DURBAN UNIVERSITY OF TECHNOLOGY

AN INVESTIGATION OF STRATEGIES TO IMPROVE THE COMPETITIVENESS OF THE POULTRY INDUSTRY IN THE BRONG AHAFO REGION OF GHANA

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An investigation of strategies to improve the competitiveness of the poultry industry in the Brong Ahafo region of Ghana.

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ABSTRACT

Copious research studies have been carried out on poultry production worldwide in the small and medium scale (SMS) sector, resulting in quantum challenges identified that oppose local industries, with production cost paramount. Nevertheless, none of these studies were found to offer effective strategies to overcome the challenges, revamp the poultry industry and enhance its competitiveness in the Brong Ahafo geographical area of Ghana.

This research thus bridges the opening left and catalyses the debate by assessing SMS poultry producers' competitiveness, along with the challenges that militate against the local industry, as well as government policies that seek to enhance the industry's competitiveness. Additionally, strategies have been proposed to boost productivity and improve the poultry industry's competitiveness. Moreover, the result will have specific significance, especially for developing countries who consider SMS poultry operation as employment creation, while also being a measure to enhance the local poultry industry's competitiveness.

This study adopted convergent mixed methods design through which quantitative and qualitative data were collected concurrently, analysed seperately and then merged and intepreted, looking for convergence, divergence, contradictions or relationships of the two sources of data. The quantitative and qualitative data were collected from a sample of 100 participants, comprising 66 SMS poultry farmers, 10 Ministry of Food and Agriculture (MoFA) and veterinary officers, and 24 consumers of chicken. The SMS poultry farmers as well as the consumers received both close-ended and open-ended questions. The MoFA and veterinary officials however, received only open-ended questions as the researcher required basically certain technical information from them as per the phenomenon under study.

The administration of the questionnaires to the identified respondents was done through the help of a reserch assistant, with a personal interview as a follow up on the open-ended questions. This was done by means of site visits and hand delivery of the measuring instrument. The statistical package for social sciences (SPSS)

version 24.0, was used to analyse the quantitative data, with outcomes presented in cross-tabulations, correlation and frequency tables, as well as figures. The constant comparative analysis (CCA) method was used to analyse the qualitative data.

The outcomes reveal that a low level of education, lack of management skills as wellas high production cost are impeding the operations of local poultry producers. The overwhelming challenges confronting the industry are exacerbated by policymakers' apathetic attitude towards its development. However, by employing cost effective strategies throughout the poultry value chain, local producers can increase production, add value and be competitive in the turbulent market setting, currently dominated by foreign mega competitors. A collaboration is recommended between lawmakers and the Ghana National Association of Poultry Farmers (GNAPF), based on the study findings, in order to create an enabling environment, within which to promote policy implementation and ensure the local poultry industry's competitiveness.

Key words: competitiveness, strategy, policy implementation, poultry value chain (VC)

DECLARATION

I declare that this thesis was composed by myself, that the work contained herein is my own, except where explicitly stated otherwise. This work has not been previously accepted in substance for any Doctoral Degree, and is not being concurrently submitted in candidature for any other Doctoral Degree at any other institute. All sources consulted in the course of the study are duly acknowledged with unequivocal references.

Isaac Yeboah
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DEDICATION

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to my children for your patience and spiritual support throughout my studies.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACMF	Australian Chicken Meat Federation
ADB	Asian Development Bank
APD	Animal Production Directorate
APEDA	Agricultural and Processed Food Products Export Development Authority
BA	Brong Ahafo
BBC	British Broadcasting Corporation
BDG	Brewers Dried Grains
BUSAC	Business Advocacy
Ca	Calcium
CA	Comparative Advantage
CAP	Common Agricultural Policy
CCA	Constant Comparative Analysis
CCRED	Centre for Competition, Regulation and Economic Development
CET	Common External Tariff
CF	Crude Fibre
CLM	Cassava Leaf Meal
CP	Cerebral Palsy
CRM	Cassava Root Meal
DDGS	Distillers dried grains with solubles
DOCs	Day Old Chicks
EAFRD	European Agricultural Fund for Rural Development

ECOWAS	Economic Community of West African States
EDAIF	Export Development and Agricultural Investment Fund
EFA	Exploratory Factor Analysis
ETLS	ECOWAS Trade Liberalization Scheme
EU	European Union
FAO	Food and Agricultural Organisation
GAIN	Global Alliance for Improved Nutrition
GBN	Ghana Business News
GDP	Gross Domestic Product
GHABROP	Ghana Broiler Revitalisation Project
GiEPA	The Gambia Investment and Export Promotion Agency
GNAPF	Ghana National Association of Poultry Farmers
GoG	Government of Ghana
GSS	Ghana Statistical Service
IC	Indigenous Chickens
ICCO	International Cocoa Organization
ICRA	Investment Information and Credit Rating Agency
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IDC	Industrial Development Corporation
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
ITAC	International Trade Administration Commission
LDC	Least Developed Countries
MDM	Mechanically Deboned Meat
MIS	Management Information Systems
MINAGRI	Ministry of Agriculture and Animal Resources
MoFA	Ministry of Food and Agriculture
MOLM	Moringa Oleifera Leaf Meal
MoTI	Ministry of Trade and Industry
MT	Metric ton

MY	Marketing year
NBSSI	National Board for Small Scale Industry
OECD	Organisation for Economic Co-operation and Development
PCA	Principal Component Analysis
PPF	Production possibility frontier
R&D	Research and Development
RQ	Research Question
RVO	Rijksdienst voor Ondernment Nederland – Netherland Enterprise Agency
SA	South Africa
SAPA	South African Poultry Association
SBM	Soybean Meal
SBS	Small Business Service
SFM	Sunflower Meal
SMEs	Small and Medium-sized Enterprises
SMS	Small and Medium Scale
SPSS	Statistical Package for Social Sciences
SRID	Statistical Research and Information Directorate
SSA	Sub-Saharan Africa
UN	Uniteded Nations
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
USD	United States / American Dollar
USDA	United States Department of Agriculture
USAID	United States Agency for International Development
USITC	United States International Trade Commission
VAT	Value Added Tax
VC	Value Chain
VCA	Value Chain Analysis
VS	Versus

WHO	World Health Organization
WTO	World Trade Organization

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CHAPTER ONE
OUTLINE AND BACKGROUND

1.1 Overview

The continually unpredictable competitiveness and volatility of today's business environment compels business owners to craft sustainable strategies to obtain sound functioning, and thus achieve a competitive edge (Thompson, Peteraf, Gamble and Strickland 2012: 210). A strategy is considered as a master plan designed for a company and its various components to achieve the desired goal of the business (Panwar *et al.* 2016: 579). The essence of strategy involves competing in a different manner to that of rivals; accomplishing what competitors cannot accomplish or what competing firms cannot do (Thompson *et al.* 2012: 53). A firm's strategy is, therefore, the action plan by management to successfully compete, while also operating cost-effectively, according to an appropriate resource set, competitive capabilities and the know-how to do so (Thompson *et al.* 2012: 52; Agbim, Zever and Oriarewo 2014: 134).

A business strategy thus necessitates the evaluation of chains of solutions, to establish the superlative method of handling the firm's challenges (Panwar *et al.* 2016: 580), which are crucial to outperform competitors (Porter 1985). The undisputed fact is, when a strategy is deployed by one firm or a new strategic move is made, producing good results, competitors countermove either offensively or defensively (Thompson *et al.* 2012: 102). For small and medium scale (SMS) poultry farmers to compete successfully against their foreign rivals and survive in a turbulent business environment, managers need to deploy strategies that seek to make efficient use of available resources at their disposal, explore cost effective methods of production and marketing their products to satisfy the needs of consumers.

The efficient application of these strategies will help lower the cost of production and make local products more affordable to consumers. The SMS poultry producers will then gain a competitive advantage through the production of quality and affordable local products to satisfy consumers (Kandampully, Zhang and Bilgihan 2015: 385).

This study explores strategies to assist in enhancing the competitiveness of Ghana's poultry industry. Chapter one opens with an outline of the study's background, the problem statement and study aims. The rationale of the study is described, with research objectives, and research questions (RQs) also set out. The chapter further illuminates the research scope, the methodology and a brief outline of the chapters constituting this study.

1.2 Research background

Poultry (specifically chicken) is a leading source of high quality protein, and more preferable in many sosieties globally (Wahyono and Utami 2018: 1; The Poultry site 2013). The spiralling demand for chicken is due to population expansion, urbanisation, as well as the need to ameliorate human nutrition and food safety (Heise, Crisan and Theuvsen 2015: 198; Tan *et al.* 2018). This demand also increases due to the pressing need to obtain cheap proteins that the majority of consumers can afford. However, Ghana's poultry industry is 'bedevilled' by the inundation of imported, cheap, frozen chicken from the United States of America (USA) and Europian Union (EU) member states (Banson, Muthusamy and Kondo 2015: 167).

Several factors have caused Ghana's inability to increase its poultry output at reduced cost, which include high cost of production, disease outbreak, importation of cheap, frozen chicken and lack of government support (Banson *et al.* 2015: 169; Kusi *et al*. 2015a: 482; Oppong-Apane 2013: 5). With the cost of feed amounting to approximately 70 percent of total production cost, it is largely by minimising the entire production cost, which feed cost is paramount, that competitive advantage can

be achieved (Bagopi *et al.* 2014: 172); maize and soya bean constitute 60 to 70 percent of the feed component (Ncube, Roberts and Tatenda 2016). The most vital input for poultry production is feed and thus, accessibility to cheaply priced, superior quality feeds is indispensable for the poultry industry's development and resulting competitiveness (Hellin, Krishna, Erenstein and Boeber 2015: 151; Krishna, Erenstein, Sadashivappa, and Vivek 2014: 117). The high cost of production, resulted in farmers' inability to close the demand and supply gap (FAO 2014a). This problem is exacerbated by difficulties in banning cheap poultry imports, since Ghana operates a free market economy (USDA) (2016), while operating within the boundaries of international, as well as regional, according to the World Trade Organisation (WTO) agreements (Amoah 2014: 7). Etuah (2014) emphasises the government of Ghana's (GoG) subsidy for the production of maize implies the cost of poultry production is effectively being subsidised, since it has a significant effect on the cost of feed, which makes up a large portion of poultry production costs.

The policies of the government and development programmes in the sector of agricultural are pivotal to the local poultry industry's growth and competitiveness. Nonetheless, policies in favour of the poultry industry, such as government subsidies on agricultural inputs, and the banning of imported chicken meat, among others, have not been effectively implemented by the government of Ghana (GoG) (Kusi, Agbeblewu, Anim and Nyarko 2015a: 482; Norman *et al.* 2016: 422). According to Ayisi and Adu (2016: 563), the government's perceived apathetic role towards local poultry development has crippled the sector. With the high, local domestic need for chicken, policies are thus expected of government, chiefly import tariffs and agribusiness subsidies, in favour of the poultry sector. The policies on tariffs could create much protection and boost local poultry production (Ayisi and Adu 2016: 563).

Small and medium scale enterprises (SME) are recognised as very dynamic in the development of every economy; although small in size, they have greatly promoted the enhancement of major economies around the globe (Agbor and Quartey 2010:

220). SMEs are the ‘live wire’ behind numerous innovations and contribute to the development of the national economy by means of job creation, investments and exports (Akugri, Bagah and Wulifan 2015: 264). Therefore, with government support, good management and access to credit facilities, education and training, the capabilities of SMS poultry producers to deploy and efficiently organise production inputs (Kusi, Opata, and Tettey-Wayo 2015b: 707) can, to a high degree, be a panacea to the nation’s poultry production insufficiency and also ensure the industry’s competitiveness.

1.3 Problem Statement

The growing demand for adequate protein, especially poultry products, has lead to the importation of frozen chicken from the USA and EU countries since the 1990s Randon and Ashitey 2011). This, however, tends to impact the local industry’s competitiveness. The fierce rivalry from the escalating USA and EU imports of frozen, cheap chicken poses significant challenges to the poultry sector in Ghana (Killebrew and Plotnick 2010). Other problems the poultry industry encounters include high production cost (Avevor 2016), lack of adequate attention and government support (Kusi *et al.* 2015b: 706).

The competition from the maga international poultry producers, such as the USA and EU, threatens most domestic SMEs, largely narrowed and/or segmented products and sales (Singh, Garg and Deshmukh 2009: 55). Trade liberalisation has increased the infiltration of remote and underdeveloped markets while also enhancing the capability of well-organised foreign manufacturers and retailers to paralyse the local poultry industry (Singh, Garg and Deshmukh 2009:46). Against this development, the local poultry industry finds it progressively more challenging to survive or even retain its current business position in the market. In such a competitive atmosphere, the development of effective competitive strategies is crucial to establish long-term sustainability (Thompson *et al.* 2012: 53) of Ghana’s poultry industry.

The local poultry sector in Ghana has been deteriorating, and as the Global Alliance for Improved Nutrition (GAIN) pointed out in 2015, unable to make any significant improvement in poultry production to meet local demand (GAIN Report 2017a). According to Anang, Yeboah and Agbolosu (2013: 424) a considerable amount of frozen chicken products are imported into the country annually from the USA and the EU. In 2017, Ghana's importation of frozen chicken from the EU soared to 135 000 metric tonnes (Mt), a 76 percent increase over the 2016 EU's import (EPAMONITORING 2018).

Ghana has been a net importer of poultry products as a consequence of the high poultry demand, as opposed to the low local supply (Aning, Turkson, and Asuming-Brempong 2008). The low production and supply are found to emanate mostly from the high cost of production (FAO 2014a; Avevor 2016), not excluding the high cost of day old chicks (DOCs) (Ncube *et al.* 2017). A third of EU overall poultry products destined for Africa, goes to Ghana (Ghana Business and Finance 2013). GAIN Report (2017) estimated the 2017 broiler meat produced in Ghana would rise to 35 000 Mt, supplying below 25 percent of demand, with imports anticipated to upsurge by 14 000 Mt to 158 000 Mt, as a result of inadequate local supply and spiraling demand.

The high local demand for poultry meat (Ayisi and Adu 2016: 652), in addition to the failure by successive governments to provide clear protective policies and agribusiness subsidies (Banson *et al.* 2015:169), has generated an upsurge in frozen poultry imports from the EU and the USA. Victor Oppong Adjei, chairman of the Ghana National Association of Poultry Farmers (GNAPF), specifically warned as far as 2013 that, should imports be controlled, Ghana's poultry industry would be able to promote a major recruitment drive, creating at least 75 000 direct jobs (Ghana Business and Finance 2013).

What has aggravated the problem faced by Ghana's domestic poultry industry, is dumping. Regarding international business, dumping concerns the export of a product to a foreign market at a lesser price than that asked for in the domestic market (Kate 2017). EU producers receive direct and indirect subsidies, and direct export assistance of more than 40 percent for their poultry industry (Kate 2017). This enables the EU to obtain unfair competitive advantage over its receiving markets such as Ghana, as production and export costs are drastically reduced, making their poultry products very cheap.

Apart from chicken breasts and drum sticks, which are most desired by consumers in developed countries, the thigh leg quarters and other parts are considered as surplus, and dumped in countries such as Ghana, Senegal, Cameroon, and South Africa (SA) (Kate 2017). These surpluses are sold fairly cheaply at a price no domestic producer can afford to compete. The economic implications of the surge of imports are found in, for example, 70 percent of Senegalese broiler operations having ceased, with 120 000 people losing their jobs in Cameroon by 2015. The FAO reported a decrease in the poultry processing in Ghana by 2016 , operationally, to 25 percent of capacity, while a 42 percent decrease was found in feed mills (Kate 2017).

Trade restriction is one method in guarding against unfair competition. For example, tariffs and health barriers have been elevated by China to limit imports, whereas Western imports have been banned entirely by Russia (Kate 2017). African countries have also protected their own industries, including Kenya and Nigeria (Kate 2017). Botswana has, moreover, been successful in implementing policies that restrict the import of poultry meat, except for import permits granted for highly specialised poultry, such as free range or organic products (Grynberg and Motswapong 2016: 16). In addition, import bans or countervailing duties have been enforced by Senegal and Cameroon, resulting in a gradual improvement in the industry (Kate 2017). Additionally, Bagopi *et al.* (2014) stated that, in Zambia, the Ministry of Agriculture

and Cooperatives apply strict administrative processes to the import of DOCs and feed.

In South Africa (SA), trade restriction has taken the form of tariff increases, as highlighted in the 2017 SA Department of Trade and Industry's (DTI) report, with tariff increases from 18 percent to 37 percent recorded for bone-in chicken portions, and from 27 percent to 82 percent for whole birds; the maximum tariff allowed according to SA's commitments with the WTO (GAIN Report 2017b). What is more, as a result of the recent dumping, SA's International Trade and Administration Commission (ITAC) issued a provisional 13.9 percent safeguard duty on all EU imports (GAIN Report 2017a). Notwithstanding this tariff increase, analysts say tariffs offer only an interim safeguard and consequently, lasting measures ought to be considered (GAIN Report 2017b) to enhance the local poultry industry's competitiveness.

In Ghana, however, the low contribution or inattention by government in protecting the infant poultry industry, has led to unreasonable competition with inexpensive, imported poultry products, at 30-40 percent lower in price than domestic poultry (USDA 2013a). The lack of protection on the infant poultry industry by the Ghana government is a recipe for its demise as local poultry producers can no wise compete fairly with the importers.

Other constraints that challenge the poultry industry's productivity and competitiveness include the high cost of feed (Bagopi *et al*. 2014), non-availability of credit facilities and the high cost of vaccines (Islam, Ashraful and Dutta 2014: 22). Farmers are unable to control poultry diseases, which adversely impact production cost, due to lack of training and regular visits by veterinary officers (GhanaWeb 2017). This calls for serious government intervention by means of policy enforcement, to ensure the poultry industry is more competitive.

1.4 Aim(s) of the research

The study's aim is to explore challenges impacting the Ghana poultry industry and to craft strategies to boost its competitiveness.

1.5 Objective of the research

1.5.1 Primary objective

The research will explore strategies to improve competitiveness of the poultry industry in Ghana.

1.5.2 Secondary objectives

The study seeks to explore the following sub-objectives in order to achieve its primary objective:

1. To investigate SMS poultry farmers' operations in enhancing the poultry industry's competitiveness.
2. To examine those challenges that militate against the development of Ghana's poultry industry.
3. To evaluate existing government policies that seek to promote and enhance competitiveness of the poultry industry.
4. To propose strategies to improve competitiveness of the poultry industry.

1.6 Research questions

1. What operations are undertaken by Ghana's SMS poultry farmers in enhancing the poultry industry's competitiveness?
2. What challenges confront the Ghana's poultry industry?
3. How are government policies being implemented to enhance competitiveness of the poultry industry?
4. What strategies could be adopted to expand the poultry sector's competitiveness?

1.7 Significance of the study

Research of the topic is necessary, considering Ghana's peculiar geographical, political and environmental context. The available research on poultry in Ghana has been centred on poultry production techniques, marketing, and constraints in the poultry industry (Eshun, Agbadze and Asante 2014: 7; Banson *et al.* 2015:168; Ayisi and Adu 2016: 651); with little, if any, having been done on strategies to achieve competitiveness in Ghana's poultry industry. Available literature on SMS poultry farmers' operations and the associated challenges, as well as existing government policies and their implementation in the poultry sector, were examined, with the outcome underscoring the necessity to undertake a study of this kind.

It is, therefore, envisaged that the study outcome will contribute immensely to upscale poultry production in Ghana; to satisfy the protein needs of the populace, as well as creating employment for a large portion of Ghanaians.

This study, with the main focus on cost reduction, intends to complement earlier research done on poultry production in Ghana. The outcome of the research will propose strategies to heighten the Ghanaian poultry industry's performance and competitiveness. This will include strategies that will enable SMS poultry farmers in Ghana to effectively utilise available resources and also explore more cost effective methods of production, especially by replacing highly expensive conventional feed, with an unconventional alternative, and control poultry disease to reduce the high bird mortality rate.

Operations of SMS poultry farmers could be enhanced through increased production, enjoying economies of scale and increasing their competitiveness. It will also contribute to literature and poultry development and serve as a conference paper to guide policy-makers in the poultry subsector of Ghana.

1.8 The scope of the study

The geographical area of the study is restricted, in as much as only six of the 28 districts in the Brong Ahafo (BA) region of Ghana were included, namely: Sunyani Municipality District (Sunyani), Sunyani West District (Odumase), Berekum District (Berekum), Dormaa District (Dormaa Ahenkro), Dormaa East District (Wamfie) and Tano North District (Duayaw-Nkwanta) as illustrated in figure 1.1 below. According to the Ministry of Food and Agriculture (MoFA 2016), these districts have a high concentration of poultry farmers in the region; while poultry production in the remaining districts is rather low or minimal. Although there are other regions in Ghana where poultry production is as high as BA, these are not captured in the study. Nonetheless, the outcome of the study can be generalised in the Ghanaian context, as well as in countries with similar characteristics, where SMS poultry farmers operate.

The study confined itself to poultry farmers, government officials and consumers of poultry products in the selected districts of the region.

Figure 1.1: Map of Brong Ahafo (Ghana) - the study area

Source: Google – district maps (Brong Ahafo region)

The BA region is dominated by SMS poultry farmers contributing 28.07 percent of the total poultry production in Ghana in 2009 (FAO 2014b). Based on a baseline survey report by the Ghana Poultry Project (GPP) in 2015, three regions were identified with high concentration of poultry producers in Ghana namely: Brong Ahafo, Ashanti and Greater Accra. The BA region had 210 farms, representing 51.22 percent of the poultry producers, followed by Ashanti region with 154 farms, representing 37.56 percent of the poultry producers, and Greater Accra having 46 farms accounting for 11.22 percent of the poultry producers (USAID 2015). These poultry farms however, include large and small scales. The BA region lies in the middle belt of Ghana with moderate temperatures which provides the most favourable setting for producing chickens and also for maize production, making poultry production in this region an additional advantage of being near to the principal feeding component (Kwaw *et al.* 2017).

1.9 Limitations

The research is limited to exploring strategies to improve competitiveness of the poultry industry.

1.10 Research methodology

This section provides the design this research adopts to achieve the research objectives. A mixed research methodology was adopted for this study. In employing a mixed research approach, the methodology comprises collecting, analysing, and integrating quantitative and qualitative tools in a single study or a program of enquiry (Creswell 2013) to assure validity and trustworthiness of data. Additionally, this method triangulates the data, which according to Migiro and Magangi (2011: 3759) ensures its soundness and degree of variation, while Driscoll, Appiah-Yeboah and Salib (2007: 20) explained it as also able to clarify multifaceted, conflicting, survey responses.

The central premise of adopting a mixed method design is that the merging of quantitative and qualitative approaches ensures better comprehension of research issues, as opposed to either approach on its own (Cresswell and Clark 2011), and complement each other where there are limitations (Babbie 2010).

The population was restricted specifically to the operations of SMS poultry farmers in Ghana's BA region. A total of 100 participants, comprising 66 SMS poultry farmers, 10 MoFA and veterinary officers, and 24 consumers formed the population of the study. A non-probability, purposive sampling method of collecting data was adopted, via the use of a questionnaire, structured using a Likert-scale format, with adequate instructions to guide participants in tailoring responses in accordance with the research issue.

Analysis of the quantitative data was via the SPSS version 24.0. The Constant Comparative Analysis (CCA) method was used to ascertain broad patterns or categories and themes that become apparent from qualitative research studies. (Fram 2013: 11). This method was used because it is valid and grounded in theory.

1.11 Outline of the research

The study is set out in seven chapters as follows:

Chapter 1: Introduction

The background of the research has been dealt with in this chapter, along with the research context, problem, aims and objectives, as well as the RQs. It also comprised the study scope and limitations and the framework of the research. The chapter aimed at conceptualising the research project and guiding readers throughout the envisioned outcome of the whole research.

Chapter 2: Theoretical and conceptual framework

The chapter will explore pertinent underlying theories and a conceptual framework that underpin and guide the entire study. This chapter is complemented by re-examining of appropriate literature in the next chapter, thus enriching the information required for the study.

Chapter 3 Literature review

This chapter will review the pertinent literature that provided the historical context for the research topic. The researcher used journals and scholarly articles to substantiate work done by others in this study area. The chapter is organised according to the objectives of the study and under subtitles, leading the reader to identify methods for collecting, analysis and discussion of data, as set out in chapter four.

Chapter 4: Research methodology

The research design and procedures of the study are presented in this chapter, in addition to how the study was conducted. The chapter discusses the type of research (quantitative and qualitative) design and the method used in collecting data, as well as analyses and presentation of findings. The chapter defines the target population, highlighting the sampling method, data collection and analysis techniques. It also explains the form the data analysis takes and deals with the issue of validity and reliability pertaining to the research.

Chapter 5: Data analysis and interpretation

This chapter addresses the analysis and interpretation of data collected, with research findings portrayed in graphs and tables, as well as pie charts, used by the reader to assign meaning to the phenomenon and have an insight of a pictorial presentation or data display. The quantitative data are analysed utilising SPSS version 24.0. to produce descriptive statistical results. The constant comparative analysis (CCA) method is used to analyse the qualitative data.

Chapter 6: Discussion of the findings

Devoted to a discussion of the findings, drawing inferences from chapter five and from literature on poultry production, this chapter also includes a summary of the findings.

Chapter 7: Conclusion and recommendation(s)

The chapter concludes the study, with a discussion of the findings and inferences drawn from the research objectives, analyses and literature review. Feasible recommendations are proposed from the research findings, analyses, summary and conclusion. Future research is proposed to address the limitations of the current research.

1.12 Conclusion

The discussion in this opening chapter introduced the study's background and context, the research problem, the study aims and objectives, along with delimitations and limitations. It also discussed the research approach adopted in gathering data, as well as the tools used in the analyses of the data. A study framework, in the form of chapters, was also displayed. The subsequent chapter examines the theoretical and conceptual frameworks and explores relevant underlying theories, presenting a conceptual framework that underpins and guides the entire study.

CHAPTER TWO
THEORETICAL AND CONCEPTUAL FRAMEWORKS

2.1 Introduction

This study is underpinned by globalisation theory; international trade theories; particularly Ricardo's Comparative Advantage (CA) theory in his 1817 book *Principles of Political Economy* (Hill 2011: 166), Porter's Five-Forces competitive model (Porter 1979), Porter's three forces generic model and Porter's value chain (VC) model (Porter 1985), as well as Porter's vertical integration theory (Porter 1980). These theories relate to the global and local market environment in which firms compete, as well as the strategies SMS enterprises, particularly, can adopt to gain competitive advantage. The chapter also discusses a poultry VC model that can be espoused by SMS poultry producers in their operations to reduce cost, upsurge production and enhance competitiveness.

2.2 Globalization theory

Today, globalization theory has become a field of multidisciplinary and comprehensive debate (Asllani 2014: 75). The attempt to define globalisation generally highlights its economic dimensions, eliminating "artificial" boundaries to the flow of goods, global market services and production factors as the essential international integration channel. According to Amavilah, Asongu and Andrés (2014), globalisation can be defined as the cumulative integration of "the markets for goods, services and capital''. Globalisation, according to Hamdi (2013: 142), is a process of global economic, political and cultural integration. A different definition of globalization by Giddens (1990), indicated the amplification of universal social relations that connect remote localities, to the extent that events taking place several miles away mould local happenings, and vice versa.

Globalisation is, therefore, a move toward a universal economy that is more interdependent and integrated (Hill 2011: 6). Defined as a concept in the context of

this study, globalisation seeks to eliminate economic and social demarcations between nations, in order to integrate the world as one political, social and economic unit.

2.2.1 Impact of globalisation

Notwithstanding the substantial benefits globalisation has brought to countless economies, it has a huge effect on the competitiveness of companies in emerging economies (Baffour and Amal 2011: 122). The suggestion is that globalisation's impact hangs on a firm's competency to learn and innovate, as well as studying the organisational structure of successful firms in other countries (Baffour and Amal 2011: 122). Through globalisation, firms can have access to new markets, take advantage of lower costs of labour and raw materials, and enjoy the increased need to intensify competitiveness (ICSI 2014: 10).

Contrariwise, more pressure due to importation of new products from advanced nations results in loss of clients and strong competition from firms in Least Developed Countries (LDC) (UNCTAD 2018). This, however, compels firms to improve quality outcomes, customer satisfaction and business performance (Goriwondo *et al.* 2012: 32) to enable them to compete successfully. The multifaceted nature of globalisation, with probabilities enticing entrepreneurs to take advantage of lower tariffs, and threats requiring an entrepreneurial approach to enhance services and products (UNCTAD, 2018), is a challenge more apparent in many emerging economies globally (Mutalemwa 2015).

2.2.2 Globalisation of markets

Market globalisation, an aspect of globalisation, refers to one colossal international market resulting from the integration of historically unique and discrete domestic markets (Hill 2011: 6). In addition, declining obstructions to cross-border trade has made universal trade easier. Levitt (1983 in Hill 2011: 6) maintained that consumers' taste and preference in diverse nations are showing some global norm, thereby

enabling the creation of a global market. Coca-Cola, McDonald's hamburgers and Kentucky Fried Chicken (KFC) can be exemplified as global consumer products (Hill 2011: 6).

Presently, however, majority global markets are hardly markets dealing in consumer goods, where dissimilarities in preference and taste are of paramount importance, but rather markets of manufactured goods that serve the global need. These comprise markets for commodities, like aluminium, and oil for industrial products, such as automobiles and commercial aircraft (Hill 2011: 7).

2.2.3 The globalisation of production

The globalisation of production concerns the sourcing of goods and services from global localities, to benefit from national cost differences, and quality of production factors, including labour, energy, capital and land (Hill 2011: 7). Firms endeavour to reduce their total cost through the use of global sourcing, or improve their product offering's quality or functionality, thus permitting them to compete more efficiently (Hill 2011: 7). Inputs such as small hand tools used by small-scale farmers, as well as tractors and farm machinery, can then be sourced from the government, non-government organisations and the private sector to enhance farmers' production (Yuan 2016).

Nevertheless, the aftermaths of globalisation and trade liberalisation frequently encompass new threats. Certain industries are highly sensitive to changes in production costs, and due to the high amount of pressure emanating from global competition, this unquestionably affects local producers in countless ways (AFMA 2018: 24). Trade liberalisation can threaten developing countries' economies due to being compelled to compete in the same market arena as developed countries or economies. Local industry diversity can be restricted by this challenge or it can lead to the demise of newly emerged industries (AFMA 2018: 24).

2.3 International trade theory

For the past 50 years, the economic policy of many nations has been shaped by international trade theory. This trade theory was the motivation behind the establishment of the WTO, along with regional trade blocks, for instance, the European Union (EU) and North American Free Trade Agreement (NAFTA) (Hill 2011: 160).

Theories by Smith, Ricardo and Heckscher-Ohlin contribute to elucidate the international trade pattern acknowledged in the world economy (Hill 2011: 161). Climate and natural resource attributes are the reason for Ghana's cocoa exports, Brazil's coffee exports, oil exports by Saudi Arabia and crawfish exports by China. Nonetheless, of the observed international trade, there is much that is not easy to clarify.

As example, why are consumer electronics, machine tools and automobiles exported by Japan, or why are watches and jewellery exported by Switzerland, in addition to chemicals and, pharmaceuticals? (Hill 2011: 161). An explanation is provided by David Ricardo's theory of CA, with regards to international labour output differences (Hill 2011: 161).

2.3.1 Absolute advantage theory

Adam Smith, in his landmark 1776 book, *The Wealth of Nations,* criticised mercantilists' assumption of trade being a zero-sum game, whereby a gain by one nation leads to another's loss. The core principle of mercantilism is that it was advantageous for a country to export rather than to import (Hill 2011: 162). In doing so, gold and silver would be accrued, increasing the country's prestige, power and national wealth (Hill 2011: 162).

Smith (1863 in Hill 2011) stated that countries have different capabilities to produce goods. The English, in Smith's era, were the worldwide most resourceful textile

producers, with an exceptional manufacturing process ability. At the same time, the French had the most productive wine industry globally, owing to the combination of promising climate, suitable soil, and high level know-how. Thus, in textile production, the English had absolute advantage, whereas the French were at the top in wine production. Accordingly, a country has an absolute advantage in product production when it is better able to do so, more than any other country that produces the product.

A theory proposed by Adam Smith, known as absolute advantage, proposes that countries ought to specialise in producing goods they have complete advantage of and trade these for other countries' produced goods (Smith 1863 in Hill 2011: 163). Smith argued, a country should avoid producing goods locally that can be bought at a cheaper price outside its borders. In validating his argument, Smith stated that, by specialising in producing goods in which the individual nation possesses absolute advantage; through engaging in trade, both countries profit.

Through specialisation and trade, output of both the English and the French in textile and wine, respectively, would increase and both nations' consumers would consume more. Hence, we can observe trade as a positive-sum game, producing net gains for all parties involved (Hill 2011: 166). Specialisation, therefore, leads to greater economic efficiency and consumer benefits (Lynch 2016: 36). A firm gains economies of scale when an upsurge in its productivity results in its long-run average cost decreasing. Scale economies may emanate from specialisation, because when a firm's scale of operations expands, its opportunities to specialise in the use of factors of production also expand.

2.3.2 Comparative advantage (CA) theory

David Ricardo (1817) advanced the need to address certain concerns not answered in the absolute advantage theory. For instance, what could be the result of an

absolute advantage by one country in producing all goods? Smith's absolute advantage theory contends global trade would not be of benefit to such a country (Hill 2011: 166). This is not the situation, though, as stated by Ricardo's Comparative Advantage (CA) theory. Rather, it was reasonable to specialise in manufacturing of those goods a country produces expertly and trade with other countries for the goods it produces less efficiently: even though it may result in buying goods produced more competently itself, from other countries (Ricardo 1817 in Hill 2011: 166). Though this may seem counterintuitive, the rationale behind Ricardo's CA can be clarified with the ensuing illustration.

Working from the assumption that Ghana is more efficient in producing both chicken and cocoa, Ghana would thus have an absolute advantage. One ton of cocoa takes 10 resources to produce in Ghana and 13 1/3 resources for one ton of chicken. Therefore, with 200 resource units, 20 tons of cocoa and no chicken can be produced, or no cocoa and 15 tons of chicken or, for that matter, any combination in between on its production possibility frontier (PPF) (the line GG – Fig, 2.1). In the USA 40 resources are required to produce one ton of cocoa with 20 resources needed for one ton of chicken (Hill 2011: 164). The USA can produce five tons of cocoa and no chicken, 10 tons of chicken and no cocoa or any blend of its PPF (the line KK – Fig, 2.1). It should further be assumed that, unless trade takes place, half of its resources are employed by each country to produce chicken, while the other half is utilised in producing cocoa. Without trade, Ghana would produce 7.5 tons of chicken and 10 tons of cocoa (point A – Fig, 2.1), while the USA would produce five tons of chicken and 2.5 tons of cocoa (Hill 2011: 166).

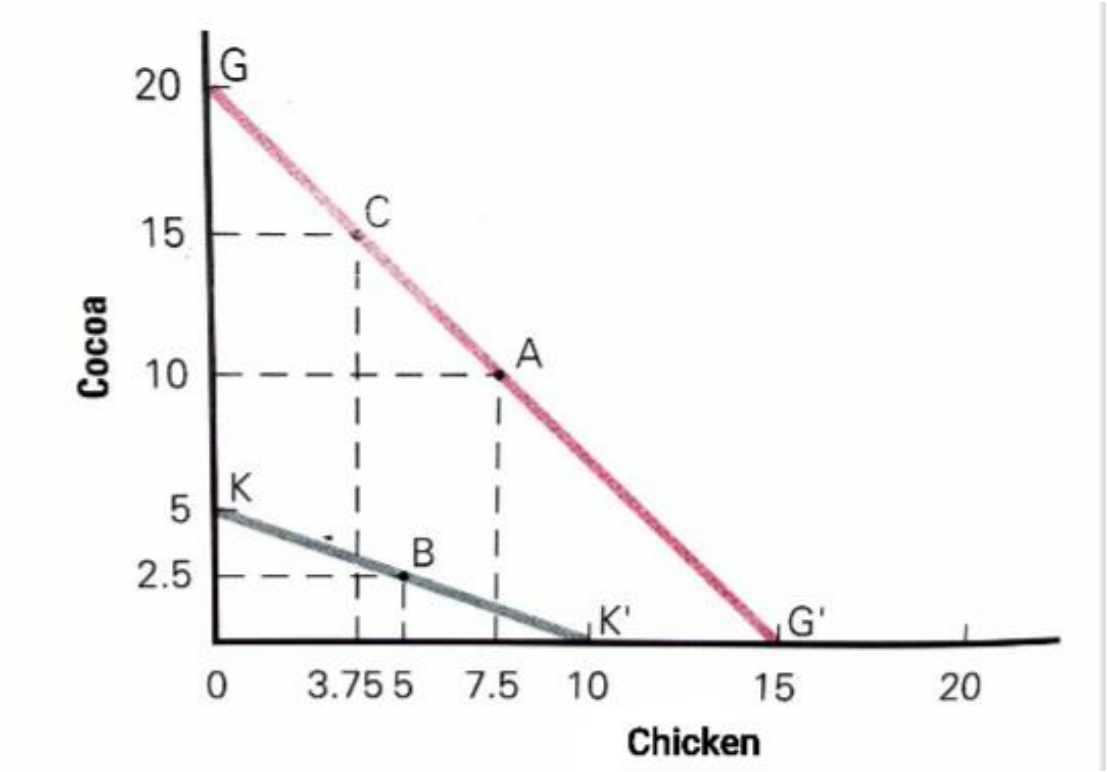

Figure 2.1: The theory of Comparative Advantage

Source: Adapted from Hill (2011: 166).

The question arises as to why Ghana, with its absolute advantage in the production of both cocoa and chicken goods, should trade with the USA? Even with this absolute advantage in the production of these goods, it is only in the production of cocoa that Ghana has a CA, able to produce four times as much as the USA, however, the country can only produce 1.5 times as much chicken as the USA. By inference, Ghana is unable to produce chicken more efficiently than cocoa.

A scenario without trade will see the combined production of cocoa at 12.5 tons (2.5 tons in the USA and 10 in Ghana), while the combined chicken production will be 12.5 tons (five tons in the USA and 7.5 in Ghana). In addition, without trade, each country has to consume what is produced. Each country can, through engaging in trade, increase their combined cocoa and chicken production, by specialising in the

production of the good it has absolute advantage for and afterwards trade with the other for the deficit goods; in so doing, both nations' consumers can utilise more of both products (Hill 2011: 167).

