantial growth in commercial chicken breeds in the country over years.

More specifically, the observed growth is verified by the government publication over different years. For example, United Republic of Tanzania (URT) (2010) argued that there were 23 million commercial chickens in 2009/2010. Six years later, the URT (2016) report showed an increment in the stock of commercial chicken up to 32 million. This implies that, there is a substantial increment in the number of commercial chickens kept by different households in the country.

However, despite a visible growth in the keeping of commercial chickens that has been observed in recent years in Tanzania, these breeds are often not suited to local conditions and demand high investment in feeds, veterinary services and high level of management (Adetayo *et al.*, 2013; Pym, 2013; URT, 2010). Thus, investing in the aforementioned items is usually associated with high costs to chicken farmers. In cognizance of this, the International Livestock Research Institute (ILRI) established the African Chicken Genetic Gain (ACGG) project in 2014 in order to provide agro-ecologically adaptive and low inputs chickens to smallholder African farmers in Ethiopia, Nigeria and Tanzania so as to improve chicken productivity (Dessie, 2015).

Additionally, the introduced chickens *viz.*, Black Australorp, Kuroiler and Sasso are high productive in terms of eggs and meat recording to over 150 eggs per chicken annually (Dessie, 2015; Komwihangilo, 2015). This implies that, the introduced chicken could be reasonably anticipated to contribute positively to improved productivity of chicken farmers under local conditions of Tanzanian environment. This is consistent with

Government of Tanzania (GoT) policy objectives to provide improved genetics, productive chicken breeds and strengthen the value chains to enhance productivity of farmers, sustainable income generation and food security in the country (URT, 2010).

Specifically, the ACGG project conceived to conform to the current Tanzania policy frameworks such as National Livestock Policy (NLP) of 2006, Livestock Sector Development Strategy (LSDS) of 2010 and Agricultural Sector Development Strategy (ASDP) II of 2017 in a bid to attain competitive livestock sector, economic and social development as well as improving nutritional status in Tanzania. The implication henceforth is that, the introduced chickens have potentials for long term benefits in terms of income generation, improved nutrition and capital accumulation for chicken farmers. However, despite the enormous potential that the introduced improved chickens may have to the chicken farmers in the country, understanding the whole value chain is imperative to enhance improvements for sustainable chicken production and growth of the poultry sub sector.

The term value chain refers to sequence of linked activities performed by chain actors to transform resources and/or raw materials to produce value added products or services for the market (Kumar and Rajeev, 2016; Trienekens, 2011). Chain actors are individuals performing different functions such as production, processing, trading or consuming a particular commodity. More specifically, they include primary actors who are directly involved in the chicken value chain (for example producers, traders, retailers, consumers) and supporting as well as regulating actors for example financial services, business service providers, the government, and researchers (Kumar and Rajeev, 2016).

Value chain studies intend to understand how raw materials are organised to produce and add value to a particular commodity by analyzing the contributions of different actors along the value chain. Additionally, value chain analysis (VCA) has potentials for mitigating sub optimal performance by addressing constraints in a particular commodity value chain. Therefore, since the ACGG provided highly productive chickens to farmers in Tanzania, a value chain analysis to contribute to possible improvement strategies and elimination of constraints along the chain is critical. This will in turn help to capitalise on this opportunity to enhance sustainable income generation, food security and poverty reduction to smallholder farmers and other actors employed along the value chain of the introduced chicken in Tanzania.

1.2 Problem Statement and Justification

Chickens are the most commonly owned type of livestock in Tanzania and thus make a significant contribution to income generation and improved nutrition (NBS, 2012; URT, 2011). The chicken subsector represents a viable opportunity in Tanzania both for domestic and export oriented value chain development. Nevertheless their role and popularity, provision of low input and productive chicken breeds remained imperative in enhancing productivity of smallholder farmers and gainful farmer's participation in the emerging markets such as supermarkets and export markets. This premise is consistent with the need to meet the continual increasing in demand for eggs and meat due changes in consumer preferences and population growth within and beyond national borders (Hailemichael *et al.*, 2016; Macleod *et al.*, 2013).

However, since the smallholder farmers in some parts of the country have been provided with improved genetics low input chicken breed starting from 2014/2015, there is a dearth of information on the linkage between the input suppliers, producers and the consumers.

Further, the distribution of benefits among participants is not known and subsequently resulting into difficulties in intervening and accurately advising for appropriate pro-poor development pathways. This therefore calls for empirical understanding of the value chain for the introduced chicken to establish knowledge on the market players, distribution of benefits and upgrading strategies for sustainable chicken production.

Furthermore, understanding of the value chain of the introduced chicken will help to understand how rural farmers can participate in profitable value chains or improve their terms of engagement with other chain actors. Additionally Michael *et al.* (2010) argued that value chain study provides a powerful mechanism that can identify critical issues among different role-players along a particular agricultural value chain. In this respect, this study will help to propose possible interventions to change the existential circumstances that impede generation of sustainable benefits from the value chain of tropically adapted improved chicken.

It is for these reasons that, value chain analysis of the tropically adapted improved chicken is at the forefront of this study to improve smallholder livelihoods through the improved production systems, value adding activities and proposes possible strategies to overcome the barriers to improved market participation. Therefore, this study attempt to provide in-depth evidence based research to sustainable and profitable chicken production by analysing the value chain for tropically adapted improved chicken. This study is significant especially now, as the Government of Tanzania (GoT) is promoting commercial livestock sector and value addition as stipulated in Agricultural Marketing Policy (AMP) of 2008 and ASDP II .

1.3 Objectives

1.3.1 Overall objective

To analyse the value chain of the tropically adapted improved chicken in Lindi Rural and Masasi districts in Tanzania and propose possible improvement for sustainable production.

1.3.2 Specific objectives

Based on the overall objective, this study specifically intended;

- (i) To map the value chain and characterise the structure of tropically adapted improved chicken in the study area;
- (ii) To determine gross margin of different actors along the tropically adapted and improved chicken in the study area; and
- (iii) To analyse the factors influencing improved chicken farmer's gross margin in the study area.

1.4 Hypotheses

Based on the study's specific objectives, the following hypotheses guided this study;

- There is no significant difference in gross margin among the actors in the tropically adapted improved chicken value chain.
- Social-economic and institutional factors have no significant impact on improved chicken farmer's gross margin.

1.5 Research Questions

- What are the characteristics of tropically adapted improved chicken value chain in the study area?

1.6 Significance of the Study

The study provides diversified information on the improved chicken production systems, the structure of the value chain, distribution of gross margin along actors in the tropically adapted improved chicken value chain, determinants of profitability at the farm level and existential challenges in the value chain. The findings of this study will benefit chicken farmers, traders, policy makers and non-governmental organizations such as credit providers that have a stake in poultry subsector development. Specifically, this study will help the aforementioned stakeholders in proposing possible interventions in the production and marketing of eggs and live birds such as cocks, chicks and hens in order to enhance multiplication of the tropically adapted improved chicken to many households in the country, and thus contribute to poverty reduction and multiplication of the projects in other areas within and outside the country.

1.7 Organization of the Dissertation

This dissertation is organised into five chapters. Chapter one is written to provide the introduction with focus to the background information to the problem, problem statement, study's objectives as well as hypotheses and research questions. Chapter two presents the review of the literature relevant to the study while the third chapter is rooted to provide a detailed description of the study area and the methodology employed. The fourth chapter presents results and discussion of the findings while the last chapter pulls together conclusions and recommendations drawn from the findings of this study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Definition of Terms and Concepts

2.1.1 Value chain concept

The value chain describes all activities that are directed towards delivering a particular product/good to the market. Kaplinsky and Morris (2001) defined value chain as the full range of activities that are required to bring a product or service from its conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use. Additionally, FAO (2014b) extended the concept to refer to the full range of farms and firms and their successive coordinated value-adding activities that produce particular raw agricultural materials and transform them into particular food products that are sold to final consumers and disposed of after use, in a manner that is profitable to actors in the chain and broad-based benefits to the society.

Moreover, according to Gereffi and Fernandez (2016), a value chain represents the entire input-output process that brings a product or service from typically activities that include research and design, inputs, production, distribution and marketing, and sales, and in some cases the recycling of products after the usage. In addition to that, the typical value chain as contained in an input-output structure represents the flows of tangible and intangible goods and services (Gereffi and Fernandez, 2016; Riisgaard *et al.*, 2010). Riisgaard *et al.* (2010) posited that, the activities that comprise a value chain can be contained within a single firm or divided among different firms and a firm's goods or services can be contained within either a single or spread over wider geographical areas in the world (global value chains). The latter are characterized by increasing spatial distances and

complexity due to the global division of labour and are usually carried out in inter-firm networks (*ibid*).

In this respect, in the poultry subsector, value chain focuses on the various tiers of actors. This include suppliers such as input supply (chicks include day old chicks and feeds), extension services and research and downstream actors such as buyers (including retailers, village traders and consumers whether at local, national or global market (Michael *et al.*, 2010). Value chain studies are therefore important to understand critical issues and propose intervention for specific groups in a particular agricultural value chain and subsequently generating effective intervention and development strategies for improving performance and societies' benefits.

2.1.2 Value chain analysis

According to United Nations Industrial Development Organization (UNIDO) (2009), value chains analysis encompass understanding of all economic activities including input supply, production, transformation, handling, transport, marketing, and distribution necessary to create, sell, and deliver a product to a certain destination. In addition, Kumar and Rajeev (2016) argued that, determining the performance in terms of price, cost and distribution of profit amongst actors in the value chain, their strengths, weakness as well as the challenges and their opportunities is imperative to improve chain performance and distribution of benefits among participants in the value chain.

Specifically for instance, Michael *et al.* (2010) argued that, value chain analysis has commercial sustainability at its core because of its market focus thus offering a critical point for improving the linkages between farmers and other actors in a value chain. Furthermore, value chain analysis helps to identify the price and profit shares of actors

along a particular value chain by analyzing the margins and profits within the chain (Warsanga, 2014). Subsequently the outcome of value chain analysis helps to know which actors receive high profits and which actors are the most disadvantaged in the chain. This in turn provides critical input to value chain influencers such as policy makers to identify and develop possible strategies to support the disadvantage group for better performance and relatively equitable returns to both actors along a particular value chain.

Furthermore, value chain analysis provides information on impediments exist in a particular agricultural value chain. This is evident by the existing literature both in Tanzania and other countries, for instance Kabuje (2008) employed the value chain analysis to identify the major constraints facing actors along the value chain for hides and skin in Tanzania. Globally, value chain analysis was employed to document constraints faced by low-income participants in agriculture in Latin America (Michael *et al.*, 2010).

2.1.3 Value chain mapping

Panlibuton and Lusby (2006) defined a value chain map as a graphical representation or snapshot of the various functions in the value chain, key participants performing those functions and their dynamic inter-relationships. This implies that, value chain mapping is a process that entails identifying the activities and actors in a specific value chain to understand the links and dynamics between the activities and/or actors in delivering a particular commodity to downstream actors until the commodity reached the ultimate user. Kaplinsky and Morris (2001) argued that, mapping helps to assess the actors' characteristics, movements of commodities along the chain, employment characteristics, the endpoint sales and the volumes of sales. It is envisaged that, mapping of a particular value chain is an important step in a value chain analysis study, as it allows an establishment of the relationships between actors. Therefore having identified the actors

such as producers, intermediaries, processors and exporters and the flow of inputs, services, and credit through a particular chain, is an important step to propose and identify areas for intervention in eliminate constraints along a value chain.

2.1.4 Marketing and marketing channels

Hai (2003) defined agricultural marketing to encompass everything that happens between the farm-gate and the consumer, including food processing. Kotler and Armstrong (2006) defined the same to encompass all business activities involved in the flow of goods and services from point of initial agricultural production until the same goods are in the hand of ultimate consumers. Marketing of agricultural products consists primarily of moving products from production sites to points of final. In East Africa, marketing of chicken (whether live birds or chicken products) is characterized by movement of live birds and their products from villages to urban areas. For instance, in the seminal work by Queenan (2016) and Mlozi *et al.* (2003) marketing of chicken is largely based on transportation of live birds and eggs to peri-urban and urban markets. This is consistent with studies by Aila *et al.* (2012) and Bett *et al.* (2009) who posited that marketing of poultry and poultry products in Kenya is characterized by movement of live birds and eggs between regions (within a country) and from neighbouring countries.