2.3.3 Comparative advantage and gains from trade

Think of a scenario where Ghana takes advantage of its CA in the production of cocoa, increasing output from 10 to 15 tons, which would deplete 150 resource units, allowing the leftover 50 resource units to be used in the production of 3.75 tons of chicken (point C Fig. 2.1). In the interim, the USA concentrates on chicken production, yielding 10 tons; combined output for both chicken and cocoa has expanded, having been at 12.5 tons of cocoa and chicken, respectively. Expanded output is thus 13.75 tons of chicken and 15 tons of cocoa (Ghana: 3.75 tons of chicken and USA: 10 tons). Table 2.1 summarises the source of the increase:

Table 2.1: Comparative advantage and gains from trade

Resources required to produce one ton of cocoa and chicken		
	Cocoa	**Chicken**
Ghana	10	13.33
USA	40	20
Production and consumption without trade		
	Cocoa	**Chicken**
Ghana	10.0	7.5
USA	2.5	5.0
Total production	12.5	12.5
Production with specialisation		
	Cocoa	**Chicken**
Ghana	15.0	3.75
USA	0.0	10.0
Total production	15.0	13.75
Consumption after Ghana trades 6 tons of cocoa for 6 tons of United States American chicken		
	Cocoa	Chicken

Ghana	11.0	7.75
USA	4.0	6.0
Increase in consumption as a result of specialisation and trade		
	Cocoa	**Chicken**
Ghana	1.0	0.25
USA	1.5	1.0

Source: Adapted from Hill (2011: 167).

From the above illustration, output is observed as higher, while benefit from trade is possible for both countries. In other words, should Ghana and the USA exchange chicken and cocoa on a unit-for-unit basis, four tons of export for four tons of import, this will allow both countries to consume more chicken and cocoa than they could have, prior to specialisation and trade.

Therefore, should Ghana receive four tons of chicken from the USA, in exchange for four tons of cocoa, there is a remainder of 11 tons of cocoa, 100 percent more than before trade. The four tons of chicken obtained from the USA, in exchange for its four tons of cocoa, when added to the 3.75 tons it currently produces locally, shows an end total of chicken at 7.75 tons, with a resultant 0.25 of a ton prior to specialisation. Likewise, after the exchange of four tons of chicken with Ghana, the USA is, nevertheless, left with six tons of chicken, more than before specialising. Moreover, the four tons of cocoa received in exchange, are 1.5 tons in excess of prior production. Consumption of chicken and cocoa can thus, as a result of specialisation and trade, increase in both countries (Hill 2011: 168).

The primary idea behind CA theory is that attainable world production is more realistic with unconstrained free trade, when compared with restrained trade. It is proposed by Ricardo's theory that, when there are no controls on trade, consumers in various countries across the globe can consume more; this also takes place in countries where there is no absolute advantage in any goods production. The theory

of CA additionally explains trade as “a positive-sum game in which all nations that partake achieve economic gains” because specialisation leads to efficiency and increase in production (Hill 2011: 166). Hence, encouraging free trade is strongly justified by this theory (Hill 2011: 168). The entire population thus gains advantage from international trade as consumers, with goods becoming inexpensive and obtainable in huge amounts. Apart from this, global trade offers no other economic benefits (Schumacher 2013).

2.3.4 Is the theory of comparative advantage relevant today?

The basic principle underpinning Ricardo’s CA theory is that it was reasonable for a country to specialise in producing such goods it produces best and acquire inefficiently self-produced goods from other countries, regardless of the consequence. The end-result is the procurement of goods from other nations that could more efficiently be self-produced (Ricardo 1817 in Hill 2011: 166). The benefits of the theory of CA is overly emphasised by Ricardo.

However, the dynamic nature of society presently renders the theory of CA quite irrelevant in a number of ways:

- The theory of CA fails to address the issue of lesser yields attributed to specialisation, arising when extra resource units are needed for the production of each added unit (Hill 2011: 170). Hence, as a country attempts to expand productivity of a specific product, it is highly possible to make use of further borderline resources, whose output is less than those originally used (for instance certain lands are more productive than others) (Hill 2011: 170). Though specialisation leads to an upsurge in productivity, the profit margin of raw material producing countries is certainly reduced by diminishing returns.

- According to Paul Krugman, a prominent USA economist, global producers’ constant application of economies of scale, through modern technology use, results

in many countries, such as China, where production is done very cheaply, with excesses exported (Economics Online 2019). In addition to this, there is a seemingly unappeasable demand for variety and choice, with the result that countries will, instead of specialising in a limited scope of products, generally make a variety of products for the world market, with the traditional CA theory thus almost outdated (Economics Online 2019). On the contrary, countries specialising in manufacturing activities rather benefit (Ukwandu 2015: 24), as they are able to generate additional employment, grow their revenue and in the long run, "enjoy the fruits of globalisation and international trade" (Hill 2011: 24).

- Different goods use resources in different amounts (Hill 2011: 170). In the case of two countries, Ghana and South Korea growing cocoa and rice, respectively, more land is utilised in the growing of cocoa than that of rice. Too much labour and too little land will proportionately be released by the rice industry to enable efficient production of cocoa (Hill 2011: 170). To accommodate the extra labour and land resources, more comprehensive production methods will be needed by the cocoa industry. The implication is that the cocoa industry's efficient utilisation of labour will decrease, resulting in diminished returns (Hill 2011: 170).

Considering the geographical area of Ghana totalling 238 533 km^2 (Aryee 2014: 91), with only 1 717 44 hectares of land area under cocoa production in 2015 (MoFA 2016). More beneficial for the nation, would be to include poultry as an additional sector of production as it uses less land and labour. Poultry production takes between six and seven weeks for broilers to be ready for market, unlike cocoa trees, which become productive four to five years after planting (ITC 2001: 5). According to Singh *et al*. (2011: 2), an integration farming system offers the prospect of increasing net profit significantly, as compared to cropping alone.

- The theory of CA might have worked perfectly in the 17^{th} and 18^{th} centuries, the eras of agrarian society, where production was mainly restricted to a nation's

geographical area endowed with fertile soil and good climate. It was sensible then to grow cocoa in Ghana and rice in South Korea (Hill 2011: 170). These two nations can therefore each specialise in their own product with a CA and trade their excesses with each other. However, the age of dominance of agricultural goods is over. Presently, raw materials can be sourced from other countries to benefit from national differences in raw material quality and cost (Hill 2011: 7) to boost production.

- Ricardo again failed to address the fate of nations that produce sole agricultural raw materials during adverse climatic conditions and disease outbreaks. In 1983, Ghana experienced an unprecedented drought, coupled with an extended harmattan, and the attendant bush fires ravaged many cocoa plantations and other food crops that resulted in a terrible famine in the nation (Agency for International Development 1983). Cocoa production in the early 1980s was lower than half that of the previous 20 years, with market conditions worsened by a nearly 75 percent drop in cocoa prices globally between 1977 and 1982 (Mulangu, Miranda and Maiga 2015: 4).

These natural disasters, coupled with unfavourable market conditions, unleashed a lot of hardships on Ghanaians. This is the price Ghana had to pay for boasting in the specialisation of cocoa as the only main cash crop. Another example, is the Great Famine of Ireland that claimed 1.5 million lives, as a result of a devastating potato disease known as blight. Of the Irish population, 33 percent depended on potatoes to survive, and the 1845 start of the disease resulted in mass starvations that carried on until 1853 (Fitzgerald 2013).

- According to CA theory, a country's production depends on the resources it has been endowed with and therefore, cannot produce more than what it has. Grounded on this postulation, it is hard to explain the attainment of Germany, Switzerland, Japan and South Korea that have scarce natural resources (Porter 1990: 76). However, we live in an age of computer and digital revolution, whereby

policy makers and business managers set the right policies and make good decisions for the development and diffusion of these technologies, while preparing their employees and supply chains to influence them and position their economies for development (Kearney 2017).

Modern technology can revolutionise global production systems and unleash a new trend of competition amongst producers and countries alike (Kearney 2017). In a nutshell, the application of technology in the modern economic situation has moderated the relevance of CA.

- Grounded on the theory of CA, capital and labour are mobile within a country, but internationally, immobile, with only processed goods able to move freely. Consider the high level of labour migration today, which has become a global phenomenon, and is motivated by inequality in wages between nations and regions. In addition, jet travel has enabled extensive and speedy movement of both people and goods across national borders (Hill 2011: 14).

Presently, capital moves frequently between nations thanks to the internet, which enhances e-commerce and globally accelerates funds and capital transfer, resulting in globalisation (Hill 2011:14). With the profusion of technology, money is becoming more digital than physical and is not bounded by time and location. E-commerce can be transacted, among others, through the use of a credit card and electronic money bank transfer (UNCTAD 2017: 2).

- Countries partaking in manufacturing activities benefit from CA more than those specialising in raw materials. According to (Reinert 2008:106), should countries in the primary-producing sector partake in semi-processing of the primary product, their profits can be optimised. For instance, fruits harvested in Ghana were traded in Britain to be processed and afterward, shipped back to Ghana at a greater cost (Offiong 2002: 45). Similarly, cocoa was exported from Mozambique to Portugal

for processing and re-exported to Mozambique as chocolate (Offiong 2002: 48). Mills and Herbst (2012: 5) contended it is hardly challenging for countries exporting primary products solely to achieve progress. According to Ukwandu (2015: 23), emerging economies in Africa that specialise in exporting primary products are basically specialising in poverty, as diminishing returns will certainly lessen the profit margin of poverty-striken countries.

Secondly, lack of technological advancement will not permit cocoa producers in Africa to make additional profit than countries such as Switzerland, where the making of chocolate is concerned, and who add increasing returns to their trade (Ukwandu 2015). An estimation of the cocoa industry in Malaysia shows it contributed a sum of RM1.566 billion to the nation's gross domestic product (GDP), consisting of RM16 million from the upstream sector and RM1.406 billion from the downstream sector.

With this huge profit margin obtained from cocoa processing, Malaysia's aim is to become the "King of Chocolate in Asia", with the local cocoa industry having earned RM5 billion in exports in 2015 (The Star Online 2016). Due to the economic benefits accrued from cocoa processing, Lim, the president of the Federation of Malaysian Manufacturers, emphasised the need to build more chocolate factories, instead of more cocoa plantations (MalayMail 2017). Conversely, Ghana is wallowing in poverty, as the nation continues to expand cocoa plantations and export raw cocoa beans, without thinking of adding value to the product to gain more revenue and create more jobs for its citizens.

Since the movement of capital is free internationally, England, and indeed most of the world's advanced economies, will incessantly enjoy the CA ingrained in manufacturing. The bottom line is there will be plenty jobs and lots of technological and industrial growth in processing countries (Ukwandu 2015: 23; Reinert 2008: 106) than in countries that continuously export primary products, without adding value to

such products. The latter will thus experience impoverishment and lack of development in the near future.

2.3.5 Deconstructing the theory of comparative advantage

There has been overwhelming support for free trade by most economists, due to the supposed benefits free trade accrues to practicing economies (Sulaymonov 2017: 1). Generally, the CA theory has been the main backbone of free trade (Ricardo 1817), illustrating why free trade is beneficial for all nations, worldwide, and how free trade certainly leads to the achievement of those benefits.

Based on free trade theory, it is of paramount importance for impoverished countries to engage in free markets and be part of a free trade regime, so as to elevate living standards (Schumacher 2013). The entire WTO process of trade liberalisation, which embraces universal economic welfare can be optimised by free trade, is grounded in the CA theory (Schumacher 2013).

The theory of CA argues nations should focalise on the production of goods and services for which they have a CA (Ricardo 1817), in other words, those goods and services that can be produced cheaply, whether due to higher levels of output or lower production costs, comparative to that of other countries (Dolphin 2014).

Nonetheless, economists such as Hausmann and Hidalgo (2011) and Cristelli *et al.* (2013) have lately started examining the competitiveness of countries in a different way, based on the observation that the most competitive nations hardly specialise, instead, they have a high degree of diversification in their exports (Dolphin 2014). Hausmann and Hidalgo (2011) therefore contended it is industrial diversification, rather than specialisation, which empowers national wealth creation. From this perspective, the growing interconnectedness of products and services means greater diversification is connected with the accumulation of more ‘capabilities’ (Dolphin 2014); the things needed to allow production of particular goods and

services. Dolphin (2014) stated that the more capabilities an economy has, the better positioned it is to create new areas of CA, which can produce strong export development; and a higher national income per head.

As explained by Hausmann and Hidalgo (2011), poorly diversified nations can only export goods also exported by several other nations, while most diversified nations are able to export more exclusive, less widely exported goods. Equally, Cristelli *et al.* (2013) proposed that, given their level of technology and development, many countries tend to produce as wide a range of products as they possibly can. These assertions relate to the success of Brazil, Malaysia and other recently developed economies.

Technological capability, regarding the adoption of relevant new technologies applied to production and processing of various natural resources, can be relevant in tapping the potential of natural resource endowments (Hanson 2017: 133). The experience of Malaysia's diversification efforts into cocoa production has revealed that, even though Malaysia has a greater labour cost than West Africa and Brazil, it has been predominantly successful in gaining relative comparativeness in the production of cocoa, by attaining unprecedented yields from novel hybrid varieties developed by its crop-breeding programme (International Trade Centre 1987). In addition, the success is attributed to the launch of a newly produced fertiliser, known as MCB F1 HYFer, developed specifically for cocoa, which had been proven to increase production by 20 percent, compared with conventional fertilisers (The Star Online 2016).

After gaining independence from British rule in 1957, Malaysia diversified its production and major source of incomes away from tin and rubber, to its electronics factories, and the production and processing of oil palm and palm oil, respectively (Thillainathan and Cheong 2016: 55). This was fuelled by the underlying strategic policy thrust, in view of the high instability in rubber and tin prices, and an expected

drop in long-term commodity prices, particularly rubber (Yusof and Bhattasali 2008). The diversification of production was in the right direction, as competition from synthetic rubber has lately exacerbated the volatility of the commodity market (Yusof and Bhattasali 2008).

Yeats (1991) argued a natural-resource-based industrialisation strategy can be beneficial to economies that produce primary commodities, and several emerging economies have tried to adopt this strategy. Currently, rubber, palm oil, and wood-based products are the three important resource-based manufacturing industries in Malaysia. With the diversification of the agricultural sector away from rubber, the cultivation of palm oil became a chief contributor to export earnings for Malaysia. Palm oil is the chief export product for Malaysia, and the processing of palm oil for export has been part of the country's general industrialisation strategy (Yusof and Bhattasali 2008). Hence, markets for processed commodities may be more stable than those for raw commodities, and could ultimately yield more stable and larger price increases (Yusof and Bhattsali 2008). Emerging economies must make efforts to stimulate local processing of domestically produced primary commodities to increase their profit margin and also create more job opportunities.

The rise of Brazil as an agro-exporter powerhouse, from being a net agro-importer and food aid beneficiary, was a milestone in the country's economic development (Hopewell 2016). This change was catapulted by state-driven novelty and associated policies that opened up considerable new fields to the nation in agriculture and empowered it to diversify towards the production of goods in direct competition with the global leading agricultural exporters; a phenomenon that produced considerable achievements in productivity and competitiveness (Hopewell 2016).

The recent diversification of Ghana's agro-production from cocoa to cashew has strategically gained the country a competitive edge in the international market

(GhanaWeb 2017). In 2016, the amount of raw cashew nuts exported was 163,000 Mt, which placed Ghana as one of the chief exporters of the commodity in the global market (GhanaWeb 2017). Currently, cashew sells on the world market at US$2,200 per Mt, as opposed to cocoa at US$2,100 for the same quantity. The entire export revenue obtained from cashew in 2016 was US$244,500,000, making the commodity the chief non-traditional crop export revenue generator in Ghana (GhanaWeb 2017).

According to Lin (2012: 3), countries that remain poor have failed to achieve structural transformation in failing to diversify away from agricultural raw material production into manufacturing activities. Specialisation in agricultural exports has an economic disadvantage, due to the price unpredictability of agricultural products at the global market and the declining trade terms for raw materials, in comparison with processed goods (Gonzalez 2010: 465). Approximately 43 developing countries depend on a sole agricultural products for over 20 percent of their entire revenues from commodities exports (FAO 2004).

The majority of these countries are in Sub-Saharan Africa (SSA), Latin America and the Caribbean, most of which suffer from extreme poverty, with more than three-quarters of these considered as LDCs, where per capita GDP is lower than US$900 annually (FAO 2004). Among the 42 countries being categorised by the International Monetary Fund (IMF) and World Bank as Heavily Indebted Poor Countries (HIPCs), 37 depend on chief commodities for over half of their commodity export revenues.

Over a half of the world's cocoa and above a quarter of its coffee, are grown in nations categorised as HIPCs (FAO 2004), with Ghana included among those countries classified as HIPC and the second highest producer of cocoa. According to the Sustainable Commodities MarketPlace (2019), Ghana, in the 2016 exported cocoa beans worth (USD 2.5 billion) followed by Côte d'Ivoire (USD 3.9 billion).

LDC and HIPC countries are highly vulnerable to market-related and weather induced economic volatilities, more so than that of highly diversified economies. Adverse weather conditions, poor markets and declining agricultural prices can impede the ability of these countries to buy food and other essential commodities on international markets. Economic diversification and industrialisation are, therefore, indispensable in promoting food security and poverty alleviation (Dreze and Amartya 1999: 76).

Ghana can thus not survive on a single cash crop (cocoa), which is sometimes left at the mercy of the weather, bushfires, as well as the dictates of the commodity market. Hence the need to diversify into other sectors of production, such as poultry. Against this background, the study investigates strategies that could upsurge the competitiveness of the poultry industry in latecomer Ghana, to augment the nation's CA.

2.4 Porter's Five-Forces competitive model

The market is a volatile and competitive arena, where there is a continuous fierce and dynamic contest among competitors (Thompson *et al*. 2012: 102). Each competing firm strives to utilize whatever strategy in its business capacity it believes will entice and retain customers, reinforce its market position, and produce better results. The challenge then, is to develop a competitive strategy that will not only fortify the firm from the onslaught of competitors but also offer a competitive advantage over rivals (Thompson *et al.* 2012: 102). For example, when a particular firm employs a strategy or adopts a novel strategic advancement that yields positive outcomes, its competitors respond with offensive or defensive counteraction of their own (Thompson *et al.* 2012: 102).

Porter's Five-Forces are employed to analyse competitive positions against other firms operating in the market and also examines how a firm's performance varies in different competitive situations (Pervan, Curak and Kramaric 2016: 2). According to

Porter (1980), there are five key forces that, collectively and individually (as a result of internal and external reactions), generate values for businesses through competitive advantages.

Porter affirms the five forces that threaten organisational competitiveness comprise new entrants, rivalries among competitors in the same industry, bargaining power of both suppliers and buyers, as well as the threat of substitute commodities. The threat of new entrance is the evolving of new or related business in the market, such as recent competitors to existing business. The evolving of new firms implies that existing firms will have additional business competitors, so their markets will be shared by those new rivals (McKenzie 2015).

New entrants could impact existing firms by offering more value to new customers, with their chief objective to secure the shares of new markets by creating pressure on policies and prices (Cadiat and Probert 2015). Porter's Five forces model has been used as one of the models that underpins this study, due to its applicability in Ghana's poultry industry. Porter's five forces of competition maintains the competitive forces impacting industry profitability transcend rivalry among competing sellers and incorporates pressures from four coexisting forces.

The five competing forces include, (1) competition from rival sellers, (2) competition from potential new entrants to the industry, (3) competition from producers of substitute products, (4) supplier bargaining power, and (5) customer bargaining power (Thompson *et al.* 2012:102). These competitive forces will be discussed further in the subsequent sections. The intensity of the forces, however, enables industry management to forge competitive weapons against competitors and also to attain a long-lasting competitive advantage above key competitors (Thompson *et al*. 2012: 62).

2.4.1 Rivalries among Competitors in an Industry

As competitive pressures from other firms in the industry increase, dynamic rivals may compete with one another to differentiate their products, by offering better products or enhanced customer service. The magnitude of the rivalry differs from one industry to another and is subject to diverse factors that include:

Rivalry intensifies as the products of competing sellers become more undifferentiated, and it weakens as the products of industry rivals become highly differentiated. When the offerings of rivals are undistinguishable, buyers tend to be brand loyal, a situation that easily propels rivals to induce buyers to switch over to their offerings. On the contrary, strong differentiated offerings among rivals breed high brand loyalty on the part of buyers, with many buyers considering some brand attributes as more attractive or appropriate for their needs (Thompson *et al.* 2012: 106).

Imported poultry products are differentiated in terms of processing and packaging. These same methods of differentiation can be adopted by local farmers by adding value to their products and thus achieving a competitive edge. Moreover, local chicken products can be differentiated by taste, freshness and leanness. These attributes usually appeal to consumers, since these are considered visual quality cues that influence purchasing decisions (Xazela, Hugo, Marume and Muchenje 2017: 8)

Rivalry amplifies as competitor numbers upsurge and become more equivalent in magnitude and competitive strength. The larger the number of competitors, the greater the likelihood that one or more companies will be vigorously employ strategic offensive to boost their market position, thus increasing competition and putting new force on rivals to retaliate with offensive or defensive moves of their own (Thompson *et al*. 2012: 106).

Although the threat from dominant rivals may cause a decline in firms' profits, since rivals can reduce their ability to increase market share, threats compel firms to differentiate their products, specifically through value addition, to enable competitive edge (Thompson *et al*. 2012: 106).

2.4.2 Bargaining Power of Suppliers

Whether suppliers of industry members represent a strong or weak competitive force, rests on the extent to which suppliers have adequate bargaining power to determine the terms and conditions of supply to their advantage (Thompson *et al.* 2012: 112).

Bargaining power is the power of suppliers who gain strong influence on product prices, as they are able to raise or lower the prices of their goods (Martadisastra, Drayanto, Arfin, and Gumbira-sa `id 2014: 392). Bargaining power can create a huge change in each firm. Suppliers with powerful influence can eat away industry profitability, by charging industry members bigger prices, passing cost to them, and restricting their opportunities to obtain superior deals (Thompson *et al.* 2012: 112).

Suppliers of fish meal, the protein component of poultry feed, have uncontrollable bargaining power, as poultry producers cannot do without fish meal.

There are then factors that influence the capability of suppliers' bargaining power, which comprise the following:

Whether supplier products are in short supply. Suppliers of goods in limited supply have pricing authority and negotiating advantage, whilst an upsurge in the existing supplies of specific items moves the negotiating abilities to industry members. Suppliers of the protein component of poultry feed, especially fish meal, have pricing power due to its scant supply.

Whether perfect substitutes are accessible to suppliers' products. The readily accessibility of substitute inputs reduces the negotiating influence of suppliers, by decreasing the reliance of industry members on their suppliers. The superior the price and performance attributes of the substitute inputs, the feebler the negotiating ability of suppliers. Suppliers continue to have bargaining power due to local farmers, as yet, not having developed or determined a cheaper protein substitute, such as maggot meal, to replace rocketing fish meal prices (Okah and Onwujiariri 2012: 472).

Whether it is economically sensible for industry members to embark on backward integration and self-manufacture materials they have been purchasing from suppliers. On the one hand, it becomes generally challenging for industry members to manufacture on their own parts and components less expensive than can be obtained from suppliers that specialise in the production of those items (Thompson *et al.* 2013: 115). On the other hand, poultry farmers in Ghana are mostly farmers who self-produce maize, using poultry manure as fertiliser to boost production and also reduce production costs. Farmers can, therefore, integrate backward to produce more soybeans and vegetables to supplement what they cannot self-produce.

2.4.3 Bargaining Power of Buyers

The bargaining power of buyers signifies the ability of buyers to influence the prices and quality of particular products and services (Martadisastra *et al.* 2014: 392). Whether buyers can exercise tough competitive pressures on industry members rest on: (1) the extent to which buyers possess negotiation ability and (2) the degree to which buyers are responsive to price. Buyers with effective negotiation ability can narrow industry lucrativeness by price concession or better terms of payment terms. Different buyer groups (wholesalers, retailers and consumers) depict different degrees of bargaining power. For example, small retailers, restaurants and fast food outlets have more bargaining power over poultry producers than individual consumers, as the former normally buy these products in bulk to speed up the marketing process (Thompson *et al.* 2012: 115).

Below are some of the factors that influence buyers' bargaining power:

Buyers' bargaining power surges when goods are standardised or differentiation is feeble; in such conditions, buyers make their choices based on price, which upsurges price competition amongst sellers. By differentiating products, buyers' choices are more restricted and they are more directed to moderate prices, which may indicate inferior quality (Thompson *et al.* 2012: 116).

Buyer price sensitivity rises as buyers are able to make a small profit from consumers with little earnings. Price is a vital factor in the buying decision of low-income consumers and enterprises scarcely coping. In situations like this, high price responsiveness restricts the power of vendors to charge exhorbitant prices (Thompson *et al.* 2012: 118). Most consumers buy imported chicken because it is cheaper (Kwadzo, Dadzie, Osei-Asare and Kuwornu 2013: 72). In order to improve productivity and attract consumers to local products, efforts must be made by producers to strategize their production methods to reduce costs.

Cadiat and Probert (2015) stated that, in a competitive business atmosphere, buyers' influence depends on their capabilities to bargain with producers. This means buyers with bargaining ability could compel producers to decrease product or service prices.

2.4.4 Threat of Substitute Commodities

The threat of substitutes denotes products or goods available in the market. Recognising supplementary products involves seeking for other products or services that can serve the same purpose as the industry's products (Riley 2012). Customers or buyers can thus have several alternatives to select other products, instead of depending on a sole brand or distinct product (Debasis and Sayantani 2015: 7). For instance, consumers in the music industry can choose to buy CDs or download digital music from sites like iTunes (Thompson *et al.* 2012: 111).

In the poultry market, however, it becomes extremely difficult to find a close substitute for chicken, unless consumers consider imported chicken as a substitute to local chicken, with the former being processed and packaged, unlike the latter. Since imported and local chicken are the same basic product, they constitute rivals, not substitutes (Thompson *et al.* 2012: 111).

The availability of a close supplement generates competitive pressure, by placing a ceiling on the prices, industry members can switch, without granting customers an incentive to shift to substitutes and risk sales erosion. In determining to shift to an alternative product, customers matches its features, performance, simplicity of use and other attributes, in addition to price, to see whether the supplement presents superior value for money than the industry's product (Thompson *et al.* 2012: 111).

2.4.5 Potential new entrants

New entrants into a market introduce new production capability, the intent to set up a save place in the market, and occasionally, considerable resources. Just how severe the competitive threat of entry is in a specific market hinges on two classes of factors: (1) barriers to entry, and (2) the anticipated response of incumbent firms to new entry (Thompson *et al.* 2012: 107). A barrier to entry exists whenever it is hard for a newcomer to break into the market and/or the economics of the business put a potential entrant at a disadvantage. An entry firm may face a huge challenge when incumbent firms enjoy cost advantages associated with large-scale operations, outsiders must either enter on a large scale (a costly and perhaps risky move) or accept a cost disadvantage and consequently lower profitability (Thompson *et al.* 2012: 107).

The following is included among other barriers new entrants may encounter:
Sizeable economies of scale in production, distribution, advertising, or any other area of operational. Whenever existing firms benefit from cost advantages

connected to large production scale, new entrants must also enter likewise or accept a cost disadvantage and subsequently, lessen profitability.

Considerable cost advantage is enjoyed by incumbent firms by virtue of expertise and learning curve effects. In several industries, existing firms are favoured by learning-based cost savings, accrued from experience and carrying out activities, namely manufacturing, new product development or inventory management. This offers existing firms a 'first mover' advantage above new entrants that may be tough to surmount (Thompson *et al.* 2012: 107).

Incumbent firms that are eager and able to present powerful, defensive moves to perpetuate their positions, can make it difficult for a new entrant to obtain adequate market footing to succeed and finally become lucrative. Among other defensive measures deployed by incumbents are: the offering of price discounts, running frequent sales promotions, adding attractive new products, paying a lot on advertising, or offering additional services to customers (Thompson *et al.* 2012: 107). Such defensive maneuvers on the part of incumbents raise an entrant's cost and risk and have to be considered likely if one or more incumbents have previously tried to strongly contest the entry of new firms into the marketplace (Thompson *et al.* 2012: 107).

In March 2013, the South African Poultry Association (SAPA) applied for higher tariffs to ensure the sustainability of SA broiler production and deter unfair competition from foreign producers (Davids, Meyer, and Louw 2015). In Ghana, however, the domestic firms encounter fierce import competition from foreign competitors resulting from free market (Neequaye, Haung, Amowine and Fynn 2018: 182), coupled with GNAPF's inability to keep new entrants (foreign competitors) at bay on behalf of its members.

In response to these five factors, Porter (1980) additionally indicated that competitive strategy assumes one of three generic forms: cost leadership, differentiation and focus, which are discussed below.

2.5 Porter's generic strategy model

One other theory that underpins this study, is Porter's generic strategy model, with the two crucial strategies (Porter 1980; 2004) being cost leadership and overall differentiation strategy, whilst focus, the third strategy, was built on these two strategies. The competitive scope of the firm's choice is focus (Mutisya 2013: 10).

2.5.1 Cost leadership

A cost leadership strategy is a conglomerated set of activities employed to produce goods or services, with attributes that satisfy consumers at the lowermost cost, comparative to that of competitors (Ireland, Hokisson and Hitt 2011). This strategy embodies efforts by firms to produce competitive advantage, by attaining the least cost in the industry (Porter 1980).

A requirement for attaining this industry-wide, lowermost cost level is to gain a large market share and consequently, produce in great amounts. The company sells its products either at regular industry prices, to make a profit above that of competitors, or lower than the normal industry prices, to achieve large market share. This allows for cost digression based on experience curve effects, sharing out fixed costs amongst a large quantity of products, and exercising market power (Porter 1980; 2004).

Ways in which firms gain cost advantages include amelioration process efficiencies, obtaining sole access to a great source of lowermost cost materials, making appropriate outsourcing and vertical integration decisions, and accelerating cost spreading and control, along with overhead cost and cost optimisation, in aspects such as research and development (R&D), service, sales force and advertising

(Porter 1980). When competing firms fail to reduce their costs by a comparable amount, the firm can experience a competitive advantage grounded on cost leadership.

Some scholars perceive cost leadership strategies as single practicable for big companies, with the opportunity to enjoy scale economies and volumes of production. Nevertheless, this takes a narrow industrial outlook of strategy. Small firms can equally become cost leaders on particular product lines when they enjoy any advantages favourable to low costs (Zamani *et al*. 2013). For instance, a local restaurant in a low rent locality can entice price-sensitive clients by serving a customised menu, rapid table turnover and employing staff on minimum wage (Nyauncho and Nyamweya 2015).

Products or process innovation may similarly allow a start-up or small business to offer an inexpensive product or service, in cases existing firms' costs and prices have turned out to be exorbitant (Nyauncho and Nyamweya 2015). Firms pursuing a cost leadership strategy attains cost advantage by increasing efficiency, enhancing processes, and attaining lesser production cost, either through vertical integration or by employing optimum outsourcing (Zang 2013: 3).

Although a cost leadership strategy favours large firms, this strategy could suit SMS poultry producers in Ghana, who are yet to exploit available resources, especially feed, which is the most expensive input, to lower production cost and increase their output. Moreover, as the GoG subsidises poultry inputs, production cost would decrease, enabling farmers to maximise poultry production.

2.5.2 Differentiation strategy

Pearce and Robinson (2011) stated that, the differentiation strategy is a business strategy that aims at building competitive advantage through its product or service, by having it unique from other obtainable competitive products, sprang from product

features, performance, or other factors not precisely associated with cost and price. The dissimilarity would be the unique product or service difficult to generate and/or hard to reproduce.

The differentiation strategy is employed by a firm to be distinctive in its market, and seeks to obtain a price premium through its differentiation, which can hardly be duplicated by other competitors (Porter 1985). Firms pursuing a differentiation strategy endeavour to craft and market distinctive products for diverse consumer groups. They seek to create an exceptional fulfilment of customer needs in one or numerous product attributes, so as to build up customer satisfaction and loyalty, which can frequently, in turn, be utilised to charge the lowest price for the products (Morshett, Swoboda and Schramm-Klein 2006).

Consequently, the firm pursuing cost leadership, must for instance, make products with the best components, integrate expertly, inspect them carefully, and effectively advertise their superiority (Kotler and Keller 2009: 94). According to Michael (2011), there are six pointers that elucidate differentiation strategy namely: new product or existing product development, placing emphasis on offered new products, the extent of introducing a novel commodity to the market, as well as advertisement and marketing force, with the focus on both selling effort development, and a powerful brand development.

Firms that try to out-compete their rivals adopt certain basic differentiation features. These features comprise superior quality, enhance performance, broader product selection, and more desirable styling, as well as valued-added services, and technological excellency. Prosperous embracers of differentiation strategy comprise Apple (innovative products), Johnson & Johnson in baby products (product reliability), Mercedes (engineering design), and Rolex (top-of-the-line prestige) (Thompson *et al*. 2012: 56).

These firms have gained a competitive advantage due to their capability to satisfy consumer needs more successfully than competitors can, hence maximizing their customer's readiness to pay premium prices. Notwithstanding the higher price of domestic chicken, most Ghanaian consumers express a preference for it and are ready to pay more, because of its taste, freshness and leanness, compared to imported frozen chicken (Xazela *et al.* 2017: 8; Woolverton and Frimpong 2013: 19). One way of sustaining this type of competitive advantage is to become adequately innovative in foiling ingenious competitors' strategies to mimic or similarly replicate the product offering (Thompson *et al.* 2012: 56).

Other surveys show small firms are able to more quickly adopt a differentiation strategy as a source of efficiency and competitiveness (Xuefeng and Xiaobo 2011: 22). Contrary to this, Hammervoll, Mora and Toften (2014: 112) asserted that SMEs operating in advanced, extremely competitive atmospheres, may hardly be effectively differentiate because of low barriers to entry, or may have inadequately easy-to-imitate resources, narrowing the array of viable strategic choices. Conclusively, it is beneficial for SMEs to employ hybrid or integrated competitive strategies so as to achieve competitive edge and gain optimum continual business returns (Ouma and Oloko 2015: 1060; Saldanha, Rahyuda, Yasa, and Sukaatmadja 2019: 2456).

Though some studies indicated pure strategies (adopting either of the three generic strategies) enhanced performance (Lechner, Gudmundsson and Vidar 2014; Hansen, Nybakk and Panwar 2015), others showed hybrid strategies, where elements of both generic competitive strategies merge concurrently, generate higher achievement (Manev, Manolova, Harkins and Gyoshev 2014; Salavou 2013). Hybrid strategies comprising a high level of accentuation on both differentiation and cost leadership strategies concurrently, should be differentiated from a 'stuck-in-the-middle' strategy, whereby a firm backfires effectively follow either of the differentiation cost-leadership strategies (Mita, Ochie'ng, and Mwebi, 2017: 482).

Considering the possibilities of adopting mutually cost-leadership and differentiation strategies in the case of SMEs, farmers in Ghana can employ both strategies simultaneously to increase the poultry industry's competitiveness. Moreover, with the availability of resources (nonconventional feed ingredients), coupled with consumers' preference for local chicken (Xaxela *et al.* 2017: 8; Alhassan *et al*. 2014: 220), the adoption of a hybrid method can be effective.

2.5.3 Focus strategy

Firms that use a focus strategy offer a specialised service in a niche market (Porter 1985). By adopting a focus strategy, firms can attain an edge using either superior efficiency in satisfying the niche market or superior efficiency addressing customers' distinctive needs. These firms are capable of achieving competitive advantage by performing above rivals in responding to the distinctive needs and tastes of clients in the niche market (Thompson *et al*. 2012: 56).

Focus strategy can be separated into cost focus strategy and differentiation focus strategy. This strategy is quite distinct from the others since it is based on the selection of a limited competitive scope in an industry (Porter 1985). The assumption is that the needs of the niche can be well addressed by focusing completely on it. Firms that adopt a focus strategy prioritise particular niche markets and, by understanding the dynamics of that market and the exclusive needs of customers within it, create entirely low cost or well-defined products for the market (Su and Tang 2016: 6).

A focus strategy can be adopted to suit poultry farmers who specifically produce indigenous chicken (IC) for consumers who have a preference for tough, less fatty, fresh and tasty chicken meat. Smallholder poultry farmers and those that produce specialty or value-added chicken meat, are more likely to focus on a particular niche market. However, care must be taken in using a focus strategy for the poultry

industry in Ghana, as a middle income country, with price being the main determining factor, where consumer preference for chicken meat is concerned (Woolverton and Frimpong 2013: 19; Kwadzo *et al*. 2013: 71). Therefore, price must be carefully considered when producing chicken meat for a niche market.

2.6 Conceptual framework

The conceptual framework for this study is grounded primarily on the theories captured in the theoretical framework, particularly Porter's Five-Forces competitive model (Porter 1979), Porter's three generic model and Porter's value chain (VC) model (Porter 1985), as well as Porter's vertical integration theory (Porter 1980). These theories are used to analyse the competitive capabilities of the poultry industry, with particular emphasis on cost reduction strategies (Thompson *et al*. 2012: 229) that will enhance efficiency of production and increase competitiveness (Dima *et al*. 2018: 12). Essentially, a host of efficient strategies are available to a firm. It is significant that a firm develops its peculiar growth strategy according to its own characteristics and environment (Adeleke *et al.* 2019: 1)

The conceptual framework in this study highlights value chain analysis (VCA) as a tool to promote competitiveness of poultry production in Ghana. The term value chain was originally introduced by Michael Porter. According to Porter (1885), a VC is a set of activities that an organisation performs to create value for its customers. Gereffi and Fernandez-Stark (2011), defined VC as the full array of activities that firms and workers enact to develop a product from its conception, through the various stages of production, to the final consumer and beyond. In the context of the current study, VC is defined as a set of primary activities performed to add value to poultry production cost effectively, from the primary stage to maturity, to satisfy the needs of consumers.

With the poultry industry's emphasis on value-creation activities, the VCA is an appropriate device for assessing how the industry provides on its customer

proposition (Hassan 2012: 70). It offers an opportunity to comprehend the poultry industry's cost structure and capability to present lower prices, while at the same time not compromising quality (Thompson *et al*. 2012: 158).

The capacity of any industry to comprehend its own competences and customer needs is crucial for an effective competitive strategy. Lack of development strategies drains the company of possible opportunities which usually leads to loss of its entrepreneurial managers (Kotler and Keller 2014). The poultry industry can achieve great profits by creating more value for its customers and able to do that at a lower cost (Hill 2011: 404), an idea associated with low cost strategy that underscores reducing the cost of production (Hill 2011: 404). Porter contended that differentiation and low-cost are two key strategies for value creation and achieving a competitive edge in a firm (Porter 1980).

Porter (1980) maintained, firms can generate superlative value and achieve superior profitability. The means of creating superior value, is to reduce the business' cost to the barest minimum and or differentiate the product to be valued by customers, to the extent where they are ready to offer a premium price (Hill 2011: 404).

Moreover, added value creates more profitability for an organisation (Porter 1985). It must then be noted that there is a profit margin element of the VC. Tracking the profit margin, in addition to the value-creation activities is crucial, unless an industry thrives in providing customer value cost-effectively, the business cannot maintain growth for long (Thompson *et al.* 2011: 158).