Andreasen *et al.* (2008) defined marketing channel as a business structure of interdependent organizations that start from the point of product or origin to the consumer with the purpose of moving products to their final consumption or destination. Additionally, Stern *et al.* (1996) defined marketing channels as sets of interdependent enterprises involved in the process of making a product or service available for consumption. A study conducted in Ethiopia by Moges and Dessie (2010), found that live birds and eggs are either sold directly to consumers or sold to intermediaries for retail in

the larger towns and cities, The implication is that, live bird and chicken products flow either directly to ultimate consumer or go into the hand of middlemen such as village buyers, retailers, wholesalers until delivered to final consumer.

Therefore, the analysis of marketing channels is critical to provide a systematic knowledge of the flow of the goods and services from their origin to their final destination (Hai, 2003). As observed further by the author, the intended knowledge is acquired by identifying and examining the participants or marketing intermediaries in the process of delivering commodities to ultimate consumers. It is against this knowledge that, examining the marketing channels serves the basis for understanding the marketing of eggs and chicken in the study area.

2.2 Theoretical Framework

2.2.1 Theory of profit maximization

Theory of the firm explains the rational behaviour of individuals of either maximizing profits or minimizing costs subject to set of resource constraints. Blandon *et al.* (2007) argued that, as a rational producer, a smallholder producer assumes to decide the level of output to be sold to the existing outlets and actors in a manner that maximizes returns. However, Tzouvelekas (2011) posited that, agricultural household is both a producer and consumer of the output harvested from production. The author further observed that, smallholder farmers are choosing the allocation of inputs to crop production and other products, and allocate some quantities for sale and consumption. This is consistent with Janssen (2007) who argued that farmer's decision-making is not restricted to profit maximization alone and, often there are conflicting, objectives such as sales maximization and yield maximization for consumption. Furthermore, the portion of eggs consumed by households represents the opportunity cost and it is valued at the market price for eggs in

the prevailing market. This is consistent with seminar work by Hossen (2010) who argued that, the amount of eggs consumed by farmer are valued at the market price and taken as part of revenue.

In the light of this, the present research assumes smallholder chicken keeper aims to maximize profit from chicken keeping activities and s/he will choose an alternative with greater gross margin than the remaining one (market channel) given the cost and benefit pertinent to that channel.

2.2.2 Transaction costs economics theory

Transaction costs plays vital role in determining producers decision. According to Jaffee (1995) transaction costs includes search and information costs, bargaining and/or negotiation costs, monitoring and costs of enforcing the contracts. The author further observed that, transaction costs prevails in a particular market affect producers' decision and actors in the value chain to select the governance form that minimizes transaction costs. The theoretical linkage can therefore be seen in the sense that, producers will strive to maximize the profit in a way that transaction costs are minimal. This motive subsequently implies that, a chicken keeper as a rational economic agent will ultimately select the downstream actor from the available options who is paying higher price for the product and at a lesser transaction costs based on the availability of market information, negotiation, agreement and relationship that exist between the two parties.

2.3 Review of Empirical Studies

There vast value chain studies conducted in different parts of Africa. For example, Okello *et al.* (2010) analysed the value chain of chicken in Kenya. Among other things, the analysis involved characterising the structure of value chain, identifying actors and recommending possible strategies for improvement. It was revealed that, the layer and egg

value chain strands were longer than the value chain for local chickens. It was further revealed that, for local chicken; trading arrangement involved direct marketing of eggs by smallholder farmers to consumers.

Asem-Bansah *et al.* (2012) examined the value chain of backyard poultry (local chicken) in Ghana to describe the subsector competitiveness. The study mapped the actors, their functions and relationship in the value chain. It was found that the actors are wide spread and operate in open market exchange. In terms of governance mechanism, this study revealed that, there were weak contractual and business relationships amongst actors in the value chain.

In Tanzania, there are many empirical studies conducted by different researchers on the chicken value chain. For instance, a study by Kashindye (2011) employed the value chain approach to analyse commercial egg value chain in Dar es Salaam. The analysis involved determination of marketing and profit margins for actors in the value chain and identification of factors affecting profit them. Findings revealed that, six marketing channels exist in the commercial egg value chain in the study area. Additionally, commercial chicken farmers received higher gross margins compared to other actors in the value chain.

Furthermore, Peter (2015) conducted a value chain study to examine the economic coordination of poultry value chain in Coastal region. In his study, various aspects were examined for instance, gross margins of actors in the value chain, value chain map and value chain governance. The results showed that different actors such as input suppliers, chicken keepers, retailers, aggregators, whole sellers and consumers exist in the value chain for poultry in Kibaha. It was further revealed that, there were differences in gross

margin among actors in the value chain. Value chain actors were also found to have weak contractual relationships in all the nodes of the VCs. Additionally, Mlozi *et al.* (2003) analysed the marketing of local chicken in Morogoro markets in which various actors such as chicken farmers and village assemblers were identified.

2.4 Opportunities in Chicken Subsector in Tanzania

Chicken already play a significant role in supporting farmers and actors along the value chain such as improving their livelihoods through income generation and provision of food from meat and egg consumption. Improved chicken breed production is a certainly attractive investment avenue, as the additional eggs they generate is sizable compared to local chicken that provide much less egg and proved to outgrow local breeds. In cognizance of continual increasing in demand for Day Old Chick (DOC) and poultry products such as chicken meat and eggs in Tanzania and global markets as discussed by Macleod *et al.* (2013) and URT (2011) the country and actors in the value chain needs to strategise and capitalise on these opportunities.

Capitalising on the opportunities will increase the subsectors contribution to countrys' GDP and export earnings as well as food security, income generation and employment opportunities. This however require the good poultry husbandry practices such as good rearing of chicken, proper feeding practices, disease control for instance, the use of thermo stable New Castle Disease vaccine and timely vaccination. Furthermore, there is a need to understand the market requirements in order to comply to the market dynamics at domestic, regional as well as international markets to ensure profitability poultry industry in Tanzania. This in return has potentials to contribute significantly towards achievement of the Sustainable Development Goals (SDGs) specifically ending poverty in all its forms

everywhere (SDG 1), ending hunger by achieving food security and improved nutrition (SDG 2) and ensuring sustainable consumption and production pattern (SDG 12) by 2030.

2.5 Analytical Review

2.5.1 Sub sector mapping analysis

Sub sector mapping analysis entails the mapping of the linkages between different participants in a particular value chain and their functions (Michael *et al.*, 2010). It visually represents the flow of a commodity from producer to essential components such as chain participants, their functions and market channels. Adding to that, the interrelationship among actors and their respective functions along the whole chain is shown during mapping process (Lusby, 1999). Furthermore, According to Vermeulen *et al.* (2008), the mapping exercise in the value chain analysis is not limited to actors only, but also it goes further to policies, legal and institutional framework which influences the functioning of the particular value chain.

This method has been employed in different studies, for instance Mmasa and Msuya (2012) mapped the sweet potato value chain and the linkages between actors and processors. The findings from this study revealed that, the value chain is operated by multitude of actors such as as input suppliers, producers, traders, retailers and wholesalers who performed different function. Furthermore, Peter (2015) used this approach to map the value chain for poultry in Kibaha, whereby various actors and their respective functions were identified and mapped.

2.5.2 Gross margin analysis

In most of the research studies, the gross margin analysis is used to measure the profitability of economic agents. Gross margin analysis involves the determination of

variable costs incurred and revenue associated with a certain enterprise in a certain period of time. In constructing gross margins, despite the fact that fixed costs of an enterprise are not taken into account the measurement has remained an important tool in analysing the performance of marketing systems and returns to producers and actors (Abdullah *et al.*, 2017).

There are abundant empirical evidence from research studies assessing profitability using the GMA for instance; Thwala (2011) used GMA in analysing the profitability of the family poultry sub sector in Swaziland. Results of this study revealed that, gross margins of smallholder farmers who sold the eggs to urban markets were greater than their counterpart who sold to rural areas. Additionally, Bwalya and Kalinda (2014) used GMA to determine profitability of local chickens in Zambia in which results showed that gross margins of smallholder farmers were greater than those of traders and retailers. Further, Natukunda *et al.* (2011) used the gross margin to determine profitability of local chicken in Eastern Uganda. In that regard, this tool will be useful in the determination of the profitability of chain actors along the value chain for introduced improved chicken in Tanzania.

2.5.3 Regression analysis

This is a widely used tool in socio- economic studies to explain the relationship between set of variables. Regression models predict the value of a dependent variable based on the value of one or more predictor variables. Evidences from various studies show that, the multiple linear regression analysis has been used to identify various factors affecting profitability of an enterprise whether crop production or livestock keeping enterprises. For instance, in a study by Kashindye (2011), multiple regression model was used to determine the influence of socioeconomic factors on the profitability of commercial eggs

at producers level in which the results revealed that, packaging costs was statistically significant. Further, Yusuf and Malomo (2007) applied the same model to identify the factors affecting profitability of poultry egg production in Ogun state whereby the results revealed that, farmer's experience, education and household size were statistically significant in influencing gross margin. It is in this background, the multiple linear regression analysis befit this study in determining the factors influencing gross margin of smallholder farmers in the study area.

2.6 The Conceptual Framework

The conceptual framework (Figure 1) is developed to guide this study by visually showing the production and flow of eggs to end markets (downstream actors). Specifically smallholder farmer as producer of eggs in the value chain, keep and manage the chickens to allow production and flow of eggs to downstream actors. At the marketing stage, both producers and retailers play a vital role to deliver the eggs to end markets. For example, smallholder chicken farmers may deliver eggs to end markets by supplying directly to consumers. On the other hand, retailers buy eggs from producers and resale to final consumers. The outcome of these functions includes incentives (profit margin obtained) by actors in the value chain.

Furthermore, profit (in this study measured by gross margin) obtained by the smallholder farmer's from the chicken keeping is influenced by various factors such as socio-economic and institutional factors, production costs and the selling price. Therefore, the conceptual framework is constructed to visually show the flow of eggs from smallholder chicken farmers to end markets and the outcomes and/or rewards of these functions to various actors.

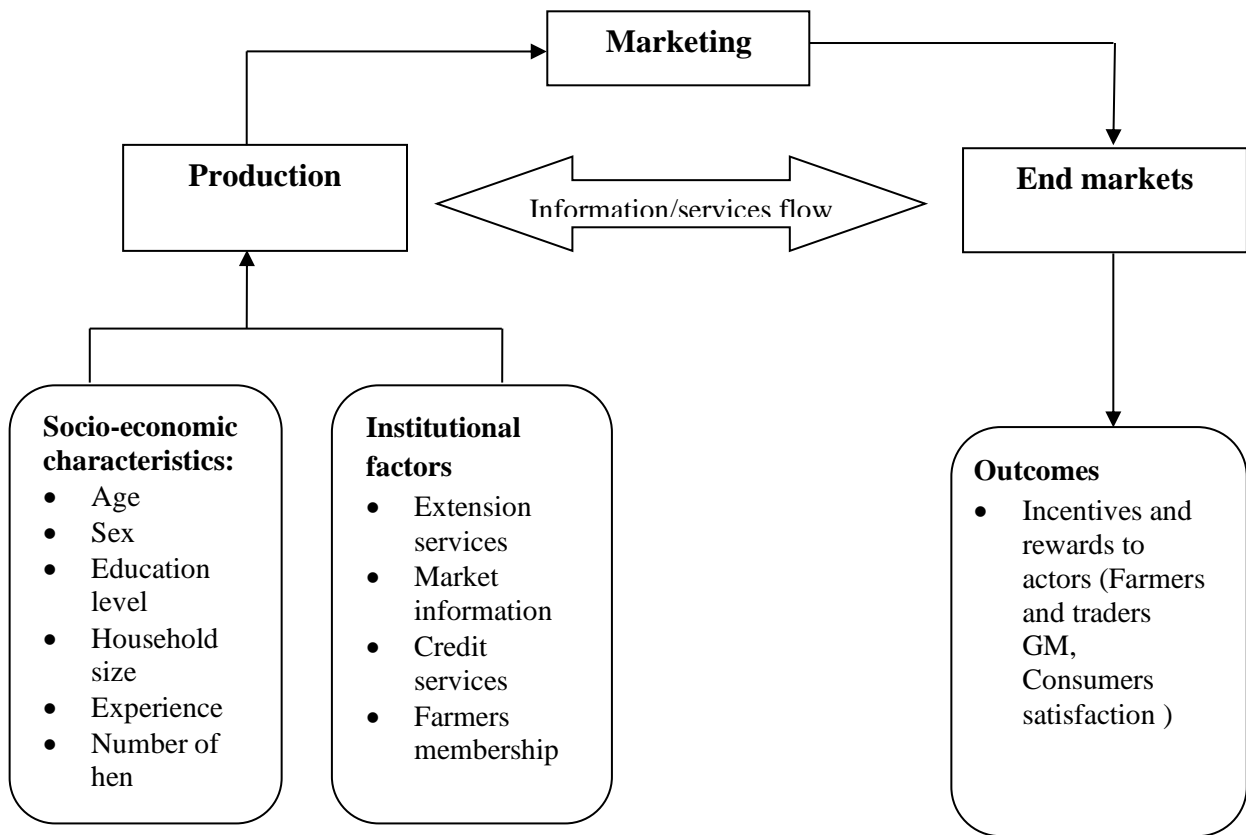


Figure 1: The Conceptual Framework

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of Study Area and Justification for Selection

This study was conducted in Lindi Rural and Masasi Districts in Lindi and Mtwara regions respectively. Lindi rural district is among the six districts of Lindi region. The district borders Kilwa district in the North, Indian Ocean in the East, Mtwara district in the South, and Ruangwa district in the West. Administratively Lindi rural district has 10 divisions, 28 wards, 125 villages and 552 sub-villages. The district has a population of 194 143 people as per 2012 population census, with the major economic activities being crop production (largely cassava, maize, cashew, and sesame), livestock keeping, fishing and wage employment (NBS, 2016b).

Masasi District is one of the six districts of Mtwara region. The district borders Nachingwea and Ruangwa district to the North, Lindi district and Newala districts to the East and Ruvuma River to the South. To the West it borders Nanyumbu district. According to the 2012-population census, the total population of the district was 247 993 people. Masasi district is administratively comprised of 5 divisions, 22 wards, 156 villages with the major economic activities being crop production (specifically cassava, cashew nuts, sesame, maize and pigeon peas) and livestock keeping largely cattle, goats, pigs and poultry (NBS, 2016b).

Selection of the study area was based on the fact that, the two districts are found in the regions that are not prominent in chicken keeping compared to other regions in which the ACGG project is being executed. It is therefore an interesting study area to assess the value chain for tropically adapted improved chicken since the two districts are not well

known to be engaging in chicken keeping activities and thus being not affected by the presence of local and commercial chicken breeds as compared to districts in other regions such as Mbeya, Mwanza, Dodoma and Morogoro. In this respect, it is permissible to draw evidence based learning for expansion of the intervention in other areas within and outside the country.

3.2 Research Design

Cross sectional design was used to solicit data from chicken keepers and participants in the value chain for tropically adapted improved chicken such as traders, extension officers and consumers in Lindi rural and Masasi districts. In this design data were collected at a single point in a time from the selected respondents during the study survey without repetition. Seminal work by Nardi (2018) and Bryman and Bell (2014) argued that, this design is less time consuming and appropriate to facilitate the determination of relationships between variables.

3.3 Sample and Sample Size

The sample consisted of the respondents both smallholder chicken keepers, and chain actors who are directly or indirectly involved in small scale chicken production in the study areas.

3.3.1 Selection of smallholder farmers

The list of smallholder chicken producers was obtained from Livestock Extension Officers (Enumerators of the project) at ward level from respective villages. Smallholder farmers in this case were the beneficiary of the ACGG project. In sampling chicken farmers, a simple random sampling technique was employed to select farmers to be interviewed. More

specifically from the formula proposed by Yamane (1967) as depicted equation number (1), the number of smallholder farmers was obtained as follows

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

Where n is the sample size, N is the population size, and e is the level of precision

$$\frac{132}{1 + 132(.05^2)} = 100 \text{ smallholder farmers}$$

However, there were incidents where identified households (smallholder chicken farmers) in the selected villages were not interviewed due to loss of chickens that was caused by death and theft; as a result the number of smallholder farmers interviewed in this study was 97 out of 100 pre-determined smallholder farmers.

3.3.2 Selection of traders and consumers

Snowball sampling method, which is particularly suitable when a list of the population poses difficulties for the researcher to obtain was used. In this sampling technique a researcher made initial contact with few respondents who then served as inputs to establish contacts with others respondents as a result the sample finally expand (Etikan *et al.*, 2016). In that regard, a snowballing sampling method was employed in obtaining retailers and consumers who bought eggs from producers in the study area. In this case smallholder farmers were the starting point and they were asked to mention their consumers and retailers. Further, retailers were asked to mention their fellow retailers who were then selected for the interview. Therefore, 23 retailers were obtained and interviewed during the study survey. Furthermore, 20 consumers were selected for interview using snowballing sampling technique in order to elicit information related to relation with producers, price setting and coordination. Lastly, livestock extension officers were also

selected to provide information on various functions that they perform in their respective villages.

3.4 Sampling Procedure

A multistage sampling procedure was opted. In the first stage, Lindi rural and Masasi district were purposively selected from the list of districts provided with tropically adapted improved chicken in the southern zone (Lindi and Mtwara regions). The second stage involved random selection of the three villages from each district. The selected villages in Lindi rural district were; Kilangala, Madangwa and Kilimahewa. In Masasi district, the selected villages were Nanganga, Mtunungu and Chidya.

3.5 Data Collection

Primary and secondary data were used in this study. Primary data on output produced and sold, inputs such as feeds, input costs, prices and key economic and socio-economic variables were solicited directly from the value chain actors specifically smallholder chicken farmers, traders and consumers in the study area through a structured questionnaire and checklist (Appendix 1 and 2). Observation was part and parcel of data collection, as it was used to examine available chicken flocks, egg size and handling practices, chicken feeding as well as housing practices. Discussion with government employees particularly extension officers at ward level who were working for livestock issues was also conducted guided by checklist (appendix 3) to ensure sufficient data is generated for meaningful analysis and evidence based recommendation. Moreover, secondary data was obtained from project progress to probe output and input prices, flock size and productivity of the introduced chicken.

3.6 Data Analysis

The data that were solicited from aforementioned respondents (smallholder farmers, retailers and consumers) was coded for different analyses. Responses for the close ended questions were assigned numbers while in open ended questions all possible answers were identified, summarized and coded. The primary quantitative data collected were analyzed using the Microsoft office Excel and Statistical Package for Social Sciences (SPSS) software. Data were analyzed by computing descriptive statistics to determine frequencies, percentages and means. For objective one which is mapping and characterising actors in the tropically adapted improved chicken value chain, sub-sector mapping was used. Gross margin analysis was used for the second objective which is to determine gross margin of actors involved in the value chain. Econometrics analysis specifically multiple linear regression model was estimated through Ordinary Least Square (OLS) to analyse factors influencing gross margin of chicken farmers in the study area.

3.6.1 Sub-sector mapping analysis

Sub-sector mapping was used in the first objective that was to map improved chicken value chain linkages between actors, processes and activities along the tropically adapted improved chicken as well as product flows in the chain. The aim was to visualize networks in order to establish the connection between actors along the value chain and processes taking place to deliver eggs from one node to another until the product is consumed and disposed. This in turn helps to eliminate constraints along the value chain while also providing a basis for value chain upgrading in order to promote well functioning value chains.

3.6.2 Gross margin analysis

This entails computation of total revenues and costs incurred during production process to ascertain viability of enterprises and projects. Many researchers employed this technique to establish return to producers to ascertain economic viability of their enterprises and projects as it was discussed in the chapter two. Therefore, Gross Margin Analysis (GMA) was used to determine gross margin of different actors along the value chain for introduced chicken in the study area. Mathematical notation for the analysis is presented below

$$GM = TR - TVC \dots\dots\dots (2)$$

$$GM = Q_j P_i - \sum X_i P_{xi} \dots\dots\dots (3)$$

Where;

GM – Gross Margin

Q_j -Eggs (Output)

P_i - Farm gate price of egg(s)

X_i - Variable input

P_{xi} - Unit cost of a variable input

TR= Total revenue= $Q_j P_i$

TVC=Total Variable Cost= $\sum X_i P_{xi}$

3.6.3 Determinants of factors influencing farmers' gross margin

A multiple linear regression model was estimated using OLS to analyse factors that influence farmer's GM in the tropically adapted improved chicken value chain. Farmers' GM per egg was taken as a function of age of the household head, sex, education level, experience, household size, membership to farmers association, extension visits and

number of laying hen (Table 1). To describe this model, Y represents dependent variable (farmer's GM) and x denotes a set of explanatory variables (institutional and socio-economic characteristics of households). The error term was included in the model to account for other important explanatory variables which were not included in the model but yet significantly affect farmers' GM.

The model was therefore expressed as follows,

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + \alpha_4 D_4 + \beta_5 X_5 + \mu \dots\dots (4)$$

Whereby,

Y = GM in Tanzanian Shillings per egg

α_0 Is the intercept of the regression model

$\alpha_1 - \alpha_4 D_4$ and $\beta_1 - \beta_5$ are the parameters to be estimated

μ Is an error term and X_s are explanatory variables of the multiple linear regression model and the priori expectation is specified in Table 1.

Table 1: Explanatory variables of multiple linear regression and prior expectation

Variable name	Variable description	Expected sign
AGE (X_1)	Age of household head (Number of years)	+/-
EDU (X_5)	Education level of household head (Number of years in formal education)	+
SEX (D_2)	Sex of household head (Dummy; 0 Female, 1 Male)	+/-
HSIZE(X_2)	Size of household in number	+
EXP(X_3)	Years of farmers experience in number	+
EXTENSION(D_3)	Farmer's contact with extension officer(Dummy; 0 No, 1 Yes)	+
ACCMKTINF(D_4)	Accessibility of market price information(Dummy; 0 No, 1 Yes)	+
MEMBERSHIP(D_5)	Farmers membership (Dummy, 0, No, 1 Yes)	+
LAYB(X_4)	Number of laying hen	+

3.7 Limitation of the Study

Some limitations were encountered during field interviews. In some cases, it was difficult to locate some of the respondents specifically smallholder farmers and traders in both

districts. This was due to their engagement in harvesting, weeding and other economic activities such as teaching. Additionally respondents do not keep records of their production and consumption pattern of eggs as a result it was difficult to recall costs incurred during production and number of eggs consumed and sold as well as their income from other sources. Also, continuous rainfall in some villages especially in Mtunungu, Nanganga, Chidya and Madangwa impeded the process of data collection as a result it became a time consuming process. In overcoming these limitations, the research team spent some additional time looking for respondents in the selected villages. In situations of rainfall the interviews had to be cancelled until the time when the situation was conducive to allow the process of looking for the respondents.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-economic and Demographic Characteristics of Smallholder Tropically

Adapter Improved Chicken Farmers in the Study Area

Demographic and socio-economic characteristics of smallholder chicken farmers were assumed to have important implications on the productivity, ability to make decision and their skills and experience in the chicken keeping as well as egg production and marketing and therefore the general performance of poultry sub sector in the study area. The characteristics examined include age, gender, farming experience, as well as education levels of the respondents.

4.1.1 Age of the respondents

Age groups of chicken farmers in the study area were examined to understand their productive capacity and energy to manage chicken keeping, egg production, egg marketing and its influence on gross margin. Results show that the majority of the respondents were aged between 31-50 years as represented by 66% followed by household heads aged above 50 years represented by 32% (Table 2). Moreover respondent aged between 18-30 years were few as represented by 2% of the respondents, this is amongst the energetic group in the community hence they involved in other activities such as businesses in the village.

4.1.2 Sex of respondents

Findings from the study show that both male and female households are engaging in the keeping of tropically adapted improved chicken. This is due to the fact chicken keeping can be practiced in different production system such as scavenging, semi scavenging and

confined thus allowing a chicken farmer to participate in other income generating activities such as crop production, businesses, other livestock keeping enterprises and wage employment. Findings from the study however show that 55.7% of the chicken farmers were females while 44.3% were males (Table 2).

4.1.3 Education level of the respondent

Results on education level of the respondents show that 74.2% of all smallholder farmers had attained primary school education while 22.7% had completed secondary education. In addition to that, 3.1% of respondent attained tertiary education (college/university). In that regard, majority of the household heads in the study area have low level of education (primary and secondary). This might imply that, there are difficulties for smallholder farmers in the study area to practice business oriented chicken keeping that is associated with value addition and higher income generation avenues due to low level of education.

4.1.4 Experience of the respondent in chicken keeping

This is important variable as experience in chicken keeping has impact on many aspects on chicken production such as disease control and overall productivity. Results show that 29.1% of the respondents had 1-5 years of experience in chicken keeping activities while 70.9% had 6 years and above on the same (Table 2). This shows that, most of the chicken keepers in the study area have significant experience in keeping chicken and thus being able to employ best practices accumulated over time in managing chickens, controlling diseases e.t.c.