A company's VC comprises two key classifications of activities: the core activities that lead to creating value for clients, and essential support activities that expedite and improve performance of the primary activities. The core activities include inputs, supplies, operations, and distribution, as well as marketing and sales as the chief in creating value for consumers (Thompson *et al.* 2012: 157). These primary activities

are supported by product R&D, technology, human resource management and general administration, to enhance performance of the primary activities, as stated by the United States Agency for International Development (USAID) in its 2016 Briefing Paper, along with Thompson *et al.* (2012: 158). It remains crucial to determine strategies that emphasise those activities that would support the company in achieving a sustainable competitive advantage.

Managers can identify which VC activities, either primary or supporting, can be enhanced for better performance. This type of enhancement does not only bring efficiency but can also become basis of competitive edge, as in the situation of poultry production. The VCA in this study represents a set of primary activities the SMS poultry producers perform by procuring quality input in-house and/or outsourced from suppliers, to enable production of quality poultry birds they can process and thus deliver a valuable product for the consumer (Porter 1985).

The main purpose of performing this set of activities in the VC is to ensure cost saving, without compromising in quality. This will create a strong correlation between the actors (SMS poultry producers, suppliers, processors, retailers and consumers) in the chain for value creation and for competitive advantage.

The VCA therefore assists in evaluating which particular value every specific function adds to the firm's products for customer satisfaction. Hence, the more value a company can create, the more willing customers are to pay the price and the more profitability the firm is able to attain (Sarku and Appiah 2017: 151; Anselmsson, Bondesson and Johansson 2014: 91). Porter (1985) suggests that the source to identify competitive advantage of a company lies in its understanding and adoption of a VC. The value addition to local poultry products at a cheaper cost can ensure the industry's competitiveness.

2.6.1 Conceptualising the poultry value chain

For the purpose of this study, the poultry VC is categorised into three stages, namely: Primary stage one, two and three (Fig, 2.2).

Primary stage one comprises input supplies and in-house production. These inputs include raw materials for feed sourced from the farmer's own production, as well as those sourced from other farmers and suppliers. Other inputs are DOCs from the farmers' cooperative hatchery, and vaccination services obtained from the veterinary officers.

The production process, where the farmer raises the DOCs to maturity, is primary stage two and critical, as inputs must be used efficiently to achieve optimum results. Primary stage three comprises the processing, storage, and marketing and sales of the chicken meat to the consumer at a reduced cost. These three stages are integrated and all the actors (suppliers, producers and processors) add value to the product at each stage to enhance cost effectiveness and competitiveness.

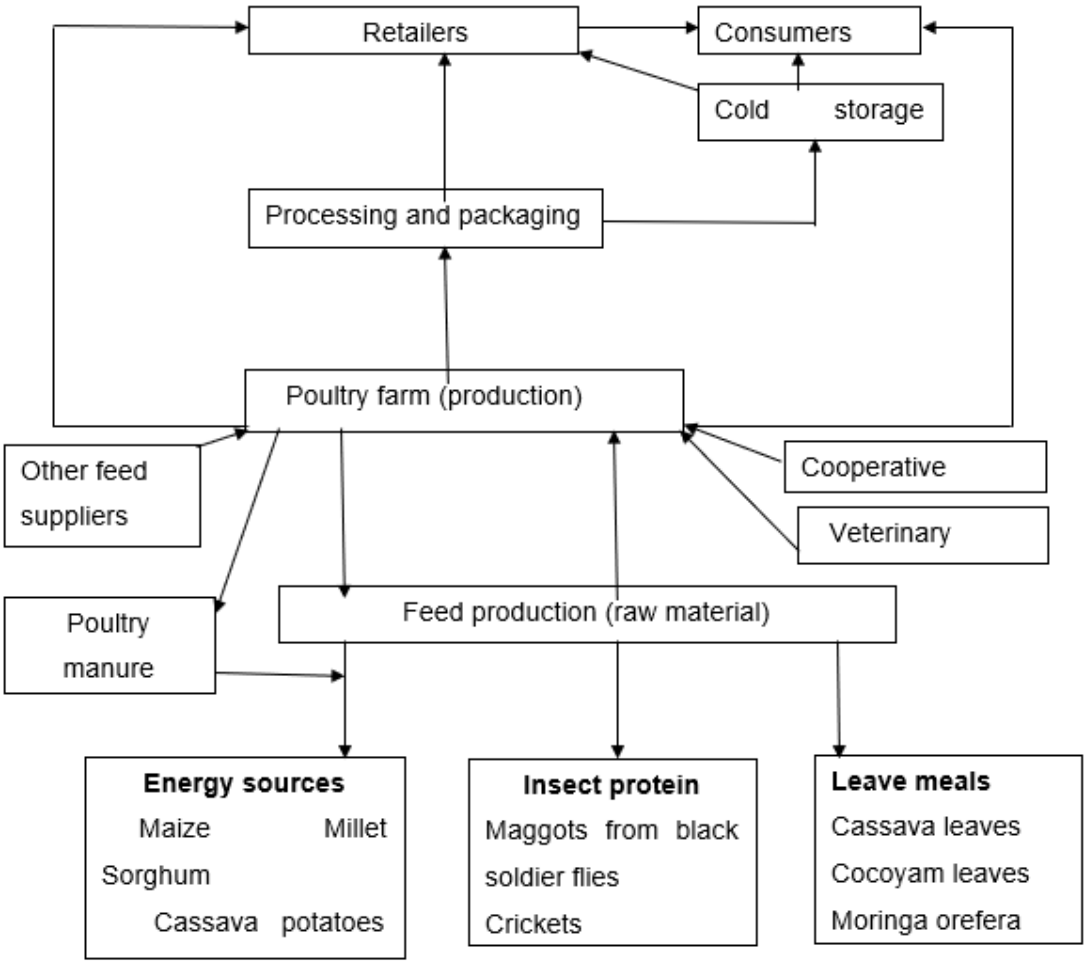

Fig 2.2. A value chain model for poultry competiveness

Source: Developed for this study

2.6.2 Primary stage one

This VC model for poultry competitiveness has primary stage one as the foundation of the VC, on which the other stages are built. The high input cost element that challenges SMS poultry farmers the most, is feed; constituting approximately 70 percent of the production cost (Bagopi *et al.* 2014; Banson *et al.* 2015). Farmers integrating backward, by sourcing for feed ingredients such as maize, soybean and insect protein, can go a long way to reduce cost and optimise productivity. Other equally expensive inputs are DOCs, medicines and vaccines.

The owning and procuring of farmers' cooperative farms and hatcheries can effectively maximise maize production and minimise the cost of DOCs, respectively. Medicines and vaccines can be bought by the cooperative in bulk to reduce transportation cost of individual farmers. Successful chicken production depends on the affordability and the availability of these inputs. Therefore, the optimisation and availability of quality inputs (feed, day-old chicks, and medicine and vaccines) at reduced cost, can narrow the current gap in production costs.

Moreover, local poultry meat has to be of high quality to be acceptable to consumers and thus, quality has to be maintained from primary production stage one, through to the final product. An efficient VC, therefore has to be established and maintained throughout the life cycle of each poultry business unit, through the implementation of efficient input utilisation and cost-reduction measures by producers.

Poultry farmers' contribution in producing sufficient maize at cheaper cost will result in low cost of poultry production (Davis *et al.* 2013: 72). This can be achieved through the application of poultry manure from the poultry farm as organic fertilisers to boost maize production. In this way, the farmer integrates production to the source of input to cut on cost. The use of adequate amount of poultry manure at a rate of 4 t/h has the potential to improve maize production considerably (Agyenim Boateng, Zickermann and Kornahrens 2006: 9), and can possibly contribute 50-60 percent to crop productivity (Enujeke 2013: 24).

Farmers can also form cooperatives to enable them obtain input subsidies, such as tractors and low interest loans, to enhance mass production of feed and benefit from scale economies to enhance poultry production. Therefore, with the bulk of feed provided by the farmer at cheaper cost and being complemented by quality and affordable feed from suppliers, it is perceived that the flock would be well fed with superior feed to promote fast growth and improve productivity.

In trying non-conventional feed sources, poultry farmers can also look beyond conventional energy feed ingredient sources, such as maize, which is quite expensive and instead, try sorghum and millet, whose production can be maximised by farmers due to their drought resistance and ability to grow successfully in relatively poor soil (Liu, Selle and Cowieson 2013; Mitaru, Mgonja, Rwomushana and Opio 2012: 28).

These non-conventional feed ingredients can substitute a greater percentage of maize without any adverse impact on the birds' growth (Rodgers *et al.* 2012). Overdependence on maize will thus be reduced, alleviating some of the strain of high competition for its consumption between human, livestock, and industries (Andam *et al*. 2017: 5; VOTO 2015). Large scale production of millet and sorghum and their incorporation in poultry feed as energy sources, can therefore save costs and boost chicken production.

The inclusion of cassava and sweet potatoes in this discussion is significant as both crops are underutilised in the poultry sector, although they have contributed immensely to poultry production in Nigeria (FAO 2014). Potato could be partially used to replace maize to reduce the cost of broiler production (Sakib, Sultana, Howlider and Rana 2014: 193). These crops are widely produced in Ghana, especially cassava, and are cheap energy sources for poultry (Zanu, Azameti and Asare 2017: 29). Due to their fast growth rate, high yield potential and nutritive value, cassava and sweet potato can serve as alternative carbohydrate sources in poultry rations to lower production costs and increase poultry production in Ghana.

Another efficient cost cutting measure is the substitution of fish meal, which is currently extremely expensive (Wang *et al*. 2015: 128), with soybean meal (SBM); the preferred poultry diet plant protein source. Although the production of soybean is comparatively new crop in Ghana, its ability to thrive well in most parts of the country, coupled with its nutritive value in poultry feed (Akramov and Malek 2012),

makes it a motivating factor for its mass production by farmers. Therefore, by optimising soybean production, poultry farmers can have ready access to cheap protein to replace a high level of fish meal, resulting in a decrease of the production cost and improved productivity.

The production and inclusion of insect protein is gaining popularity in Ghana. This study finds it economical for SMS poultry farmers to culture insects, like crickets, termites, and maggots from black soldier flies, to substitute the high cost of fish in feed preparations. Maggots, for instance, feed on waste such as chicken manure, animal offal, rumen content, and blood from the abattoir, as well as rotten fruits (Kone *et al.* 2017: 2; Diener 2011: 2)

These waste materials are readily available all year round and can be used to produce a sustainable and cheap protein for poultry. Crickets and termites can be cultured and harvested respectively to improve the poultry diet. The production of these two insects is also cost effective as they feed mostly on waste material such as leaves, grasses, plant debris, and straws from maize, millet and sorghum (van Huis *et al.* 2013). These cheaper sources of protein will enhance productivity and increase the poultry industry's competitiveness. Educating poultry farmers on the advantages of producing insect protein for their flock can enable them to minimise soaring feed and overall production costs.

Leaf meals, such as cassava, moringa oleIfera and cocoyam leaf meals are commonly available and accessible to poultry farmers. The pigment content in these leaves have the potential to promote the distinctiveness of chicken meat, in terms of hue, which often appeals to most customers (Hien *et al*. 2017:476). The incorporation of leaf meals in the birds' diet is to achieve optimum efficiency in quality and productivity (Hien *et al*. 2017: 476), as well as reducing the high cost of protein supplements (Fanatico 2016: 157). This will result in cost savings and enhance affordability and desirability of local chicken products by consumers.

Outsourcing is crucial in the poultry VC, especially when products or services are sourced cheaply from external sources, as opposed to being produced in-house. Farmers cannot provide all the inputs needed for poultry production and therefore, need to outsource a certain percentage of inputs, such as feed (especially maize from farmers or traders, as well as processed feed from the millers) to complement what they produce.

Farmers can form cooperatives to enable them purchase inputs they have no control over as individuals, such as concentrates from millers in bulk, in order to gain discounts and/or share transportation cost to minimise costs. With their cooperatives, farmers can bargain for lower prices from their suppliers. Poultry producers can, therefore, negotiate bulk input purchases to best leverage their bargaining power with major suppliers (Chen, Ellis and Suresh 2016: 153). Furthermore, poultry farmers can obtain quality but affordable input from other suppliers, since the latter mostly specialises in input supplies and gains economies of scale.

Farmers can, therefore, outsource inputs, such as maize and soybean, when in-house turns out to be more expensive (Kalinzi 2015:1). Establishing a good working relationship and trust with suppliers, poultry farmers can be assured of quality, cheaper, sustainable and timely supply of inputs to boost poultry production to satisfy the customers (Mumelo, Selfano and Onditi 2017: 58). Quality, cheaper, and sustainable inputs will set a good tone for primary stage two, which is the production stage.

2.6.3 Primary stage two

The VC's primary stage two is critical, as it determines how the inputs are to be utilised effectively and efficiently to ensure maximisation of production and profit. This can be achieved based on quality and sustainable inputs sourced and

outsourced from farmers and suppliers, respectively, for the production process. Obtaining DOCs from reliable suppliers or from farmers' cooperative hatcheries can be an assurance of low mortality rates (Anang, Anthony and Cosmos 2013: 424), better growth and performance but does not mean the birds will grow to maturity without diseases or mortality.

In Ghana, a study revealed that broiler birds' mortality averaged 17 percent and the dependability of the source of DOCs was identified as significant in guaranteeing low mortality rates (Anang *et al*. 2013: 424).

Farmers are thus expected to perform all husbandry practices effectively from day one, until the birds are ready for the market. A good temperature, as well as ventilation, especially at the brooding stage, has to be ensured in the poultry house to guarantee the health of the birds and avoid mortality. Maintaining quality throughout the production cycle is also essential, as quality inputs efficiently and effectively utilised lead to a quality end product. Through backward integration, farmers can produce quality but cheaper feed for their flock to increase the industry's competitiveness.

Another way of increasing poultry production, minimising cost, and decreasing high risk, is through contract farming. Under the contract farming system, poultry farmers obtain input such as DOCs, feed and medicine from integrators to increase production (Kumar and Panigrahy 2016: 742). Farmers also receive training from integrators on how to raise poultry in a scientific and efficient manner. Through this type of assistance, farmers benefit from economies of scale through large scale production (Kumar and Panigrahy 2016: 742).

Good management skills, as well as experience of the farmer, contribute significantly to high productivity and equally reduces the high risk of economic losses (Todsadee *et al*. 2012: 228). This is achieved through efficient farming practices, namely

ensuring sufficient feeding and watering, housing and stocking of poultry birds, appropriate disposal of waste, disinfection, and routine visits to the flock to identify the birds' eating habits, sick birds and dead ones, so as to attend to each problem immediately to curb the situation from worsening.

Efficient management practices will ensure economic gains (Abera *et al.* 2017: 50; Baliyan and Marumo 2016: 215). The intensity of the production activities and efficient input use contribute to the performance of the SMS poultry producers (Asem-Bansah *et al*. 2012: 5772). It is therefore significant to note that upgrading SMS poultry producers' management skills will improve their capability to manage the swift vicissitudes in the agribusiness atmosphere and run their businesses more efficiently and cost-effectively (Baliyan and Marumo 2016: 215).

In commercial poultry farms, the risk of disease outbreak is high and can lead to significant financial loss to the farmer. The introduction of a disease into a flock results in much higher morbidity and mortality (Shahib *et al.* 2017). Biosecurity is thus critical to successful poultry production, as it cuts the costs of disease treatment and reduces losses. Identifying simple yet effective low cost biosecurity expertise that can be implemented on farm (Julien and Thomson 2011:138) can improve profitability as well as the overall flock health and productivity.

Farmers who compromise with biosecurity measures are at high risk of economic loss. While there are vaccines and antibiotics to boost the birds' immunity against diseases and enhance their growth rate, it will be indispensable to prevent and eliminate disease agents to ensure high productivity and profitability (Shahib *et al.* 2017). Therefore, by supplying quality inputs, such as feed and DOCs, and with disease control, complemented with less mortality and continuous production (Samboko, Zulu-Mbatha and Chapoto 2018) the industry's competitiveness can be optimised.

Record keeping is essential to the farmer but is often ignored. Efficient management of poultry farming operations nowadays necessitates keeping of records, so managers can make well-informed decisions impacting the performance and success of their farms (Baliyan and Marumo 2016: 215). Through record keeping the farmer is able to observe and understand flock behaviour, such as poor feed intake, diseases and their symptoms, and mortality.

These challenges must, consequently be addressed immediately to avoid losses. Based on the farm records, the veterinary officer can advise the farmer on improvement as well as precautionary measures that can enhance productivity and avert high economic risks, respectively. The farmer also learns, through record keeping, which inputs are good enough and can save costs, while at the same time enhancing productivity and profitability. Eventually, record keeping will enable the farmer to assess the expenditure, income and profitability of the business (Nene and Marilyn 2017: 6).

At the end of primary stage two, production is expected to be completed and the birds are ready for the market within a short period of six to seven weeks. The hopes of the farmer may be heightened, as there has been high growth performance of the birds, with less mortality. However, the next stage will determine how consumers will patronise local chicken products, based on quality, price, availability, and accessibility.

2.6.4 Primary stage three

Comprised of the processing and packaging, storage, and marketing and sales of the chicken meat to consumers. Primary stage three is quite challenging as local poultry producers fail to compete favourably with the influx of cheap, frozen, imported chicken (Banson *et al.* 2015; Anang *et al*. 2013: 428) due to high input costs. The high production cost consequently results in expensive local products unaffordable to consumers.

The challenge posed by the surge of imported chicken products (Bagopi *et al*. 2014) can be minimised, if not completely eradicated, by maximisation and availability of local products. In order to remain competitive, farmers must ensure the local chicken product is available in large quantities, cheaper, processed into ready-to-cook products, and packaged and labelled to differentiate it from imported products.

Although price is considered as an important attribute that influences consumers' preference in purchasing chicken meat (Kwadzo *et al*. 2013: 71), other attributes such as taste, freshness, processing and packaging mentioned in the literature cannot be overemphasised. Therefore, consumers' purchase decision can also be based on value rather than price alone (Rihn, Khachatryan and Wei 2018: 2).

One main marketing challenge facing local farmers, is the ability to process and package their chicken products into more convenient forms similar to imported chicken products, to which the growing domestic market is increasingly attracted (Schuch *et al.* 2018). To remain competitive and gain large market share, local producers are required to tailor make their chicken products through processing and packaging to suit consumers' demands.

The lack of processors along the VC means that local chickens are usually sold live and consequently cannot be retailed through formal channels like supermarkets resulting in the elimination of potential consumers in the middle and high income groups who customarily shop from supermarkets (Bwalya and Kalinda 2014: 48). Processing of local chicken similar to imported chicken products can be attractive to the growing domestic market. To remain competitive and gain large market share, local producers are required to tailor make their chicken products through processing and packaging to suit the demands of the consumers.

Importantly, processing and marketing will ensure the farmer's control over the prices, product quality and fair distribution to optimise market share and be more competitive (Bwalya and Kalinda 2014: 48). They could also establish direct contacts with retailers to simplify their supply chain. Forward integration in the poultry industry can help eliminate costs connected with middlemen in the supply end of the VC (Teimoury, Jabbarzadeh, and Babaei 2017).

Another marketing channel is farmers selling their products directly to the consumer. This has obvious, positive economic benefits, as farmers eliminate retailers to increase their profit margin. This however, requires farmers to operate their own cold stores, which will be stocked regularly with meat from their farms.

Chicken abattoirs and further processing operations are capital intensive. Moreover, abattoirs not connected to big producers are frequently unable to obtain adequate volumes of chicken to make their operations efficient (Bagopi *et al.* 2014). Production entails high-tech logistics, as freezer capacities can only hold production for a restricted number of days (Gugler, Liebensteiner and Schmitt 2017: 455). To curtail high cost pressures and narrow margins that have compelled smaller producers out of the market, SMS poultry operators can be integrated by big poultry firms, as large, integrated holding firms have lasted because of benefits gained from scale economies as well as cost reductions emanating from vertical integration.

Again, to remain competitive, local producers can upgrade their production process in small scale abattoirs (das Nair and Chisoro 2017: 25), which require less per week volumes of chicken to be processed and whose operation is cost effective (Bagopi *et al.* 2014). Farmers' cooperatives can, according to the Rijksdienst voor Ondernment Nederland (RVO – Netherland Enterprise Agency), empower members to procure cold depots where processed meat can be stored, while also serving as a distribution centre for wholesalers and retailers. This centre can then facilitate the government's poultry and livestock import policy that restricts imports to 60 percent,

indicating that 40 percent of their output must be sourced from domestic producers to improve local production and competitiveness, leading to a reduction in the country's poultry importation (RVO 2014).

Individual poultry famers, with large stock and who operate frequent cycles within the year, can process their chicken at the farm level. Poultry meat processing on the farm includes slaughtering, cut portions, packaging and cold preservation. However, farmers must operate in a hygienic environment in order not to compromise food safety rules and regulations. Constant power supply must also be ensured to keep the processed meat in the refrigerators wholesome before they reach the final consumers. Frozen local poultry meat has to be of high quality and appealing to be acceptable by consumers.

Another marketing channel is the selling of live poultry to retailers and other consumer groups at the farm gate; this method of marketing cuts down the cost of processing and packaging, transportation, and refrigeration. With the farm gate price often only a fraction of the retail price, this motivates most consumers to purchase live poultry at the farm gate. Marketing at the farm gate is optimised during special occasions such as Christmas, Easter, and Ramadan, when there is an upsurge in demand for live chickens (Banson *et al* 2015: 166; Aning, Turkson, and Asuming-Brempong 2008).

Nevertheless, the seasonality of local poultry production due to high cost of production can be replaced by year-round production, allowing consumers a constant flow of cheap and available chicken products. The continuous production and efficient marketing channels of chicken products can keep farmers in business and ensure the local industry's competitiveness.

By increasing chicken production at cheaper cost and being able to process and package the meat according to the demands of the consumers, it is perceived that

local chicken can be cheaper, available and appealing to consumers and thus upsurge the local poultry industry's competitiveness.

2.7 Conclusion

A review of the theories that underpin the study were presented in this chapter, along with findings on how cost reduction can be an efficient strategy in making local poultry products cheaper to heighten the industry's competitiveness. The conceptual framework of this study aims to reorganise the local poultry industry through its VC activities, from primary stage one through to primary stage three, with the emphasis on increasing production at lower cost to gain economies of scale, and by complementing with value addition, farmers can compete favourably in the poultry industry.

The ensuing chapter addresses the literature review, which relates to the theories and the conceptual framework. The literature review is expatiated to detail the challenges of the poultry industry, particularly in Ghana, and thus new strategies are discussed to revamp the industry and make it more competitive.

CHAPTER THREE
LITERATURE REVIEW

3.1 Introduction

Having examined the theories that underpin the study in chapter two, this chapter reviews the literature relevant to the current topic. A literature review serves as a bedrock of any study because it reveals to the researcher the previous work on themes of this study and how this information will assist. A discussion is also offered in this chapter on globalisation theory, international trade theories, Porter's generic strategy and growth strategy. Moreover, an examination of SMS poultry famers' operations in Ghana is set out, along with poultry industry challenges in general and that of Ghana in particular. Finally, strategies that can boost Ghana's poultry industry and make it competitive are recommended.

3.2 General overview of the poultry sector

The term "poultry" embraces a variety of domesticated birds, including chickens, ducks, turkeys, and ostriches, as well as geese and quail (Habib and Shabbir 2018: 53). The production of poultry and its trade, globally, are projected to develop faster than other meat-producing sectors (Ayisi and Adu 2016: 648).

According to The Poultry Site (2014), poultry can adapt easily, have high economic value, a high level of output that can bring about meat production in a space of eight weeks, with several repeated cycles the year round. Poultry birds are excellent in converting of feed-stuffs into indiscernible protein in the form of meat and eggs (Aboki, Jongur and Onu 2013: 54). Additionally, the cost of production per unit is comparatively low, and the return on investment is great. Consequently, poultry producers do not need much capital to begin a poultry business (Aboki *et al.* 2013: 54).

Poultry meat is, furthermore, relatively cheaper when compared to beef; with high consumer acceptability, irrespective of religious beliefs, in comparison to pork (Liu *et al*. 2012: 895). Globally, chicken production contributes roughly 87 percent of all poultry meat, while others, including turkey, guinea fowl, duck, and geese represent 13 percent of meat output as stated by the Australian Chicken Meat Federation (ACMF 2011). Broiler meat production worldwide was forecasted up one percent to 89.5 million metric tons (Mt) in 2017 (USDA 2017).

A couple of decades ago, the worldwide demand for meat was 173 million Mt per anum, of which poultry contributed 23 percent. In the year 2000, countries globally exported more than 8.79 million Mt per anum of poultry meat. Nevertheless, in 2015, World Trade Organisation (WTO) reported that the quantity of poultry exported worldwide nearly doubled (94 percent rise) from the overall exported 15 years before (WTO 2015). As at 2015, the yearly, worldwide demand for meat extended to 285 million Mt, with poultry comprising 35 percent or 100 million Mt of this (Rabobank 2011).

Consumption of poultry products are projected to escalate by 1.7kg per capita from nearly 13.2kg in 2013 to 14.9 kg in 2023, globally, as a result of increases in incomes, urbanisation, change of diets and declines in the comparative prices of livestock products (Nyarko and Adu 2016). The Poultry Site (2016) publications indicate that poultry meat intake in emerging countries is anticipated to upsurge from 16.7 million Mt in 2011 to 84.2 Mt in 2024, thanks to fast population growth in the regions.

The need for poultry meat intake in the West African region far exceeded local production recently; resulting in a huge deficit in the sector. Nigeria, being the highest populated nation in West Africa, produced 290 000 Mt of poultry meat in 2013, yet consumed nearly 1.2 million Mt. The resulting shortage of 910 000 Mt was therefore imported from the EU member states and the USA, smuggled through the port of

Benin (Hinshaw 2015) following the banning of poultry imports by the federal government since 2003 (Wale *et al* 2016 :1).

In 2014, the importation of poultry meat to the Gambia was 9 504 Mt (for an estimated value of US$2 198 717). In the same year, domestic production of poultry meat was estimated to be 1 120 Mt (FAO 2018a). Liberia, in 2013 similarly produced 11 600 Mt of chicken products and imported 25 290 Mt from China and India. Liberia's population in 2015 was 4 195 666 and is estimated to reach 6 414 000 by 2030. This would considerably expand poultry meat intake in the country, as many people are now switching to chicken meat (Ayisi and Adu 2016: 648).

According to Kusi *et al.* (2015a: 478), poultry imports from the EU, USA and Brazil increased from 20 000 Mt in May 2002 to over 98,000 Mt in May 2010. Global Agricultural Information Network (GAIN (2013), indicated that post forecasts poultry meat imports for Ghana rose by five percent to place at 165,000 Mt in May 2013, from 157,000 Mt in May 2012. These poultry imports originate from the USA, EU and Brazil, where production cost is relatively low (GAIN Report 2013). The high consumption rate of chicken in Ghana is an indication of a huge market, making effective strategies by domestic producers vital to increasing production cost-effectively to meet the upsurge demand and make the industry competitive.

3.3 Definition of Small and Medium-sized Enterprises (SMEs)

There is no fixed definition of SMEs presented in literature (White, Steel and Larquemin 2017: 56). Therefore, national governments normally define enterprise size within their national legislation, reflecting national economic and social situations (White, Steel and Larquemin 2017: 4). In the USA, firms with lower than 500 employees are considered SMEs. In the case of EU member states, businesses having lower than 250 workforce are considered small and medium sized businesses (Khalique, Isa and Shaari 2011: 75).

Table 3.1: Definition of Small and Medium Enterprises with European Union standards

Enterprise indicators (2/3)	Headcount: Annual Work Unit (AWU)	Annual turnover OR	Annual balance sheet total
Medium	<250	≤€50,000,000	≤€50,000,000
Small	<50	≤€10,000,000	≤€10,000,000
Micro	<10	≤€2,000,000	≤€2,000,000

Source: European Commission (2005)

Conversion for €2 000 000 in GHS = GHS 12 006 400 00. The money converter: 12/07/2019

The EU recognizes a Micro, Small and Medium-sized Enterprise (MSME) as one with up to 250 members in its workforce and with either a turnover of not more than €50 million or a total balance sheet value of not above €43 million. Specifically, micro enterprises are those businesses that employ fewer than 10 employees and also have either a turnover or balance sheet value of not above €2 million; small enterprises employ fewer than 50 workforce and have turnover or balance sheet value of not above €10 million; and medium-sized enterprises employ less than 250 personnel and have either a turnover of €50 million or balance sheet value of not above €43 million (European Commission 2005).

Table 3.2: Definition of Small and Medium Enterprises by World Bank standards

Enterprise indicators (2/3)	Number of employees	Total assets OR Total annual sales	
Medium	>50; ≤300	>$3,000,000; ≤$15,000,000	>$3,000,000; ≤$15,000,000
Small	>10; ≤50	>$100,000; ≤3,000,000	$100,000; ≤$3,000,000
Micro	<10	≤$100,000	≤$100,000

Source: Independent Evaluation Group (2008).

Conversion for 100 000 USD in GHS = GHS 532 680 00. The Money Converter: 12/07/2019

Likewise, the World Bank (2013) categorises an enterprise as a SME when it satisfies either of the ensuing standards, specifically, number of workers with either total assets or total annual sales. Micro enterprises employ up to 10 workers, with overall assets or yearly sales of up to $10 000; small enterprises employ a workforce of up to 50, with entire assets or yearly sales amounting to $3 million; and medium-sized enterprises employ up to 300 personnel, with entire assets or yearly sales of reaching $15 million.

Largely, SMEs in Ghana are classified as businesses that meet the quantitative benchmarks of number of employees and not less than one financial criteria (total assets or total annual sales) (Agyapong 2010: 198).

Table 3.3: Definition of SMEs by the National Board for Small Scale Industry (NBSSI) in Ghana

Enterprise category	Number of employees	Fixed asset
Medium	30 – 99	$1 million
Small	6 – 29	≥$100 000
Micro	1-5	$10 000

Source: Independent Evaluation Group (2008).

Conversion for 100 000 USD in GHS = GHS 532 680 00. The Money Converter: 12/07/2019

The definition given by the National Board for Small Scale Industry (NBSSI) in Ghana, defines micro enterprises as those that employ between 1-5 employees, with fixed assets not greater than $10 000. excluding land and buildings. Small enterprises employ between six and 29 or have fixed assets not above $100 000. excluding land and buildings. Medium enterprises employ between 30-99 employees, with fixed assets not above $1 million (Oppong, Owiredu and Churchill 2014).

Table 3.4: Distribution of firms by number of employees in different countries

Country	Micro	Small	Medium
EU countries, Iceland, Norway and Switzerland	1-9	10-49	50-249
Australia	0-9	10-49	50-199
Canada	0-9	10-49	50-499
Mexico	1-10	11-50	51-250
New Zealand	1-9	10-49	50-99
USA	1-9	10-99	100-499

Source: OECD (2010).

Majority of of sources defines SMEs as having a cut-off range of 0-250 workforces (Ayyagari *et al* 2003). The USA and Canada set the upper threshold for SMEs at 500 employees while New Zealand sets the upper threshold at 100 employees. This could probably be explained due to the size of each country's economy. Every country exercises the liberty to define SMEs specially, the outcome of which today's SME theory counts with copious definitions (Berisha and Pula 2015: 23). Beck *et al.* (2005: 201) ranked Zimbabwe as having the lowermost SME sector's share of employment globally, when the threshold of 250 employees was considered the benchmark in defining an SME. Consequently, in Zimbabwe, the Small Enterprise Development Cooperation (SEDCO 2011) defines SMEs as firms with a workforce not exceeding 100 working full time.

Entirely among SMEs definitions, the one widely implemented in SME studies is that of the European Union (Berisha and Pula 2015: 23). Nevertheless, state governments and policymakers hardly apply it. Despite being recommended by the EU, that definition remains only requisite for businesses and institutions looking for funding from it (Carter and Jones-Evans 2006).

The use of financial criteria to define SMEs has suffered certain downsides. Among other limitations of employing annual turnover as a criteria for defining SMEs are: variations in financial reporting practices of accountants up to incomparability and inconsistency (Berisha and Pula 2015: 23). Most SMEs managers/owners in emerging economies such as Ghana have low level of education. Consequently, they are unable to keep proper records of their business to enable them account efficiently the progress of their businesses (Nene and Marilyn 2017: 6). Moreover, the prevalent corrupt propensity in Ghanaian society, which has infiltrated the structure of the society comprising Ghanaian entrepreneurs, have prevented most SME operators from keeping satisfactory records (Oppong, Owiredu and Churchill 2014: 89).

SMEs, especially, in developing countries face financial challenges (Gandhi and Mohan 2014: 2) which makes it difficult to meet the financial criteria set by the EU (less or equal to €50 000 000) and World Bank (more than $3 000 000 and less or equal to $1 000 000). Access to funds or credit from the banking institutions is one major challenge which characterizes the SMEs in developing countries (Oppong, Owiredu and Churchill 2014: 89; Gombarume and Mavhundutse 2014). Chipangura and Kaseke (2012: 41) indicated that SEDCO no more uses the capital and turnover benchmark to define SMEs in Zimbabwe owing to valuation challenges due to the adoption of a multi-currency system.

Notwithstanding the quantum of SMEs definitions, there is a propensity to adopt the employee number criterion as the core basis in classifying SMEs (Berisha and Pula 2015: 23). Therefore, state governments and policy makers of developing counties must reconsider the inclusion of financial criteria set for SMEs by the EU and World Bank and adopt attainable criteria that clearly defines their SMEs. In the context of this study, small and medium scale enterprises are defined as firms that have a workforce of between 10-100 employees.

3.4 Classification of poultry production systems

The FAO classifies the systems of poultry production into four categories namely: Industrial integrated system, large scale commercial with top biosecurity, commercial poultry production with limited biosecurity and village or backyard production respectively.

3.4.1 Sector 1: Industrial and integrated production

An industrial integrated system offers a maximum level of biosecurity and poultry birds marketed commercially, for instance, farms that constitute an integrated broiler production enterprise, with distinctly definite and implemented standard operating methods for biosecurity (Agrifood Consulting International 2006: 25). In Ghana, the big scale industrial producers that match sector 1 of the FAO classification possess

breeding parent stock, feed mills, hatcheries and have marketing channels with inadequate exports of DOCs to countries in West Africa (FAO 2014:17). Such farms are noted for good record keeping of production, a high level of productivity (FAO 2014:17).

3.4.2 Sector 2: Large scale commercial with high biosecurity

According to FAO (2013: 11) classification, this sector represents a system of commercial poultry production with satisfactory to maximum biosecurity and the birds are commercially sold. Farmers in this sector always keep their chickens indoors to avoid contact with other hens or livestock. The operations of this sector are termed locally as commercial large scale poultry farms. These farms are chiefly egg producing but sporadically raise broiler chickens, guinea fowl and turkey for meat, particularly catering for festive occasions.

Several of the farms produce their own feed, parent stock as well as DOCs (FAO 2014: 17). The number of chickens stocked by such farms is well over 10 000, with high levels of veterinary drug and feed inputs. The chickens in this segment are either raised in battery cages or on deep litter systems. The feed given is well formulated, with the main feed ingredients being maize, SBM, fishmeal and cotton-seed cake, whereas vitamin and mineral premixes are imported (FAO 2014: 17). Broilers are normally sold at week six and seven, when they have attained a live weight of two to 2.5kg (FAO 2014: 17).

3.4.3 Sector 3: Commercial poultry production with low biosecurity

The system of production in this sector, according to the FAO (2013: 12), is described as commercial poultry production with low to negligible biosecurity and the birds sold at live bird markets. Though chickens in this sector are caged, they occasionally spend time outside the shed; chickens may mingle with waterfowl on the farm. This sector includes medium-scale commercial farms, stocking 5 000-10 000 ckickens and small-scale commercial farms that keep 50-5 000 chickens (FAO

2014: 17). Farmers in this sector depend on hatcheries for DOCs and feed mill operations for feed. Nonetheless, several farmers purchase maize and concentrate for preparing their feed on-farm (FAO 2014: 18).

3.4.4 Sector 4: Village or backyard production

Backyard production, also known as village production, is associated with minimal biosecurity and the birds are consumed locally (FAO 2013b: 12). Poultry in this sector are usually free ranged on a small scale, with semi commercial production. This system of poultry production is promoted in rural areas, whereas there is a concentration of large commercial poultry production in urban and peri-urban areas. Village poultry production can be used as a principal tool for rural poverty alleviation, extinction of undernourishment and employment creation in large rural settings (Rajkumar, Rama Rao and Sharma 2010: 59).

The village poultry production, specifically chickens, involves a few local breed hens and a cockerel. The eggs produced in this system are brooded and hatched by the hens to provide replacements, while excess eggs are consumed within the household. The Birds usually scavenge for their food and are supplemented with crop by-products and household scraps. (Rajkumar *et al.* 2010: 59). Basically, there are no veterinary inputs, such as drugs and medicine, in this sector and birds are prone to diseases, thereby resulting in a high mortality rate (Rajkumar *et al.* 2010: 59).

Backyard or village poultry production can, however, contribute immensely to dietary protein consumption and earnings of the poor rural folk (Chatterjee and Rajkumar 2014: 93) because they are abundant, being kept by almost every household (Chatterjee and Rajkumar 2014: 93). More to the point, since the cost of production of village poultry is low and they fetch a higher market price, this system is expected to earn a positive economic return, notwithstanding growing rivalry arising from the commercial sectors (Chatterjee and Rajkumar 2015: 93).

The main significance of these different systems of production varies. For instance, in Mali, 90 percent of poultry production is obtained from village poultry production, where as in Kenya, 80 percent of chickens are reared under low input systems of production. Conversely, the SA poultry production system is largely commercialised, with only seven companies contributing 75 percent of the total production (AgriTrade 2011).

In Ghana presently, there are fewer than 20 large-scale, commercial poultry farms that produce mostly eggs, with scant broiler production. Broiler chickens from some commercial poultry producers are aimed at festive occasions, such as Christmas and Easter, when Ghanaians customarily purchase live poultry (Banson *et al.* 2015: 166). Most poultry farmers also sell spent layer chickens during such festive seasons (GAIN Report 2013).

3.5 Contributions of SMEs to national economy

Globally, SMEs are noted for the vital roles they play in different economies (Almutairi and Sathiyanarayanan 2015); in both emerging and developed economies (Agbor and Quartey 2010). Hence, SMEs have served as vital instruments to address economic, as well as social problems, in order to attain developmental goals. SMEs are sources of innovation, entrepreneurial skills, and employment as indicated by the Organization of Economic Cooperation and Development (OECD 2017).

Approximately 23 million SMEs offer roughly 75 million jobs, representing 99 percent of all enterprises (European Commission 2005). In the United Kingdom (UK), SMEs constitute more than 99 percent of the UK's 3.8 million enterprises, 56 percent of employment and generate 52 percent of entire UK turnover, as indicated by the Small Business Service (SBS) (Pepra, Osei and Akosa 2016: 26).