4.1.5 Marital status of household head

Results from the findings show that, 82.5% of the respondents were married, 9.3% of the respondents were widowed and 8.2% were divorced (Table 2). The might imply that,

majority of smallholder farmers in the study area have greater chance to make profitable chicken enterprise driven by synergies that are brought by knowledge sharing in the decision making process regarding the chicken keeping activities between men and their wives.

4.1.6 Household size of the respondent

This has important implication on the available labour for taking care, feeding chickens and all other activities relating to chicken keeping. Results show that, only 22.7% of the respondents have the family size of members less than 4 (1-3) and 77.3% had 4 members and above. The implication is that, many smallholder farmers had enough labour force to perform various activities in the keeping of chicken and marketing activities since majority of the smallholder farmers in the study area rely on family labour for daily management of their chicken enterprise.

4.1.7 Households main occupation

This was categorized into crop cultivation, livestock keeping, civil servant and business/self employed. Findings show that, 64.9% of the respondents were crop producers and largely engaged in production of cashewnut, cassava, maize and pigeon peas. On the other hand, 15.5% of the respondents were livestock keepers largely owning cattle, goats, sheep and ducks. In addition, it was also found that 17.5% of the respondents were engaged in businesses/self employment while 2.1% of the respondents were civil servant. The findings are consistent with NBS (2016b) socio-demographic profiles of Lindi and Mtwara regions that discussed that the majority of households were engaged in crop production specifically cashewnuts, cassava and pigeon peas and other were keeping cattle and goats.

Table 2: Socio-economic and demographic characteristics of tropically adapted improved chicken smallholder farmers in the study area

Variables	Frequency	Percentages
Age		
18-30	2	2
31-50	64	66
51 and above	31	32
Total	97	100
Sex		
Female	54	55.7
Male	43	44
Total	97	100
Education level		
Primary education	72	74.2
Secondary education	22	22.7
Tertiary education (College and University)	3	3.1
Total	97	100
Experience in chicken keeping		
1-5 years	29	29.9
6 and above	68	70.1
Total	97	100
Household marital status		
Divorced	8	8.2
Married	80	82.5
Widowed	9	9.3
Total	97	100
Household size		
1-3	22	22.7
4 and above	75	77.3
Total	97	100
Household main occupation		
Business/Self employed	17	17.5
Civil Servant	2	2.1
Crop cultivation	63	64.9
Livestock keeping	15	15.5
Total	97	100

4.1.8 Chicken breed, flock size and production system

4.1.8.1 Chicken breed kept

Chicken breed have implication on productivity, resistant to disease and growth rate. The findings from the study shows that 38.1% of the respondents had kept Sasso and 35.1% kept Kuroiler. On the other hand, 24.7% of the respondents kept Black Australorp and 2.1% kept both Sasso and Kuroiler (Table 3). In that regard, smallholder farmers in the

study area keep chicken breeds that are conceived to be productive in eggs, meat, growth rate and resistance to diseases as well as egg and meat production. However, in some villages smallholder farmers were found to keep both improved and local chickens.

4.1.8.2 Chicken flock size

The chicken flock size refers to the number of chicken owned by household. It determines amount of eggs collected in a day and thus affect farmers gross margin from eggs marketing. Table 3 reveals that 26.8% of the respondents had flock size of chicken from 10 and above and 73.2% of the respondents had the flock size of less than 10 chickens. It was found that, variation in flock size was caused by theft in some villages and deaths associated by prevalence of diseases such as chicken heart failure.

4.1.8.3 Chicken production system

This was categorized into scavenging, semi-confined and confined production system. It was found that 17.5% of the respondent practice confined production system. Furthermore, it was found that 47.4% of the selected farmers practice semi-confined production system while 35.1% do practice scavenging systems (Table 3). The last two systems had economic advantages in terms of cost reduction as it allows both supplementation of feeds as well as scavenging for food in the neighbourhood. However, in the latter systems, smallholder farmers are at the risk of loss of chicken that may be caused by theft and predators.

Table 3: Chicken breed, flock size and production system

Variables	Frequency	Percentages
Chicken breed type		
Black Australorp	25	25.8
Kuroiler	34	35.1
Sasso	37	38.1
Sasso and kuroiler	1	1
Total	97	100
Flock size (Number of chickens)		
1-9	71	73.2
10 and above	26	26.8
Total	97	100
Production system		
Confined	17.5	17.5
Semi-confined	46	47.4
Scavenging	34	35.1
Total	97	100

4.1.9 Smallholder farmers access to extension services, credit, market information and membership

4.1.9.1 Access to extension services

Extension services plays critical role in enhancing appropriate chicken keeping practices among poultry farmers and thus has significant implication in the best practices on various aspects such as disease control. Results from the study area show that all the respondents in the study area had access to the extension advice from the livestock ward officer in their respective villages. However differences in terms of frequency of extension visit among smallholder chicken farmers existed as shown in the Table 4.

4.1.9.2 Access to credit

It was found that, only 1% of the respondent had access to credit for financing various activities in the chicken keeping. The remaining 99% of the smallholder farmers in the study areas had no access to financial services especially credit from financial institutions like commercial banks and microfinance (Table 4). This might imply that majority

smallholder farmers were relying on their personal income from other activities to finance their chicken keeping activities. Smallholder farmers in some villages argued that, they lack credit services due to the fact that they were unable to meet collateral requirements as well as being unable to form groups for joint group loan.

4.1.9.3 Access to market information

Market information allows participant in the market (including smallholder farmers) to make optimal decision on how to manage chicken. Further, market information, helps smallholder farmers to select market option to supply their eggs to obtain greatest returns or minimize the costs. It was found that 51.5% of the respondents in the study area had access to market information especially market prices of eggs in different market outlets. On the other hand, 48.5% of the respondent had no information on the market prices as shown in Table 4. Moreover, major source of market information were found to be farmers association and extension officers.

4.1.9.4 Membership to farmers' association

Household membership to a farmers' association plays a critical role in knowledge and sharing of experiences on chicken keeping and other relevant information such as market prices and the need of the market. In the study area it was found that, 37.1% of the respondents were the members in farmers group and the remaining 62.9% of the respondent were not the members of any farmers group (Table 4). The key functions of farmers' association in the study areas were found to be sharing information for instance best practices in managing chicken, diseases control, market information and procuring other necessary inputs. However, these associations were village based and weakly operated as result smallholder farmers in some villages were not aware of the existence of these associations.

Table 4: Smallholder farmers' access to extension, credit, market information and membership

Variables	Frequency	Percentages
Access to credit		
Yes	1	1
No	96	99
Total	97	100
Access to extension		
Yes	97	100
No	0	0
Total	97	100
Access to market information		
Yes	50	51.5
No	47	48.5
Total	97	100
Membership to farmers group/association		
Yes	36	37.1
No	61	62.9
Total	97	100

4.2 Eggs Price Determination in the Study Area

Price is important variable affecting returns to actors as well as providing a picture of demand and supply condition of a good or service in a particular period. In this study different modes of price determination existed depending on the availability of market information (price information) to smallholder farmers and other actors along the chain. However, it was found that, 47.4% of the smallholder farmers in this study claimed that prices for eggs were established through negotiations between farmers and buyers, and 36.1% argued that prices were established by market forces of demand and supply. Not only that, in some cases prices were established by buyers/traders as it was claimed by 16.5% of the smallholder farmers interviewed (Table 5).

Table 5: Price determination for eggs in the study area

Variables	Frequency	Percentages
Buyer/trader	16	16.5
Market forces	35	36.1
Negotiation	46	47.4
Total	97	100

4.3 Socio-economic and Demographic Characteristics Retailers in the Study Area

4.3.1 Age of retailers

As one of important element to understand productivity of labour force, age of traders was grouped to establish level of energy of manpower (traders) in the study area. Table 6 shows that 87% of traders in the study area were in the age group between 30-49 years implying that majority traders are energetic and capable of exploring some market opportunities such as high price market channels to maximize their returns from the poultry activities. On the other hand, 13% of the respondent ranged between 50 years and above, implying that they might have accumulated a vast experience which would be necessary in making better decision.

4.3.2 Sex of retailers

Understanding composition of males and females along the value chain is important now that gender aspects along agricultural value chains are gaining interest from researchers and practitioners. In this study, it was found that 78.2% of the respondents (traders) were males and the remaining 21.8% were females (Table 6). In that regard, males dominate in activities relating to delivering and marketing of eggs in the study area. Weak participation of women in the value chain was found to be due to participation in the domestic chores as well as other agricultural activities especially crop cultivation.

4.3.3 Education level of retailers

This is also an important element to understand productivity level of manpower along the value chain. It is expected that, the higher the level of education, the better decision making abilities of a household, holding other factors constant. In this study it was found that, 56.5% of the respondent had primary education while the remaining 43.5% of the same had secondary education (Table 6).

4.3.4 Household size of retailers

Household size might have implication on the available workforce for performing various activities regarding marketing such as delivering of eggs to consumers. In this study, many traders (73.9%) had family size of 4 and above people while the remaining 26.1% had between 1 and 3 of the same (Table 6). The implication is that, many traders had enough labour force to assist on various activities in the value chain since they rely on family labour to perform various function such as collecting eggs from farmers.

Table 6: Socio-economic and demographic characteristics retailers in the study area

Variables	Frequency	Percentages
Age		
30-49	20	87
50 and above	3	13
Total	23	100
Sex		
Female	5	21.8
Male	18	78.2
Total	23	100
Education level		
Primary	13	56.5
Secondary	10	43.5
Total	23	100
Household size		
1-3	6	26.1
4 and above	17	73.9
Total	23	100

4.4 Mapping and Characterization of the Tropically Adapted Improved Chicken Value Chains

4.4.1 Actors in the tropically adapted improved chicken value chain

Different functions at supply of necessary inputs, production and marketing processes of eggs are undertaken by various actors along the value chain in the study area. Inter alia, the key functions include supply of inputs, production, transportation and retailing.

Observation from the subsector mapping identified several value chain actors to include brooders who are raising and selling baby chicks, producers (smallholder farmers) who obtain chicks from brooders, the consumers who buy eggs, the retailers (retail shops and kiosks) who collect and take the eggs to final consumers. From the study, it was further found that, there were a range of supporting services from different actors, specifically veterinary and credit services to smallholder farmers in the study area. In that regard, there are multiple activities performed directly or indirectly by various actors along the value chain (Figure 2).

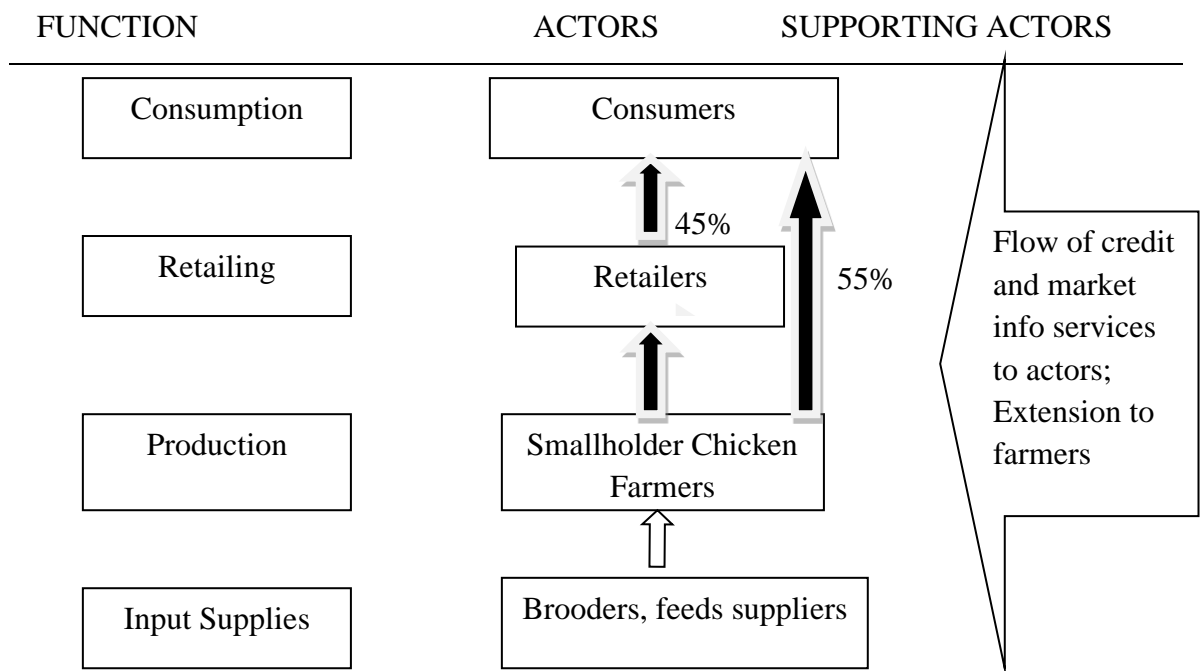


Figure 2: Value chain map of eggs in the study area

Key: Flow of eggs
 Flow of inputs to smallholder chicken farmers

4.4.1.1 Smallholder chicken farmers

These are the producing units of eggs supplied to various downstream actors along the eggs value chain. Smallholder farmers in the study area practiced different production system such as scavenging system, semi-confined and confined system based on the number of chickens (flock size) they own and ability to feed. The feeding process of the chicken is largely relying on the kitchen leftovers and the main care taker of the flock size is family labour of a producer. In some villages chicken were claimed to be owned by mothers while in some other villages chickens were belong to a family. In addition to functions performed by smallholder farmers as producers of eggs, the same play other multiple roles such as storage and transportation functions and selling of eggs to consumers and retailers.

4.4.1.2 Traders/Retailers

Generally, a retailing function involves buying commodity from another individual (e.g., producer) and resells that commodity for consumption. These functions were performed by men and women who were the owners of small shops and kiosks in the study area. The key role of retailers was to make eggs available in different market outlets for consumption. In that regard, retailers must engage in collecting, storage and transporting of eggs. In the study area, retailers buy eggs direct from the smallholder chicken farmers and resell directly to consumer. However, the nature of transaction between the two was based on spot market whereby they only interact for transaction. The other role played by retailers in the study area was aggregating the eggs from smallholder farmers to sell them in trays or in small unit (one egg).

4.4.1.3 Consumers

These are individuals including neighbours and fellow farmers who buy eggs for consumption. In the study area consumers buy eggs from either smallholder farmers or from shops (retailers). Consumer's decision on whether to buy eggs from smallholder farmers was due to multiple factors such as distance from market/retailers and smallholder farmers implying that, a consumer will choose a market outlet that is close to him/her. Size of egg was also important decision making factor for consumers in the study area. In addition to that, other consumer would choose to buy eggs depending on the price of the same, implying that the higher the price, the lower the likelihood that they will buy eggs from that source.

4.4.1.4 Input suppliers/Supporting services

These were the individuals providing services/supporting services to actors along the value chain. They include input supply, extension services, and financial services. It was found that, extension services in the study area were provided by the ward livestock officers and inputs such as feeds were supplied by agro suppliers in some villages in the proximity of Masasi road (Lindi-Tunduru road). It was further found that, veterinary support services were hardly available in some villages as a result smallholder farmers had to rely on traditional medication which proved failure to cure diseases such as heart failure. Interestingly, in some villages smallholder chicken farmers were organised and collaborated to procure inputs such as medicine and vaccines at a cheaper prices.

4.4.2 Value addition of eggs

4.4.2.1 Eggs value addition at farm level

Smallholder chicken farmers in the study area were found to add value to their produced eggs in some ways. Findings from the study show that the majority smallholder farmers

tend to collect eggs and store in order to sell them in trays at a relatively higher price compared to the price of selling in small quantities. However, smallholder farmers in some villages sell their eggs in small quantities, for instance some sold one egg at 350TZS to 400TZS while some three eggs at 1000TZS. On the other hand, smallholder farmers add value to their eggs by collecting, storing and transporting to retailers to fetch a relatively higher price. At this stage smallholder farmers added the value of eggs in form of place by making the products at the right place. In that regard, smallholder farmers who performed these functions sell their eggs at 12 000TZS to 13 000TZS per tray.

4.4.2.2 Eggs value addition at retailing level

As important actors along the value chain, retailers in the study area provided a linkage between smallholder farmers and consumers. It has been found that, retailers perform multiple functions such as collecting and transporting eggs from smallholder farmers to aggregate output (eggs) for sell in small quantities. At this stage, the value of eggs has been added in terms of place, since some smallholder farmers are located in interior areas while the consuming actors are located in proximity of main roads. Thus in some in some villages retailers were able to sell eggs in trays at higher prices, for instance 15 000TZS per tray.

4.4.3 Analysis of the marketing channels

Eggs and live birds (live chicken) on the way from producer to consumer follow what is known as a marketing channel. However, in this study the typical traded products from the tropically adapted improved chicken were eggs. Findings from the study show that two routes (marketing channels) exist to deliver eggs to ultimate consumer in the study area as described in sub section 4.5.3.1 and 4.5.3.2.

4.4.3.1 Channel I: Smallholder farmers- consumers

This was shortest and the common marketing channel in the study area. Smallholder farmers in this channel sell their produced eggs at their homes direct to consumers in which small quantities of eggs were sold usually 1 egg at 400TZS or 3 eggs per 1000TZS. It was found that, 55% of the total eggs that were directly supplied to final consumers for consumption (as previously shown in figure 2). This implies that, the direct marketing of eggs to final consumers was done by smallholder farmers in the study areas. This is similar to studies by Mlozi *et al.* (2003) and Queenan *et al.* (2016) who argued marketing of eggs is largely based on supplying of eggs to final consumers.

4.4.3.2 Channel II: Smallholder farmers- retailer- consumers

In this marketing channel, retailers buy eggs from smallholder farmers in their proximity and resale to consumers. Findings (in the figure 2) reveal that, 45% of the total eggs consumed are obtained from retailers shop and kiosks in the study area. However, smallholder farmers in this strand aggregate the eggs and sell them to retailers who then sell them in small quantities in their shops and/or kiosks direct to consumers. In few villages this channel is supported by informal agreement in which some retailers agreed to buy eggs weekly without specifying the prices to be paid.

4.4.4 Value chain linkages

Horizontal and vertical linkages provide valuable insights on the performance of the value chain and upgrading strategies for improvements. For instance, horizontal linkages through farmers' association offered multiple benefits in terms of procuring medicines and vaccines and access to and sharing of relevant information on disease management and market prices. Despite the aforementioned benefits, horizontal linkages along tropically adapted improved chicken value chain were found to be informal, unorganized and

unregulated. This is evidenced by the observation that, only 37.1% of the smallholder farmers in the study area have been found to be members of farmers' association. As a result, smallholder farmers in many areas especially where farmers association does not exist were found to work individually with weak bargaining power in procuring necessary inputs, production and marketing of eggs.

In terms of the vertical linkages, actors in different stages play vital role to deliver eggs to downstream actors including consumers. At the core of vertical linkages, the connection and relationship between actors in the tropically adapted improved chicken was examined. Findings from this study show that the value chain actors interact to each other when buying and selling eggs only. The implication is that, formal business support relationship and contracts such as verbal and written were nonexistent. As a result there are unpredictable market for eggs and frequent fluctuations in the selling price in many areas.

4.5 Gross Margin Analysis

This is a tool employed in this study to determine profit obtained by various actors in the value chain. It entails computation of variable costs and revenues from chicken keeping and eggs marketing were done to obtain gross margin for the aforesaid actors in the study area. In this respect, the gross margins for smallholder farmers and retailers were computed to compare the distribution of profit among the actors in eggs value chain.

4.5.1 Gross margin at smallholder farmers' level

As smallholder chicken farmers are important actors in the chicken value chain, gross margin was computed to determine profitability of introduced chicken to them in the study area. The results reveal that, the average GM of smallholder farmers was 308.8TZS per egg. The maximum gross margin was found to be 946TZS per egg and the minimum gross

margin was found to be 147TZS (Table 7). However, it was found that smallholder farmers in some areas earned the lowest gross margin due to small quantity of eggs produced which is caused by having small flock size (particularly number of laying hen) and limited access to market information on egg prices as a results they end up selling small quantity of eggs and at the lowest price.

Table 7: GM at smallholder farmers' level (n = 97)

Items	Values in TZS
Variable Costs	
Supplementation feed costs	3 750
Medication costs	10 545.6
Total Variable Costs (TVC)	14 295.6
Revenues	
Egg selling price (P)	385
Quantity of egg sold (Q)	171
Total Revenues (TR) = P*Q = 385*171	65 835
GM in TZS = TR- TVC	52 804
GM (GM/egg sold)	301.4

4.5.2 Gross margin at retailer's level

At retailers' level, the gross margin analysis was computed based on revenue obtained by the retailers and the variable costs involved during performance of various functions such as buying and transportation of eggs to their shops. Results show that, the average GM of retailer was 108.7TZS per egg. It was further found that, the maximum gross margin for retailers was 133.3TZS per egg and the minimum gross margin for the retailers was 100TZS per egg (Table 8). The lower GM of retailers as compared to the smallholder's GM may be attributed by the fact that, in some cases smallholder farmers sell their products directly to consumers at a price higher than that is set by retailers in some villages. In addition to that, smallholder farmers do not incur costs of transport as in some occasion smallholder farmers were reported to walk to retailers shops to deliver eggs.

Table 8: GM at retailers level (n = 23)

Items	Values in TZS
Variable Costs	
Purchasing price/egg	385
Quantity of eggs purchased	171
Purchasing costs = (Purchasing price*Quantity of eggs purchased) (=385*171)	65 835
Transport costs	1 077.2
Total Variable Costs (TVC)	
TVC= Purchasing price+ Transport costs	66 912.3
Revenues	
Egg selling price (P)	500
Quantity of egg sold (Q)	171
Total Revenues (TR) = P*Q	85 123.8
GM in TZS = TR- TVC	18 211.5
GM (GM/egg sold)	106.5

4.5.3 Comparison of gross margin along the eggs value chain

To test the hypotheses that there is no significant difference in gross margin among the actors in the tropically adapted improved chicken value chain, a T-test was conducted by using an independent t test as results (Table 9).

Table 9: An independent T-test between the mean differences in gross margins of the smallholder farmers and retailers

Group	Mean	n	t-value	sig.
GM_Retailers	108.7	23	-4.167	0.000
GM_Smallholder farmers	308.8	97		

From the independent T-test statistics under the assumption of equal variances not assumed, the t value is -4.167 having a significance level of 1%, thus implying that there is significant difference in the mean gross margin obtained by actors (in this study, smallholder farmers and retailers) in the tropically adapted improved chicken value chain.

The differences can be attributed by differences in selling prices and cost incurred by actors during the production and marketing processes.

4.6 Factors Influencing Chicken Farmers Gross Margin

Regression analysis was done to analyse the factors affecting gross margin of smallholder farmers in the study area. The dependent variable was gross margin per egg and the independent variables include both socio economic and institutional variable. More specifically, variables of the model were age of household head, sex, education level, access to market information, household size, extension visits, household membership to farmers' association, farming experience and the number of laying hen. The reason behind identification of factors affecting the gross margin of smallholder farmers rests on the premise that, such factors are critical for the policy makers and stakeholders to effectively recommend and propose strategies on how to increase returns to chicken keeping business among smallholder farmers and overall improvement of the chicken subsector.

4.6.1 Regression model accuracy

A multicollinearity test was carried out using SPSS in which the tolerance and Variance Inflation Factor (VIF) values are used to determine the extent of collinearity between the explanatory variables in the regression model. The results show that, VIF for all the explanatory variables were less than a threshold value *i.e.*, 5, implying that there is no multicollinearity problem from the variables included in the multiple linear regression model. Further, the coefficient of determination as a measure of variation in dependent variable explained by explanatory variables was examined and it is 0.33 showing that 33% of the variations observed in the dependent variable are explained by the explanatory variables of the model (Table 10).

4.6.2 Regression analysis results

Results as shown in the Table 10 shows that, three explanatory variables *viz.*, education level, market information and number of laying hen were statistically significant variables in this study. Education level of household head was statistically significant at 5% on the smallholder farmers' GM. It means that, other factors held constant, an increase in number of year in formal education will increase the mean GM by 0.198TZS per egg. This tendency can be associated by the fact that, educated households tend to use and adopt good production practices such as good animal husbandry as argued by URT (2010). And Okello *et al.* (2009). The positive contribution of the household level of education on the gross margin is consistent with findings by Natukunda *et al.* (2011) and Adegbola and Gardebroek (2007) who argued that, educated farmers are more likely to use productive resources more efficiently and capitalise on profits obtained to improve business compared to farmers with no or lower education level.