Similarly, SMEs in the USA absorbed around 60 million of non-farm, private sector workforces in 2006, which further constitutes 99.9 percent of the 27 million employer and non-employer, private non-farm businesses (USITC 2010: 342). SMEs in India provide about 20 percent to GDP, while generating 40 percent of exports and 45 percent of industrial output. The sector employs 60 million people, creates 1.3 million jobs yearly and produces over 8 000 superior products for the domestic and global markets (Capacity Development Centre 2012) and thus serves as incentive for economic growth, income and employment.

In emerging economies, SMEs are progressively being recognised as prolific drivers of economic growth, as well as being a key source of job creation (Asma 2015). Countries worldwide, micro-enterprises (up to 9 employees) dominate the business arena, accounting for 70 percent to 95 percent of all firms (OECD 2017: 9). Ayyagari, Demirguc-Kunt, and Maksimovic (2011) stated that SMEs contribute greatly in creating jobs across emerging economies and have the biggest share of employment, which accounts for 71 percent of jobs in the region.

In Ghana, the SME sector absorbs more than 85 percent of the employed workforce. They are as well considered to provide approximately 70 percent to Ghana's GDP and account for about 92 percent of businesses in Ghana (Quartey 2015: 218). The immense contribution that SME makes places them at the core of the entire economic policy and recognised as the most significant sector in Ghana's economy. It is estimated that 85 percent of employment in the manufacturing industry, and largely the total employment development in the country, emanates from SMEs, making the sector a force to reckon with in the Ghanaian economy (Oppong, Owiredu and Churchill 2014: 86).

According to Asare and Prempeh (2016: 681), business industrial activities of SMEs include leather making, textile, agro-processing, and food processing, along with bakery, tailoring, and blacksmithing, as well as mechanics, electronic assembling,

furniture, and livestock production. By absorbing specifically, the youth in these sectors, the SMEs have helped curb rural-urban migration in the country. Moreover, with minimal funds that would be insufficient to finance or support big business, individuals are able to set up a small business enterprise (Ntiamoah, Li and Kwamega 2016: 559).

The SME production costs is relatively low, especially in the case of poultry production where return on investment is huge. Consequently, farmers need a comparatively little amount of capital to commence a poultry business (Heise *et al.* 2015: 198). SMEs can be opened in any area, for whatever kind of business activity, in either a rural or an urban area and thus, has the capability to employ both skilled and unskilled labour (Khan and Khalique 2014). Moreover, the operation of SMEs is cost effective since largely the materials used for their operations are sourced locally and at cheaper cost (Heise *et al.* 2015: 198).

3.6 SMEs competitiveness

There has been a lot of debate with regards to the role of SMEs business activities in contributing to economic growth (Gunasekaran, Rai and Griffin 2011). One such debate among researchers centres on how to improve competitiveness of SMEs (Rostek 2012: 2040; Ada, Kazancoglu and Sagnak 2013: 525). Rostek (2012. 2040) contended that SME is required to increase its competitiveness to survive in the fierce competitive market. Ada *et al*. (2013) established that SME competitiveness could upsurge the position of bargaining in business competition. Several researchers have further expressed their views on how SMEs can be competitive, with Bek, Bek, Sheresheva and Johnston (2013) having observed that innovation is critical to SMEs competitiveness in order to increase their business achievements.

Innovation results in the capability to craft products and business processes with property rights and intangible assets. Antonioli, Mazzanti and Pini (2011) proposed levels of innovation in business, such as expanding a novel strategy of promotion,

generating new supplier, distribution network and buyer, and augmenting a new product to the market. Similarly, access to finance is crucial to the performance of SMEs, since finance is required for start-up purposes and daily activities such as purchase of raw materials (Sibanda, Hove-Sibanda and Shava 2018: 4). Finance therefore, determines SMEs performance and continued existence.

The majority of poultry farmers belong to the small-to medium scale group of producers. Small-scale operators primarily produce broilers, while medium-scale operators mostly produce eggs. Biosecurity is minimal in both cases, causing these operations to be susceptible to disease outbreaks (FAO 4014a). Therefore, since the outbreak of the HPAI H5N1in 2007, the GoG has been watchful in the avoidance of disease outbreaks, particularly H5N1 Avian Influenza and has intensified biosecurity measures in poultry farms, live bird markets and hatcheries (FAO 2014a).

3.7 Global poultry production

The international poultry industry was confronted with escalating input costs in 2012 that necessitated measures to cut down high cost of feed that could impede advance development of global poultry production (Agritrade 2013: 2). Based on this, poultry industries in numerous countries called on their respective governments for backing amidst soaring feed costs. Some EU governments adhered to these calls with support packages (Agritrade 2013: 2).

African markets have been the target for USA poultry exporters and it is stated by the USDA that the fourth largest fertile market for USA broiler and turkey exports is SSA (Agritrade 2013: 2). Nevertheless, the most astonishing trend has developed since 2009, with the EU having increased its poultry exports to 163 percent, supplying its four chief markets in Africa, namely Ghana, Benin, SA, and the Democratic Republic of Congo (DRC) (Agritrade 2013: 2).

In 2009, these markets constituted a mere 14 percent of entire EU poultry meat exports, while by 2012 the percentage had escalated to 26.2 percent of entire exports, in a context where EU poultry exports had improved by 41 percent in total. SA, Ghana and Angola are Brazil's top three of the 25 poultry markets in Africa (Agritrade 2013: 2).

The growing demand for animal protein, globally, has fuelled the production of poultry, being a cheaper source of protein and also acceptable in many communities (AVEC 2016). With this international trend, it is anticipated that poultry production occurs in progressively higher scale to gain scale economies, with this expansion being obvious not only in developed but progressively in developing countries. The movement towards larger production units will escalate the poultry sector's reliance on feed inputs, primarily grain. There is equally the likelihood to mount great tension on poultry producers in the SMEs sector (Agritrade 2013: 3).

3.7.1 United States of America

The USA is classified as one of the leading and well-organised poultry producers globally, constituting nearly a quarter of the world's poultry production from 2006–2012 (Weaver 2014). This achievement is partially due to the organisational structure of the US poultry industry, which has been maintained for several decades (Weaver 2014). The production of poultry in the USA was valued at $30.2 billion in 2012, with the most common meat consumed in the United States being chicken (USDA 2012).

The poultry industry in the USA is vastly vertically integrated. This process of vertical integration permits the companies known as "integrators" to benefit from economies of scale and coordination that have driven production upsurges (Aiden 2016: 5). These integrators generally own hatcheries, feed mills, and slaughter and processing plants. The ''grow-out'' farmers therefore, raise the chickens from chick to the chosen market weight. When the chickens reach the preferred weight, they

are sent back to the integrators, who slaughter and process them into whole dressed chickens or cut into convenient portions for consumers (Weaver 2014).

3.7.2 European Union Member States

The EU poultry operation is presently a domestic-focused industry. In 2014, the production of EU chicken meat rose to 10.5 million Mt, constituting roughly 6.5 billion poultry birds and nearly 12 percent of global poulry output, demonstrating the EUs self-sufficiency rate at 103.9 percent (European Commission 2016). Intra-EU trade is primarily centred on fresh chicken meat, where the Netherlands dominates in chicken meat, constituting nearly 30 percent of total intra-EU trans-border movements; then after, France, Germany and Poland. With a mean consumption of 26.8 kg per capita per year in 2014, chicken account for the second largest consumed meat in the EU, which is approximately 30 percent of all meat consumption. The consumption of chicken is increasingly expanding in almost all member states (European Commission 2016).

The EU member states' broiler sector was anticipated to continue to develop in 2016 and 2017 due to rising demand for local chicken meat, lower price, more convenient to use and an upsurge in export demand. The considerable and constant decrease of prices of grain in the EU member states from 2013, particularly in 2015 and 2016, has dropped the cost of poultry production and enhanced competiveness of broiler meat locally and for export (GAIN Report 2016a).

Exports of frozen, cheap priced cuts and mechanically deboned meat (MDM) to Sub-Sahara Africa (SSA), particularly SA, Ghana and Benin, as well as new Asian clients such as the Philippines and Malaysia, were predicted to continue to increase in 2016 and 2017 (Asian Development Bank (ADB) 2015; GAIN Report 2016a). In 2016, the EU exported 68 000 Mt of chicken to Ghana (GAIN Report 2016a).

The spiralling consumption of chicken breast within EU member states has subsequently prompted the trade in chicken parts and offal in SSA (Goodison 2015). This increase in exports of frozen chicken parts and offal that has progressively targeted SSA markets, would appear to impede the growth rate of domestic SSA poultry production to meet the escalating consumer demand, not only in EU exporting but also in neighbouring regional markets (Goodison 2015).

3.7.3 Brazil

The growth of Brazil's broiler industry over the past 15 years has moved the country to grow into one of the chief poultry producers, globally. Between 1999 and 2014, the country's poultry production amplified from 5.5 million Mt to 12.7 million Mt, or 130 percent, pushing Brazil to become the world's third largest poultry producer, following the USA and China (Valdes, Hallahan, and Harvey 2015). Brazil's exports have increased fivefold in current years, outdoing the United States as the chief chicken meat exporter globally, with broiler exports in 2014 of more than 3.6 million Mt, comparable to 34 percent of the entire international broiler trade (Valdes, Hallahan and Harvey 2015).

The effective vertical integration in Brazil's poultry industry has generated a growth in productivity, efficacy gains from vertical coordination, and low cost of production (Valdes, Hallahan, and Harvey 2015: 263). These developments have led to subsequent reductions in cost of production, superior productivity, and improved exports. The growth of Brazil's meat production was accompanied by parallel growth of maize and soybean production (Cattelan and Dall'Agnol 2018: 9). A clear picture of Brazil's broiler industry, particularly regarding costs at farm stage, and of technical performance for broiler production, could offer a clue to the industry's future competitiveness (Valdes, Hallahan and Harvey 2015: 264).

Several reasons have resulted to the expansion of big poultry production in Brazil which include low labour costs, accessibility to inexpensive soybean and maize,

which constitute about 90 percent of feed cost, favourable climate that promotes poultry production as it reduces cost on thermal control of poultry houses, and satisfactory foreign investment regulations, along with a large home market (Caldas 2014). Policies the government of Brazil has equally contributed immensely to the growth of the sector, with the provision of subsidised credit for production and investment, as well as funding to the feed sector (Valdes, Hallahan and Harvey 2015: 264).

3.7.4 India

One other country that has achieved tremendous success in the poultry industry is India, the world's third leading producer of egg and 6th in chicken meat production (USDA 2016). According to Chatterjee and Rajkumar (2015: 91), the poultry industry in India has the capacity of 3.8 million Mt of poultry meat obtained from 3 billion broilers, 3.4 million Mt of eggs are produced from 260 million layers annually. The poultry industry is generating approximately Rs 70 000 crore to the national GDP and offering job to over 4 million people either directly or indirectly (Chatterjee and Rajkumar 2015: 89)

India's poultry industry has profited from scientific developments in poultry breeding and disease control but an essential factor has been the obtainability of low-priced, superior quality feed (Ravindran 2013). A significant factor underpinning poultry industry in India is the accessibility of animal feed, chiefly maize. Maize production in India is increasing and transforming promptly with respect to the development in the poultry industry (Hellin *et al*. 2015).

The rate of chicken consumption in India has soared by 181 percent in urban and 256 percent in rural areas from 2004–2005 to 2011–2012 (Mallapur 2015). The most common meat in India is chicken, with per capita consumption of 2.5 kg per person annually which has gradually improved in the last decades (Hellin *et al*. 2015). The per capita consumption of meat is projected to upsurge in India, from its present

state of 3.1 kg to approximately 18 kg by 2050, of which 12.5 kg would be chicken (Alexandratos and Bruinsma 2012).

Contract farming dominates the poultry production system in India (Ramdas 2015). Under contract farming arrangements (CFAs), integrators supply DOCs, feed, equipment, veterinary supplements, vaccines, credit and marketing, whilst the grower is required to supply housing, labour, and water.

As a result of high production cost, contract farming is increasing rapidly as cheap inputs are supplied by integrators. Farmers in the CFAs do not, however, make higher profits than non-contract farmers, due to the integrators taking any efficiency related to profit. Nonetheless, owing to price variations for chicken, farmers obtain the security of an assured return, though it is lower in comparison to non-contract farmers who are confronted by higher market threats (Sasidhar and Murari 2015). Generally, the majority of producers (roughly 70 percent) operate small-scale holdings between 3 000–10 000 chickens and medium-scale holdings between 10 000–50 000 chickens while approximately 10 percent of poultry farmers operate on a large-scale, between 50 000– 400 000 chickens, and these farms are automated (Hellin *et al*. 2015).

3.7.5 South Africa

South Africa is the leading commercial poultry-producing country in African, followed by Egypt, Morocco, Nigeria and then Algeria, in that order (Nkukwana 2018). The poultry industry is the chief segment of the country's agricultural sector, contributing greater than 16 percent of its share of GDP (Nkukwana 2018).

Local poultry production in SA has developed greatly, at a compounding growth rate of 6.3 percent annually, between 2004 and 2014 (DAFF 2014). The growth in production was largely driven by the growth in domestic consumption, from 23kg per

capita in 2003, to nearly 38kg per capita in 2014 (DAFF 2014). The development in local production has corresponded with the upsurge in local consumption.

In South Africa, the majority of poultry is raised by large-scale commercial players who are mostly vertically integrated with main inputs like feed, all the way to slaughtering operations (DAFF 2014). However, the industry is controlled by a few completely integrated large commercial producers, and a high amount of small-scale producers, either as contract growers or individual producers supplying exclusively the informal market. (Nkukwana 2018).

The value of SA poultry imports escalated from nearly $180 million in 2010 to almost $400 million in 2014. Before 2012, the major source of imports was Brazil. Afterwards, there was a shift towards chicken imports from the EU, due to the trade agreement between SA and the EU (Tregenna and Kwaramba 2014). Southern Africa experiences a trade deficit that is basically resulting from deep-sea imports into South Africa, which is both the leading poultry consumer as well as poultry producer in the region. By 2016, South Africa's trade shortfall in poultry meat had escalated from US$110 million in 2010 to US$244 million (Ncube 2018).

A substantial spike in poultry imports in the third quarter of 2012 witnessed imports growing from $80 million to $140 million and backed the call for anti-dumping duties (CCRED 2016). Therefore, anti-dumping tariffs ranging from 12 percent to 82 percent were enforced in 2013 on full dressed birds, bone-in portions, boneless cuts and offal imported from Brazil (Tregenna and Kwaramba 2014). Following the imposition of anti-dumping duties, saw a drop, amidst fluctuations, in the value and the volume of imports (Tregenna and Kwaramba 2014).

3.7.6 Poultry production in Ghana

The Poultry industry in Ghana is currently among the most underperforming in the agribusiness (Banson *et al.* 2015) basically due to high production cost (Kusi *et al.*

2015: 486) coupled with cheap imports of poultry products (Andam *et al*. 2017: 1; Kusi *et al*. 2015: 486; Nkukwana, 2018). Poultry production does not need much capital, especially at the SMS level, nor does it require much technical expertise. Ghana has observed substantial upsurges in poultry meat consumption. Stimulated by growth of income and food preferences among the fast increasing urban population over the past decade, this consumption trend is anticipated to prolong (Andam *et al*. 2017: 1).

According to USDA as of 2012, Ghana was merely able to satisfy approximately 10 percent (46 308 Mt) of entire poultry demand with deficit of 73 788.4 Mt being addressed through imports from the EU, Brazil and the USA (GAIN Report 2013). Post forecasts poultry imports for Ghana was projected to rise by 5 per percent to stand at 165,000 Mt in the marketing year (MY) 2013, up from 157 000 Mt in MY 2012 as a result of soaring demand and the shortfall generated by the low local poultry meat production (GAIN Report 2013). Ghana is the third-largest importer of chicken products in the SSA, after South Africa and Angola (LIinden 2013). The estimated per capita consumption of poultry products per year in Ghana has improved by 33 percent from 4 kg meat in 2010 to 6.6 kg in 2012, based on GoG sources (GAIN Report 2013).

The production of both broilers and layers together culminates in ensuring food security in Ghana. There are, however, vast differences between broiler and layer chicken production. While the latter is developing constantly, local broiler producers are able to supply only 10 percent of the entire market demand (GAIN Report 2013). Basically, this is as a result of the high cost of local production and its attendant effect on the price of broiler meat, which can hardly rival imported chicken products that are generally 30-40 percent less expensive (GAIN Report 2013). Between 2011 and 2012, the quantity of layer birds in Ghana augmented by 10 percent, from 21 to 23 million, while the number of broiler birds was in excess of five million around the same period (GAIN Report 2013).

This clearly indicates that broiler production in Ghana is quite insignificant, although broiler meat production is supplemented by spent layer meat, there is still a huge supply shortage that needs to be filled by domestic producers. According to Avevor (2016), the high cost of production has been a major setback to broiler production in Ghana, resulting in competitiveness of domestic chicken compared to imported poultry products (USDA 2017). Feed alone constitutes roughly 70 percent (USDA 2013) of the production cost, besides the cost of DOCs, electricity, drugs/vaccines and labour. Moreover, the import of cheap chicken meat, compared to domestic chicken (Banson, Muthusamy and Kondo 2015), has greatly discouraged most broiler producers and forced some farmers to quit broiler production, while others have turned to layer production where the competition is less intensive.

Mainly concentrated in the middle belt, poultry production in Ghana is largely practiced in the BA and Ashanti regions, which make up nearly 70 percent of the total population (Andam *et al*. 2017: 6). According to FAO (2014b), of the 10 political regions in Ghana, the BA region is dominated by SMS poultry farmers, with 28.07 percent of overall poultry output in the country in 2009 from this area (USDA 2013).

The middle belt of Ghana provides the most suitable location for poultry production. This is as a result of average temperatures, paralleled with the more humid temperatures in the south and the hotter northern regions. The BA region is also conduisive for maize growing. Poultry farmers therefore have the advantage of easy access to maize, the primary feed ingredient (Adam, Johnson and Ragasa 2017). Maize is grown in all the ten regions, however, the BA accounted for 27 percent of national production in the period between 2012 and 2014, followed by the Eastern Region contributing 22 percent of nation-wide production, while the Ashanti region contributes 11 percent of national maize production (Kwaw *et al.* 2017). Ghana is, however, not self-sufficient in the production of maize and this has become a major challenge to its poultry industry (Angelucci 2012).

The one sure way of becoming more efficient in poultry production is through vertical integration, which has tremendously boosted poultry production in countries such as the USA (USITC 2014), Brazil (Caldas 2014), India (APEADA 2016a), and SA (IDC 2016). Vertical integration is lacking in Ghana, as independent (grow-out) farmers are not integrated into the main poultry VC. Through the integrated farming scheme, farmers receive input supply, such as chicks, feeds, vaccination drugs, transport and technical support, as well as a guaranteed market and thus avoid market risk (FAO 2013b). The integrated farming scheme also incentivises farmers to maintain moderate to high biosecurity and follow prescribed feeding (FAO 2007).

Upon reaching the expected weight, the live poultry birds are sent to integrators for slaughtering and value addition, by processing into whole dressed birds or cuts and packaging. With the fragmentation of independent SMS poultry farms in Ghana, it may be difficult for farmers to enjoy economies of scale, as done by both large scale or integrated farms that provide assistance to small-scale producers to increase their production sustainably through contract farm agreements (FAO 2018b). Vertical integration can be better practiced by large farms or integrators, which is lacking in Ghana.

Another way to increase poultry meat production is to incorporate indigenous birds (scavenging chickens) into the mainstream poultry production. Egypt has succeeded in developing prolific breeds through long selection and crossbreeding through the use of its indigenous chickens (IC) population as foundation stock (Padhi 2016: 3). IC in Kenya constitute about 76 percent of the total poultry population and produce about 55 percent of the total meat demand (Kingori, Wachira and Tuitoek 2010: 309) with cost of production cheaper and easier to manage.

In Ghana, IC represent approximately 60-80 percent of the country's entire poultry production (Aboe *et al*. 2006), with an estimated population of 25 million (Aning *et*

al. 2008: 10). The main system practiced is an extensive oriented in which chickens are allowed to scavenge (Asem-Bansah *et al.* 2012: 5766) for feed resources such as grass, insects, earthworms and various seeds. Some farmers, however, feed their chickens with grains and chicken leftovers as well as termites harvested from termite nests to supplement the protein supplies of their chickens and also reduce cost of production.

Many Ghanaian consumers show a preference for IC due to the taste and texture, flavour and presumed organic nature of the meat (Kingori, Wachira and Tuitoek 2010: 310) and perceive they are healthy, compared to spent hens and broilers. Consumers with better income are prepared to pay premium for IC meat. Actors in the consumption group included local restaurants, popularly known as ‘chop bars’ that specialize in local dishes; charcoal grilled meat sellers, usually called ‘kebab’ venders who sell grilled meats openly; and households that buy chicken for consumption (Asem-Bansah *et al.* 2012: 5766).

The levels of IC production can increase considerably when supplied with some type of housing, additional feeds such as kitchen wastes, insects, water, and any other obtainable feed resource and medicine (King'ori *et al.* 2010: 309; Khobondo *et al.* 2015) together with proper management to ensure efficient production and good quality products. There must, nonetheless, be improvements in local chickens bred specifically for meat production to complement the broiler production in Ghana.

3.8 Operations of SMS poultry farmers in Ghana

SMS poultry farmers’ operations largely depend on flock size and management practices carried out by the farmer. Medium-scale (5 000-10 000 birds) and small-scale (50-5 000 birds) production systems are employed by farmers who normally observe low to minimal bio-security (FAO 2014:17). Proper management of the poultry birds entails efficiency in production and quality chicken meat products. This is achieved by controlling diseases through bio-security measures and use of

vaccines, upholding feed efficiency, appropriate handling of poultry wastes and proper housing. As a result of the short turnover rates of poultry birds and the high market demand, poultry production can potentially be a lucrative business, under good management (Gündüz, Aslanova and Abdullah 2019: 4077).

3.8.1 Deep litter method of keeping chicken

The most common method of keeping chickens in Ghana is the deep litter system, where sawdust and wood shavings are the most common materials for litter (Anang *et al*. 2013). The operation of a deep litter system is easier and cheaper in comparison to the battery cage system. In operating the deep litter system, hens are restricted to a maximum stocking density of nine birds/m2, to ensure free movement within (Krause and Schrader 2019: 4). The floor should be covered with a five to 10 cm deep litter, usually of wood shavings or sawdust, with the use of wood shavings greatly recommended, since the chickens cannot eat them. To ensure the good health of the chickens, it is required that litter is changed and renewed occasionally to avert infectious diseases (Komba 2017:206).

3.8.2 Battery cage method of keeping chicken

Briefly, a battery cage system involves keeping the birds in compartment units, where floors made of galvanised wire that slope from the back to the front. Therefore, a battery cage system offers an ideal condition for easy supervision of each bird's behaviour, so that deficiencies as well as productivity are easily examined (Santow 2017). Under this system, the birds never come in contact with their droppings therefore there is rarer incidence of parasitic diseases which lower the rate of mortality (Santow 2017).

Nevertheless, under this system, the limited space prevents the birds' free movement, not allowing them to stand or sit comfortably. Consequently, the social welfare of the birds is compromised as they are not being grown in humane conditions (Brandy 2012).

3.8.3 Broilers raised under free range system

Human health, nutrition, and animal welfare are progressively attracting the attention of consumers and organic food markets are becoming more recognised. Several consumers believe poultry keeping using battery cage systems, results in animal stress, leading to undesirable physiological and behavioural responses and improper development. (Li *et al.* 20117).

Conversely, open-air production systems could enhance the growth condition of chickens and reduce stress (Mikulski *et al*. 2011: 1407-1414). Moreover, free range systems permit selection of strains that may enhance the comfort and welfare of the chickens. Several consumers prefer buying products from chickens raised under free range as they perceive that such products have greater sensory qualities, in other words, taste better and healthier (Higenyi, Kabasa and Muyanja 2014: 47).

The development of free-range broiler production in most of the EU-27 member states and the USA, is motivated by consumer demand for free range and/or organic broiler meat (GAIN Report 2017). In the US, small scale producers have accepted free-range poultry production system that encourages intake of pasture, which has been labelled pastured poultry system. Pastures may comprise a source of protein and energy for growing the birds (Wei, Wang, Sua and Boa 2016: 805).

Additionally, the availability of a variety of bioactive compounds in the forage, like xanthophyll, may bring about enhancement in meat quality. (Wei *et a*l. 2016: 805. Thus, demands to organic and free-range reared broiler meat have also become progressively available to consumers (Inci *et al*. 2015). Free-range poultry has become highly acceptable by consumers as evidenced by its increasing availability in the marketplace (Wei *et a*l. 2016: 806).

3.8.4 Poultry housing

Housing is a prerequisite for keeping poultry in a suitable environmental conditions. To ensure the safety and good health of the poultry, a permanent poultry house is indispensable. Preferably, the house must have a concrete floor and dwarf brick walls enclosed by wire mesh for ventilation, which is vital in poultry houses to discard and dispense with ammonia, moisture, extreme heat and to improve the air quality (The Poultry Site 2012). Therefore, poultry houses in tropical regions, including Ghana, need to be open-sided to promote natural ventilation and improve the quality of air.

Another important requirement for building a poultry house is to position the long axis in an east-west direction to avoid the sun's direct contact with the poultry (Mbuza *et al*. 2017). High ambience temperature leads to heat stress, which causes chickens to pant (Lucas and Rostagno 2013: 366). At excessive temperatures, chickens develop deficiencies in minerals, vitamins and ascorbic acid, as mobilisation and excretion from tissues rise (Abidin and Khatoon 2013: 135). Furthermore, a fence should be erected around the poultry house to keep the birds away from other animals and thieves (ACMF 2010: 8).

3.8.5 Biosecurity measures

Biosecurity is an integral part of any flourishing poultry production venture. It refers to measures used to prevent the introduction and spread of infectious diseases (Scott *et al*. 2018). Correct application of biosecurity protocols results in good health and welfare of poultry on farms and decreases financial expenditures by decreasing the incidence and amount of infectious disease outbreaks (Fasina *et al.* 2012).

Ideally, a farmer should construct new poultry houses at least one to two kilometres from other commercial or private poultry facilities. However, this may not always be realistic, especially in Ghana, where agricultural land is very scarce. There have been cases where the importance of biosecurity procedures in poultry farming

systems in Ghana and parts of Nigeria have been downplayed as a result of lack of awareness and inability to enforce components of biosecurity (Mojaba, Augustine, Neils and Ngiki 2014: 13), causing periodic outbreaks of diseases that severely lower profit or causes loss of capital in the industry (Maikasuwa and Jabo 2011: 115).

The operational cost of biosecurity is generally less costly, with a high-benefit cost ratio (Akintunde and Adeoti 2014: 53), however, poor implementation of biosecurity measures because of inadequate motivation and lack of insight of its economic gains (Laanen, Maes and Hendriksen 2014:6) lead to huge financial loss. Adhering to strict biosecurity programmes controls the prevalence of disease better than the use of vaccines and antibiotics, which have their own limitations (Birol, Asare-Marfo and Yakhshilikov 2010.

A summary of farm-level cause and control biosecurity measures (Table 3.5) is tabled below.

Table 3.5: Biosecurity measures at farm level

Causative agent	Mode of transmission	Control measures
Farm workers	Contact with sick or strange birds.	Use footbath to disinfect foot wear or use special footwear and clothing in the farm. Establish the correct management processes to minimize disease risk.
Visitors	Carrying pathogens from homes or other farms	Footbaths with disinfectants. Provide fencing, give warning signs at the farm gate to control human movements on the farm.
Vehicles	Carrier of pathogens from other farms, poultry dealers (feed suppliers) and retailers.	Car baths or disinfecting pits. Packing 50 metres from the farm.
Strange animals: rodents, cats, dogs,	Contamination of feed by urine, faeces and hair.	Fencing. Restrict entry of wild birds, other bid

goats, sheep and wild birds and different bird species (ducks, geese, guinea fowls, and indigenous chicken).	Consumption of feed and attacking young birds. Transmission of diseases like salmonella.	species, and birds from other farms. Set traps for rodents or use rodenticides.
Farm equipment	Lack of disinfection of equipment or equipment used by other farmers.	Avoid sharing farm equipment. Disinfect equipment before and after use.
Sick birds and poultry carcasses	Spread of infectious agents to other flocks.	Isolating and quarantining sick birds. Get rid of carcases safely to minimise the risk of spreading infectious agents.
Manure and old materials	Breeding grounds for insects.	Make sure old litter and manure are being disposed of regularly and new ones are introduced to ensure diseases are not spread.

Source: Terrestrial Animal Health Code - 25/07/2017

3.8.6 Veterinary and extension services

Veterinary and extension services are vital to the development of a sustainable poultry production system with veterinary officers advising farmers on biosecurity measures that must be taken to avert poultry diseases resulting in high bird mortality. These officers also educate farmers on the correct methods of administering vaccines to their flocks to boost their immune systems against diseases.

Nonetheless, most SMS poultry farmers have limited access to veterinary and extension services (FAO 2014) and this impacts their production negatively (Wong *et al.* 2017: 7). Therefore, educating and training of farmers to equip them with the prerequisite knowledge about animal healthcare and administration of vaccines have been found to be effective in controlling animal diseases and ensuring high productivity (FAO 2010; Leyland *et al*. 2014).

3.9 Importation of poultry products

Ghana is among the countries where imports are anticipated to escalate most as growth in income reinforces demand (FAO 2014; Banson *et al.* 2015: 173). Poultry imports to Ghana in 2012 was estimated at 73 788.4 Mt, while local production was merely 46 308 Mt, leaving a deficit of 27 480.4 Mt (MoFA 2012).

The importation of poultry products, predominantly chicken, have posed a major challenge to the domestic industry, mainly in recent years and specifically for smaller producers in Ghana, as well as other SSA countries (Banson *et al.* 2015: 171). By 2014, poultry importation accounted for 44 percent of SSA chicken meat consumption, compared to less than 30 percent in 2004 (The Poultry Site 2014). The overall poultry imports to SSA from several sources increased from 6 000 Mt in 1981 to 1.22 million Mt in 2014, constituting 44 percent of the entire local consumption (Hansen and Gale 2014).

In 2013, Ghana imported roughly 170 600 Mt of poultry products globally, of which 68 800 Mt came from the USA, 55 900 Mt from the EU and 40 200 Mt from Brazil. A fairly small share originates from other countries (UN Comtrade 2015). Ghana is the third-highest importer of chicken meat in SSA, following SA and Angola (Linden 2013). In the last decade, exports to these nations have been especially augmented by over 200 percent (UN Comtrade 2015).

Ghana has been considering banning imports of poultry products, on which it spends approximately US$ 500 million yearly, to urge Ghanaians ‘to rise to the challenge of economic transformation’, since Ghana has the capability to develop the poultry industry as a VC (Vorley and Lançon 2016). The ban has not yet been implemented. Any hasty ban before local production has been increased would encourage smuggling and, at the same time, cause an upsurge in prices. Ghana is not competitive in profitable poultry production, notwithstanding imposing a 20–40

percent tariff on chicken imports in an effort to enhance domestic production (Vorley and Lançon 2016: 12).

According to Dr. Hanna Bisiw, Deputy Minister for Food and Agriculture in charge of livestock, the nation is accustomed to importing almost all of its chicken meat for domestic consumption for several decades. Data from the Statistical Research and Information Directorate (SRID) of the MoFA and the MoTI had indicated a steady increase in imports of meat to Ghana over the past 10 years (Gyton 2014). The minister revealed meat import spend by the country at roughly US$ 270m since 2008, with poultry imports making up a significant proportion of this figure.

Ghanaian poultry producers have persistently expressed dissatisfaction at government poultry sector policy. In May 2011, farmers' representatives appealed to the government to be an example to other West African governments and go above the common external tariff (CET), by applying extra trade regulations; a tacit reference to the ban on frozen chicken imposed by the Nigerian and Senegalese governments in 2002 and 2006, respectively (Agritrade 2012).

3.9.1 Consumption of poultry products

In India, the most consumers prefer chicken dressed in their presence. Consumers have aversion for chilled meat. The live bird market dominates over 95 percent in India (Manmohan 2016). Some research studies in Ghana established that consumers' preference for imported chicken on the grounds of handiness, and local chicken on the grounds of origin and taste (Woolverton and Frimpong 2013: 19).

The projected per capita consumption of chicken in the country has grown by 33 percent from 4 kg meat per year in 2010 to 6.6 kg per year in 2012 (USDA 2013: b). according to FOSTAT (2020), the per capita annual poultry meat consumption rose to 7.21 kg in 2019. This is, nevertheless, far below the per capita consumption in SA,

where consumption of chicken increased by nearly 80 percent, from 21.5 kg per capita per year in 2000, to 38.5 kg per capita per year in 2014 (Poultry World 2015).

In Ghana, consumers in urban centres have a preference for imported chicken that are inexpensive and processed as whole or pre-cut chicken. Processing chicken in Ghana into cut portions, to enable easy use by consumers, is inadequate (Woolverton and Frimpong 2013: 27). Nonetheless, Ghanaians usually prefer the taste of local chicken to imported chicken, due to its flavour and texture. Cottage Farms, as well as Darko Farms, have identified this market opportunity and have built cold stores in Accra, where frozen local chicken, ranging from whole birds to pre-cut pieces, are sold (RVO 2014).

3.9.2 Consumer preference for chicken products

Some empirical studies done on consumer preferences for imported chicken meat indicate that convenience and low prices are the main determining factors (Al-Hassan, Larvoe and Adaku 2014: 219, Banson *et al*. 2015: 168, Kwadzo *et al*. 2013: 71). Modern markets, mostly found in the cities, only sell processed or pre-cut broiler meat products, which most consumers find to be convenient (Woolverton and Frimpong 2013: 19). Woolverton and Frimpong (2013: 19), however, indicated that price is the most significant attribute in purchase decisions regarding imported chicken. There is unanimity on the importance of the convenience attribute. Pre-cut frozen chicken was found to be more suitable, compared to chicken sold as whole dressed or live poultry birds.

The market where the chicken meat is sold may also influence the consumer preference. In the survey of Woolverton and Frimpong (2013: 19, 27), which was carried out among urban centres, most consumers in Accra preferred Ghanaian chicken meat on the basis of taste. Among other factors that impact consumer preferences for poultry meat is the price, freshness, and packaging, along with origin, availability, closeness, and fattiness, as well as tenderness, perceived quality, and

convenience to cook (Adetunji and Rauf 2012: 17). The local chicken product is generally bought live (Egyir *et al.* 2012: 13), or as whole-dressed fresh chicken while imported chicken are commonly obtainable as frozen pre-cut (Al-Hassan *et al*. 2014: 220).

Considering the factors that influence the buying of chicken, it becomes glaringly obvious that imported chicken is prevalent for causes totally different to the qualities of locally produced chicken. For example, the outcome of the consumer survey conducted by Kwakwa (2013), showed consumers prefer local chicken for its perceived quality, tenderness and taste, while imported chicken is preferred due to its availability and cheapness. Kwadzo (2013) also came to a related conclusion by juxtaposing local and imported chicken features within consumer ranking.

Consequently, local chicken is valued higher in terms of taste and quality attributes, as opposed to imported chicken, which obtains higher scores with regards to attributes like price, packaging, perceived quality of the meat, and availability, as well as nearness of accessibility options (Kwadzo 2013). Thus, taste, freshness and source are the causes for the preference for local chicken, while imported chicken is favoured for being in pre-cut pieces (Banson *et al*. 2015: 171). According to Donkor *et al*. (2013: 81), consumers rate imported chicken with higher quantity but lower quality, in relation to local chicken.

3.10 Government policies on poultry production in Ghana

The upsurge in poultry imports into Ghana is triggered by two main contributors: the decline of trade barriers caused by regional integration and economic liberalisation; along with local farmers' incapability to satisfy consumer demand due to structural limitations to efficient production (Banson *et al*. 2015: 167). Consequently, the GoG has instituted import quotas and import tax to safeguard the emerging poultry industry; the price of imported chicken is nonetheless so cheap that the domestic chicken products can hardly compete. Import flooding has become commonly

prevalent since West African countries dropped tariffs in accordance with their regional trade agreements in the late 1990s (Benson *et al.* 2015: 167).

As members of the World Trade Organisation (WTO), majority of West African countries have the authority to enforce tariffs stretching from 79 to 230 percent (Benson *et al.* 2015: 167). Nevertheless, as signatories of regional trade agreements committed to establishing common external tariffs, West African countries have interestingly dropped their tariffs (Diouf 2012). Emerging economies, such as Ghana, could momentarily safeguard its local poultry industry with high tariff barriers and/or quotas on poultry imports and therefore try to support local producers to increase their production. The expectation is that farmers will be capable of boosting production for the local market without a tariff wall and equally export cheap poultry products (Todaro and Smith 2009).

In order to enhance local production, in 2013 the GoG eliminated custom duties on poultry inputs like feed, additives, vaccines and drugs and has expedited better accessibility to veterinary services (Benson *et al*. 2015: 172). Additionally, July 15, 2014 saw the launch of the Ghana Broiler Revitalization Project (GHABROP), intended to encourage domestic broiler production. The GHABROP is mandated to improve the sector all through the VC, with hatcheries, feed mills, slaughtering and processing facilities, as well as cold depots and stores, and consumers together to ensure ‘self-sufficiency’ (RVO 2014).

According to the project, a new poultry and livestock import policy was designed to reduce the importation of poultry products (RVO 2014). The policy restricts imports to 60 percent, signifying that importers have to source 40 percent of their produce from domestic producers (FAO 2014). These interventions are intended to catapult growth of the domestic broiler sector.

3.10.1 Ghana Broiler Revitalisation Project (GHABROP)

The GHABROP, launched in 2014, is a ten-year collaboration between the GoG and GNAPF, with the project starting at Kumasi, where large poultry farms in Ghana are situated. The project is supported by the government through firstly, the provision of fertilised eggs to hatcheries for the production of DOCs and secondly, ensuring there is a buffer stock of maize accessible as feed for the chickens. The project aims at rejuvenating the industry throughout the poultry VC and will ensure production farms, suppliers of input, feed mills, hatcheries, and, along with veterinary service providers, processors, retailers, and cold store operators, as well as consumers, all play efficient roles to promote Ghana's self-sufficiency in chicken production (Kpentey 2016).

The main aim of GHABROP is to boost domestic capability in the production, processing and marketing of broilers nationwide. The amount devoted for is $5 115 625 to produce 30 000 Mt of broiler meat yearly (GNA 2015), while projected to run for a decade, and provide suitable environments for all poultry industry players in the VC. The GHABROP was expected to progressively reduce Ghana’s meat import burden to 40 percent by 2016, and ensure that at least 40 percent of the entire poultry products consumed in the country is produced locally (Kpentey 2016). Presently, as part of the conditions for securing an import license, importers of poultry products are obliged to provide a concrete proof that 40 percent of their entire stock is sourced from domestic poultry producers (Kpentey 2016).