It was also found that, smallholder farmer's access to market information has positive effect on the GM of smallholder farmer. Specifically, being able to access market information will increase the mean farmers' gross margin by 0.193TZS per egg (Table 10). This can be due to the fact that, informed smallholder chicken farmers are able to identify profitable market outlets to supply their eggs hence being able to sell at a relatively higher price. In this regard, smallholder farmers with no access to market information are more likely to sell their products at a lower prices and subsequently earning lower gross margins.

Furthermore, Table 10 shows that, the number of laying hen was statistically significant at 1% and has positive effect on the GM of smallholder farmers. Specifically it implies that, under *ceteris paribus*, increasing the number of hen to smallholder farmers will increase

the mean GM per egg by 0.498TZS. This suggests that increasing the number of hen to smallholder farmers has a potential to increase smallholder farmers' gross margin. However, such efforts should be structured to ensure cost effectiveness management of flocks in order to sustain chicken production at a minimum cost possible.

Table 10: Regression results for factors influencing chicken farmers' GM

Variable	Coefficients	Sig
(Constant)	-1.440	.000***
Age of respondent	-.103	.510
Education (Number of years in formal education)	.198	.0048**
Number of years in chicken keeping	.117	.458
Extension (0 No, 1 Yes)	.134	.163
Household size	-.001	.990
Number of laying hen	.498	.000***
Market info on prices (0 No, 1 Yes)	.193	.091*
Membership (0 No, 1 Yes)	.010	.926
Sex (0 Female, 1 Male)	-.004	.967

(***) (**) (*) significant at 1, 5 and 10 percent level respectively,
R square 0.33 and Adjusted R square 0.26

4.7 Challenges Facing Actors in the Tropically Adapted Improved Chicken

Actors in the value chain argued that there are number of challenges hindering potentials of obtaining benefits from the newly introduced chicken in the study area. In this study, challenges are categorised into marketing and production challenges for producers. On the other hand, challenges facing traders along the tropically adapted improved chicken value chain are discussed to identify areas for intervention in order to improve chain performance.

4.7.1 Challenges facing smallholder chicken farmers

As critical point in the value chain, smallholder farmers claimed that there is multitude of constraints impeding optimal realization of benefits from the tropically adapted improved

chicken in the study area, thus requiring intervention to reverse the situation and subsequently ensure greater returns such as in terms of gross margin from the newly introduced chicken.

4.7.1.1 Marketing challenges

Results from Table 11 shows that, the majority of smallholder farmers (41.2%) argued that market prices for eggs are low in the study areas and surrounding villages. The second major constraint was found to be price fluctuation, reported by 40.2% of the smallholder farmers in the study area. Price fluctuations are associated by demand and supply conditions as during early days of the project implementation, eggs were sold up to 1000TZS/egg while in latter day's eggs are now sold at 300TZS to 400TZS. On the other hand, 18.6% of the smallholder farmers claimed that, there is inadequate market for eggs in the study area.

Table 11: Marketing challenges facing smallholder farmers

Variables	Frequency	Percentages
Low market prices	40	41.2
Price fluctuation	18	40.2
Unreliable market	39	18.6
Total	97	100

4.7.1.2 Production challenges

At production and keeping of tropically adapted improved chicken, stallholder farmers in the study area argued that there are multiple challenges they face as shown in the Table 12. Specifically, it was found that, many smallholder farmers 59.8% had experienced diseases and challenges in obtaining medicines including vaccines for preventing diseases in their flock. The typical diseases experienced include chicken typhoid, heart failure and extreme fatness. The second major challenge was expensive supplementation feeds as in some

villages maize bran are sold at 3 500TZS to 4 000TZS per bucket, while chicken mash are sold at 50 000TZS per bag. Other smallholder farmers 6.2% argued that, theft hold back their enterprise and reduce flock size as chickens were stolen when left out to scavenge during evenings while 6.2% of the same had experienced predators in their surroundings which eat eggs and sometimes live chickens.

Table 12: Production challenges facing smallholder farmers

Variables	Frequency	Percentages
Diseases and absence of medicines	58	59.8
Expensive feeds	27	27.8
Predators	6	6.2
Theft	6	6.2
Total	97	100

4.7.2 Challenges facing retailers in the value chain

Retailers in the study area argued that there are number of challenges encountered when performing the collecting, marketing and transportation function of eggs along the value chain. As shown in Table 13, 39% of the retailers claimed that there is inadequate working capital to enable them to perform their functions such as collecting and transporting eggs to profitable market outlets in the growing town such as Masasi town and Lindi urban. The second major challenge is low egg supply from smallholder farmers, as 30.4% of retailers argued that supply of eggs from the producers is low as a result retailers had to collect eggs from different producers to get marketable quantities. Additionally, 21.7% of the retailers posited that market for eggs in the study area is low as a result it may take a week to sell two trays in some villages. On the other hand, 8.7% of the respondent argued that, egg losses due to breakage during collection and transportation was a challenge that leads into loss of revenue.

Table 13: Challenges facing retailers in the study area

Variables	Frequency	Percentages
Inadequate working capital	9	39.1
Low egg supply from farmers	7	30.4
Low market for eggs	5	21.7
Egg losses (breakage)	2	8.7
Total	23	100

4.8 Summary of Findings and Testing of Hypotheses

The discussion of findings as presented in this chapter focused on the objectives and relevant poultry aspects which were conceived to be germane in improving chicken subsector. Actors in the tropically adapted improved chicken were identified and mapped to enable designing of possible suggestion to improve the position of disadvantaged individuals in the chicken value chain. Further, gross margins of the actors were computed to probe distribution of returns and incentives. Lastly factors affecting the GM of smallholder farmers were analysed using the SPSS.

Furthermore, two hypotheses were tested in this study. From the Independent T-Test under the assumption of equal variance not assumed gross margins of actors were compared to observe differences. Additionally, multiple linear regression analysis was used to test whether or not the selected socio-economic variables have significance effect on GM of smallholder farmers in the study area.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study characterised and mapped actors in the tropically adapted improved chicken in selected villages of Lindi Rural and Masasi Districts. Additionally, gross margins of actors were computed and various factors were found to influence smallholder chicken farmer's gross margin. Various strategies and incentives should be designed in order to establish sustainable enterprises of the newly introduced chicken; eggs value addition and marketing of eggs. In addition, interventions such as strengthening veterinary services need to be executed to lessen the challenges that impede the growth and profitability of enterprises.

Further, multiple challenges were found to inhibit the keeping of tropically adapted improved chicken in the study area. As a result, few chickens reached the productive age (maturity) in many areas. At the marketing stage, performance of the marketing function was held back by many factors at farm level as well as at the retailing level. Therefore, conclusion of this study is rooted with respect to research objectives and findings from the study as summarised hereunder.

5.1.1 Actors along the value chain for tropically adapted improved chicken

In attempt to identify and characterize actors along the value chain for tropically adapted improved chicken, subsector mapping analysis was used. The results revealed a number of actors such as input suppliers i.e., feed suppliers and brooders, smallholder chicken farmers, retailers (retailing shops) and final consumers. From these findings, it was further revealed that, the coordination of activities (vertical and horizontal linkages) is weak and

poor as there were no contractual and business relationships amongst actors in the tropically adapted improved chicken value chain.

Further, it was revealed that, there was limited value addition in the study area. This is evidenced by observed practices in which smallholder farmers in some villages sell their produced eggs in small quantities at a price of 300TZS or three eggs at a price of 1000TZS. In this respect most of them sell their products at the low price compared to their counterpart in the same area who aggregate and sell in trays at price of 15 000TZS.

5.1.2 Gross margin of actors along the value chain

From the GMA, actors in the tropically adapted chicken value chain specifically smallholder farmers and traders have different gross margin. Results revealed that, average gross margin of smallholder farmers was higher (308.8TZS per egg) compared to gross margin of traders (108.7TZS per egg). Adding to that, from the independent t test, the mean gross margin obtained by the smallholder farmers (308.8TZS per egg) was significantly different from that of the retailers (108.7TZS per egg) at 1%. However, variation in terms of gross margin amongst smallholder farmers in the study area existed as some of them sold their eggs at the lower price while some of them sold their eggs at the price equal to that set by retailers.

5.1.3 Factors affecting gross margin at farm level

Multiple linear regression model was used in this study to analyse factors influencing gross margin at farm level. It was found that, education level of a household head, access to market information and number of laying hen owned by a smallholder farmers are statistically significant in determining smallholder farmers' gross margin in the study areas. Therefore, among other things, differences in the gross margin among smallholder

farmers in the study area is attributed by level of education of particular farmer, access to relevant market information such as on selling prices and number of laying chicken owned by a farmer.

5.1.4 Challenges encountered in the production and marketing of eggs

Smallholder egg producers in the study area face numerous problems ranging from production to marketing and these problems require solutions in order to reverse the existing situation. Adding to that, addressing the existential challenges will promote and give a way towards profitable eggs production and chicken keeping in the study area. From the findings, the major challenges encountered at the production stage were diseases (e.g., heart failure), absence of medicines and predators. Additionally, in some villages egg production and growth rate of chicken was low. The aforementioned challenges were claimed to be the major setbacks that lead to high death rates, loss of chickens and sub optimal performance of the chicken in the study area. As a result many smallholder chicken farmers remained with small flock size ranging from 4 to 10 chickens.

Furthermore, feeds such as maize bran, seed cakes and ration (for supplementation) were found to be expensive in some villages. As a result smallholder farmers had to practice scavenging system in order to allow searching for food while also supplementing their flock with kitchen leftovers and maize. Moreover farmers in the study area do not have access to credit and loans from financial institution as a results they depend on their own incomes from other activities such as crop cultivation and businesses to finance their chicken enterprises whereby in most cases their own source of incomes are not sufficient for enterprise financing for sustainable egg production.

Besides these, there was limited information and knowledge sharing, limited market for eggs produced and low market prices caused by absence of farmers association for smallholder chicken farmers. This imposes continual hindrance in chicken keeping especially in the production level and performing marketing functions. Additionally, it impact negatively price setting of eggs due to weak bargaining power of individual farmers and weak vertical and horizontal linkages including business support relationship amongst actors in the chicken value chain.

5.2 Recommendations

Despite the contribution of chicken production to household food security, nutritional diversity and income generation to households in the study area, It has been observed that, there are impediments which require attention in order to promote growth of the subsector and its contribution to the country's GDP. These interventions however require shoulder to shoulder cooperation between smallholder chicken farmers, actors in the chicken value chain as well as policy makers. The following recommendation may lead to achieve this.

5.2.1 Recommendation for smallholder farmers

- Smallholder chicken farmers should take measures to optimize performance of improved chicken. This can be done by ensuring proper and good health management practices (bio-security) such as timely vaccination of the flocks and feeding practices. Adding to that, sustaining adequate feed supplementation is vital to enhance proper chicken growth and increase in egg production.
- Smallholder chicken keepers should be encouraged to establish farmers association. As it has been proved that found that smallholder farmers associations contributed diversely in engendering bargaining power and performance of marketing functions. Therefore it is important for smallholder chicken farmers to

establish farmers association in which they will be sharing information and acting collectively to perform marketing functions as well as procuring inputs such as medicines and feeds. In addition, farmers association may help the same to acquire loans and improving their enterprises. Also association will help to reduce transaction costs and default risks.

- Smallholder chicken keepers should add value to their eggs. This can be achieved in multiple ways for instance by collecting, storing and selling in trays instead of selling them in small quantities. This will add their incomes from marketing activities thus enabling them to improve their standard of living.
- Smallholder chicken farmers should build coop (cage for confining chicken) to prevent predators which were found to be common for poorly built coops in some villages. As a result in some villages predators were able to penetrate in coop and eat eggs as well as live birds. Furthermore, since predators were found to be common to farmers practicing scavenging system, smallholder farmers should shift to confined production system.
- Smallholder chicken farmers in the study area should develop and maintain linkages and business relationships with other actors such as brooders and service providers. This will help them to be secured in terms of needy services such as chicks from brooders and eggs markets.

5.2.2 Recommendations for policy makers

- Developing incentives to enhance value addition and open new market possibilities for eggs and other possible products from the tropically adapted improved chicken. This can be done by training and advancing smallholder chicken farmers' knowledge and skills to stimulate new product development

from eggs. Additionally, incentives for value addition can be done through stimulating collaborative (horizontal linkages) amongst smallholder chicken farmers to participate and act collectively to deliver the products in high value markets. Further, new markets can be identified through market research and demand stimulation.