3.10.2 Challenges of the Ghana Broiler Revitalization Project (GHABROP)

Though the GHABROP project was meant to boost domestic chicken production, processing and marketing, the main partner, GNAPF, was unaware of the document or policy drafted to implement the project; a situation that led to the collapse of the pilot phase in Kumasi (Kwofi 2016).

Notwithstanding the elaborate nature of the GHABROP project, two years into the programme, the GHABROP could not boast of a single bird in its name (GBN: Ghana Business News 2016). The way MoFA was conducting the GHABROP project came as a surprise to the GNAPF. Consequently, the Vice Chairman of the GNAPF, Mr. Napoleon Aqyeman Oduro had challenged the government's assertion that it has given support to poultry producers in Ghana, denying that any of the GNAPF members had obtained any funding from the government, MoFA or the Export Development and Agricultural Investment Fund (EDAIF), as indicated by the President in his State of the Nation Address in 2016 (Kwofi 2016).

According to the president of Ghana, Mr John Dramani Mahama, at the commencement of the programme, a 20 million Broiler Project was launched, with the aim to decrease the import of poultry by 40 percent by the close of 2016 and save the economy about US$150 million. The president stated that poultry farmers had already started enjoying the benefits connected to the augmented demand for chicken on the local market, supported by GHABROP (Kpentey 2016). The latest statistics, according to the president, indicate Ghana has attained a decline of 30 percent in chicken imports, from US$208.7 million to US$149 million (Kpentey 2016). It is noted that a seemingly irreconcilable difference exists between Mr John Dramini Mahama's commendation to the GHABROP programme and the GNAPF president's observation about the same project. The onus, therefore, lies on GoG, GNAPF and all stakeholders to collaborate in ensuring the development and competitiveness of the poultry industry.

3.10.3 A ban on imported poultry products

One way of protecting the infant domestic poultry industry and promoting consumption of local chicken, is through the banning of cheap imported poultry products. The federal government of Nigeria banned poultry imports in 2003, without any effective measures taken to boost poultry production. Nigeria's annual local

demand for chicken is 1.5 million Mt and the nation currently produces 300 000 Mt (The Poultry Site 2016).

The deficit of 1.2 million Mt is mainly smuggled into Nigeria, mostly through the Benin Republic (The Poultry Site 2016). Botswana, however, has been successful in implementing policies that restrict the import of poultry meat, except import permits granted for highly specialised poultry, such as free range or organic products. Currently, Botswana is self-sufficient, in terms of poultry meat production (Grynberg and Motswapong 2010: 18).

It is argued that the GoG must be proactive in taking steps to ban the import of chicken until the domestic industry is sustainable in chicken production. The current production rate of around 10 percent is way below the estimated target of 60 000 Mt, or 40 percent of the local demand, anticipated to have been accomplished by the end of 2016. Government sources confirmed Ghana would spend $198 million on 170 000 Mt of poultry imports by the close of 2016 (The Poultry Site 2016).

The fact, nonetheless, is that any attempt to control imports, similar to the situation of Nigeria, without first boosting local production, resulting in large-scale smuggling of poultry products across the borders of neighbouring countries (Agritrade 2012: 4).

3.10.4 Tariffs and import duties on poultry products

Tariffs serves as Ghana's chief trade policy mechanism. In Ghana the implementation of the tariff system with four ad valorem import duty rates (0 percent, 5 percent, 10 percent and 20 percent) continues till the ECOWAS Common External Tariff (CET) is implemented in 2016 which would include a fifth band of 35 percent. Until then the maximum customary tariff rate of 20 percent duty is imposed on poultry and rice (GAIN Report 2016c)

A principal component of the community's trade policy is the ECOWAS Trade Liberalization Scheme (ETLS), with the objective of increasingly forming a customs union. Consequently, on January 1, 2015, CET was enforced. The tariff policy ensures that all member countries collect a common tariff across all the sub-region boarders (GNA 2016). The CET comprises a fifth band of 35 percent for products considered most sensitive, particularly meat (including poultry (World Bank 2015).

On February 1, 2016, the CET was implemented in Ghana (World Bank 2015). Since then, importation of poultry products faces a 35 percent duty and will be eliminateded from liberalisation measures in the ensuing years. This tax policy, complemented by the implementation of GHABROP, will enhance the development of Ghana's poultry industry (BUSAC 2014). However, the subject of the implementation of these policies is quite challenging. In Cameroon, tariff protection was applied to re-launch poultry sector development amidst the flooding of chicken imports. Conversely, GoG has frequently declined calls for upholding tariffs to be introduced, notwithstanding the upsurge in imports of chicken (Agritrade 2013: 6).

3.10.5 Agricultural subsidies on poultry production

Before the mid-1970s, several SSA countries embarked on subsidy programmes to reduce food insecurity, hunger and malnutrition, and rural poverty (Wang *et al* 2019: 1). These subsidies reinforced nationalistic policies by offering direct support to farmers and were seen as a major tool for growth through agricultural intensification. However, subsidies also posed a massive financial drain on governments (Chirwa and Dorward 2013; Jayne and Rashid 2013).

Many countries subsidise agricultural production with the objective to safeguard national food security. During the nation's economic recovery programmes in the 1980s, the implementation of trade liberalisation, encouragement of the private sector, deregulation of the fertilizer market, along with state withdrawal from the input

market, but above all, the removal of agricultural subsidies, have had a significant impact on farmers' access to agricultural inputs (Kato and Greeley 2016: 34).

Though poultry production is not directly subsidised per se by the government of Ghana (GoG), subsidy in the upstream of a product's food-chain is successfully a subsidy for everything downstream. For example, a substantial subsidy for maize production through the provision of fertilizers, means a subsidy for poultry production cost – since it has a bearing on feed cost, which is a key aspect of the cost of poultry. Low price therefore, can entice consumers to buy local chicken (GBN 2011).

According to WTO regulations 2008-2010, agricultural subsidies are to be abolished. Notwithstanding this regulation, the EU and USA are considered as the 'subsidy superpowers', accounting for more than 60 percent of rich countries agricultural support spending (GBN 2011). The major objection with regards to policies that support subsidised production, is that it encourages over-production.

Most Central and West African countries have become victims of unfairness by the USA and EU, as the former become dumping grounds for low priced chicken products (Ward 2017). Regardless of the abolition of subsidies, farm subsidies are generally high in developed countries and lower – even sometimes non-existent in real terms – in poor countries (Strubenhoff 2016). A huge part of the EU's budget is dedicated to supporting agriculture. Every farmer in the European Union obtains a subsidy of 260 euros per hectare of agricultural land if all environmental and sustainability requirements are met by the farmer. Approximately 6.5 million farmers were granted agricultural subsidy from the Common Agricultural Policy (CAP). Together, farmers received more than 41 billion euros (EDJNet 2019).

Europe expends largely in absolute terms and its subsidies signify a greater share of the value of farm output. On the other hand, the USA expends more per farmer and as well focusses on subsidies on a narrower array of produce. The USA and the

EU subsidies is a concern to the rest of the world because of their predominant role in global markets (EPRS 2014). The issue of subsidy in the case of the USA is quite intriguing. Farmers in the USA receive subsidies for keeping land in production and surplus products are bought by the government. Once bought, the government decides what to do with these surplus products (EPRS 2014).

According to Kenneth Quartey, Managing Director of Sydel Farms, foreign farmers are greatly subsidised by their respective governments, thereby making it tough for locals to compete (CorpWatch 2005). This emphasises measures the EU takes in making agriculture sustainable and competitive (EDJNet 2019). In order to ensure the competitiveness of Ghana's poultry industry, poultry production need to be heavily subsidised by the government.

3.11 Challenges facing the local poultry industry

The Ghana poultry industry is saddled with numerous setbacks that hamper productivity and render the industry less competitive. The key among these challenges include: unfavourable government policies (Kusi *et al.* 2015: 484); high cost of feed (Bagopi *et al* 2014); cost of DOCs, cost of utilities (electricity and water), labour cost and above all, the soaring import of cheap imports of frozen chicken that is 30-40 percent cheaper than domestic chicken (Killebrew and Plotnick 2010).

3.11.1 Unfavourable government policies

The policies of the GoG towards the development and competitiveness of the poultry industry have been criticised as not being effective (Kusi *et al*. 2015: 484). With the absence of competitiveness in the local poultry sector and the deterioration in local production levels perceived to be caused by cheap chicken imports, poultry farmers in Ghana are pushing for policy interventions to support local production by restricting imports (Sumberg, Awo and Fiankor 2013; FAO 2014).

There was substantial government involvement in the 1960s (comprising disease control) that improved the poultry sector, then deteriorated steeply in the 1990s. This was as a result of the Structural Adjustment Programmes, whose policies included the removal of government support for drug costs, the cessation of government importation and subsidy for feed-mill ingredients and the lessening of preference in agricultural credit rates (Kusi *et al*. 2015b: 215). These raised production costs sharply, causing the demise of several poultry operations (Raza, Ali and Mehboob 2012).

The scrapping of agricultural subsidies on feed by GoG has resulted in the soaring cost of imported feed concentrates and other mineral supplements (BBC News 2016). This has, consequently, augmented the cost of producing domestic chicken, making it more expensive for consumers compared to imported chicken. In an effort to improve domestic production, various governments in Africa, particularly Nigeria, Botswana, Swaziland and Namibia, have endeavoured to address the issue by enforcing import restrictions. Botswana, with more than three decades of heavy import duty on poultry behind it, now produces adequate chickens to meet local demand (BBC News 2016). However, no such pragmatic steps have been recorded by Ghana to protect its domestic poultry industry.

In January 2006, a regulation was passed by the GoG to raise import tariffs from 20 percent to 40 percent to safeguard the local industry but was officially reversed two months later (Kusi *et al*. 2015a: 479). Considering the apathetic role played by successive government to enact clear policies to restrict imports of poultry, the GNAPF took the GoG to court to ensure that poultry sector policies are implemented but the case was deferred to enable the GoG address their concerns resulting in the establishment of a Poultry Council to assist the industry prosper (Kusi *et al*. 2015a: 479).

3.11.2 Access to funds

Access to credit facilities to enable poultry farmers to expand their business is very challenging in Ghana. Farmers are unable to access loans from the commercial banks, as the banking institutions usually demand security before granting loans for business purposes (Mwirigi, Gakure and Otieno 2019: 286). This is an important feature in obtaining a loan, as collateral serves as surety for loan recovery; in case of default. Unfortunately, most SMS poultry farmers lack collateral (Mwirigi, Gakure and Otieno 2019: 286).

In 2015, the Ministry of Agriculture in Russia stretched support programmes for poultry production, with subsidies for partial reimbursement of interest for investment and short-term loans that remain the principal support measures towards the poultry sector (GAIN Report 2016b). The Ministry of Agriculture also aims at continuing its breeding stock development support programme, by reimbursing direct expenses for the construction and modernisation of breeding centres. Russia's federal budget allocated 237 billion roubles for support of agricultural producers in 2016, and similar sum of money was allocated in 2015 (GAIN Report 2016b). In Ghana however, farmers neither have access to credit facilities nor do they receive any substantial support from the government.

3.12 Feed as determinant of cost of poultry production

Achievement in poultry production depends principally on the quality of the DOCs, creating a conducive atmosphere and the provision of quality feed, with the latter being the costliest of other inputs, all of which deserve befitting attention (Chatterjee and Rajkumar 2015). Achieving high output and efficiency depends on employing nutritionally well-balanced feed composed to meet the nutritional requirements of the chickens (FAO 2013a). The high feed cost is ascribed to the competition for conventional feedstuff for competitive uses, predominantly protein feed ingredients, such as soybean and fishmeal meal for livestock (Chand *et al.* 2014a: 574). The

price of soybean meal and fishmeal continue to escalate, thus swelling the production cost which impacts the profit margin of the farmers. Therefore, it is essential to search for other sources of protein which are capable of substituting for fishmeal and soybean meal (Hagan, Donkoh and Awunyo-Vitor 2016: 2).

Feed, the key input in poultry production, accounts for between 60 and 70 percent of entire production costs (Adedeji, Kazeem, Ogunjimi and Otekunrin 2013: 119; Donkor *et al.* 2013: 74). The key ingredients utilised for feeding comprise maize, soybean, fishmeal, and concentrates, along with premix. However, with the exception of maize produced locally, several feed inputs are imported. Regulating the cost of animal feed is crucial as it totals 82 percent of the variable cost of production (USDA 2013). Hence, several feed manufacturers are changing to cheaper alternatives, particularly cake from palm kernel, copra, cotton-seed, and soybean, as well as other by-products obtained from agro-processing. Utilising unconventional (low cost) feed ingredients obtainable locally, to formulate the least-cost feed formulation has been found as a strategy to reduce poultry feed cost (Thirumalaisamy *et al*. 2016: 3998).

Exorbitant feed price can be ascribed to excessive raw material cost. Maize and soya constitute the main determining factors of the cost of poultry production (Ncube *et al.* 2017: 10). The scant cost of poultry production in Brazil and the US is attributed to the inexpensive price maize which consequently reduces feed cost (Davis *et al*. 2013). The constant reduction of grain costs in EU member states since 2013, particularly in 2015 and 2016, has dropped the cost of production and enhanced competiveness of chicken in the home market and for exports (GAIN Report 2016a).

Policy makers in Ghana can, therefore, reasonably be expected to emphasise the high production of maize and thus reduce the high cost of feed that mostly challenges poultry producers. For instance, in India, the accessibility of low cost but superior quality feed has guaranteed the local poultry production remains

competitive, opposing importation (Hellin *et al.* 2015: 159). Intensifying feed production encompasses capitalising on grain production, especially maize and soybean. In India, maize is currently extensively obtainable as a low-cost energy source, simply digestible for the birds and exceedingly appetising (Hellin *et al*. 2015: 155). Research to upsurge efficiency and increase the range of feed sources can, to a large extent, help to improve the entire poultry sector.

Due to their scant supply and numerous uses, conventional protein and energy sources are becoming increasingly costly (Chand *et al.* 2014a: 575). The alternatives for energy and protein sources must, however, not only have quality nutritional value but also be less expensive compared with conventional protein origins and must always be available (Tufarelli, Khan and Laudadio 2012: 138). Any attempt towards cheap protein and energy resources will exceedingly reduce poultry production cost (Okah and Onwujiariri 2012: 472).

The effectiveness of feed application in poultry birds and the growth of the feed industry of a country hinge on the quality of feeds obtainable (Dhama *et al.* 2015). This makes it essential to consider factors such as quality, tastiness and functional properties of ingredients, as well as the likely content of anti-nutritional components that can impact the health and growth performance of poultry birds.

3.12.1 Feed processing in Ghana

In Ghana, the feed mill industry for livestock has been in existence from the early 60s. With more than 23 feed mills registered with the Ghana Feed Millers Association, majority have been shut down. As at April 2013, there remained only eight commercial feed mills, situated in the Greater-Accra, Ashanti region and Eastern regions (MoFA 2016). The overall installed capability of these feed mills was 51.5 Mt/hour, with a yearly production capacity (supposing they operate at full capacity) of 123 600 Mt/annum (MoFA 2016). Majority of these feed mills that were shut down did so owing to poor patronizing attitude of commercially produced animal

feed, contributed to a number of medium and small scale farms folding, as affordability of locally processed feed became hard.

Feed producers in Ghana can be characterised as commercial feed millers and on-farm self-millers. Nevertheless, several feed millers are producing only 40-50 percent of their capacity, as a result of the low demand from small scale operators who prefer to prepare their own feeds to minimize cost. For the past few years, the annual average amount of compound feed produced in Ghana is approximately 100 000 Mt (GAIN Report 2013).

Commercial feed millers generally supply poultry feed for SMS poultry producers, as most large scale poultry producers have their on-farm feed mills. These commercial feed millers manufacture mostly mash feed with a few others producing high feed concentrates, whereas only two feed mills pelletize feed (AgroChart 2013). Several SMS poultry farmers prefer feed concentrates as it is inexpensive, suitable, and less colossal to transport. Broiler feed cost rose to GHC40-55 ($21-$28) in 2012, up from GHC35-40 ($18-$21) in 2011. Layer feed is reasonably lesser in price, starting from GHC35-45 ($18-23.7) in 2012 (GAIN Report 2013).

3.12.2 Import of feed ingredients

Apart from locally produced white maize, feed components comprising vitamins and mineral complements, fish meal, along with non-nutritive feed additives in the form of antibiotics, enzymes, including premixes and concentrates, are imported. Complete feeds, SBM and to a lower extent, yellow maize (for poultry feed), and groundnut cake are also imported (The Poultry Site 2013).

The amount of feed ingredients for livestock imported to Ghana in 2014, according to the Animal Protection Directorate (APD), totalled 53 459.83 Mt comprising 8 475.97 Mt fish meal, 714.47 Mt premix, 11 818.63 Mt concentrate and 32 450.77 Mt SBM (APD 2015). An amount of70.51 Mt wheat bran, 378.05 Mt crude palm kernel,

752.93 Mt oil cake and 107.69 Mt copra cake was imported in 2011 (MoTI 2012). The high cost of conventional feed ingredients like SBM and fish meal has necessitated the inclusion of maggot meal in the poultry diet formulation.

3.12.3 Feed production for poultry in Ghana

Feed has taken centre stage in poultry production, as it constitutes roughly 70 percent of the entire production cost (Bagopi *et al*. 2014), with maize and soybean alone making up 60 to 70 percent of the feed component (Ncube 2016; GAIN Report 2013). The contribution of maize and soybean farmers, as well as SMS poultry producers in the production of these cereals for feed, can significantly boost poultry production in Ghana (Hellina *et al*. 2015: 151).

The high production of unconventional feed, such as sorghum, millet, cassava, and sweet potatoes, as well as moringa oleifera, and their inclusion in the feed formulation to substitute a certain percentage of maize and soybean, cannot be overemphasised. It is, therefore, critical to empower especially SMS poultry farmers, whose livelihoods largely depend on farming, to engage in feed production to control costs and increase poultry production.

3.12.3.1 Optimising feed production with poultry manure

The decline of soil fertility has necessitated the need for fertiliser application to optimise especially maize production in Ghana. Millet and sorghum, however, can be cultivated well on relatively poor soil and in drought conditions (Jacquie 2015; USAID 2014). Nonetheless, the application of poultry manure to poor soil can maximise the crop yield of these cereals. The soaring prices of inorganic fertiliser is a disincentive to smallholder farmers. Alternatively, farmers have access to their own poultry manure, which is free and always available on the farm, to improve crop yield and reduce production cost.

Chicken excreta has high nitrogen, a good amount of phosphorus and potassium, and balanced nutrients; this means it has the maximum of nutrients, among all livestock and poultry manure (Modern Ghana 2017). Chicken manure can increase the soil's moisture and nutrient-holding capabilities, producing quality soil for successful growth of crops and vegetables (Morden Ghana 2017), as well as enhancing the physical and chemical properties of the soil (Amanullah, Sekar and Muthukrishnan 2010).

To discard poultry manure from the farm, most farmers burn instead of applying it on the farm to avoid waste and increase crop production. These farmers might not know the efficacy and/or efficient application of farm manure, or may consider it too bulky to transport to their maize farms, usually situated a fair distance from the poultry farm.

The inadequate supply of maize for the production of feed has resulted in limitations of the development of the poultry industry, thus encouraging ongoing flooding of imported, frozen poultry products in Ghana (VOTO 2015). The use of poultry manure can contribute to reduce the cost of fertiliser inputs and increase crop yield, to enhance poultry production.

3.12.4 Role of maize in poultry production

Maize constitutes a major source of dietary energy in the formulation of a poultry diet and although maize is produced all over the globe, there is keen competition for it amongst humans, livestock and industries (Chand *et al*. 2014a: 174), as it is high in energy in comparison with other grains (Gebeyew, Mohamed and Urge 2015). Consequently, its several uses, comparably higher moisture requirement for development and its production in drier areas in most parts of Ghana, may impact negatively on poultry production in the future.

The majority of the arable land for maize production is rain fed and the cultivation of crops is exclusively dependent on sporadic seasonal rainfall (Ndamani and Watanabe 2017: 270). Ghana, as a non-grain sufficient country, therefore faces a serious challenge in poultry production. Maize is domestically produced, though inadequate, to satisfy the yearly demand of the industry (Oppong-Anane 2013: 8). Hence importation of yellow maize to supplement domestic supply.

Maize is the leading staple crop in Ghana and contributes immensely to consumer diets. However, the poultry industry consumes nearly 30 percent of maize in Ghana (FAO 2014). A major factor exacerbating the feed issue is that Ghanaians compete with poultry, especially over white maize; with humans consuming 70 percent of the total annual maize production (FAO 2014). Since maize constitutes a key component of the poultry diet, its price can determine the prices of poultry products.

There was a significant rise in maize production between 2008 and 2010. This rise was undoubtedly due to satisfactory rain patterns, a fertiliser subsidy in 2008, and exorbitant food cost, which could have inspired local maize production between 2008 and 2010 (Angelucci 2012). However, according to MOFA, the maize average yield in 2010 was 1.9 Mt per hectare, against a projected attainable harvest of about 2.5 to four Mt/ha (Angelucci 2012).

It was noted by Otoo (2009) that, whereas the average Ghanaian farm produces 10 bags of maize per hectare, similar land in Brazil, for instance, produces 36 bags. This underscores the vast difference between the cost of poultry production in Ghana compared to other advanced countries. Nonetheless, Ghana still lacks efficient ways of boosting maize production. This deficiency must be addressed by MoFA to improve maize production for both human and livestock consumption.

3.12.5 Amount of maize consumed as feed

Poultry consume nearly 400 000 Mt of maize annually in Ghana, with the volume of yellow maize used in commercial poultry feed at approximately 200 000 Mt. Maize is produced all through Ghana. Nevertheless, the major producing areas are predominantly in the middle-southern part (BA, Ashanti and Eastern regions), where 84 percent of the maize is produced, with the other 16 percent being produced in the northern regions of the country (Upper East, Upper West and Northern parts) (Angelucci 2012).

The supply of maize in Ghana has been growing progressively for the past few years, with an average produce at 1.4 million Mt per year over the period 2005-2010. Though there is no dependable data for maize used for animal feed, the GoG speculates that 70 percent of the entire maize produced in Ghana is intended for human consumption, with the other 30 percent designated for feeding animals (primarily poultry) (FAO 2014).

The exorbitant cost of feeds, rated at 70–80 percent of the entire cost of production, is a serious limitation to poultry production in Nigeria (Ogunleye *et al* 2008). There are readily available, high quality agro by-products of leguminous plants that are at no or less cost and thus able to minimise the cost of meat production (Moyle *et al.* 2010). This is due to grain feed diet being inadequate and expensive and has militated against ample animal protein production and intake in the country (Moyle *et al.* 2010). However, farmers must be cautious when using nonconventional feeds, since the inappropriate use of them may adversely affect the birds' growth and performance.

3.12.6 Soybean as feed

The world's utmost significant source of protein for poultry and livestock is soybean (Wierup 2017), while conventionally, the most used protein sources are soybean and fishmeal (Sleman, Robert and Swick 2015). SBM is the most favoured protein source

used in poultry feed processing. Its cerebral palsy (CP) content is approximately 40–48 percent but this rests on the quantity of hulls extracted and the oil extraction process. Compared to the protein meal of other oil seed grains such, as cotton seed and sunflower seed, soybean protein is preferred due to its well-balanced amino acid profile, particularly those that are indispensable, enabling it to balance most cereal-based diets (Ravindran 2013).

Although soybean is comparatively novel crop in Ghana (Akramov and Malek 2012), according to Etwire *et al*. (2013), the crop is now becoming more popular and accepted among Ghanaian farmers. The continually significant role the soybean crop in Ghana plays in the country's economy (Akramov and Malek 2012), in terms of meeting the protein requirements for both humans and livestock, cannot be overstated.

Currently, Ghana's soybean production is approximately 172 345 Mt annually (MoFA 2014), with the Northern Region producing 102 107 Mt. notwithstanding the numerous benefits of the soybean, the yield per unit area is low in Ghana, with an average of 1.96 Mt per hectare (MoFA 2014). However, the entire local demand for animal feed cake and cooking oil is projected at approximately 30,000 Mt annually. The level of SBM inclusion is low, ranging from 15 to 25 percent for broilers and 10 to 18 percent of the feed ration for layers (GAIN Report 2013). Strategies to enhance soybean production in Ghana can go a long way to ease the overdependence of fishmeal in poultry feed formulation, decrease production cost and optimize output of poultry producers.

3.12.7 Fishmeal as feed

Fishmeal is obtained from fish that is crushed, cooked, and processed and offers the potential to be utilised as high protein supplements for poultry (Al-Marzooqi *et al*. 2010: 1614). With sufficient quantities of essential amino acids, such as lysine and methionine, as well as a good balance of unsaturated fatty acids, fishmeal also

contains minerals, such as phosphorus, vitamin B-complex and vitamins A and D (Jacquie 2013).

The utilisation of fishmeal is generally limited to five percent to 10 percent of the content of poultry feeds (Jacquie 2013). The amino acid composition of plant proteins for poultry is lower than that of animal-based proteins, particularly regards to the essential sulphur comprising amino acid content; methionine in particular (Józefiak *et al.* 2016). Fish meal is still used to quite an extent in poultry feeds. However, as a result of overfishing, fish meal is considered a very scarce resource, which is echoed by the soaring prices over the previous years (Józefiak and Engberg 2015).

Additionally, fishmeal can be the cause of food-borne pathogens, specifically Salmonella species (Jacquie 2013). Consequently, substituting conventional protein sources of comparable value, such as maggot meal and cricket meal, is needed in order to sustain and enhance poultry production.

3.13 Strategies to improve the poultry industry and make it competitive

Strategies, from government policy interventions to cost cutting measures, aimed at improving the local poultry industry are crucial to its growth and competitiveness. The growth of Rwanda's poultry industry is steered by a five-year strategic plan introduced by the Ministry of Agriculture and Animal Resources (MINAGRI) in 2012, with the aim of creating the industry as the ''flagship'' of Rwanda's livestock industry by the end of 2017. MINAGRI's strategy is intended to entice private investment to help satisfy the increasing local and regional demand, in a dual approach focused on enhancing the (1) production and (2) marketing of Rwandan poultry products (Miklyaev, Afra and Hashemi 2017: 6).

The strategy aims to establish poultry product standards and inspection regimes, with a view to improving competitiveness through the promotion of a high-quality

‘’made in Rwanda” brand (Miklyaev, Afra and Hashemi 2017: 7). These strategies are executed to promote the development and competitiveness of the poultry sector in Rwanda.

MINAGRI has established two strategy documents to enhance development of an efficient feed industry, with the aim to boost domestic supply of high-quality compound feeds with competitive price. The initial strategic plan for enhancing animal nutrition, was launched in 2009. This was complemented in 2012 by a poultry strategy and investment strategy, which offers technical guidelines to enrich the quality of animal feed (Miklyaev, Afra and Hashemi 2017: 7).

Additionally, the Rwandan government instituted Value Added Tax (VAT) exemption on ready-made feed, and on inputs used for poultry feed production. VAT exemption is presently laid on key feed ingredients, such as industrial food waste, crop by-products, salt, minerals and vitamin pre-mixes. Most farmers desire to mix feed on their own, since this allows for easy observance of the quality of feed ingredients. MINAGRI strategies recognise the relevance of increasing farmers’ awareness and understanding of poultry nutrition (Miklyaev, Afra and Hashemi 2017: 8). The Rwandan poultry sector strategy can equally work for Ghana, should it be adopted and effectively implemented by the GoG.

The attempt by the GoG to protect the domestic industry against cheap imports is too insignificant to bring about any effective change. Therefore, it is argued that the government must first grow the industry to ensure self-sufficiency, as drastic protection measures may lead to smuggling of poultry products from neighbouring countries (Agritrade 2012: 4).

3.13.1 Reducing the cost of feeding

The soaring cost of feed ingredient continues to be the principal determinant of profit margins in poultry production, particularly in emerging economies. The most efficient strategy for these countries is to produce feeds from locally available nonconventional ingredients (Gebeyew *et al.* 2015: 1). Adopting this method would reduce the high cost of feed, as well as the reliance on imported and conventional feed input. The upsurge in the prices of poultry feed is due to the shortage and expensive cost of feed ingredients, specifically protein supplements (Chand *et al.* 2014).

The continued soaring in the cost of poultry feed ingredients has necessitated the search for alternative protein sources (Wickramasuriya *et al*. 2015), which must be highly nutritious and cheaper than other conventional protein sources (Laudadio *et al*. 2012). Any attempt towards achieving cheaper protein resources for the production of feed will greatly reduce the cost of poultry (Okah and Onwujiariri 2012: 472).

The idea of searching for cheaper protein sources should not compromise the well-being of the poultry birds. Mainly, the concept is to use domestically obtainable ingredients cost-effectively in providing essential nutrient content and balance of the final diet (Mohanta, Subramanian and Korikanthimath 2013: 1). Diverse proportions of cheaper ingredients can be mixed to attain the nutrient balance of highly expensive ones (Mohanta, Subramanian and Korikanthimath 2013: 1). However, it is essential to take factors into account, such as quality, tastiness, digestibility and functional properties of ingredients, as well as the possible content of anti-nutritional components that could possibly affect the health and development of poultry birds.

3.13.2 Sorghum as substitute for maize in poultry feed

Sorghum, also known as *milo* and *guinea corn*, is an extremely drought-resistant crop produced in several parts of the world, including Ghana. According to Jacquie

(2015), sorghum is merely three to five percent less than corn, in terms of feeding value. Sorghum is normally less expensive than maize, since the high proportion of tannins it contains restricts its use in poultry feed (Liu, Selle and Cowieson 2013). Nonetheless, tannin-free varieties are currently obtainable, and therefore, sorghum can be substituted for maize in poultry feed, with only slight changes in the quantities of other ingredients (Torres *et al.* (2013: 1564).

Torres *et al.* (2013: 1564) affirmed that low-tannin sorghum of modern varieties has been discovered, allowing 100 percent substitution of maize in poultry feed. Till now, several reports have emphasised the possible implementation of sorghum (Rodgers *et al*. 2012) as poultry feed. Some studies, however, indicated a decrease in feed consumption and weight gain in sorghum-based feed (Jacobs and Parsons 2013: 2351). Nevertheless, sorghum is potentially an attractive energy source for the poultry industry (Torres *et al.* (2013: 1564).

In contrast to maize, sorghum can be cultivated effectively on rather infertile soil and is drought resistant (Ohadi *et al.* 2017). Sorghum is tolerant to drought, thanks to its root system and can be cultivated under drier conditions than those appropriate for maize and wheat (Liu *et al.* 2013). According to Olomu (1995, in Gebeyew *et al.* 2015: 3), the metabolisable energy (ME) and the percentage crude protein (CP) component of sorghum are 327 kilocalorie (kcal) kg-1 and 9.5 percent, respectively, which is equivalent to the 319 kcal kg-1 ME and 10.1 percent CP, respectively, of maize. The percentage ash (1.2) and fibre (7.8) are greater compared to maize (one percent ash and 5.5 percent crude fibre (CF) and sorghum is fairly comparable in price to maize, in relation to other cereals like wheat.

Comparatively, sorghum grain parallels with some other cereals with the protein content comparable to wheat but higher than maize and rice (Proietti, Frazzoli and Mantovani 2015: 173). In Ghana, sorghum, unlike maize, has less competitive uses.

Consequently, the cultivation of sorghum in a tropical country such as Ghana will be a good alternative for maize, since the former is drought resistant.

3.13.3 Millet as substitute for maize

Millet (Pennisetum glaucum, Setaria italica) has been grown globally and utilised in animal diet (Heuzé and Tran 2015). Pearl millet crop can be cultivated in places of drought, poor soil fertility and severe temperature where other cereal crops cannot survive (Kumaravel and Natarajan 2015: 230; USAID 2014).

This has perhaps made the production of millet predominant, chiefly in countries surrounding the Sahara Desert in western Africa. Pearl millet grain has higher nutritive value than maize, rice, wheat, and sorghum (Muthamilarasan *et al.* 2016). Therefore, the cultivation of millet, particularly for poultry feed and for human consumption, could be a good alternative for maize, in a tropical country such as Ghana.

Pearl millet has been proved as an appropriate feed ingredient in poultry feeds. Up to 50 percent pearl millet can be included in broiler feed without any adverse effect on bird performance. Pearl millet was considered to be comparable or superior to corn as a grain source for broiler diets (Baurhoo *et al*. 2011). Incorporation of pearl millet as a substitute for maize can decrease the reliance on maize and also the high cost of poultry production (Kumaravel and Natarajan 2015: 232).

3.13.4 Cassava (Manihot esculenta Crantz) as an alternative source of energy in poultry feed

Cassava root meal has been adopted as an excellent substitute energy source in poultry feeds (Diarra and Devi 2015: 735). Global output of cassava is projected at over 230 million Mt yearly (FAOSTAT 2011), with Nigeria, Brazil, Indonesia, and Vietnam, as well as Thailand and the DRC being the leading producers (FAOSTAT

2011; Khempaka, Thongkratok, Okrathok and Molee 2013). Ghana is the seventh major producer of cassava globally (GrowAfrica 2015).

Cassava is an essential starchy primary crop in Ghana, with per capita consumption of 152.9 kg/year (Bayitse, Tornyie and Bjerre 2017: 313). Apart from being a chief food crop, cassava can be utilised as raw material for the manufacturing of industrial starch and ethanol. Cassava is grown in most parts of Ghana as a monocrop or intercropped with other food crops. With regards to amount produced, cassava is considered the principal root crop in Ghana superseding yam and cocoyam, however, cassava positions next to maize in relation to hectares planted (Adjei-Nsiah and Sakyi-Dawson 2012: 1688).

Commonly used in several tropical regions as food, cassava is also suitable for industrial use, as well as for feeding cattle, pigs, sheep, and goats, along with poultry and fish (Angelucci 2013). For instance, cassava-based animal diets are fairly popular in Latin America, and huge amounts of dried cassava have been incorporated into livestock feed in the EU, particularly when domestically grown feed grains are comparatively costly. Cassava is comparable to feed grains, since it is almost completely comprised of starch and simple to digest. Processed cassava products comprise a significant proportion of carbohydrates and minerals (Guira, Tankoano and Savadogo, 2016). Nonetheless, the intake of cassava feed products is inadequate in poultry by the tastiness of cassava-based diets, as a result of its dustiness and mass. This limitation could be minimised by treating the cassava-based diets to a better extent through pelleting or possibly adding molasses to ameliorate texture and lessen dustiness, while concurrently providing essential fatty acid (Morgan and Choct 2016: 4)

In Ghana, cassava roots are ubiquitous and have limited food or industrial uses and therefore relatively cheaper. Kana *et al*. (2012: 23) stated that replacing up to 75 percent of maize with cassava root meal (CRM) complemented with the mixture of

cocoa husk and palm oil gave equivalent results compared to control diet with maize as energy source for broiler chickens. The CRM and its supplementation displayed benefits in broiler chickens, comparable to that of commercial broiler finisher diet formulated on imported ingredients (Glatz 2012).

To include cassava in the feed formulation, it must first be processed. According to Diarra *et al.* (2014: 2), fresh cassava root was peeled, grated and dried in sun for 72 hrs. The dried product was therefore milled to pass through a 2-mm sieve and named CRM. A broiler finisher feed may be prepared to contain 20 percent crude protein and 3000 Kcal/kg metabolisable energy utilising CRM as the core energy source (Diarra *et al.* 2014: 2). It is held by FAO (2013) that the processing of cassava into chips, pellets and feed meal could directly improve the Ghanaian livestock sector by decreasing production costs.

3.13.5 Sweet potato as feed

Sweet potato (*Ipomoea batatas L,*) can serve as an unconventional source of energy alternative to corn in poultry rations (Mozafari *et al.* 2013). Sweet potato roots are rich in nitrogen-free extract showing its potential value, primarily as an energy source with carbohydrates usually making up about 80–90 percent (Beckford and Bartlett 2015). It is also an essential source of both macro and micro minerals. Relative to other minerals, magnesium, iron, phosphorus, chlorine, potassium zinc and sulphur are found in larger quantities (Sultana, Khatun, and Ali 2016). Other valuable components available in sweet potatoes comprise proteins, carotenoids, vitamins and minerals (Akoetey, Britain and Morawicki 2017: 1).

Sweet potato can serve as an unconventional source of energy alternative to corn in poultry rations (Mozafari, Ghazi and Moein 2013: 583). Mozafari *et al.* (2013: 583) indicated that up to 25 percent maize can be substituted with sweet potato meal in broiler rations, devoid of any negative effects on the birds' development.

The production cost of potato is much lower compared to cereal crops such as maize (Mozafari *et al.* 2013: 584). A shorter harvesting period of 90 days for sweet potato compares well with the 140 days for maize (FAO 2010); its production and inclusion in poultry diets must be considered by farmers. Due to its fast growth rate and high yield potential, sweet potato can serve as alternative carbohydrate source in poultry rations, to lower production cost and increase poultry production in Ghana.

3.13.6 Moringa (Moringa oleifera) as feed

The increasing acceptance of Moringa oleifera utilisation as a feed additive in poultry diet calls for investigation into its nutritive value, along with its effect on haematological parameters as a benchmark for both nutritional and medicinal values to broilers (Alnidawi, Ali, Abdelgayed and Ahmed 2016). Moringa oleifera leaves integrated into maize meal feed resulted in superior growth performance of the birds and a substantial improvement in the serum level of biochemical minerals equated to the maize meal feed solely (Alnidawi *et al*. 2016).

According to Gakuya *et al*. (2014: 209), it is estimated that 87 percent of the entire crude protein in the moringa leaves was in the form of true protein and the leaves had insignificant quantities of tannins. Gakuya *et al*. (2014: 210) evaluated the impact of supplementation of moringa oleifera leaf meal (MOLM) on a broiler chicken diet, which resulted in improved weight. In a recent study in Zimbabwe, Gadzirayi *et al*. (2012: 5) discovered that 25 percent inclusion level of dried forage leaf of moringa, as protein complement in broiler feed, produces broilers of comparable weight and growth in contrast with those fed under traditional commercial feeds. Sarker *et al.* (2017) found that MOLM can replace antibiotics in terms of development performance, meat yield traits and internal organ development.

3.13.7 Cassava leaf meal

To address the challenges of the soaring cost of protein feedstuff, such as groundnut cake meal and SBM in poultry diet, a cheaper alternative of protein is considered.

Cassava Leaf Meal (CLM) is identified as one of those cheaper alternative sources of protein capable of improving livestock performance. CLM provides some vital protein sources with an essential and non-essential amino acid profile (Diarra and Devi 2015: 735). Depending on the varieties, CLM is rich in protein, dry matter, minerals, vitamins B1, B2, C and carotene (Diarra and Devi 2015: 735).