- Developing and strengthening institutions for supporting smallholder chicken farmers such as smallholder farmers association so as to reduce transaction costs in obtaining various inputs such as vaccination, feeds, and medicines while also strengthening their abilities to market their eggs and chicken meat. On the other hand, this will allow provision of necessary information concerning both marketing and production to smallholder chicken farmers. This will reduce transaction costs and increase smallholder farmers' gross margin.
- Developing framework for the establishment and strengthening of training institutions to provide education to farmers on aspect of livestock production, and entrepreneurial education in a formal business context. As results has showed that education level is sufficient for farmers to apply the necessary skills and knowledge to achieve the sustainable and profitable egg production. Then these training will help farmers to acquire necessary skills required in production practices.
- Reviewing and establishing reliable farmers' financial schemes (sources for providing credit) to smallholder chicken farmers so that many smallholder chicken keepers will have easy access to those sources in order to increase their capital for financing and investing in egg and chicken meat production.

5.3 Areas for Further Research

This research study also proposes further research work to understand the reasons for low multiplication of the introduced chicken in the study areas. Further, research should be conducted to elucidate gender participation in tropically adapted improved chicken as well as adoption patterns of the newly introduced chickens.

REFERENCES

- Abdullahi, S., Abdulwahab, K. and Sadiq. (2017). Gross Margin Analysis of Modern Groundnut Oil Extraction in Gombe Metropolis Gombe State, Nigeria. *World Journal of Agricultural Research* 5(2): 58-63.
- Aboe, P. A. T., Boa-Amponsem, S. A., Butler, E. A., Dorward, P. T. and Bryant, M. J. (2006). Free range village chickens on the Accra Plains, Ghana: Their husbandry and productivity. *Tropical Animal Health and Production* 38: 235-248.
- Adegbola, P. and Gardebroek, P. (2007). The effect of Information sources on technology adoption and modification decision. *Journal of the International Association of Agricultural Economists* 37(1): 55 – 65.
- Aila, F. O., Oima, D., Ochieng, I. and Odera, O. (2012). Biosecurity factors informing consumer preferences for local chicken: A literature review. *Business and Management Review* 1(12): 60–71.
- Aklilu, H. A., Almekinders, C. J. M., Udo, H. M. J. and Van der Zijpp, A. J. (2007). Village poultry consumption and marketing in relation to gender, religious festivals and market access. *Tropical Animal Health and Production* 39(3): 165-177.
- Al-Nasser, A., Al-Khalaifa, H., Al-Saffar, A., Khalil, F., Albahouh, M., Ragheb, G. and Mashaly, M. (2007). Overview of chicken taxonomy and domestication. *World's Poultry Science Journal* 63(02): 285-300.

- Andreasen, A. R., Kotler, P. and Parker, D. (2008). *Strategic marketing for nonprofit organizations* (pp. 44-53). Upper Saddle River, NJ: Pearson/Prentice Hall.
- Aromolaran Adetayo, K., Ademiluyi, I. O. and Itebu, O. J. (2013). Challenges of Small Poultry Farms in Layer Production in Ibadan Oyo State Nigeria. *Global Journal of Science Frontier Research* 13(2): 1-7.
- Asem-Bansah, C. K., Sakyi-Dawson, O., Ackah-Nyamike, E. E., Colecraft, E. K. and Marquis, G. S. (2012). Enhancing backyard poultry enterprise performance in the Techiman area: A value chain analysis. *African Journal of Food, Agriculture, Nutrition and Development* 12(1): 5759-5775.
- Bett, H. K., Peters, K. J., Kahi, A., Lagat, J. and Bokelmann, W. (2009). An economic analysis of the market channels and factors influencing indigenous chicken marketing in Kenya. Egerton, Kenya: Tropentag proceedings on biophysical and socio-economic frame conditions for the sustainable management of natural resources: International research on food security, natural resource management and rural development, Hamburg, Germany, 6th – 8th October, 2009..
- Blandon, J., Henson, S. and Canfield, J. (2007). Small-Scale Farmer Participation in New Agri-Food Supply Chains: The Role of Transaction Costs and Collective Action. *World Development* 33 (10): 1721-1733.
- Bryman, A. and Bell, E. (2014). *Research Methodology: Business and Management contexts*. Oxford University Press Southern Africa. 424pp.

- Bwalya, R. and Kalinda, T. (2014). An analysis of the value chain for indigenous chickens in Zambia's Lusaka and Central Provinces. *Journal of Agricultural Studies* 2(2): 32-51.
- Challa, M. and Tilahun, U. (2014). Determinants and impacts of modern agricultural technology adoption in west Wollega: the case of Gulliso district. *Journal of Biology, Agriculture and Healthcare* 4(20): 63-77.
- Dessie, T. (2015). Introducing the African Chicken Genetic Gains project: A platform for testing, delivering, and continuously improving tropically-adapted chickens for productivity growth in sub-Saharan Africa. ACGG Tanzania Innovation Platform Meeting, Dar es Salaam, Tanzania. pp 20.
- Etikan, I., Alkassim, R. and Abubakar, S. (2016). Comparison of snowball sampling and sequential sampling technique. *Biometrics and Biostatistics International Journal* 3(1): 55-59.
- FAO, Food and Agriculture Organisation of United Nations (2010). *Smallholder poultry production – livelihoods, food security and sociocultural significance*, by K. N. Kryger, K. A. Thomsen, M. A. Whyte and M. Dissing. FAO Smallholder Poultry Production Paper No. 4. Rome.
- FAO, Food and Agriculture Organisation of United Nations (2014a). *Decision tools for family poultry development*. FAO Animal Production and Health Guidelines No. 16. Rome, Italy. 123pp.
- FAO, Food and Agriculture Organisation of United Nations (2014b). *Developing sustainable food value chains. Guiding principles*. Rome. 89pp.

- Gereffi, G. and Fernandez-Stark, K. (2016). Global value chain analysis: a primer. 35pp.
- Goromela, E., Kwakkel, R., Verstegen, M. and Katule, A. (2007). Identification, characterization and composition of scavengeable feed resources for rural poultry production in Central Tanzania. *African Journal of Agricultural Research* 2(8): 380-393.
- Hagan, J. K., Bosompem, M. and Adjei, I. A. (2013). The productive performance of local chickens in three ecological zones of Ghana. Asian Research Publishing Network (ARPN). *Journal Agriculture Biology Science* 8(1): 51-56.
- Hai, L. T. D. (2003). The organization of the liberalized rice market in Vietna. Thesis for Award of PhD Degree at University of Groningen in the Netherlands. 249pp.
- Hailemichael, A., Gebremedhin, B., Gizaw, S. and Tegegne, A. (2016). *Analysis of village poultry value chain in Ethiopia: Implications for action research and development*. LIVES Working Paper 10. Nairobi, Kenya: International Livestock Research Institute (ILRI). 57pp.
- Hossen, M. J. (2010). Effect of management intervention on the productivity and profitability of indigenous chickens under rural condition in Bangladesh. *Livestock Research for Rural Development. Volume 2*. Retrieved June 19, 2018, from <http://www.lrrd.org/lrrd22/10/hoss22192.htm>
- ILRI, International Livestock Research Institute (2012). *Strategy and Action Plan for Mainstreaming Gender at ILRI*. Nairobi: ILRI. 20pp.

- ILRI, International Livestock Research Institute (2016). Corporate report 2015-2016. 40pp.
- Jaffee, S. (1995). *Transaction Costs, Risk and the Organization of Private Sector Food commodity systems. Marketing Africas High-Value Foods: Comparative Experiences of an Emergent Private Sector*. Dubuque. Kendall/Hunt Publishing Company. 502 pp.
- Janssen, S. J., and van Ittersum, M. K. (2007). *Assessing farmer behaviour as affected by policy and technological innovations: bio-economic farm models* (No. 24). SEAMLESS. 86pp.
- Kabuje, F. L. (2008). *Analysis of the Value Chain for Hides and Skin in Tanzania: The case of Dodoma and Arusha Regions*. Dissertation for Award of MSc. Degree at Sokoine University of Agriculture. Morogoro, Tanzania. 109pp.
- Kaplinsky, R. and Morris, M. (2001). *A Handbook for Value Chain Research* (Vol. 113). Ottawa: IDRC. 113pp.
- Kashindy, L. P. (2011). *Commercial egg value chain analysis: a case study of Ilala municipal council, Dar es Salaam*. Dissertation for Award of MSc. Degree at Sokoine University of Agriculture. Morogoro, Tanzania. 127pp.
- Khobondo, J. O., Muasya, T. K., Miyumo, S., Okeno, T. O., Wasike, C. B., Mwakubambanya, R., Kingori, A. M. and Kahi, A. K. (2015). Genetic and nutrition development of indigenous chicken in Africa. *Livestock Research for Rural Development* 27(7): 1-6.

- Komwihangilo, D. M. (2015). The role of chicken in the Tanzanian economy and opportunities for development: An overview. Presented at the First ACGG Tanzania Innovation Platform Meeting, Dar es Salaam, Tanzania, 13-14 July 2015. Dar es Salaam, Tanzania: Tanzania Livestock Research Institute.
- Kotler, P. and Armstrong, G. (2006). Principles of marketing management. *New Delhi: Hall of India private limited.*
- Kumar, D. and Rajeev, P. V. (2016). Value chain: A conceptual framework. *International Journal of Engineering and Management Sciences 7: 74-77.*
- Lwelamira, J. (2012). Genotype-Environmental (G x E) Interaction for Body Weights for Kuchi Chicken Ecotype of Tanzania Reared On-Station and On-Farm. *International Journal of Poultry Science 11(2): 96-102.*
- MacLeod, M., Gerber, P., Mottet, A., Tempio, G., Falcucci, A., Opio, C., Vellinga, T., Henderson, B. and Steinfeld, H. (2013). *Greenhouse gas emissions from pig and chicken supply chains – A global life cycle assessment.* Food and Agriculture Organization of the United Nations (FAO), Rome. 196pp.
- Mapiye, C., Mwale, M., Mupangwa, J. F., Chimonyo, M., Foti, R. and Mutenje, M. J. (2008). A research review of village chicken production constraints and opportunities in Zimbabwe. *Asian-Australian Journal of Animal Science 21(11): 1680-1688.*
- Menge, E. O., Kosgey, I. S. and Kahi, A. K. (2005). Bio-economic model to support breeding of indigenous chicken in different production systems. *International Journal of Poultry Science 4(11): 827-839.*

- Michael, B., Marije, B., Ivan, C., Luigi, C., Tim, P., Dominic, S., Nico, J., Paule, M., Laura, P. and Siebe, V. W. (2010). Making Value Chains Work better For the Poor. A Tool book for Practitioners of Value Chain Analysis. The Asian Development Bank (ADB) Resource Centre (GF02, 23 Phan Chu Trinh, Hanoi) pp. 46 -55.
- Mlozi, M. R. S., Kakengi, A. V. M., Minga, U. M., Mtambo, A. M. and Olsen, J. E. (2003). Marketing of free range local chickens in Morogoro and Kilosa urban markets, Tanzania. *Livestock Research for Rural Development. Volume 15, Article #14*. [<http://www.lrrd.org/lrrd15/2/mloz152.htm>] site visited on 28/12/2017.
- Mmasa, J. J. and Msuya, E. E. (2012). Mapping of the sweet potato value chain linkages between actors, processes and activities in the value chain: A Case of “Michembe” and “Matobolwa” Products. *Sustainable Agriculture Research* 1(1): 130pp.
- Moges, F. and Dessie, T. (2010). Characterization of village chicken and egg marketing systems of Bure district, North-West Ethiopia. *Livestock Research for Rural Development. Volume 22, Article #196*. [<http://www.lrrd.org/lrrd22/10/moge22196.htm>] site visited on 17/12/2018.
- Mottet, A. and Tempio, G. (2017). Global poultry production: current state and future outlook and challenges. *World's Poultry Science Journal* 73(2): 245-256.
- Nardi, P. M. (2018). *Doing survey research: A guide to quantitative methods*. Routledge.