As found by Silva *et al*. (2012), the inclusion of CLM in poultry feed did not interfere with bird performance in the growth, finishing, and laying phases, with the recommended level of up to 12 percent of the ingredient in chicken nutrition. However, the presence of tannins and possibly phytin, may limit the nutritional value of cassava leaves (Obeten *et al*. 2017: 4032). Cassava foliage can thus represent an important alternative feedstuff in poultry production.

3.13.8 Cocoyam leaf meal

Cocoyam leaf is abundant in proteins and can sevrve as supplementary protein, carotene and trace minerals in poultry feeds (Temesgen, Retta and Tesfaye 2018: 17; FAO 2014). Additionally, majority of poultry feeds are made of cereals and deficient in the most essential amino acids for humans particularly threonine lysine, the sulphur-bearing amino acids (methionine and cysteine). Nonetheless, amino acids stated above are very costly and above the reach of SMS poultry producers (Temesgen, Retta and Tesfaye 2018: 16).

To attain the utmost efficacy in meat quality and productivity, an appropriately balanced ration is indispensable and cocoyam leaf could be a possible substitute feed ingredient in poultry nutrition. Temesgen *et al*. (2018: 17) found that with the integration of cocoyam leaf meal in the feed formulation up to 7 percent, the amino acid and fatty acid composition enriched in chicken meat and thus it is essential to add cocoyam leaf meal in chicken diet formulation so as to enhance chiefly the limiting amino acids and unsaturated fatty acid composition in the feed and as well as in the chicken meat. The inclusion of cocoyam leaf meal in chicken feed would

thus enhance poultry production cost-effectively and also balance essential amino acids, hence enriching the end products required for human beings and ensuring its affordability for consumers (FAO 2014).

3.13.9 By-products as feed

With the increased scarcity of feed, the poultry industry is required to use an increasing amount of cereal by-products in their feed formulations (Abdulla, Rose, and Pirgozliev 2018: 34). Distillers dried grains with solubles (DDGS) is a residue product of corn-based ethanol manufacturing that is considered a valued source of energy, digestible amino acids, and obtainable phosphorus in poultry diets (Rochell 2018: 1). Dietary integration of DDGS decreases the quantity of principal ingredients like soybean meal and corn required to prepare poultry nutrition, enhancing the effectiveness of both biofuel and poultry production (Rochell 2018: 1).

By-products are locally obtainable, unconventional animal nutrition in Ghana. A great quantity of cereals (maize, sorghum and millet grains) are made use of by breweries and can serve as a potential feed ingredient to minimize poultry production cost (Swain 2016: 187). These by-products are not fit for human consumption; therefore, the likelihood of conversion into inexpensive and wholesome animal products could be exploited.

Millet residue, for instance, is equivalent to other cereal by-products such as maize bran, wheat bran, and rice bran in nutrient composition and can thus be incorporated in poultry diet (Okai *et al.* 2005: 33). Okai *et al.* (2005: 41) projected that approximately 9 020 Mt of “Dusa” could be obtained in Ghana as livestock and poultry feed to reduce the production cost of poultry thereby making the meat more affordable. Regrettably, this by-product is presently underused and sometimes wasted.

Though neglected by most poultry farmers, the dietary inclusion of cassava by-products such as peels, pulp and leaves have inherent feed ingredients good for feeding poultry and have been found to be beneficial, in terms of bird health and carcass quality (Diarra and Devi 2015: 735). Cassava leaves, peels and pulps are modest to high in energy and thus incorporated in poultry feeds as substitutes for traditional protein and energy sources (Diarra and Devi 2015: 736). Broilers fed ondiets comprising cassava by-products were identified to display superior health condition and needed less antibiotic comparable to those fed with maize based diets (Diarra and Devi 2015:736).

3.13.10 Insects as poultry feed

Naturally, insects contribute significantly to poultry feed, and can be raised on a range of different diets, like food waste and manure (Diener 2011). Current studies show it to be technically achievable to culture insects on a big scale as an unconventional, sustainable, protein-rich constituent in the poultry diet (Veldkamp *et al.* 2012). Utilising insects as feed needs little resources contrary to conventional soybean, maize and fishmeal-based diet (FAO 2016). Insects are largely rich in both micro (vitamins and minerals) nutrients and macro (protein and energy). Although insect species vary in composition, they usually do not vary considerably from the extensively used conventional feedstuffs (Ssepuuya *et al*. 2017: 292). Insects are recommended as an unconventional source of protein in poultry feed, due to comparable fat (30–40 percent dry matter) and protein content (40–60 percent dry matter) to that of soybean meal (Makkar *et al*. 2014: 1). Protein-rich insects are being considered to lessen cost of protein supplements in poultry diets (Khusro, Andrew and Nicholas 2012: 436).

Livestock feed contributes 60-80 percent of the entire cost of production with the protein ingredient comprising approximately 70 percent of the overall feed cost (Abu *et al*. 2015: 169). The high cost of conventional protein-based feed, such as soybean and fish meal, has necessitated the need to consider locally available,

unconventional protein as alternatives in the poultry diet (Chand *et al.* 2014b). Insect proteins are more cherished protein sources for chicken (Makkar *et al.* 2014: 1), while also considered as a highly nutritive source of animal protein at all developmental stages (Bovera *et al.* 2015). Insect meals, made from insect larvae or whole insects, are also rich in protein (42-63 percent on a dry matter basis) (Bovera *et al.* 2015), with good, essential amino acid composition of their proteins and high protein digestibility (Makkar *et al.* 2014: 1).

An experiment conducted in Zimbabwe confirmed that adopting insects as feed was not just comparable to conventional feed, but competitive with it economically (Shadreck *et al*. 2014). Large scale production of insect-based protein ingredients, such as maggot meal, cricket meals and other insects would help subsistence and smallholder farmers not only to reduce their cost of production, but would also increase production efficiency (Khan *et al*. 2016).

3.13.11 Maggot meal as poultry feed

Maggot meal is the core product of black soldier fly larvae, comprising dried and defatted maggots milled into a high protein meal. Maggot meal is especially convenient for the feeding of monogastric animals, such as chickens, fish and pigs (Smallstarter 2014). Maggot meal contains good nutritional value, inexpensive and easier to produce than other animal protein sources (Ezeafulukwe and Anyanwu 2018: 2). Harinder *et al.* (2014) detected that fish meal and SBM could be completely substituted by maggot meal in the poultry diet, without any adverse effects on birds' performance. According to Khan *et al*. (2017:13) maggot meal replacement with soya bean meal had no impact on taste, tenderness, juiciness, hue and flavour.

The black soldier fly has recently been identified as a useful insect for commercial production of maggots (Uchewa 2014). Maggots, produced by black soldier flies, can be cultured on countless organic wastes or by-products, such as manures, food leftovers, wheat, maize and rice-bran, and naturally attracted black soldier fly

infestation and egg laying materials. Various production techniques have been employed to produce maggot meal (Uchewa 2014).

Uchewa (2014) adopted a technique using bags full of different substrates. The substrates were watered occasionally to prevent them from becoming dry. New substrate was put into new empty bags to entice maggots; consequently, the flies moved from the old substrate and eggs were cultured on the new substrate. Afterward, the mature maggots were harvested by pouring hot water on the substrate to kill them, after which they were sundried for further treatment. Okah and Onwujiariri (2012) also cultured maggots by using poultry manure which, in turn, offers a viable way for producing protein sources directly on the poultry farm.

A company in SA, branded AgriProtein, is the world's leading fly farm and keeps roughly 8.5 billion flies that produce more than 20 000 kg of maggots daily (Smallstarter 2014). AgriProtein's maggot-based animal feed is more than 15 percent less expensive than other substitutes and has been confirmed to be highly efficacious protein for monogastric animals, specifically chickens (Smallstarter 2014). Maggots are also produced from wastes which otherwise would constitute nuisance, particularly in poultry farms and agro processing industries (Ezeafulukwe and Anyanwu 2018: 2).

The short life of maggots and their generation in huge biomass from materials considered as waste, make them a viable alternative for fish and soybean to explore. Maggots can, therefore, be cultured by farmers in Ghana to save costs on animal feed, while providing their poultry birds with high-value protein. Awoniyi (2016: 52) indicated that the broiler meat produced from maggot meal was not only found to be nutritionally rich but also microbiologically safe and acceptable to consumers.

Nutritionally, the content of maggot meal generated on poultry manure by Okah and Onwujiariri (2012: 474) comprised 87.13 dry matter, 44.4 percent crude protein,

14.29 percent ash, 16.81 percent nitrogen free extracts, 9.76 percent crude fat, 0.05 percent fat and 0.03 percent calcium (Ca). The nutritive value of maggot meal suggests it can effectively substitute other protein sources, like SBM, fish meal and groundnut cake (Józefiak 2016; Awoniyi 2007: 55).

3.13.12 Termites as poultry feed

Termites are harvested in the wild all over West Africa to feed chickens (Kenis and Hein 2014; Van Huis 2017). Chippings of termite mounds are collected and given to chickens on-farm, especially to chicks (Kenis and Hein 2014). One way of harvesting termites is the use of a pot with a short neck that has a capacity of at least 10 litres. The pot is filled with cow dung and straw and a little water sprinkled on the substrate. The pot is then set upside down, with the opening on sandy soil (van Huis *et al*. 2013). Similarly, dried grass, maize cobs/stalks are used as substrate to attract the termites (Van Huis *et al*. 2017). The substrate is left for one full day to attract the termites that are then harvested early the following morning to feed the chickens

Termites are a valuable protein source, essential amino acids and fats in the diet for both humans and primates. The Crude protein ranges from 41-76 percent, crude fibre from 4-16 percent, the extract from 5-37 percent, ash from 2-26 percent and gross energy from 20-27 percent (Amza and Tamiru 2017: 31). Considering the nutritive values, insect meal is a superb and essential substitute of poultry feed replacing extensive variety of feed stuffs (Amza and Tamiru 2017: 31). In Ghana, termites can be reared on a large scale by farmers to feed not only indigenous but also hybrid chickens.

3.13.13 Common house cricket (*Acheta domesticus*) as feed

Crickets are comparable to the black soldier fly, in their capability to produce a steady nutrient source for several animals, mainly broiler chickens (Gaffigan 2017). Cricket meal can conveniently substitute fish meal at the rate of 25 percent to 100 percent, without any adverse effect (van Huis 2013). The high productivity rate of cricket

encourages its production and inclusion in the poultry diet. Productive females can lay approximately 200 eggs in a batch, and roughly 600 eggs in a life time (Kvassay 2014). Eggs hatch after 11-14 days at 30°C and it takes crickets 45 days to reach maturity (Kvassay 2014).

Experience from Thailand indicates the main limitation of raising crickets to counter the expensive cost of commercial protein chicken feed, which forms almost half of the production costs (Hanboosong *et al*. 2013: 12), as the cost of feeding crickets. The high cost of feeding crickets can be minimised by the inclusion of locally available agricultural and food industry by-products, like rice bran, wheat bran, blood meal and brewer's spent yeast, as well as spent grain, cassava tops and water spinach, in the ration (Orinda *et al*. 2017: 1665).

House cricket can thrive and develop effectively on a diversity of organic materials (Makkar *et al.* 2014). Hence, agricultural and food industry by-products and plants, can serve as possible, low-cost and efficient feed sources. In Cambodia, agricultural by-products like cassava leaves and rice bran have become potential feed resources for house crickets (Miech *et al*. 2016: 286). Cricket protein has the potential to substitute the high cost of fishmeal and soybean in the poultry ration and thus enable poultry farmers to increase production at a reduced cost.

3.14 Conclusion

This chapter elucidates global poultry production, with special emphasis on the USA, EU member states, Brazil, and India, as well as Ghana comprising the study area. The poultry sector in the above mentioned countries, apart from Ghana, is vertically integrated and SMS poultry farmers are being subsidised by their various governments, thereby boosting production and enhancing competitiveness.

Operations of the SMS local producers is characterised by numerous challenges, of which the principal is cost of production. What has exacerbated the plight of local

producers is that government policies for poultry production in Ghana are not implemented. It is against this background that the study discusses cost reduction strategies that can improve the local poultry industry and make it more competitive.

The subsequent chapter will address the methodology employed by this study, the data collection instrument and how the survey outcomes will be analysed.

CHAPTER FOUR
METHODOLOGY

4.1 Introduction

This chapter discusses the research methodology used in the study, with the prime objective of this chapter to clarify how data were collected and analysed. The first section tackles the research and questionnaire designs, while the second section deals with different kinds of analyses conducted on the data.

The issues of validity and reliability of the data from the methods chosen, as well as the prospective errors that might happen, are covered in the third section. The preventive measures of these errors are of vital concern in research, and every attempt has been made by the researcher to rectify them.

4.2 Research Design

Research design applies to how a researcher puts a research study together, generating important research questions and address a set of questions and objectives (Creswell 2009; Johnson *et al*. 2007: 129). It serves as a methodical overview of the study, the researcher's methods of compilation, details on how the research will arrive at its conclusions and the limitations of the study. The design is always based on the research questions (RQs) and outlines procedures for every research activity (Johnston 2014: 620).

This study adopted convergent mixed methods design. The purpose of a convergent mixed methods design is to a establish thorough analysis of the research problem by integrating quantitative and qualitative databases. In a convergent design, quantitative and qualitative data are gathered simultaneously, analysed independently and then merged and interpreted, in search of convergence, divergence, contradictions or relationships of two sources of dataset (Creswell and Plano Clark 2018). Accordingly, the trustworthiness of the findings could be heightened as considerable sources and types of data made triangulation possible.

For instance, qualitative data from the open-ended questionnaire expanded on quantitative data from the survey (Creswell and Plano Clark, 2011).

The researcher used the convergent mixed method design to attain an empirical overview of the range of operations and challenges of SMS poultry farmers, as well as contributions of key players in the poultry industry; namely government and consumers of poultry products, in enhancing competitiveness in the poultry industry.

The strength of using this method has the capacity to triangulate the data and ensure its validity and level of variation (Migiro and Magangi 2011: 375), and particularly during the data analysis stage, qualitative data can perform a significant role by interpreting, describing, clarifying, and validating quantitative outcomes (Johnson, Onwuegbuzie and Turner 2007: 115). The results from one method can support in the development of another, for instance, findings from a focus group can govern the construction of a questionnaire (Wium and Louw 2018: 9).

However, the main challenge that the convergent design poses is how to deal with the situation in which quantitative and qualitative results contradict each other. This challenge may be resolved by collecting supplementary data to resolve the incompatibility, re-examining the original database, gaining understanding from the discrepancy of the data or developing a new project that addreses the inconsistency (Creswell and Clark 2007).

Diagram of convergent mixed methods

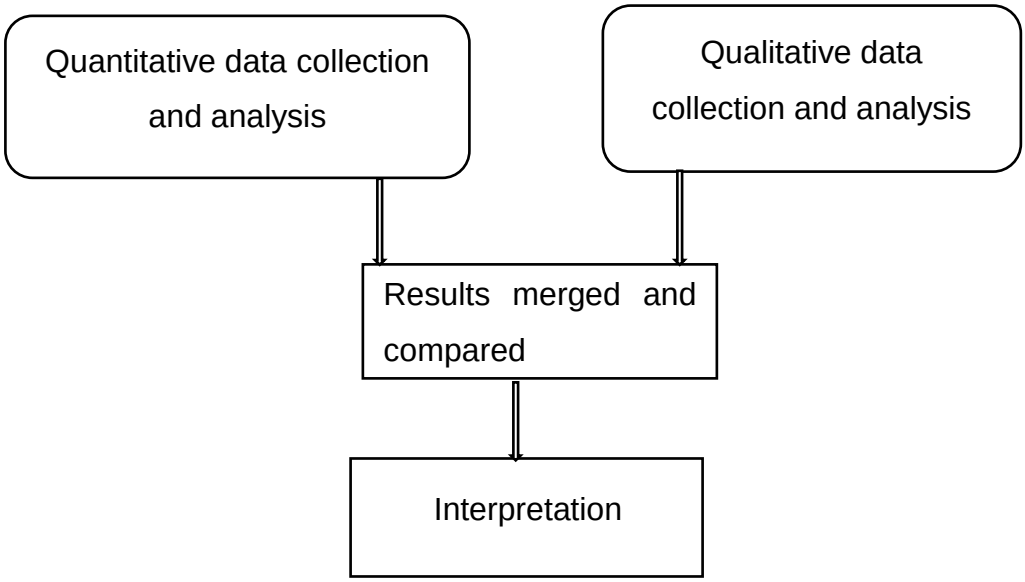

Figure 4.1: Convergent mixed methods design

Source: Adopted from Creswell and Clark, 2017

Figure 4.1 describes how both quantiitative and qualitative data were collected and analysed independently, and then merged or integrated the results during the level of interpretation.

Closed-ended questions were adopted to gather quantitative data, in order to quantify variations, describe characteristics of the population or predict casual relationships (Antwi and Kasim 2015: 221), ensuring a valid estimate of a generalised relationship between variables has been obtained (Babbie 2010); thus allowing for greater objectivity and accuracy of results.

Moreover, the quantitative data were collected to measure operations and challenges of SMS poultry farmers, as well as consumers' preference for either imported or local chicken. Data were collected simultaneously, via both quantitative

and qualitative methods. Employing a quantitative method also enables the researcher to summarise the vast sources of information gathered from respondents, make comparisons and categorise their responses (Babbie 2010).

However, quantitative research is less elaborate, since outcomes are based on statistical responses and consequently, most responses will not offer much understanding into thoughts and behaviours, thus being deficient in context. The use of open-ended questions permits the participants to express views that could not be covered with the closed-ended questions in a survey (Wium and Louw 2018: 7). Open-ended questions induce respondents to answer with sentences, lists, and stories, allowing for profound and new acumen, while closed-ended questions restrict answers: thus tighter stats.

The Constant Comparative Analysis (CCA) method was adopted for the qualitative analysis (Fram 2013: 11). The CCA method is used to identify extensive categories and themes that emanate from qualitative research studies. In these themes, the exact nature of each individual's view can be captured and data displayed in a logical order, in relation to the RQs addressed in the study (Fram 2013: 11).

By using a CCA method, codes were assigned to the data and units or categories known as themes were generated (Saldaña 2013: 5). According to Bazeley (2013), the process of coding continues till data are saturated; when no new codes and themes emerge. A list was compiled of themes in relation to each research question (RQ). Once all the RQs had been allocated input from the themes, the information connected to each question was examined and reviewed to draft a report.

A CCA method was employed because it is valid and grounded in theory (Glaser 2011: 78). The CCA, being more in-depth in nature, is not an easy method. However, it can aid novice researchers to develop an aptitude to analytically organize and condense data (Fram 2013: 20).

The central premise of adopting a mixed methods design was because the use of quantitative and qualitative methods in conjunction offer a superior insight of research issues than either approach only (Cresswell and Clark 2011); as they complement each other where there are limitations (Babbie 2010). Mixed methods also add context and facilitate profound understanding as part of a comprehensive analysis (Babbie 2010). The choice is significant, as it employs multiple ways to explore what accounts for non-performance of the poultry sector in Ghana, which necessitates inductive and deductive inquiry (Maxwell 2016: 14).

The mixed-methods design has the advantage of combining the strengths and lessening the weaknesses of a sole design, offer a detailed understanding of the questions asked, and may be more effective in developing relevant survey instruments (Story and Tait 2019: 201), contributing to overall validity of the findings (McKim 2017: 203). The shortcomings are that they can be complex, time-consuming, and difficult to integrate and interpret (Story and Tait 2019: 201). Nonetheless, the use of mixed methods needs extra time, as a result of collecting and analysing two dissimilar types of data (Creswell and Clark 2011).

4.3 Population/ target population

A population can be defined by any number of characteristics within a group that a researcher uses to draw conclusions about the subjects in a study (Kenton 2019). The target population refers to all the members who satisfy the particular criterion stated for a research survey (Alvi 2016: 10).

The population of the study consists of all poultry producers in Ghana, with the target population comprising active SMS poultry producers operating in the BA region of Ghana.

4.4 Sampling method and sample size

A sample can be defined as a collection of a comparatively lesser number of people, taken from a population for research reasons (Alvi 2016: 11). Garson (2012) defines sample size as any combination of sampling units that does not comprise the entire set of sampling units defined as the population. It represents the real population elements from which data is to be gathered.

The sampling design is dependent on the judgment of the researcher as to who will supply the best information to answer the RQs of the study; individuals who are capable and well-informed regarding the phenomenon under investigation (Etikan and Bala 2017), who have the aptitude to communicate experiences and ideas in an eloquent, expressive, and reasonable manner (Etikan and Bala 2017).

Poultry production in Ghana is divided into three major strata: The southern, middle and northern strata. Within the strata of the middle belt was the sample chosen which constitutes farmers in the Brong Ahafo region, as well as the MoFA officials, and the consumers.

The study constituted a population of 100 participants, with 66 SMS poultry farmers, 10 Ministry of Food and Agriculture (MoFA) and veterinary officers, and 24 consumers.

Table 4.1: Target population as structured

Category	Number
SMS poultry farmers:	66
Districts:	
Sunyani Municipality District (Sunyani)	11
Sunyani West District (Odumase)	11
Brekum District (Brekum)	11
Dormaa District (Dormaa Ahenkro)	11
Dormaa East District (Wamfie)	11
Tano North District (Duayaw-Nkwanta)	11
MoFA and veterinary officers	10
Consumers	24
Total	100

A non-probability purposive sampling method (Creswell and Clark 2011) was adopted to select prospective participants for this research. This method allows the researcher to meet the criteria set for his elements: SMS poultry farmers. First, in consultations with MoFA, the Veterinary Services Division of MoFA, and Ghana National Association of Poultry Farmers (GNAPF) officials, a purposive sampling was employed to choose six districts in the Brong Ahafo (BA) region, with a massive concentration of poultry producers. Moreover, the poultry producers in each selected district were stratified into two, notably small scale and medium scale farmers, based on a list provided by the veterinary services division of MoFA in the BA region.

Additionally, a random sampling method was adopted to select the SMS poultry farmers, with at least 11 farmers from each of the following districts: Sunyani Municipality District (Sunyani), Sunyani West District (Odumase), Brekum District (Brekum), and Dormaa District (Dormaa Ahenkro), along with Dormaa East District (Wamfie), and Tano North District (Duayaw-Nkwanta). One hundred participants,

comprising 66 SMS poultry farmers, 10 MoFA and veterinary officers and 24 consumers, were selected for the study.

A non-probability sampling method was selected as it is quick, inexpensive, and convenient, allowing the researcher to select the sample elements based on convenience, accessibility and proximity (Elfil and Negida 2017: 2).

4.5 Measuring instrument

This study used a questionnaire as the main instrument to gather data. Primary data were gathered through face-to-face, structured interviews, using open- and closed-ended questions to maximise participation, as well as giving respondents an opportunity to voice their own opinions on the principal topics covered in the survey (Singer and Couper 2017: 127).

Informal conversation with participants was employed to collect data to enhance the qualitative data obtained via the open-ended interview. The formulation of questions found in the questionnaires was motivated by the literature review, the objectives of the research, as well as the RQs. A 5-point Likert scale was adopted to structure the closed-ended questionnaires, with adequate instruction to guide participants.

Respondents were provided with five options to select from, subject to whether they agree or disagree with a statement or question. The open-ended questions left enough space to provide thorough information, based on respondents' knowledge of the subject matter. The questionnaires were self-administered to ensure a timely and high response rate; as well as ensuring that the questionnaires administrators interact with respondents to ascertain their understanding of the research issue.

Before the final questionnaires were established, a pilot survey was performed on 14 respondents, which included eight farmers, two MoFA and veterinary officials and four consumers, to establish the significance of the questions to incorporate in the

questionnaires. The pilot survey was conducted to ascertain whether the questions were suitable, what respondents' reaction would be, the time for completion and collection, including the recovery rate.

Additionally, the pilot study enabled the researcher to identify the need for further explanation or rewording of any question that might seem ambiguous and thus establishing the respose rate and ensuring that the questions touched on pertinent issues in order to collect suitable results that encapsulate the research objectives and questions. Eleven of the 14 respondents completed the questionnaire within the stipulated time, indicating a recovery rate of approximately 78.5 percent.

Three categories of respondents were used in the survey; 66 SMS poultry farmers, 10 MoFA and veterinary officials and 24 consumers of chicken. The SMS poultry farmers as well as the consumers received both close-ended and open-ended questions. The MoFA and veterinary officials however, received only open-ended questions as the researcher needed basically certain technical information from them as per the phenomenon under study.

The 100 questionnaires were distributed to the identified respondents; SMS poultry farmers, MoFA and veterinary officials and the consumers of chicken. Data was collected in the form of completed questionnaires, with a personal interview as a follow up on the open-ended questions. This was done by means of site visits and hand delivery of the measuring instrument.

The results of the questionnaires administered yielded a higher response rate of 95 percent as 95 out of the 100 respondents successfully completed their questionnaires. This higher response could be attributed to the amemdments made in the pilot study to ensuring validity and reliability of the results.

Table 4.2: Sample of questionnaire

Please respond to each of the following statements/questions and indicate with a tick (√) how you feel about them.

Options: ‘’1:SA = Strongly Agree’’, ‘’2:A = Agree’’, ‘’3:U = Uncertain’’, ‘’4:D = Disagree’’ and ‘’5:SD = Strongly Disagree’’.

Statement/Questions	SA	A	U	D	SD
	1	2	3	4	5
Challenges facing the poultry production					
1. Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo.	1	2	3	4	5
2. High cost of local poultry production impedes competitiveness.	1	2	3	4	5
3. Farmers are quitting the poultry industry because it is not profitable anymore.	1	2	3	4	5
4. High cost of input is a factor to production	1	2	3	4	5
5. The poultry sector is devastated by poor disease control.	1	2	3	4	5
Poultry sector policies in Ghana					
6. Government has flexible and friendly policies for the poultry sector.	1	2	3	4	5
7. Do you receive any support from the government in terms of:					
	1	2	3	4	5
i. Financial subsidies					
ii. input subsidies	1	2	3	4	5
iii. Loan facilitation	1	2	3	4	5

8. The role of government in enhancing competitiveness of the poultry industry is inadequate.	1	2	3	4	5
9. Government has put effective policies in place to ban the importation of cheap, frozen chicken products.	1	2	3	4	5
10. Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse.	1	2	3	4	5
Strategies to improving competitiveness of the Ghanaian poultry industry					
11. Preparing own feed is cheaper than buying from the market.	1	2	3	4	5
12. Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost.	1	2	3	4	5
13. Input subsidy from government can reduce production cost and enhance productivity.	1	2	3	4	5
14. The high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries.	1	2	3	4	5
15. Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper.	1	2	3	4	4
16. Stakeholders input into poultry policies could improve the competitiveness of the poultry industry.	1	2	3	4	5
17 Value can be added to local output by processing and packaging.	1	2	3	4	5

18. Education could improve disease control and improve poultry production	1	2	3	4	5

Table 4.3: Key questions directed to each stratum

Strata	Key question
Farmers	1. What are the main challenges facing farmers in poultry production? 2. What in your view could be done to improve the competitiveness of the poultry industry?
MoFA and veterinary officers	1. What are the government policies put in place to ensure competitiveness of the poultry industry? 2. What opportunities are there for farmers to exploit to reduce cost and boost production?
Consumers	1 Why do you prefer imported chicken to local chicken? 2. What do you think could be done to local chicken to make it appealing to consumers?

4.6 Data Analysis

Data analysis is the method of cleaning, analysing and transforming data collected, into meaningful output that can be digested by interested parties (Saunders, Lewis and Thornhill 2012:151). Data analysis comprise sorting, collating and coding, along with organising the collected data, so as to develop meaning from it (Bryman 2015: 347).

Data collected were quantitatively analysed by the use of SPSS 24.0. The SPSS 24.0 was specially adopted to create graphical presentations of the questionnaires for reporting, presentations or publications. In accordance with the research aims, the qualitative analysis of this research was employed to examine the various elements of the captured data, to elucidate concepts and identify patterns, themes and relationships, and determine how these patterns and themes help answer the RQs (Creswell 2013).

The CCA method was used to analyse the qualitative data. Data analysis was a continuing process as qualitative data was being collected. This allowed the researcher to recognise categories and themes that required either further probing or other, specific attention; as qualitative data collection, through open-ended questions, focuses on thoroughly exploring information.

The researcher identified all the relevant pieces of data within the entire dataset to answer the RQs. Codes that were generated from the dataset were categorised into themes and subthemes. Themes were redefined while subthemes were folded together to form new themes to better address the RQs as discussed under Section C: Qualitative analysis (Farmers, MoFA officials and consumers).

4.6.1 Frequencies

Frequencies were used to identify how frequently a respondent made a regular response to a specific question and to examine the coding of data (Ho 2013). When responses are not equivalent to the sample total, it signifies that the data were not properly captured (Bryman 2015: 347). The analysis of the outcomes and conclusions of the study were based on the information obtained from the frequencies.

4.6.2. Cronbach's Coefficient Alpha

The most familiar internal consistency measure is Cronbach's alpha (α), which is generally understood as the mean of all possible split half coefficients. It is a function of the average inter-correlations of items, and the amount of items in the scale (Mohajan 2017: 13). It normally ranges between 0 and 1, where 0 denotes no relationship between the items on a particular scale, and 1 signifies complete internal consistency (Tavakol and Dennick 2011: 53). According to Taber (2017), alpha values were characterized as excellent (0.93–0.94), strong (0.91–0.93), reliable (0.84–0.90), robust (0.81), fairly high (0.76–0.95), high (0.73–0.95), good (0.71–0.91), relatively high (0.70–0.77), and slightly low (0.68). Cronbach's

Coefficient Alpha was adopted to test for internal consistency of the questionnaire, which is a measure of its capacity to consistently measure the variables of interest.

4.6.3 Correlations

Correlation is a statistical technique used to evaluate a possible linear association between two continuous variables (Mukaka 2012). Possible correlations vary from +1 to –1. A zero correlation displays no association exists among the variables. A correlation of –1 indicates a perfect negative correlation, meaning that as one variable increases, the other decreases. A correlation of +1 indicates a perfect positive correlation, indicating that both variables move in similar direction together (Maiwada and Okey 2015: 23).

In this study, correlation was employed to analyse the operations and challenges of SMS poultry producers in Ghana and other factors affecting the competitiveness of the industry.

4.6.4 Descriptive statistics

Descriptive Statistics discusses the presentation of numerical facts, or data, in either graph form or tables, along with the methodology of analysing the data (Kaushik and Mathur 2014: 1188). It allows for simple summaries with regards to the sample and of the observations made.

These summaries may either form the foundation of the initial description of the data, as part of a more comprehensive statistical analysis, or they may be adequate in and of themselves for a specific survey (Kaushik and Mathur 2014: 1188). In this study, descriptive statistics were chiefly presented along with more methodical analyses, to provide the reader a broad perspective of the data being analysed.

4.7 Validity and reliability/trustworthiness

4.7.1 Validity

Validity is defined as the extent to which a concept is precisely examined in a quantitative research (Heale and Twycross 2015: 66). In quantitative research, validity is the degree to which any measuring instrument measures what it is designed to measure (Thatcher 2010: 126). However, in qualitative research, validity refers to when a researcher employs specific techniques to examine the precision of the research findings (Creswell 2014) which may include Cronbach's alpha (Mohajan 2017: 13).

In research, validity therefore signifies "appropriateness" of the tools, processes, as well as data. Validity safeguards that the RQ is valid for the desired result, ensures the choice of methodology is suitable for answering the RQ, the design is valid for the methodology, the sampling and data analysis are suitable, and eventually the outcomes and conclusions are valid for the sample and context (Waterman 2013).

To ensure validity, the responses to the interview questions were cautiously scrutinised by the researcher, in order to establish whether the responses reflect the RQs. Questionnaires and interviews to be used in the study were pre-tested, in the pilot stage, in order to affirm the trustworthiness of the findings. The study discussed content validity using expert judgment, peer review and analysis of the pilot responses, in connection with the objectives of the research.

Therefore, to examine the validity of this research, a pre-test was performed to examine whether the study's measuring instrument was suitable for attaining the objectives of the research. Out of the 14 respondents used for the pre-test, 11 completed questionnares were received showing a response rate of 78 percent. This results aided in shaping the questionnaires for the study. Structured, open-ended questionnaires and closed-ended questions were adopted to gather qualitative and quantitative data for the research.

A validity test is primarily separated into four types, namely: content validity, face validity, construct validity, and criterion-related validity (Creswell 2005). However, in view of this research, the subsequent forms of validity were taken into consideration:

4.7.1.1 Content (or external) validity

Content validity is the degree to which the instrument questions and the scores from these questions constitute all possible questions that could be probed with regards to the content or skill (Creswell 2005). Content validity guarantees the questionnaire is comprised of an acceptable set of items that tap the concept. The more the scale items characterise the domain of the concept being examined, the greater the content validity (Sekaran and Bougie 2010).

4.7.2 Reliability or trustworthiness

The term reliability deals with the credibility of the findings (Leung 2015). Reliability is the extent to which an assessment tool provides reliable and unvarying outcomes (Bolarinwa 2015). The questionnaires were closely scrutinised to produce similar results on repeated trials (Bolarinwa 2015). The search for reliability of the findings should, undoubtedly, investigate the degree to which it is devoid of biasness and therefore guarantees dependable measurement across time and across the individual items in the instruments (Bajpai and RamBajpa 2014: 114). Data gathered was analysed by means of the SPSS 24.0 software and Cronbach's alpha to establish reliability.

In order to establish reliability, the research instrument was edited by the supervisor and pre-tested to determine whether any problems might occur in the process of participants responding to the questions, or with the recording of the collected data, and that they are addressed. The pre-test guarantees the validity and reliability of the data. Pilot survey analysis was also carried out to confirm the questionnaire as suitable and comprehended by respondents. This allowed for correction of errors

before administering the main survey. The qualitative section of the questionnaire was used to elicit responses based on respondents' personal experience in the research area, to complement the quantitative aspect. A follow-up interview was done on a test basis to establish consistency.

Trustworthiness

In qualitative research, trustworthiness is a common term closely connected to the term "validity" in quantitative research (Marshall and Rossman 2011). This term denotes the credibility, dependability, transferability and conformability of the study (Marshall and Rossman 2011). Enhancing the trustworthiness of the study heightens the possibility that evaluation outcomes will guarantee publication. It is difficult to confirm that qualitative research is authentic or accurate; hence the concept of trustworthiness of qualitative research on the basis of these four concepts: credibility, transferability, dependability, and confirmability (Creswell and Plano Clark 2007).

Credibility

Credibility is defined as the credence that can be put in the genuineness of the study findings (Macnee and McCabe 2008). Credibility determines if the study findings depict credible information obtained from the respondents' initial data and is the precise interpretation of the respondents' original opinions (Lincoln and Guba 1985). Creditability depends more on the richness of the information collected, instead of the quantity of data collected.

There are several methods to measure the accurateness of the findings, namely data triangulation, triangulation through multiple analysts and 'member checks'. Participants in this study or readers are the very ones who can realistically determine the credibility of the outcomes (Mike 2011). To ensure credibility, the researcher had active deliberations with the supervisor and a co-researcher to try to unearth any personal inclinations on directing the findings of the research towards biasness. In

this regard, these aspects: questionnaire formulation, data collection, analysis, and interpretation of results, were thoroughly checked.

Transferability

Transferability refers to the degree to which the findings can be transferred to other settings or groups (Polit and Beck 2012). The reader identifies the exact specifics of the research situation and methods, and associates them to a related situation they are more acquainted with. Should the details be comparable, the original research would be considered more credible. It is thus vital for the original study to supply a comprehensive description of the methods used (Mike 2011). To ensure transferability, the researcher has documented the geographical area where the research was conducted, the methods of recruitment and inclusion criteria, and the demographics of participants without showing their identity due to ethical concerns and anonymity.

Dependability

Dependability refers to the stability of data over a period of time and in dissimilar settings (Elo *et al.* 2014: 4). Dependability comprises participants' appraisal of the findings, interpretation and recommendations of the research in a way that all are buttressed by the data as obtained from informants of the research (Cohen *et al.* 2011).

Dependability guarantees the study findings as dependable and could be replicated (Mike 2011). This is determined by the measure at which the study is carried out, analysed and presented. Each development in the research should be reported extensively, to allow an external researcher to repeat the inquiry and attain similar outcomes. Moreover, this helps researchers to comprehend the methods and their effectiveness (Mike 2011). To ensure dependability, the method used (convergent mixed methods) have been explicitly described. For instance, how data was collected and analysed and how themes emerged from the codes. This allows others

to critique the methods and the conclusions drowned, and repeat the methods if desired (Aguinis and Solarino 2019).

Confirmability

Conformability refers to objectivity and indicates that the data precisely epitomise the information that the respondents supplied and interpretations of those data are not created by the inquirer (Elo *et al.* 2014: 6). Confirmability questions the manner in which the study findings are buttressed by the data gathered (Mike 2011). The process determines whether the researcher showed any bias (was influenced or swayed) in the course of the study; this is as a result of the assumption that qualitative studies allow the researcher to bring a distinctive perspective to the study (Mike 2011).

The issue of confirmability has been considered in the study. A thorough description of the research process has been factored in, as well as how the data was obtained and analysed . Additionally, co-analysis and discussions with peers, have the ability to provide congruence, acting as a check against 'wild interpretation' of the data (Elo *et al.* 2014). To heighten the confirmability of the initial conclusion, an audit trail can be finalised all through the research to validate how every decision was arrived at.

4.8 Conclusion

Chapter four, captioned methodology, discussed the manner in which the data for this research were gathered and analysed. Data analysis was clearly discussed, as well as the tools for analysing data, basis for the choices together forms of analysis. The research design and research method, together with the sampling design and the rationale behind the choice of the method adopted in this study, were clarified. The survey instrument, its nature and distribution were outlined, with validity and reliability, which respectively ensure the appropriateness and accuracy of the research instruments, were explained, in addition to the research instrument's pretesting.

The central objective of chapter four was to explicate how the whole study was conducted. The subsequent chapter highlights on the presentation and analysis of the survey data.

CHAPTER FIVE
STATEMENT OF FINDINGS AND ANALYSIS OF PRIMARY DATA

5.1 Introduction

This chapter follows a description of the methodology, presenting the outcomes and interpreting the responses obtained from the questionnaires for this research. The questionnaire was the principal tool employed to gather data and was distributed to the poultry farmers, MoFA officials and veterinary officers, as well as poultry consumers in the BA region of Ghana. The quantitative data of the farmers, and that of the consumers, were first analysed using SPSS 24.0. The outcomes were presented as descriptive statistics, using appropriate frequency graphs, figures and cross tabulations. A CCA method was employed to analyse the qualitative data of the farmers, consumers, and MoFA officials, along with veterinary officers. Relevant feedback from the qualitative responses will be interpreted. Themes that emerged from the coded data were used to address the RQs in this study.

5.2 The Sample

The survey was conducted among active SMS poultry farmers who belong to the GNAPF, consumers of poultry products, as well as MoFA officials and veterinary officers, all from BA region. The interviewers visited these three groups of respondents that are categorised as farmers, consumers and MoFA officials, for the completion of the questionnaires.

The total number of questionnaires printed were 100 and were distributed to farmers (66), consumers (24), and MoFA officials and veterinary officers (10) and completed forms representing 62 farmers, 20 consumers, and 9 MoFA officials and veterinary officers were returned which gave a 91 percent response rate. According to Pazzaglia, Stafford and Rodriguez (2016), a survey response rate of more than 85 percent is a good representative of the target population.

5.3 The quantitative analysis of responses from farmers

This section deals with the analysis and interpretation of the quantitative data collected from the farmers.

5.3.1 The research instrument

The research instrument for the farmers comprised 45 items, with a level of measurement at a nominal or an ordinal level. The questionnaire for the poultry farmers was divided into three sections that measured various themes, as illustrated below:

Table 5.1: Sectional description of the questionnaire

Section	Description	No of items
A	Challenges facing the poultry industry	4
B	Poultry sector policies in Ghana	6
C	Strategies to improving competitiveness of the Ghanaian poultry industry	5

The study adopted closed-ended questions for the quantitative data and open-ended questions for the qualitative data, which will be discussed later in the qualitative section. A Likert Scale format was utilised for the closed-ended, quantitative questions. Respondents were requested to choose their responses for the closed-ended questions, and also provide short remarks on the open-ended questions. This was done to establish uniformity of the quantitative data and also to obtain broad information from the qualitative data on aspects of strategies to improve the poultry industry from a broad outlook.

This was performed to establish consistency and to, additionally, get further information on features of implementation-related issues, from a comprehensive viewpoint.

The questionnaires were administered by the researcher and a research assistant, who provided adequate instructions to permit respondents to answer the questionnaires (Appendix A). The site visit exposed significant aspects of the open-ended questions that required some explanations, as well as offering administrators the opportunity to schedule a date for collection with the respondents. The administrator's participation in administering the questionnaires offered a favourable occasion to find co-operation from respondents and confirmed completed questionnaires were collected within a definite time.

The association between the variables of the research were tested via cross-tabulation, with every variable in the questionnaires also verified for reliability.

5.4 Reliability Statistics

Reliability and validity are the two most significant aspects of precision. Reliability is computed by taking numerous measurements on the same subjects. The Cronbach's alpha scores for all items that comprised the questionnaires are illustrated below:

5.4.1 Cronbach's Alpha analysis

		No. of Items	Cronbach's Alpha
A	Challenges facing the poultry production	4	0.745
B	poultry sector policies in Ghana	6	0.750
C	Strategies to improve competitiveness of the Ghanaian poultry industry	5	0.853

The reliability scores for all sections meet the approved Cronbach's alpha value of 0.70; Alpha values above 0.7 are mostly deemed acceptable (Taber 2017: 6). A degree of tolerable, consistent scoring for these sections of the study is thus

indicated. All the three classifications: ‘challenges facing the poultry production’, ‘poultry sector policies in Ghana’ and ‘strategies to improving competitiveness of the Ghanaian poultry industry’ recorded 0.745, 0.750 and 0.853, respectively (Table 5.2). The outcome is a proof of internal consistency and a perfect correlation between majority of the items in the questionnaire classifications. This further means that conducting the same survey, on a bigger sample and at a different time, has the possibility of yielding related outcomes.

5.5 Section A1: Factor Analysis

Factor analysis was performed on group variables in the questionnaire as per every study objective-related theme. Factor analysis is an exploratory method for summarising the information in observed variables into a smaller set of factors (Woolford 2015: 3). A traditional usage of factor analysis is in survey research, whereby a researcher seeks to validate the outer model for the purpose to study whether the theoretical correlation between variables are effectually measured by the observed variables, while also, evaluating the validity and reliability of the measurement models (Ul Hadi, Abdullaha and Sentosa 2016: 215).

Based on the objectives of the study, section B of this study questionnaire has been categorised into three themes, with a minimum of five questions per theme. The goal is for the combination of individual responses in each theme, together, to offer a better measure of the theme and the associated objectives. Factor analysis was employed to ascertain if the set of questions in the three themes assess the same thing. In that case, they can therefore be put together to generate a new variable, a factor score variable that includes a score for every variable on the theme (Mohajan 2017).

The matrix tables are antecedent by a summarised table that depicts the outcomes of Kaiser-Meyer-Olkin (KMO) and Bartlett’s Test. The criteria are that the KMO Measure of Sampling Adequacy should be more than 0.50 and Bartlett's Test of

Sphericity, lower than 0.05 (Traynor and Andrews: 479). In all cases, the conditions are fulfilled, which permits the factor analysis procedure. The KMO test was used to validate the sampling adequacy for the analysis, and Bartlett's Test of Sphericity was employed to establish whether correlations between items were of sufficient size for factor analysis (Yu and Richardson 2015).

Factor analysis is performed merely for the Likert scale items with specific components further separated into finer components, as per the rotated component matrix (Table 5.3).

Table 5.2: KMO and Bartlett's Test

		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
			Approx. Chi-Square	df	Sig.
A	Challenges facing the poultry production	0.517	19.405	6	0.004
B	poultry sector policies in Ghana	0.737	176.236	21	0.000
C	Strategies to improving competitiveness of the Ghanaian poultry industry	0.505	61.793	28	0.000

All of the conditions in Table: 5.2 are satisfied for factor analysis. The KMO values indicated in each of the three themes (Table 5.2) exceed the recommended value of 0.500, with a Sphericity significant value less than 0.05. This is a clear indication the sampling and, moreover, the grouping of variables below each theme, is statistically important in measuring similar thing.

From Table 5.2, it is observed that ‘poultry sector policies in Ghana’ has a 0.737 KMO measure of sampling adequacy. This is an indication that this theme and its constituent variables have a positive effect on the competitiveness of the poultry industry in Ghana. Conversely, ‘challenges facing the poultry production’ and

'strategies to improving competitiveness of the Ghanaian poultry industry' with a KMO value of 0.517 and 0.505, respectively, are not strong in comparison to the previous variable. This means they do not have the same level of influence on the competitiveness of the poultry industry in Ghana as the initial one.

A complete individual analysis of each component variable is displayed, in accordance with the themes stated earlier, in the Rotated Component Matrix tables in the next section.

Table 5.3: Challenges facing poultry production Rotated Component Matrix A

A	Component 1	2
Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo	-0.002	0.979
High cost of local poultry production	0.483	-0.136
Farmers are quitting the poultry industry because it is not profitable anymore	0.812	-0.004
The poultry sector is devastated by poor disease control	0.819	0.234

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

In testing whether 'importation of cheap, frozen chicken products is a serious threat to local poultry production in Brong Ahafo', the variable highlighted in component two shows a KMO value of 0.979. This indicates that import of cheap, frozen chicken products has a strong significance to the study, as it can result in the demise of the industry (Donkor *et al*. 2013: 74).

In assessing whether the 'high cost of local poultry production' is a challenge faced by farmers, the KMO value of 0.483 in component one depicts a weak impact of this response, which indicates this variable does not impact the challenges facing farmers in terms of poultry production, even though literature showed high cost of production as a major challenge (Ncube *et al.* 2017: 17; Donkor *et al*. 2013: 74;

Bagopi *et al.* 2014; GAIN Report 2013). It is therefore unclear whether respondents understood the question well or they no longer consider this variable a challenge, as previous researchers may offer suggestions to the same problem that might work.

In examining whether 'farmers are quitting the poultry industry because it is no more profitable' and whether 'the poultry sector is devastated by poor disease control', the KMO values of 0.812 and 0.819 in component one, respectively indicate that both variables have a strong significance to the study. The response rate of the two variables (Table 5.3) indicates that controlling poultry diseases can enhance production and help maintain farmers in the business to enjoy its lucrativeness.

Table 5.4 represents 'Poultry sector policies in Ghana' and indicates a rotated matrix analysis of the components. This three-component results indicate uniformity and ascertains that merging such factors will disclose how the local poultry industry is supported by the government, especially through policy implementation.

Table 5.4: Poultry sector policies in Ghana Rotated Component Matrix B

B	Component		
	1	2	3
Government has flexible and friendly policies for the poultry sector	0.718	0.287	0.068
Financial subsidies	0.877	-0.120	0.092
Input subsidies	0.902	-0.115	-0.157
Loan facilitation	0.938	-0.053	0.002
The role of government in enhancing competitiveness of the poultry industry is inadequate	0.191	0.708	-0.357
Government has put effective policies in place to ban the importation of cheap, frozen chicken products	0.061	-0.004	0.941
Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse	-0.224	0.785	0.237

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

The component test conducted (Table 5.4) was to establish whether poultry sector policies in Ghana are well implemented to enhance the local poultry sector's competitiveness. The variable assessing whether 'government has flexible and friendly policies for the poultry sector' has a KMO value of 0.718, indicating a strong significance to the study. However, the literature indicates that the GoG's perceived lethargic role in the poultry industry has crippled the sector (Nyarko and Adu 2016; Banson *et al.* 2015; Sumberg *et al.* 2013: 8). Similarly, the KMO value (0.941) for 'government has put effective policies in place to ban the importation of cheap, frozen chicken products' showed a strong significance in component three (Table 5.4).

This is contrary to what is indicated in the literature, as previous governments have failed to make concerted efforts to restrict chicken imports (Kusi *et al*. 2015: 482). The indication is that farmers are either not aware of government policies for the poultry industry or that the policies are never implemented.

In testing 'financial subsidies', and 'input subsidies' as support received by farmers from the government, the KMO values of 0.877 and 0.902 in component one, respectively indicate a strong significance to the study, as the implementation of these policies can enhance poultry production. However, evidence from literature indicates that government is not assisting farmers in terms of subsidies (Kusi *et al.* 2015: 483; Alhassan *et a*l. 2014: 219; Johnson 2011: 576). The literature regarding 'financial subsidies, and 'input subsidies' is quite obsolete, as the present administration might be implementing policies in favour of the industry, hence the views from the analysed data differing from earlier research regarding these particular variables.

The KMO value of 0.938 for ‘loan facilitation’ has a strong impact on the study. Due to the high cost of production, easy access to soft loans can be of immense help to farmers in expanding their businesses. Nonetheless, because of the high-risk nature of poultry business, several commercial banks hesitate granting loans to poultry producers in the industry and government’s intervention on behalf of farmers has proved futile (Kusi *et al.* 2015: 483). With regards to ‘the role of government in enhancing competitiveness of the poultry industry is inadequate’, the KMO value of 0.708 in component two (Table 5.4) indicates its significance.

Though government’s contribution to poultry sector competitiveness might be hampered by poor policy implementation; the onus lies on the GoG to revamp the industry to make it competitive. Concerning ‘government support towards the implementation of policies in support of the poultry industry is a recipe for its collapse’, the results indicated in component two (Table 5.4) have a KMO value of 0.785. This variable shows a strong impact on the study, as the collapse of the industry is catapulted by the lack of policy implementation (GBN 2016).

The four-component result (Table 5.5) shows consistency and ascertains that combining such factors will indicate how the local poultry industry can reduce cost, maximize production and be competitive.

Table 5.5: Strategies to improve the competitiveness of the Ghanaian poultry industry Rotated Component Matrix C

C	Component			
	1	2	3	4
Preparing own feed is cheaper than buying from the market	0.754	-0.215	0.350	-0.178
Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost	0.816	-0.027	0.034	0.114
Input subsidy from government can reduce production cost and enhance productivity	0.631	0.547	-0.145	0.132
The high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries	0.506	0.038	-0.427	-0.232
Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper	-0.010	0.684	0.444	-0.385
Stakeholders' input into poultry policies can improve the competitiveness of the poultry industry	-0.097	0.775	-0.170	0.151
Value can be added to local output by processing and packaging	-0.003	0.066	0.198	0.895
Education could improve disease control and improve poultry production	0.106	-0.060	0.791	0.162

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 18 iterations.

There are eight components under section B of the Rotated component matrix (Table 5.5), with the theme 'strategies to improve the competitiveness of the Ghanaian poultry industry'. The KMO value of 0.754 for 'preparing own feed being cheaper than buying from the market', reflects a strong significance in the study. This means the strategy can positively impact the industry's competitiveness.

In assessing whether 'farmers can reduce feeding cost by using their own farm manure as fertilizers to produce maize at cheaper cost', the results from a KMO value of 0.816 in component one show the variable has a significant impact in reducing feed cost and improving output.

The outcome of the KMO result (0.631) for 'input subsidy from government can reduce production cost and enhance productivity', indicates a strong impact on strategies to improve the competitiveness of the Ghanaian poultry industry. This confirms the variable in section B of the rotated component matrix (Table 5.5) on input subsidy, with a KMO value of 0.902. This evidently shows the significance of subsidy, by way of enhancing the poultry industry's competitiveness.

The variable indicating 'the high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries' has a KMO value of 0.506. Though the KMO value is not all that high, it is important to note that farmer's cooperative hatcheries can have a significant effect on reducing the expensive cost of DOCs, which are usually imported (Anang *et al*. 2013: 428).

The KMO value (0.684) for 'consumers will be more attracted to fresh local chicken products if the price is relatively cheaper', indicates a strong significance in the study. This means low price is an important variable when it comes to consumers' preference for poultry products (Al-Hassan *et al*. 2014; Banson *et al.* 2015; Woolverton and Frimpong 2013: 19). This calls for effective strategies to reduce the cost of poultry production in Ghana to make it more competitive.

In assessing whether 'stakeholders input into poultry policies could improve the competitiveness of the poultry industry', the KMO value (0.775) in component one (Table 5.6) tested significant in the study. This indicates that stakeholders' contributions to poultry development in Ghana can significantly impact the competitiveness of the poultry industry.

The result of the response to 'value can be added to local output by processing and packaging' showed a KMO value of 0.895, demonstrating a strong impact on the

study. This means processing and packaging are attributes that can entice consumers to buy local poultry products (Woolverton and Frimpong 2013: 19, 27).

The outcome of the KMO result for ‘education could improve disease control and improve poultry production’ showed a KMO value of 0.791, indicating a strong significance in the study. This means that with education, farmers can gain more knowledge regarding bio-security measures and observe them, administer vaccinations effectively, and control their farms to keep the birds free from diseases, in order to enable them to achieve maximum productivity.

5.6 Section A2: Section Analysis of the biographical data

The subsequent tables and figures represent the findings of the study. These and their interpretations are displayed in accordance with the three sections of the survey instrument (Appendix A: Questionnaire 1).

5.6.1 Biographical Data

This section sums up the respondents’ biographical characteristics, mainly 62 SMS poultry farmers in BA, the study area. Figure 5.1 describes the overall age distribution of the SMS poultry farmers.

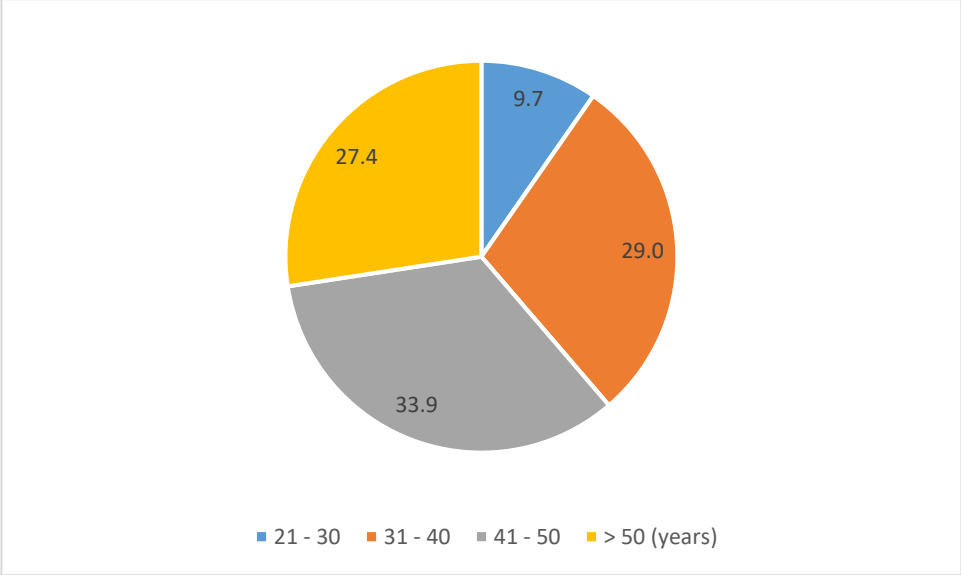

Figure 5.1: Age group

There was a disproportionate spread of the data by age. Approximately 90 percent of the sample was more than 30 years old, with a further disproportional split by age grouping (p = 0.040) (Appendix B: Chi-square analysis table). The high percentage of respondents (approximately 90 percent), between the ages of 31-50 and above, means farmers need a certain level of maturity and/or experience to go into the chicken business to enable them face the competitive pressure of frozen chicken importation (Andam *et al*. 2017: 2). The youth makes up 9.7 percent of the respondents whose age fall between 21-30 years (Figure 5.1). Being the least among the sample, the youth are either quitting the poultry business or do not have much interest in it because it is neither more profitable nor attractive.

The farm capacity, meaning the number of poultrybirds (Table 5.6), is summarised:

Table 5.6: Farm capacity

N	Minimum	Maximum	Mean	Std. Deviation
62	400	12000	2891.19	2678.868

The farm capacity of the SMS poultry producers is indicated (Table 5.6) and determines their level of competiveness. This sector is identified with small-scale commercial farms that keep 50-5 000 birds or medium-scale commercial farms with 5 000-10 000 birds (FAO 2014: 17). On average, a little less than 3 000 birds are found per farm. This average capacity per farm is inadequate, compared to the high poultry meat demand in the country. This confirms what is indicated in the literature that local producers are merely able to satisfy only 10 percent of the total chicken demand in Ghana, with the remaining 90 percent being imported (Banson *et al* 2015).

Poultry houses in this sector are not built to standard, which puts the poultry birds in danger during adverse climatic conditions, such as high temperatures, where the birds are exposed to excessive panting due to heat stress, poor growth and development (Kusi *et al.* 2015: 484). Moreover, bio-security standards are minimal and wild birds and predators occasionally enter the poultry houses causing infections to the poultry birds, and economic loses, respectively (FAO 2014: 18).

The graph below (Fig. 5.2) explains how the educational level of the respondents' impact local poultry production and competitiveness.

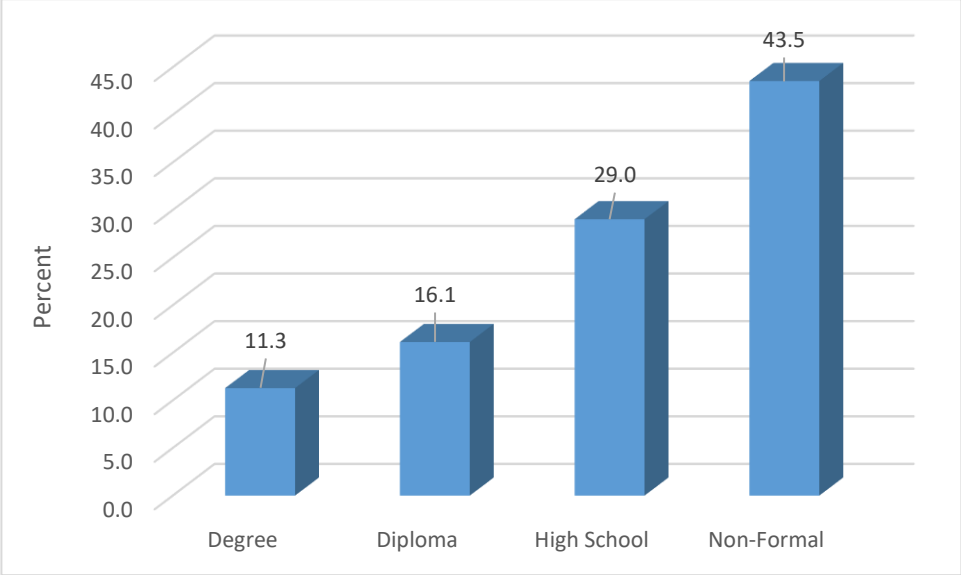

Figure 5.2: Basic educational information of farmers

Slightly above a quarter of the respondents (27.4 percent) indicated a post school qualification. There was a considerable difference in the numbers per option (p = 0.001). The greater part of respondents indicated high school as their apex of education (29.0 percent) while the rest indicated non-formal education (43.5 percent). The low level of education has a negative impact on poultry production and competitiveness, as farmers need good knowledge of bio-security measures (Abdisa and Tagesu 2017: 5), farm records (Tham-Agyekum, Appiah and Nimoh 2010: 57), basic poultry production techniques (Gemechu and Amene 2015: 29, 30), and government policies that affect their business (Food Security Ghana 2013), as well as cost reduction strategies (Bagopi *et al.* 2014) to increase production and be more competitive.

Although a high percentage (43.5) of the respondents have a non-formal education, more than a quarter (27.4 percent) had a post school qualification. This is a useful statistic, as it shows that a fair proportion of respondents have a higher qualification; which reveals that the responses gathered would have been from an informed (learned) source.

The amount of years that farmers have been operating in the poultry business is illustrated (Table 5.7) and was determined to ascertain whether experience can impact productivity.

Table 5.7: Years of experience in poultry business

Number of Years	Frequency	Percent
< 2	4	6.5
2 - 4	13	21.0
5 - 7	14	22.6
8 - 10	13	21.0
> 10	18	29.0
Total	62	100.0

There is no significant difference in the number of respondents per option ($p = 0.075$) (Appendix B: Chi-square analysis table). The implication is that respondents had been in employ for some time and this is also a useful statistic as it shows responses from experienced workers. However, only 6.5 percent of the respondents have below two years experience. This means there has not been any significant increase in farmers engaged in poultry production for the past two years, probably due to low profitability. Although farmers with more experience in the poultry business are the majority (29.0 percent), local production remains infinitesimal, probably because of the high production cost and other numerous challenges.

5.7 Section A3: Quantitative data

This section addresses the analysis of the quantitative data grounded on the objectives of the study. This was done through SPSS version 24.0 to produce descriptive statistical results. Welman, Kruger and Mitchell (2005) stated that descriptive statistics has to do with the description and/or summarization of the data

from a group. They emphasised that descriptive statistics is therefore considered as the most effective method of summarizing characteristics of huge sets of data. The three main objectives of the study are categorised into subthemes of: ‘Challenges facing the poultry industry’, Poultry sector policies’’ and ‘’Strategies to improving the competitiveness of the poultry industry’’. Each of these subthemes aims at exploring a specific objective of the study. The outcomes are firstly presented using frequencies for the variables that constitute every single section.

5.7.1 Challenges facing poultry production

The analysis under this subtheme is connected to the second objective of the study, which seeks to establish ‘challenges facing poultry production’ and how they can be overcome (Appendix A: Questionnaire1).

Table 5.8: Summary of pattern for variables under ‘’Challenges facing poultry production’’

		Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Chi Square
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	p-value
Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo	A1	41	66.1%	19	30.6%	2	3.2%	0	0.0%	0	0.0%	0.000
High cost of local poultry production impedes competitiveness	A2	13	21.3%	46	75.4%	2	3.3%	0	0.0%	0	0.0%	0.000
Farmers are quitting the poultry industry because it is not profitable anymore	A3	4	6.5%	12	19.4%	1	1.6%	15	24.2%	30	48.4%	0.000
High cost of input is a factor to production	A4	19	31.1%	37	60.7%	1	1.6%	2	3.3%	2	3.3%	0.000
The poultry sector is devastated by poor disease control	A5	4	6.5%	10	16.1%	7	11.3%	31	50.0%	10	16.1%	0.000

The summary of the variables in the subtheme ‘Challenges facing the poultry industry (Table 5.8) determines the individual number of respondents for individual variable of this subtheme and their corresponding percentages. From (Table 5.8) it is observed that the recorded p-values (p=0.001) for all items tested indicated significantly different scoring patterns.

The analysis based on this subtheme is connected to the first and second objective of the research, which aims ‘to examine the operations of the SMS poultry farmers in enhancing competitiveness of the poultry industry, and ‘to examine the challenges that militates against the development of the poultry industry in Ghana’ respectively. The outcomes are indicated by the highlighted p-values (p=0.000) for all items tested. These p-values may be ascribed to either respondents' misapprehension of those questions or having a common perception about their operations and the challenges facing them. However, the indication that all these values are within the acceptable range (-0.05 – 0.05) shows that all the variables tested for challenges facing poultry production are strongly significant and pertinent to the research objective one and two.

5.7.2 Poultry sector policies in Ghana

The analysis based on this subtheme is connected to the third objective of the research, which aims to establish the ‘Poultry sector policies in Ghana’ and how these policies are implemented in favour of the poultry sector. The data for the subtheme are summarised in Table 5.9 (Appendix A: Questionnaire 1).

Table 5.9: Summary of pattern for variables under 'Poultry sector policies in Ghana'

	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Chi Square
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	p-value
B6	1	1.6%	0	0.0%	3	4.9%	29	47.5%	28	45.9%	0.000
B7a	0	0.0%	2	3.2%	3	4.8%	44	71.0%	13	21.0%	0.000
B7b	0	0.0%	3	4.8%	1	1.6%	44	71.0%	14	22.6%	0.000
B7c	0	0.0%	3	4.8%	1	1.6%	42	67.7%	16	25.8%	0.000
B8	19	30.6%	31	50.0%	1	1.6%	4	6.5%	7	11.3%	0.000
B9	3	4.8%	7	11.3%	2	3.2%	12	19.4%	38	61.3%	0.000
B10	10	16.1%	31	50.0%	10	16.1%	7	11.3%	4	6.5%	0.000

The summary of the variables, in the subtheme 'Poultry sector policies in Ghana' (Table 5.9), elucidates the individual number of respondents for every variable of this subtheme and their corresponding percentages. It is observed (Table 5.9) that all the items tested recorded the same p-values (p=0.000). All variables under B7 testing financial support to farmers yielded p=0.000, as well as other variables (B6, B8, B9 and B10) testing the implementation of government policies (p=0.000). The fact that all these values are within the tolerable range (-0.05 – 0.05) shows that all the variables tested for ''Poultry sector policies in Ghana'' are very important and pertinent to the third objective of the study.

5.7.3 Strategies to improve competitiveness of the Ghanaian poultry industry

This section address the fourth objective of the research, which aims 'to propose strategies to improving competitiveness of the Ghanaian poultry industry'. The literature review identifies a number of challenges impeding the local poultry

industry's growth and competitiveness (Bagopi *et al.* 2014; Banson, Muthusamy and Kondo 2015; Avevor 2016) but no definite strategies were offered to address them.

This has necessitated the crafting of effective strategies to revamp and improve the industry's competitiveness. The data for the subtheme 'Strategies to improving competitiveness of the Ghanaian poultry industry' are summarized in Table 5.10 (Appendix A: Questionnaire 1).

Table 5.10: Section C: Strategies to improve competitiveness of the Ghanaian poultry industry

		Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Chi Square
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	p-value
Preparing own feed is cheaper than buying from the market	C11	31	50.0%	30	48.4%	1	1.6%	0	0.0%	0	0.0%	0.000
Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost	C12	33	53.2%	29	46.8%	0	0.0%	0	0.0%	0	0.0%	0.611
Input subsidy from government can reduce production cost and enhance productivity	C13	28	45.2%	33	53.2%	0	0.0%	1	1.6%	0	0.0%	0.000
The high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries	C14	27	43.5%	35	56.5%	0	0.0%	0	0.0%	0	0.0%	0.310
Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper	C15	29	46.8%	33	53.2%	0	0.0%	0	0.0%	0	0.0%	0.611
Stakeholders input into poultry policies could improve the competitiveness of the poultry industry	C16	21	33.9%	32	51.6%	7	11.3%	2	3.2%	0	0.0%	0.000

Value can be added to local output by processing and packaging	C17	25	41.0%	35	57.4%	1	1.6%	0	0.0%	0	0.0%	0.000
Education could improve disease control and improve poultry production	C18	26	41.9%	36	58.1%	0	0.0%	0	0.0%	0	0.0%	0.204

The individual number of respondents are illustrated (Table 5.10) for every variable of this subtheme and their corresponding percentages. The following variables, 'Preparing own feed is cheaper than buying from the market', 'Input subsidy from government can reduce production cost and enhance productivity', 'stakeholders input into poultry policies could improve the competitiveness of the poultry industry' and 'value can be added to local output by processing and packaging' recorded a p-value of 0.000, showing strong significance to the study.

The rest of the variables, 'Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost', 'the high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries', 'Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper' and 'education could improve disease control and improve poultry production', with p-values (0.611), (0.310), (0.611) and (0.204) respectively, are not significant to the study.

Although the literature stated the elaborate contribution these variables could make towards the development and competitiveness of the poultry industry (Alhassan *et al*. 2014: 220; Banson *et al*. 2015; Anang *et al*. 2013: 428), the present study proved otherwise; probably measures have been taken to address these issues.

5.8 Cross-tabulations

The traditional approach to reporting a result requires a statement of statistical significance. A p-value is generated from a test statistic and a significant result is designated with “p < 0.05".

A second Chi-square test was performed to determine whether a statistically significant relationship exists between the variables (rows vs columns) (Appendix B: Cross-tabulation table).

The outcomes of the chi-square tests (Table 5.11) are summarised, based on the relationship between the variables ‘’Input subsidies” and “Educational background’’, to substantiate the association between these variables (Appendix B: Cross-tabulation table).

Table 5.11: “Input subsidies” and “Educational background”

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	16.151[a]	9	0.064	0.055		
Likelihood Ratio	18.594	9	0.029	0.015		
Fisher's Exact Test	15.942			0.017		
Linear-by-Linear Association	1.442[b]	1	0.230	0.261	0.135	0.039
N of Valid Cases	62					

a. 12 cells (75%) have an expected count less than 5. Minimum expected count is 0.11.

b. The standardized statistic is -1.201.

The p-value between “Input subsidies” and “Educational background” is 0.017, which indicates a significant association between the yellow highlighted variables.

Specifically, the respondents' educational level played a major part regarding how input subsidies were viewed by respondents. An agricultural subsidy is understood as a government payment (in cash or kind) to supplement the income of farmers and/or agribusinesses, manage agricultural commodity supply, and influence their cost and supply (FinMark Trust 2016: 12).

Farmers misconstrued the meaning of subsidy, thinking an input subsidy is all about money, forgetting that even a subsidy on fertilisers to boost maize production, is indirectly a subsidy on poultry production, since maize is the basic component of poultry feed.

Table 5.12: High cost of local poultry production impedes competitiveness vs Number of years in poultry production

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	5.977[a]	8	0.650	0.635		
Likelihood Ratio	6.052	8	0.641	0.751		
Fisher's Exact Test	5.312			0.804		
Linear-by-Linear Association	1.988[b]	1	0.159	0.189	0.098	0.033
N of Valid Cases	61					

a. 11 cells (73.3%) have expected count less than 5. Minimum expected count is 0.10.

b. The standardised statistic is 1.410.

A p-value of 0.804, which is exceptionally high above the required p-value (Table 5.12) was found from the chi-square test performed on the variables ''High cost of

local poultry production impedes competitiveness" vs ''Number of years in poultry production''. The implication is that experience did not play any significant role when it comes to cost of production. Both new and experience farmers alike consider high cost as a factor of local production as indicated in the literature (Avevor 2016; Donkor *et al.* 2013: 74). This variable is associated with the study's second objective namely, 'to examine the challenges that militate against the development of the poultry industry of Ghana'.

The outcomes of the chi-square tests (Table 5.13) are summarised, centred on the association between the variables 'Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo' and 'Farm capacity (number of poultry birds)', to substantiate the association between these variables. (Appendix B: Cross-tabulation table).

Table 5.13: Chi-square test for chicken importation vs farm capacity

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.797[a]	8	0.454	0.478		
Likelihood Ratio	8.812	8	0.358	0.401		
Fisher's Exact Test	8.463			0.309		
Linear-by-Linear Association	.186[b]	1	0.667	0.721	0.366	0.065
N of Valid Cases	62					

a. 10 cells (66.7%) have an expected count less than 5. Minimum expected count is 0.13.

b. The standardized statistic is -0.431.

With a 0.309 p-value, the results indicated no significant association between these two variables. The implication is that farm size did not play any significant role in terms of chicken importation. Farmers might not have clearly understood the question. They are of the opinion that whether operating a small or a large farm, the import of cheap, frozen chicken is a big blow to local production, which reflects their low education level. Farmers are therefore, of the view that a ban (Wale *et al*. 2016:1) can be a panacea to local production and marketing. However, any measure to ban chicken imports should be exercised with caution until local production meets the ever spiralling demand.

A summary (Table 5.14) illustrates the chi-square test results, grounded on the relationship among the variables ‘’Value can be added to local output by processing and packaging” and “Educational background”, to substantiate the association between these variables (Appendix B: Cross-tabulation table).

Table 5.14: Value can be added to local output by processing and packaging vs Educational background

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.977[a]	6	0.680	0.693		
Likelihood Ratio	4.507	6	0.608	0.649		
Fisher's Exact Test	4.932			0.651		
Linear-by-Linear Association	.444[b]	1	0.505	0.558	0.293	0.075
N of Valid Cases	61					

a. 7 cells (58.3%) have expected count less than 5. Minimum expected count is 0.11.

b. The standardized statistic is -0.667.

The Chi-square Test results generated a p-value of .651 (Table 5.14), which exceeds the required "p < 0.05" p-value and thus, shows that no association lies between the variables. Although value addition to local chicken is indicated in the literature, through processing and packaging to make the product attractive to consumers, the findings, however, proved otherwise. The low level of education of most respondents might influence their opinion regarding value addition not being a key factor impacting the industry.

Apart from the p-value between “Input subsidies” and “Educational background”, which yielded 0.017 (Table 5.11), indicating a meaningful relationship exists between the two variables, with all other variables resulting in p-values high above the significant level. The observation made is that no statistically significant correlation exists between these variables. The majority of famers, by implication, have a common opinion about the issue in question, irrespective of age, educational background, farm capacity, number of years in operation or any other issue discussed under cross-tabulation. In other words, farmers might be thinking along the same line regarding the challenges, government policies and other issues confronting the poultry industry.

5.9 Correlations

This section determines the relationship(s) between the variables, while the (ordinal) data were subjected to Bivariate correlation (Appendix B: Correlation table).

The following patterns were shown, with positive values indicating a directly proportional relationship exists between the variables; an inverse relationship would be indicated by a negative value. An * or ** are used to indicate all significant relationships (Appendix B: Correlations).

A correlation value of 0.287 was found between “Farmers are quitting the poultry industry because it is not profitable anymore” and “The role of government in

enhancing competitiveness of the poultry industry is inadequate". This proportionality is directly related. It was indicated by respondents that, the more government takes adequate measures in enhancing competitiveness, the more farmers stop quitting, with the reverse also being true.

Further, there is a correlation value of 0.513 between "Farmers are quitting the poultry industry because it is not profitable anymore" and ''High cost of input is a factor to production''. The directly proportional correlation between the two variables shows an escalation of input cost, which consequently forces farmers to quit the poultry business.

Similarly, there is a positive correlation between "Farmers are quitting the poultry industry because it is not profitable anymore" and ''The poultry sector is devastated with disease control''. The positive value of 0.305 indicates that the more diseases destroy farms, the more farmers quite farming.

The correlation value between ''High cost of input is a factor of production'' and ''Value can be added to local production by processing and packaging'' is 0.268. This positive result indicates a proportionality between the two variables that is directly related. It was indicated by the respondents that, when more value is added to local chicken, input cost also increases. The significance between the two variables is that, even though value addition raises the cost of production, it eventually attracts more consumers to local products.

Other correlation tests conducted between ''Government has flexible and friendly policies for the poultry sector'' and '' ''Financial subsidy'', ''Input subsidy'', and 'Loan facilitation'' reveal a positive co-efficient of 0.435, 0.392, and 0.442, respectively. Respondents indicated that, in order for them to operate efficiently, financial and input support are indispensable. These values are statistically significant, since they impact the operations of the farmers in improving their productivity

Additionally, there is a correlation between ‘’Farmers can reduce feeding cost by using their farm manure as fertilizers to produce maize at cheaper cost’’ and ‘’Preparing own feed is cheaper than buying from the market’’. The positive value of 0.554 indicates that farmers can reduce cost by producing and preparing their own feed. This variable is significant to the study; as backward integration is an efficient means of enhancing poultry production (Davis *et al.* 2013).

Negative values suggest the variables have an opposite effect on each one, specifically, an inverse relationship exists. The following variables were inversely proportional to each other:

The correlation value between “Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo” and “Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse” is -0.313. In other words, the more government applies cost effective policies, the less likely importation will grow.

Furthermore, the correlation value between “Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo” and ‘’Consumers will be more attracted to fresh local chicken if the price is relatively cheaper’’ is -0.299, which implies an inverse relationship. This is an indication that the more consumers become attracted to local chicken products, the less the threat of chicken imports.

Another inverse relationship is shown in the correlation value between “Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo” and ‘’Stakeholders input into poultry policies could improve the competitiveness of the poultry industry’’ which is -0.305. Respondents are saying

that the more stakeholders input are factored into poultry policies, the less the importation.

There was also an inverse relationship between ‘The poultry sector is devastated by poor disease control’’ and “Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse’, which resulted -0.257. The indication is that, the more government implements effective policies to improve the poultry industry, the less the chances of diseases.

The next section analysis the findings from the quantitative survey of the consumers.

5.10 Section B: The quantitative analysis of responses from consumers

The results of the quantitative analysis, specifically, were presented in this chapter, along with a discussion of the findings from the questionnaire, administered to consumers of chicken products in this study. In order to enable farmers to tailor their products for competitiveness, the central aim of this section is to ascertain the views of consumers regarding the price, quality, availability and convenience of local chicken products.

5.10.1 Research Instrument

A questionnaire was employed as the research instrument and comprised of 13 items, with a nominal or ordinal level of measurement. Various themes were measured (Table 5.15) in each of the three sections of the questionnaire as shown below:

Table 5.15: Description of the questionnaire by section

Section	Description
A	Basic consumer information
B	Strategies to improving the competitiveness of the poultry industry
C	Open ended questions

A Likert scale format was adopted for the closed-ended, quantitative questions. The respondents were requested to choose their responses for the close-ended questions, and also provide short remarks on the open-ended questions. This was done to establish uniformity of the quantitative data and also to obtain broad information from the qualitative data to improving the competitiveness of the poultry industry from a expansive viewpoint.

The questionnaires were administered by the researcher and a research assistant, with sufficient instructions given to allow respondents complete the questionnaires. Respondents were given ample time to finish the questionnaire and a collection date scheduled.

5.10.2 Reliability Statistics

Reliability and validity are the two key aspects of precision. To calculate reliability, it requires considering having numerous measurements taken on the same subjects. This section's reliability scores meet the recommended Cronbach's alpha value of 0.70. It is usually deemed acceptable to have above 0.70 Alpha values (Taber 2017: 6). Therefore, this section of the research has a degree of scoring that is acceptable and consistent.