- Natukunda, K., Kugonza, D. R. and Kyarisiima, C. C. (2011). Indigenous chickens of the Kamuli Plains in Uganda: II. Factors affecting their marketing and profitability. *Livestock Research for Rural Development* 23(10):1-8.
- NBS, National Bureau of Statistics (2012). National Sample Census of Agriculture 2007/2008. 187pp.
- NBS, National Bureau of Statistics (2016a). 2012 Population and Housing Census. 264pp.
- NBS, National Bureau of Statistics (2016b). Annual Agricultural Sample Survey report 2014/15. 89pp.
- Oduol, J. B. A., Mithöfer, D., Place, F., Nang'ole, E., Olwande, J., Kirimi, L. and Mathenge, M. (2017). Women's participation in high value agricultural commodity chains in Kenya: Strategies for closing the gender gap. *Journal of Rural Studies* 50: 228-239.
- Okello, J. J., Gitonga, Z., Mutune, J., Okello, R. M., Afande, M. and Rich, K. M. (2010). Value chain analysis of the Kenyan poultry industry: The case of Kiambu, Kilifi, Vihiga, and Nakuru Districts. HPAI Working Paper 24. Washington, DC: IFPRI. [<http://www.ifpri.org/publication/value-chain-analysis-kenyan-poultry-industry>] site visited on 11/12/2018.
- Panlibuton, H. and Lusby, F. (2006). Indonesia cocoa bean value chain case study. United States Agency for International Development (USAID), Washington, DC. 68pp.
- Peter, D. (2015). Economic coordination of poultry value chain: comparative analysis of local and exotic chicken breeds in Kibaha District.

Unpublished Dissertation for Award of MSc Degree at Sokoine University of Agriculture, Morogoro. Tanzania. 111pp.

Pym, R. (2013). Poultry genetics and breeding in developing countries. *Poultry Development Review FAO*. pp 80-83.

Pym, R. A. E., Guerne Bleich, E. and Hoffmann, I. (2006). The relative contribution of indigenous chicken breeds to poultry meat and egg production and consumption in the developing countries of Africa and Asia. In; *Proceedings of the XII European Poultry Conference*. Vol. 1014.

Queenan, K., Alders, R., Maulaga, W., Lumbwe, H., Rukambile, E., Zulu, E., Bagnol, B. and Rushton, J. (2016). An appraisal of the indigenous chicken market in Tanzania and Zambia. Are the markets ready for improved outputs from village production systems? *Livestock Research for Rural Development*. Volume 28, Article #185. [<http://www.lrrd.org/lrrd28/10/quee28185.htm>] site visited on 30/12/2017.

Riisgaard, L., Fibla, A. M. and Ponte, S. (2010). Evaluation study: gender and value chain development. *Copenhagen: The Evaluation Department of the Danish Foreign Ministry*.

Simainga, S., Moreki, J. C., Banda, F. and Sakuya, N. (2011). Socio-economic study of family poultry in Mongu and Kalabo Districts of Zambia. *Livestock Research for Rural Development* 23(02): 1-9.

- Thwala, M. S. (2011). Analysing the value chain of the Family Poultry sub sector in the Lower Usuthu Project area in Swaziland. *APA assignment, INFPD, FAO, Rome, Italy*.18pp.
- Trienekens, J. H. (2011). Agricultural value chains in developing countries; A framework for analysis. *International Food and Agribusiness Management Review* 14(2): 51-83.
- Tzouvelekas, V. (2011). Production and consumption decisions of rural households under price risk: A mean-variance approach. In *5th Conference on Research in Economic Theory and Econometrics (CRETE)*. 26pp.
- UNIDO, United Nations Industrial Development Organization. (2009). *Agro-value chain analysis and development* (The UNIDO Approach, A Staff Working Paper). Vienna.
- URT, United Republic of Tanzania (2010). Livestock sector development strategy. 90pp.
- URT, United Republic of Tanzania (2011). Investment opportunities in livestock industry.40pp.
- URT, United Republic of Tanzania (2016). Tanzania country livestock report. 23pp.
- Vermeulen, H., Kirsten, J. F. and Sartorius, K. (2008). Contracting arrangements in agribusiness procurement practices in South Africa. *Agrekon* 47: 198-221.

- Warsanga, W. B. (2014). Coordination and structure of agri-food value chains: Analysis of banana value chain strands in Tanzania. *Journal of Economics and Sustainable Development* 5(7): 71-78.
- Yamane, T. (1967). *Statistics, An Introductory Analysis*, 2nd Edition, New York: Harper and Row.
- Yusuf, S. A. and Malomo, O. (2007). Technical efficiency of poultry egg production in Ogun state: a data envelopment analysis (DEA) approach. *International Journal of Poultry Science* 6(9): 622-629.
- Zeza, A., Pica-Ciamarra, U., Mugeru, K. H., Mwisomba, T. and Okello, P. (2016). *Measuring the Role of Livestock in the Household Economy. A Guidebook for Designing Household Survey Questionnaires*. 67pp.

APPENDICES

Appendix 1: Questionnaire for smallholder chicken farmers

VALUE CHAIN ANALYSIS OF THE TROPICALLY ADAPTED IMPROVED CHICKEN IN LINDI RURAL AND MASASI DISTRICTS, TANZANIA

LOCATION

Region.....

District.....

Village.....

Date.....

PART 1: HOUSEHOLD DEMOGRAPHIC INFORMATION

1. Name of the respondent
2. Sex of the household..... 1=Male, 2= Female
3. Marital status.....1= Married 2= Single 3= Divorced 4= Widowed
4. Household composition

Age of respondent	Education level	No of working age	No of non working age

Note: - working age means between 14 and 60 years of age inclusive. And 0-13 and 61 for non working

Code education: 1=Not attend education, 2=Primary education, 3=Secondary education, 4=Tertiary education

5. Is poultry keeping your main occupation? (a) Yes (b) No
6. What are the other economic activities you are involved in apart from chicken keeping?
1= Farming 2= Business/pet business/Self employed 3= Civil servant

PART 2: INFORMATION ON POULTRY KEEPING

7. What type of chicken breed do you keep?.....
8. How long have you been in chicken keeping enterprise?years
9. How did you get your improved chicken? 1= Purchased 2= From ACGG 3=From exchange
10. What is your chicken flock size per category? Chicks..... Laying hen..... Cocks.....Total ...
11. How do you feed your chicken? 1= Confined 2=Semi confined with supplement feeding 3=Scavenging 4=other specify....
12. How many eggs do you collect in a week.....?
13. Estimate the amount of eggs that you consumed and sell on weekly
Consume.....Sell.....

14. Who take care of your chicken? 1=Family labour, 2=Hired labour, 3= Both family and hired labour

15 Do you access to the following services in since you started the improved chicken keeping activities?

Services	Yes	No	If yes, how many times?	Type of services provided by extension officers
Extension			
Financial (credit, insurance)			
Market support (information prices)			

16. If, how where you access this information?..... 1=Extension agents
2=Farmers association 3= Radio 4= Neighbours 5= Others, specify

17. If no, why you don't access these services?.....

PART 4: CHICKEN MARKETING AND VALUE ADDITION INFORMATION

18. What is the distance from home to eggs market in km

19. What is your unit of measure for selling eggs? Tray.....others (Specify).....

20. Mention the amount of egg sold..... and selling price per egg/tray.....

21. What is the current price of eggs in TZS?.....

22. Who sets the price of eggs? Producer....., Buyer..... Negotiated.....

23. Where do you sell eggs 1. Neighbours 2. Village collectors 3. Retailers 4. Wholesalers

24. What do you do before selling eggs?.....

25. Does it add any value or increase price of eggs?.....

26. What reason do you give to the choice of selling eggs as you responded to the previous question?1= Reliability of the market 2= Relatively high price 3=Low production for other market channel 4=Inability to transport to places with high price

27. Which factors considered in setting egg price in the market?

1.....2.....3.....

28. What is the mode of payments during egg selling?

29. Do you have any prior-arrangement with buyers? 1. Yes 2. No

30. Is there any farmers' association/cooperative in your village? 1= Yes, 2= No

If yes, are you a member? 1= Yes, 2=No

31. List benefits you get by being a member to association/cooperative.

.....

.....

Part 5: INFORMATION OF CHICKEN PRODUCTION AND SELLING COST

32. Indicate the cost incurred in chicken production including labour and inputs.

Activity/operation	Cost (TZS)
FIXED COST	
Housing construction	
Feeders and drinkers	
Day Old Chick	
Others, specify	
VARIABLE COST	
Vaccines and veterinary drugs	
Supplementation feed	
Transport cost	
Labour cost in man days,	
Any other cost incurred	

33. What challenges do you encounter in the chicken keeping activities and adding value to eggs?

Challenges in egg production

.....

.....

Challenges in eggs marketing and value addition

.....

.....

34. What solutions do you suggest to solve these challenges?

.....

.....

.....

.....

THANK YOU FOR YOUR COOPERATION

Appendix 2: Traders survey questionnaire

VALUE CHAIN ANALYSIS OF THE TROPICALLY ADAPTED IMPROVED CHICKEN IN LINDI RURAL AND MASASI DISTRICTS, TANZANIA

- 1.0 Region 1.1 District
- 1.2 Ward..... 1.3 Village
- 1.4 Sub-village.....
2. Sex of respondent: (circle) 1 = Male 2 = Female
3. Age of respondent.....
4. Marital status of respondent:
1 = Married 2 = Single 3 = Divorced 5 = Widowed
5. Level of education of respondent: (circle) 1 = No formal education 2 = Primary education 3 = Secondary education 4 = Tertiary education
6. Type of trader involved 1 = Wholesaler 2 = Retailer 3=Local trader 4=Other specify.....
7. Who are your sources of the eggs 1= Farmers 2= Local traders 3 = retailers 4= Wholesalers
5= Other (specify)
8. At what price do you buy eggs? (InTZS)...../egg/tray.
9. What was the total amount of egg produce do you buy per week/month.....Eggs
.Tray (Select appropriate units)
10. Who sets price for the eggs and or live birds? 1 = Buyer 2 = Seller 3 = Both 4 = Other
(Specify).....
11. What factors are considered in setting the buying price for eggs or live birds? 1=Cost of
production 2= Supply forces 3= Demand forces 4= Quantity 5 = Other
(Specify).....
12. In what form do you buy eggs 1 = Raw 2 = Processed 3 = Other
(Specify).....
13. After purchase, what kind of activities do you do before selling eggs?

Activities	Tick where appropriate	Techniques	Cost	New price	Constraints incurred
Preservation/handling					
Storage					
Transport					
Processing					
Other (specify)					
.....					
.....					

14. Where/to whom do you sell your product? 1= Wholesalers 2 = Retailers 3 = Consumers 4= Other (Specify).....

15. At what price do you sell your products? (In TZS)..... /egg/tray

16. What quantity do you sell on weekly/monthly basis..... eggs.....tray... ..

17. What criteria do you use in determining the selling price?

1=Supply forces 2= Demand forces 3= Quantity 4= Grades = Other (Specify).....

18. Are you a member of any association/cooperatives? 1 = Yes 2 = No

19. If yes, what benefits do you get by being a member of the association or any other organization?

.....
.....

20. Do you have any contractual agreement with suppliers of products? 1 = Yes 2 = No

21. Do you have any contractual agreement with buyers of products? 1 = Yes 2 = No

If yes, please indicate the kind of agreement? 1 = formal contracts 2 = informal contracts

22. IDo you have access to any credit institution in your village/town? 1 = Yes 2 = No

23. If yes, list them and briefly explain how they support you?

.....
.....

THANK YOU FOR YOUR COOPERATION

Appendix 3: Consumers questionnaire

Location

Ward.....

District.....

Region.....

1. Name of respondent.....
2. Age of respondentsYears
3. Sex of the respondent 1= Male 2= Female
4. Educational levels 1= No formal 2= Primary school education 3=Secondary school education 4= Post secondary education
5. Household size
6. Main occupation of the respondent 1= farming 2= Non-farming
7. Where do you normally buy eggs 1= Farmers 2= Traders 3= Other, specify
8. What is the price per egg/ tray.....TZS
9. Who set the price of eggs....?
10. What aspects do you consider when buying eggs?
.....
.....
11. What is your weekly egg consumption
12. What are the major problems you encounter when buying eggs
.....
.....
13. What is to be done to stimulate consumption of eggs in the study area?
.....
.....

THANK YOU FOR YOUR COOPERATION

Appendix 4: Checklist for extension staffs

1. Name of respondent..... Village.....District.....
2. Age of the respondent.....
3. Education level of the respondent.....
4. Type of services you provide to smallholder farmers in your village.....
5. How often do you extend the aforementioned services to improved chicken farmers in the study area.....
6. Describe the structure of the value chain in the study area.....
7. What is the main market for eggs of the farmers in this area?
8. Who set the prices of inputs (feeds) and outputs (eggs) in the study area?
9. What are the productions challenges facing chicken farmers in your village
10. What are the marketing challenges facing actors in the value chain.....
11. Other challenges exist in the villages regarding improved chicken keeping ...
12. What should be done to improve the improved chicken keeping in the study area?

THANK YOU FOR YOUR COOPERATION