The Cronbach's alpha score for all the questionnaire items is tabled below:

Table 5.16: Reliability statistics

Cronbach's Alpha	N of Items
0.796	3

5.10.3 Section B1: Factor Analysis

A collection of statistical methods, used to asses a smaller number of dimensions or factors by reducing correlation data, is referred to as factor analysis (Woolford 2015: 3).

Section B of this study questionnaire has one main subtheme: strategies to improving competitiveness of the Ghanaian poultry industry; based on the study's fourth objective. The premise being that, together, all the individual responses in each subtheme might provide a perfect measure of the subtheme and the associated objective.

To ascertain whether the question-set in the main subthemes measures the same thing, factor analysis was used. Should this be found to be the case, a new variable can be generated, comprised of each respondent's score on the factor, in other words, a factor score variable (Mohajan 2017). A name is, therefore, assigned to the combined variables forming a component and discussed as real factors. Accordingly, the KMO and Barlett's Test were performed on the Likert-scaled components to establish, respectively, a Sampling Adequacy measure and Sphericity.

It is only for the Likert-scaled items that factor analysis is done, with specific components divided more finely. The rotated component matrix acts as explanation, as the summarised outcome (Table 5.17) of this analysis illustrates.

Table 5.17: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.504
Bartlett's Test of Sphericity	Approx. Chi-Square	10.785
	df	6
	Sig.	0.095

The conditions for factor analysis are fulfilled by the KMO test results, with a generally accepted, greater than the 0.500 KMO Measure of Sampling Adequacy value. Therefore, the p-value of 0.504 is statistically significant to the study.

The component table (Table 5.18) representing 'Strategies to improving the competitiveness of the poultry industry' shows a rotated matrix analysis of the components. This two-component outcome indicates uniformity and ascertains that merging such factors will discover the strategies to make local chicken products competitive.

Table 5.18: Strategies to improve the competitiveness of the poultry industry Rotated Component Matrix

	Component	
	1	2
Imported chicken products is preferred to local one.	-0.098	0.961
Consumers prefer imported chicken because it is always available on the market.	0.744	0.530
Consumers will shift from imported chicken to local chicken if the price is relatively cheaper	0.804	-0.132
Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook).	0.678	-0.033

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Noted is that Section B variables loaded along two components or themes (Table 5.18), which means that, within the section, respondents pinpointed different trends; with colour coding indicating splits.

Under component two, the rotated component matrix performed on 'Imported chicken products is preferred to local one' resulted in a 0.961 KMO, which indicates a strong significance to the study. This indicates an imported chicken product as a

recipe for collapsing the local poultry industry (Alhassan *et al*. 2014: 216; Wooverton and Frimpong 2013: 8). Consequently, it shows that farmers must craft strategies to improve their operations, in order to make the industry more competitive. The response regarding 'Consumers prefer imported chicken because it is always available on the market'' showed a 0.744 KMO value. This significant variable indicates that the availability of chicken products is a prime factor in consumers' choice and they thus purchase imported chicken, since they cannot rely on the erratic supply of local products.

In examining whether 'Consumers will shift from imported chicken to local chicken if the price is relatively cheaper', the KMO value 0.804 indicated a strong significance to the study. This is an indication that price (Alhassan *et al*. 2014: 219; Kwadzo *et al.* 2013: 71) significantly influences consumers' choice for chicken products and consequently, local products must be cheaper to ensure high patronage.

The KMO value (0.678) for the variable 'Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook)' is not too strong, when compared to the other three variables already stated and thus, do not exhibit a same, strong effect, as the other three do. This indicates that convenience may not matter as much to consumers, provided the chicken products are readily available at cheaper price.

5.10.4 Section B2: Basic consumer information

This section summarises respondents' biographical characteristics, mainly consumer family size, as well as the number of times chicken is consumed per week. Age, however, did not play any meaningful part in the study.

The family size of the sample (Figure 5.3) is shown as 0-2, 3-5, and 6 and above.

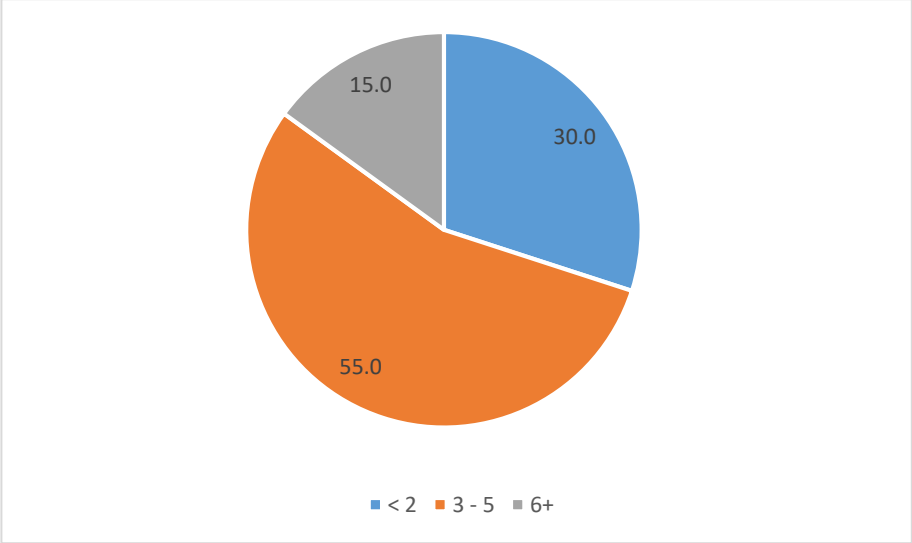

Figure 5.3: Family size

No significant difference (p = 0.086) was found in family sizes (Appendix B: Chi-square table). Over half of the respondents (55.0 percent) have a family size of between 3-5. This is followed by those with a family size of two. The minority of the respondents (15 percent) have a family size of six and more. Family size may influence affordability of chicken, as a family size of six and above is represented by only 15 percent of the respondents. This indicates that local chicken must be made cheaper.

Figure 5.4 illustrates whether there exist a significant variance regarding the number of times respondents consume chicken in a week:

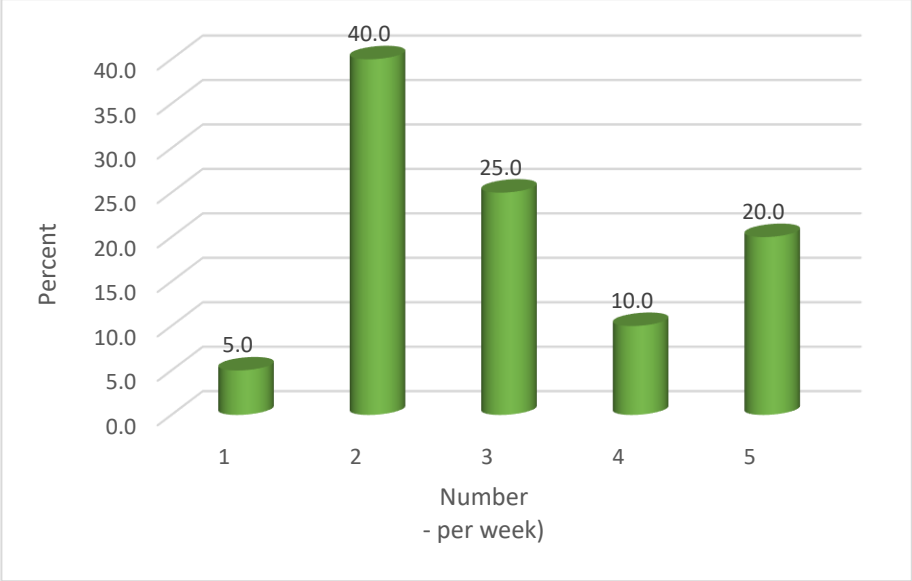

Figure 5.4: Chicken consumption per week

There was insignificant difference (Fig. 5.4) in the number of times respondents consume chicken in a week ($p = 0.112$) (Appendix B). Of the respondents, almost half (40.0 percent) stated their chicken consumption as twice a week, which is an indication that most consumers cannot afford to eat chicken many times in a week, mainly due to high price. Respondents who consume chicken three times per week constitute 25 percent, while 20 percent indicated their chicken consumption as five times a week; this shows chicken consumption on many occasions in a week by only a quarter of the respondents. While 10 percent eat chicken four times per week, chicken is eaten once a week by only five percent of the respondents. The very low response rate (five percent) of those respondents who indicated they eat chicken only once a week, could imply they cannot afford chicken many times in a week or they do not have a preference for chicken, especially imported products.

5.10.5 Cross-tabulation

A statement of statistical significance is required when results are reported in a traditional manner, with a test statistic generating a p-value. When a result is significant, it is indicated by "$p < 0.05$".

To establish if a statistically significant relationship existed between the variables (rows vs columns) a second Chi square test was conducted (Appendix B).

While the null hypothesis states an association does not exist among the two variables, an association is indicated by the alternate hypothesis.

The frequency of the variable chicken consumption per week vs family size, is illustrated (Table 5.19) and determines the rate at which consumers consume chicken per week (Appendix B).

Table 5.19: Chicken consumption per week vs family size

Number of times you consume chicken in a week vs Family size

			Family size			Total
			2	3 - 5	6+	
Number of times you consume chicken in a week	Once	Count	0	1	0	1
		% within Family size	0.0%	9.1%	0.0%	5.0%
	Twice	Count	2	4	2	8
		% within Family size	33.3%	36.4%	66.7%	40.0%
	Thrice	Count	1	4	0	5
		% within Family size	16.7%	36.4%	0.0%	25.0%
	Four times	Count	1	1	0	2
		% within Family size	16.7%	9.1%	0.0%	10.0%
	More than 5 times	Count	2	1	1	4
		% within Family size	33.3%	9.1%	33.3%	20.0%
Total		Count	6	11	3	20
		% within Family size	100.0%	100.0%	100.0%	100.0%

There was no significant difference between chicken consumption per week vs family size ($p = 0.847$). From the analysis (Table 5.19), apart from the family size of 3-5, whose consumption rate is 9.1 percent once a week, the other family sizes indicated that they do not consume any chicken. Respondents who consume

chicken twice a week are represented by 33.3 percent, 36.4 percent, and 66.7 percent for a family size of 0-2, 3-5 and six and above family members, respectively. The consumption rate and the family size of this category constitute 40 percent of the total, which is an indication that most of the families consume chicken twice a week.

The reason for this low consumption rate may be due to the inability to afford local chicken, which is the preference of most consumers (Xazela *et al*. 2017: 8). This may explain why the consumption rate of the family size of six and more reduces from 66.7 percent (twice a week) to 33.3 percent (five times a week). Respondents who consume chicken more than five times per week, with their family sizes, are as follows: 0-2 (33. 3 percent), 3-5 (9.1 percent), and six and above (33.3 percent), constituting 20 percent of the total percentage, confirming that price is a determining factor (Alhassan *et al*. 2014: 219; Woolverton and Frimpong 2013: 19).

5.10.6 Section B3: Strategies to improve the competitiveness of the Ghanaian poultry industry

The respondents's scoring patterns are analysed per variable per section in the section that follows. The outcomes are initially presented for the variables that comprise each section with summarised percentages for each, after which further analyses are done as per the statements' significance.

The summary of the variables (Table 5.20) in the subtheme 'Strategies to improve competitiveness of the Ghanaian poultry industry' shows the individual respondent numbers for each variable of this subtheme and their respective percentages.

Table 5.20: Section B: Strategies to improve competitiveness of the Ghanaian poultry industry

		Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Chi Square p-value
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	
Imported chicken products is preferred to local one.	B4	2	10.0%	2	10.0%	0	0.0%	10	50.0%	6	30.0%	0.032
Imported chicken is relatively cheaper, compared to local chicken.	B5	10	50.0%	7	35.0%	0	0.0%	1	5.0%	2	10.0%	0.013
Consumers go prefer imported chicken because it is always available on the market.	B6	8	40.0%	9	45.0%	1	5.0%	1	5.0%	1	5.0%	0.002
The imported chicken taste better than the local one	B7	2	10.0%	0	0.0%	0	0.0%	8	40.0%	10	50.0%	0.074
Consumers will shift from imported chicken to local chicken if the	B8	11	55.0%	6	30.0%	0	0.0%	1	5.0%	2	10.0%	0.006

price is relatively cheaper												
Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook).	B9	6	31.6%	13	68.4%	0	0.0%	0	0.0%	0	0.0%	0.10808

The results of the variables (Table 5.20) for B7 ‘The imported chicken taste better than the local one’ (0.074) and B9 ‘Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook)’ (0.108.) are greater than $p < 0.05$, which is the tolerable significance criteria and thus do not have any significant relationship to the study. This high p-value (0.074) for statement B7 may be ascribed to either respondent misunderstanding of the question or they might consider price as the major attribute, rather than taste, as they may only be looking for chicken to satisfy their demand for protein. Similarly, the results of B9, with a p-value of 0.108, can be attributed to the respondents’ misapprehension of the question or perhaps, convenience does not matter so much to them. What probably matters, is the affordability of chicken. Apart from these two variables, all other variables tested meet the required p-values (p=0.000), which shows significance to the study.

The results of the Fisher’s chi-square of exact test are illustrated (Table 5.21) with the test performed to ascertain whether any statistical relationship lies between ‘Imported chicken products is preferred to local one” and Family size”.

Table 5.21: Imported chicken products are preferred to the local one vs Family size

Chi-Square Tests							
	Value	df	Significancct Sig. (2-sicct Sig. (1-sioint Probability				
Pearson Cl	4.545[a]	6	0.603	0.662			
Likelihood	5.264	6	0.510	0.682			
Fisher's Ex	5.291			0.540			
Linear-by-L	.011[b]	1	0.915	1.000	0.515	0.102	
N of Valid C	20						
a. 11 cells (91.7%) have expected count less than 5. The minimum expected coun							
b. The standardized statistic is .107.							

The Fisher's Exact Test, conducted between 'Imported chicken products is preferred to the local one' and 'Family size' showed results that revealed a p-value of 0.540; this indicates no statistical significance between these variables (Table 5.21). The implication is that family size does not play any major role in terms of consumer preference for chicken products. Both small and large families disagree that imported chicken is preferred to local chicken, which calls for an upsurge in local production.

5.10.7 Correlations

This section measures the relationship(s) between the variables, with the (ordinal) data also subjected to Bivariate correlation (Appendix B: Correlation table).

A p-value of -5.64 was yielded by the correlation value between ''Imported chicken is relatively cheaper, compared to local chicken'' and ''Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook)''. This negative value implies an inverse relationship, which means the more imported chicken

becomes relatively cheaper, compared to local chicken, the less local chicken will be attractive to consumers. This will, therefore, result in local producers losing their market share to importers and thereby compelling them to quit the business.

This is the only negative correlation found in this section, with no positive correlations connecting variables.

The qualitative data analysis is discussed in the ensuing section, where data were obtained from farmers, MoFA officials and consumers, through the use of a CCA method.

5.11 Section C: Qualitative analysis (farmers, MoFA officials and consumers)

The primary objective of this section is to validate the quantitative data presented in the previous sections, by means of response analyses to the open-ended questions. The significance of the qualitative questions was to give respondents the opportunity to express their opinions explicitly on issues discussed under the quantitative data obtained from farmers and consumers. The responses elicited from respondents, based on their own experiences in the poultry industry, enhanced measures proposed to address the challenges in the industry.

5.11.1 Code generation

Coding denotes recognizing all pertinent pieces of data within the whole dataset to respond to the research questions. A code therefore is a word or brief phrase that depicts the purpose of why you think a specific data may be useful (Braun and Clarke 2013: 207). The coded data were produced from a pool of ideas based on the respondents' experiences in the poultry industry which were relevant to the research questions. Manual technique of coding was adopted to enable the researcher to control the ideas found and to group them according to their commonalities.

Codes that were pertinent to the challenges facing the SMS poultry producers in the BA region, for instance, include but not limited to high cost of feed, high cost of DOCs, disease outbreak, low productivity, high cost of fishmeal, influx of imported, frozen chicken, high cost of drugs and medicine, low profitability, lack of funds, poor marketing, high cost of electricity, lack of capital, high cost of labour, lack of storage facilities, high cost of maize, climatic change, poor management, high mortality rate, inadequate veterinary support, lack of hatcheries and high cost of labour.

5.11.2 Generating themes

A theme expresses something significant about the data in respect of the research question, and signifies some level of guided responses in the dataset (Braun and Clarke 2006: 82). In searching for the themes, the set of coded data was analysed and organised into prospective themes at the wider level of ‘’production challenges’’ as found under the above heading: Code generation. The coded data were merged based on the associations of themes and subthemes. The themes were represented as ‘’production cost’’ while subthemes were represented as ‘’internal challenges’’ and ‘’external challenges’’.

5.11.3 Theme definition

The themes and subthemes developed from the codes were redefined as ‘’High cost of production’’ and ‘’general challenges’’. The latter theme ‘’general challenges’’ was developed as a result of merging the subthemes ‘’internal challenges and ‘’external challenges’’ under one theme to clearly address the RQ 2.

The researcher followed the processes of ‘’Code generation’’, ‘’Generating themes’’ and ‘’Theme definition’’ above to develop the rest of the themes. Other themes besides ‘’High cost of production’’ and ‘’general challenges’’ are: limited knowledge, ‘’funding’’, ‘’policy implementation’’, ‘’reducing cost of production’’, ‘’becoming competitive’’. Having developed the themes, a report of the analysis was produced through the consideration of the research questions and the literature.

5.11.4 Addressing the research questions

This section has been categorised into themes to address the study's RQs. Therefore, rather than basing the analysis on individual questions, it is based on the identified themes. The RQs are separately addressed by considering the themes that emerged from the data; certain themes, however, addressed more than one RQ.

Pertaining to the first RQ, 'What operations are undertaken by the SMS poultry farmers to enhance competitiveness of the poultry industry?', two themes were identified: limited knowledge, and funding.

5.11.4.1 Limited knowledge

The limited knowledge of the SMS poultry farmers emanates primarily from their low level of education, with this limited knowledge heavily impacting poultry production, as poultry diseases that cause huge financial losses could be reduced, if not completely eliminated, by sufficient knowledge concerning the farmers' operations. Most farmers stated that a high level of disease outbreak is one major issue that challenges their operations. This was confirmed by a MoFA official, who indicated that ''Poor bio-security measures on the part of farmers leads to disease outbreak and its attendant high bird mortality''. Farmers noted that poor management characterised their operations, mainly due to their limited knowledge of poultry production.

MoFA officials stated that a lack of technical know-how, as well as poor management heavily challenge farmers and emphasised that farmers must be trained and work-shopped to enable them enhance poultry productivity and competitiveness. According to MoFA officials, educating farmers can enable them to practice bio-security measures effectively and also acquire skills to better manage their farms. Moreover, farmers will be able to identify and utilise unconventional feed, which is

relatively cheaper and readily available, to substitute for the high cost of conventional feed.

5.11.4.2 Funding

Funding appeared as a theme as most farmers accentuated that funding is the backbone of the poultry industry as the effectiveness of their' operations hinges on funding. Also, a farmer stated that ''We operate seasonally to meet festive occasions when demand for live chicken is high because we do not have enough funds''. This was confirmed by MoFA officials, who stated farmers are unable to increase production and gain economies of scale due to a lack of capital. A farmers indicated ''I cannot access loans to increase my chicken production, since banking institutions require collateral before loans are granted. Unfortunately, I do not have the collateral they require''.

MoFA officials indicated that farmers cannot afford quality feed due to its high price and thus go for low quality feed which affects the growth and performance of the birds. According to MoFA officials, farmers are unable to provide proper housing for their flock, as a result of insufficient funding. Therefore, the birds are overstocked in small spaces and suffer heat stress during adverse climatic conditions, such as harmattan, resulting in a high mortality rate.

In relation to RQ 2, 'What challenges confront the poultry industry in Ghana?', high cost of production, and general challenges were identified as the two main themes.

5.11.4.3 High cost of production

High cost of feed was indicated by both famers and MoFA officials as a major challenge confronting the local poultry industry. According to both respondent groups, although maize constitutes a greater percentage of the feed component, it is of limited supply, especially during the lean season and consequently, the price keeps on soaring. They also stated that the prices of fish meal and soybean, the

main protein sources, are exorbitant. Feed cost eventually increases the overhead cost of production, supporting MoFA officials' reiteration that farmers must resort to unconventional feed sources as an alternative way to reduce costs.

Farmers and MoFA officials alike mentioned the high cost of DOCs as a challenge in the industry. A farmer complained ''Prices for DOCs escalate, especially close to festive occasions when their demand is high''. In addition, farmers and MoFA officials mentioned the high cost of drugs and medicine as another challenge facing the industry. Due to the prevalence of diseases, such as newcastle and gumboro, farmers need to implement effectively vaccination programme to avert diseases, as failure to vaccinate the birds successfully can result in a high mortality rate, causing huge financial losses to farmers.

By implication, those farmers who cannot follow the vaccination programme strictly, due to cost, skip some of the vaccination stages, thereby risking the health of the poultry birds. Farmers indicated an inadequate number of veterinary officers to guide them, especially with regards to disease control and consequently, disease outbreaks result in high bird mortality.

5.11.4.4 General challenges

General challenges, included but not limited to importation of cheap frozen chicken, low productivity, seasonality of production, and lack of storage facilities, along with poor marketing, and a lack of processing and packaging, emanate principally from a lack of funding. Imports of frozen chicken was stated by both farmers and MoFA officials as a major concern for local producers. According to a farmer'' The market is flooded with cheap imported frozen chicken which most consumers prefer due to their low prices. We are not making any profit due to the high cost of producing local chicken''.

Farmers, along with consumers, therefore stated that chicken imports must be banned to enable farmers to increase production and create a market for local products, since local chicken will be the only option for consumers. The idea of a ban was challenged by MoFA officials and some consumers, who indicated that a ban will cause shortages, an upsurge in prices of poultry products in Ghana, and encourage smuggling of poultry products from neighbouring countries, as in the case of Nigeria. Appropriately, a ban on chicken imports should not be encouraged in the interim, until farmers have increased production levels to satisfy consumer demand.

Poor marketing was identified by farmers as a challenge emanating from the expensive nature of local chicken products, lack of promotion and inefficient distribution of local chicken products. Another challenge identified by all the respondents was a lack of packaging and processing, which can add value to local products and make it attractive to consumers. A farmer indicated ‘’Most consumers these days look for chicken cut into convenient sizes and well packaged like the imported ones. However, due to lack of funds we cannot afford to satisfy their demand, as we do not have the appropriate processing and packaging, or storage facilities’’.

Moreover, processing requires high volumes of chicken, as well as continuous production, which farmers cannot satisfy at present. Funding therefore becomes vital to the local industry’s competitiveness and sustainability, since most of the challenges could be alleviated through proper funding. Farmers affirmed the numerous challenges, coupled with low profitability, force most farmers to quit the poultry industry.

5.11.4.5 Policy implementation

Policy implementation surfaced as a theme that addresses RQ 3, ‘How are government policies being implemented to enhance competitiveness of the poultry industry?’ Both farmers and MoFA officials stated that a government subsidy

reduces the cost of production, which is the farmer's principal challenge. Both MoFA officials and farmers stressed that the implementation of policies in favour of farmers such as input subsidies, tax reduction on poultry inputs as well as high tariffs on imported chicken products must be fully implemented to ease farmers' financial burden, enhance their productivity and make them competitive.

Though MoFA officials indicated that farmers must take advantage of the input subsidy from the government to increase production and be competitive. Farmers did not, however, concur with MoFA officials on the issue of government subsidy because the former misconstrued what subsidy means, thinking that it is all about financial assistance. Moreover, farmers forget that even a subsidy on fertiliser to boost maize production is, indirectly, a subsidy on poultry production, since maize forms a major part of the cost of poultry production.

The Broiler Revitalization Project (BRP) was indicated by MoFA officials as a government policy meant to enhance the industry's competitiveness. Nonetheless, a farmer registered the disappointment of farmers, stating that ''The BRP project was a fiasco as farmers never benefited, due to misappropriation of funds and lack of policy implementation''. Farmers and MoFA officials stated that training of more veterinary officers and educating farmers are methods that can be adopted to develop the poultry industry.

Farmers, as well as MoFA officials, are of the view that policies in favour of the poultry industry are not implemented, which affect the growth and competitiveness of the local industry. Additionally, farmers indicated that policies are not well implemented because government's budget does not benefit farmers. A stated that ''The GNAPF must be involved in policy implementation, to ensure its members benefit by increasing our output and creating jobs for locals''. The farmers thus cautioned that government officials must not politicise the poultry industry against the interests of the masses.

It was further indicated by the farmers that there must be a tax reduction on farm inputs to enable farmers increase production, and MoFA must research unconventional feeds in an attempt to minimise the high feed cost incapacitating the industry. A MoFA official stated that ‘’Government must places a high tariff on imported chicken, to minimise excessive chicken imports and also to ensure that importers source 40 percent of their imports from local farmers’’. The issue of sourcing can only be possible and effective, according to MoFA officials, when farmers are able to acquire a cooperative cold depot, where locally processed and packaged chicken products can be stored and distributed from.

Responding to the challenges affecting the poultry industry in Ghana, the limited knowledge and funding that obstruct farming operations, as well as the lack of policy implementation, respondents articulated various strategies to improve the poultry industry and increase its competitiveness. Addressing RQ 4, ‘What strategies can be adopted to improve the competitiveness of the poultry sector?’, two main themes emerged: reducing cost of production, and becoming competitive.

5.11.4.6 Reducing cost of production

In order to reduce the production cost, MoFA officials propose farmers can use their own farm manure as fertilisers to produce maize at a cheaper cost. Although some farmers are currently using poultry manure to boost maize production, others are yet to realise its full potential. Both Farmers and MoFA officials agreed that preparing own feed is cheaper than buying from the market. Farmers stated that co-operative hatcheries can ensure quality and also reduce the exorbitant cost of DOCs. Farmers, as well as MoFA officials, indicated that farmers’ cooperatives can lower cost and improve competitiveness, as farmers pool their resources to increase production and enjoy economies of scale.

MoFA officials reiterated that farmers can access input subsidies, such as tractors and hatchery services through their cooperatives to enable them boost production. Farmers and MoFA officials unanimously agreed that an input subsidy from government can reduce production cost, which is the farmers' principal challenge, and enhance productivity. According to a MoFA officials, ''Fishmeal is the most expensive protein source in feed formulation, but can be substituted with maggot meal, which is not only cheap but equally efficacious as fishmeal''.

5.11.4.7 Becoming competitive

Regarding the theme ''becoming competitive'', Farmers, MoFA officials, as well as consumers, affirmed that cheap local products will attract consumers, thereby making the local industry competitive. All the respondents affirmed that the market for local chicken is large and therefore, local chicken being affordable and attractively packaged for consumers will encourage intense competition. A consumers stated that ''The local chicken is fresh, tasty, tough and less fatty unlike the imported chicken which is tasteless, fatty and sometimes almost expired''. Farmers must ensure that local products are cheap and always available.

MoFA officials, as well as farmers, indicated consumers prefer live poultry birds to frozen ones, which is confirmed in the literature with an excessively high demand for live birds during festive occasions, such as Christmas and Easter. Some farmers, however, argued that local products cannot be competitive because cheap imported chicken is a serious setback. A MoFA officials stated that ''Farmers must explore value added techniques to make local products attractive to consumers''. Farmers confirmed that, for the sake of convenience, consumers usually purchase chicken cut into portions and farmers must thus tailor local products to meet consumer demand appropriately.

Farmers and consumers unanimously stated that a ban is a strategy to make local products competitive since the local chicken products will be the only option for

consumers. Nonetheless, this idea was dismissed by MoFA officials, who stated there will be shortage of chicken and an upsurge in the prices of poultry products, indicating that farmers must increase local production before any attempt is made to ban chicken imports. The efficient application of these strategies can, to a large extent, increase local chicken production and make the industry competitive.

5.12 Summary of themes (quantitative and qualitative)

This section shows the summary of both the quantitative and qualitative themes that developed from the analysis of two strands. The purpose of summarizing the themes is to enable the researcher merge the results from both the qualitative and qualitative strands for comparison, as well as to form inferences. Inferences in mixed method research are interpretations or conclusions derived from the distinct quantitative strands of the research (Creswell and Plank 2011).

5.12.1 Summary of quantitative themes

(i) Challenges facing the poultry industry in Ghana. Under this theme, the analysis showed that importation of cheap chicken products is a threat to the local poultry industry. High production cost resulted from high inputs cost namely soybean, maize, fish meal and DOCs. Poor market for local chicken products is as a result of high cost production as well as lack of value addition through processing and packaging. Poor disease control resulted from limited knowledge and lack of funding on the part of producers.

(ii) Poultry sector policies. Under this theme the analysis indicated that government has no flexible and friendly policies for the poultry sector. However, the analysis showed that farmers receive some level of input subsidies. The role of government in enhancing the competitiveness of the domestic poultry industry was inadequate. It also came out that government lacks support towards the implementation of policies.

(iii) Strategies to improve the competitiveness of the poultry industry. The analysis under this theme showed that preparing own feed is cheaper than buying from the market. The analysis also showed that producing own feed reduces cost. Input subsidy from government can reduce cost. Similarly, farmers can procure their own hatcheries to produce DOCs at cheaper cost. Likewise, cheap local chicken products will attract consumers. Value can be added to local products to attract consumers. Also, education can improve disease control and improve poultry production.

5.12.2 Summary of qualitative themes

(i) Challenges facing the local poultry industry's competitiveness. According to the analysis, limited knowledge emanating from the SMS producers' low level of education impacts negatively on their operations. Similarly, poor management resulting from limited knowledge causes huge financial loss. Again, lack of funding confronts the farmers' operations the most. Likewise, high input cost which includes feed, drugs and medicine and DOCs were considered major challenges. Importation of cheap, imported chicken products, poor marketing and lack of processing and packaging as other challenges.

(ii) Policy implementation

Under this theme, the analysis showed that government subsidies can help SMS poultry producers to boost production and also to process and package their products. Farmers must make use of the available government subsidies to increase productivity. There is lack of policy implementation on the part of government. Equally, government must research nonconventional feed in an attempt to minimize high cost of feed. Similarly, government must take pragmatic steps to ban importation of cheap, chicken products.

(iii) Strategies to improve the competitiveness of the poultry industry

The analysis under this theme indicated that it is cheaper for farmers to produce and prepare their own feed. Also, farmers can substitute fish meal with maggot meal which is not only cheaper but also efficacious. Likewise farmers must procure cooperative hatcheries and cold depots where they can obtain quality DOCs, and store the processed chicken respectively. Similarly, value can be added to local chicken to make it attractive to consumers. Equally, a ban on cheap, imported local chicken can make local producers competitive.

5.13 Conclusion

The purpose of the chapter was on the interpretation of data using frequency tables, graphs, Chi-square test, cross-tabulations, Cronbach's alpha, and correlations along with tables for factor analysis. The themes that emerged from both the quantitative and qualitative data have been summarised to be merged for discussion in the ensuing chapter.

Cronbach's alpha expressively specifies that data gathered for this research is largely dependable and repeating this survey in other locations or on the similar sample at some other period, will possible produce related outcomes.

According to the analysis discussed above, it can be summarised that there are numerous challenges facing the poultry industry. Operations of SMS poultry farmers are characterised by high cost of production, of which feed forms the bulk, with other operational costs comprised of the cost of DOCs, drugs and medicines. Farmers also lack capital and do not have access to loans, which impede their ability to increase production and enjoy scale economies. The seasonality of poultry production emanates from the expensive production cost and poor markets for local chicken products. Disease control was another main challenge confronting farmers. The prevalence of disease is owing to farmers' limited knowledge, negligence of bio-security measures, as well as the high cost of drugs and medicine.

It was revealed that government has no definite policies in favour of the poultry industry, as farmers could not emphatically state what government is doing in terms of loan facilitation and subsidies to improve the domestic poultry production. In order to enhance the competitiveness of the local poultry industry, farmers must employ cost reduction strategies, as well as value addition strategies, to reduce the cost of production and improve productivity, respectively. Farmers can employ cost reduction strategies, for example, producing their own raw materials like maize and insect protein, as well as preparing their own feed. The qualitative results derived from the CCA method complemented the quantitative findings, showing consistency in the findings and subsequently, the primary data derived from the respondents.

The ensuing chapter presents a summation of key findings analysed and interpreted in this chapter; grounded on the study's central objectives.

CHAPTER SIX
DISCUSSION OF RESULTS

6.1 Introduction

A comprehensive discussion is presented in this chapter relating to the findings concerning analysis of the primary data in the preceding chapter. The discussion will connect these findings to the objectives and RQs of the study, along with the review literature, and state the implication of each finding, so as to make inferences and draw appropriate conclusions for the entire study. Moreover, the discussion of the findings were enhanced by previous studies that have relevance to the current study.

The study's principal aim was to examine SMS poultry farmers' operations and investigate those challenges that impact Ghana's poultry industry, with the prime objective of exploring strategies to improve the competitiveness of the country's poultry industry.

For this aim, and the primary objective to be achieved, it was necessary to formulate the following research objectives:

1. investigage SMS poultry farmers' operations in enhancing the poultry industry's competitiveness.
2. examine those challenges that militate against development of Ghana's poultry industry.
3. evaluate existing government policies that seek to promote and enhance the competitiveness of the poultry industry; and
4. propose strategies to improve the competitiveness of the poultry industry.

The research questions that accompany the primary objectives are as follows:

- What operations are undertaken by Ghana's SMS poultry farmers in enhancing the poultry industry's competitiveness?

- What challenges confront the Ghana's poultry industry?
- How are government policies being implemented to enhance competitiveness of the poultry industry?
- What strategies could be adopted to expand the poultry sector's competitiveness?

6.2 Summary of key findings

- The information obtained from the study findings specifies that respondents' low level of education and lack of experience negatively impact operations of SMS poultry farmers.
- The research also indicates that the seasonality of domestic poultry production is by dint of the expensive production cost and poor market for chicken.
- The findings also indicate that farmers are unable to increase production to gain economies of scale, owing to a lack of both capital and access to credit facilities.
- According to the findings, there are no farmers' co-operatives that can help farmers to procure input in bulk, establishing hatcheries, feed and processing plants to increase production and gain large market share.
- Disease control challenges the poultry industry, as farmers overlook the significance of bio-security measures.
- From the findings, it was revealed that high production costs, resulting from sky-rocketing feed prices, DOC's high cost, along with soaring drug and medicine costs, contribute to crippling the poultry industry.
- In addition, there are no definite government policies in favour of the poultry industry. The presumably existing policies for the industry are not implemented, however, government indirectly subsidises poultry production.
- Farmers can hardly pinpoint subsidies provided by government as government subsidises fertilisers to boost the production of maize, which forms 60 to 70 percent of the feed cost.

- No practical measures are taken by government to address the influx of cheap, imported chicken, which is collapsing the industry.
- Local poultry products can be made viable through farmers employing cost cutting strategies, for example, producing their own raw materials, notably soybean and maize, as well as preparing their own feed. Farmers can also utilise unconventional feed, for instance, sorghum, millet and CRM, thus replacing a certain percentage of maize to reduce the high cost of feed.
- Farmers can, in doing so, add value to local production through processing and packaging.
- Government policies in favour of the poultry industry must be implemented to make the local industry competitive.
- Farmers may follow the poultry VC model designed for them to enhance their productivity and achieve competitiveness

Generally, the study reveals the operations of SMS poultry farmers as characterised by numerous challenges, the principal among them being cost of production; the government is doing very little, if anything, to support the local poultry industry. However, farmers can adopt certain strategies to boost their production and increase the industry's competitiveness.

6.3 Discussion of findings in the context of the study objectives

The study findings are presented in this section, centred on the objectives of the research and the associated RQs. The qualitative findings are used to reinforce the quantitative findings to enhance the credibility of the study.

6.3.1 Operations of SMS poultry farmers

In response to the RQ1 ''What operations are undertaken by Ghana's SMS poultry farmers in enhancing the poultry industry's competitiveness?'' the study's findings confirm that farmers' low education level and their inexperience negatively impact SMS poultry farmers' operations. The study's findings showed that nearly half (43.5

percent) of SMS poultry producers have only non-formal education. This low level of education impedes their operations. This finding confirms what other scholars (Abdisa and Tagesu 2017; Tham-Agyekum, Appiah and Nimoh 2010) found in their studies, in Ethiopia and Ghana respectively, that farmers require a satisfactory level of education with regards to bio-security measures, record keeping and basic poultry production techniques to augment their productivity.

The findings from the study indicated a high response rate (71.0 percent) in disagreement with “Do you receive any support from the government in terms of input subsidy”. The outcomes from the qualitative analysis indicated that majority of the respondents disagree with this statement. This finding confirms what other scholars (Gyau 2011; Kusi, Agbeblewu, Anim and Nyarko 2015a: 482; Norman *et al.* 2016) found in their research conducted in Ghana that government’s efforts to subsidize cost of production is inadequate. However, farmers misconstrued what ‘’input subsidy’’ refers to and indicated they receive no subsidy from the government. The positive correlation between ‘’input subsidy’’ and ‘’educational background’’ showed that the respondents educational level played vital role with regards to the way respondents perceived input subsidies.

6.3.2 Challenges that confront local poultry producers

In response to the RQ2 ‘’What challenges confronts Ghana’s poultry industry?’’ the study’s findings showed a high response rate (60.7 percent) in agreement with the statement ‘’High cost of input is a factor of production’’. This statement was unanimously agreed by respondents according to the qualitative analysis. The findings from the current study validates what other scholars (Chartterjee and Rajkumar 2012; Avevor 2016; Ncube 2016) found in their studies, in India, Ghana, and South Africa respectively, that feed alone constitute roughly 70 percent of the entire input cost. Therefore controlling feed cost is paramount to the development and competitiveness of the local poultry industry.

The findings from the study indicated a high response rate (66.1 percent) in agreement with the statement ‘’The importation of cheap, frozen chicken products is a serious threat to the local poultry industry’’. Similarly, high responses from the qualitative analysis show participants’ agreement with this statement. This finding affirms what other scholars (Anang, Yeboah, and Agbolosu 2013; Kate 2017; Eshun and Tetteh 2014) found in their studies in Ghana, South Africa and Ghana respectively, that imported chicken products have bedevilled the local poultry industry as local producers can no wise compete on the same market arena with these cheap imports.

The study’s findings showed a high response rate (74.5 percent) in agreement with the statement ‘’High cost of local poultry production impedes competitiveness’’. Responses from most participants, according to the qualitative analysis, agreed with this statement. This finding confirms with what other scholars (Darko *et al*. 2013; Abu *et al.* 2015;) found in their research conducted in Ghana and Nigeria respectively that high production cost impedes productivity and the domestic poultry industry’s competitiveness and may lead to its demise if drastic measures are not taken to salvage the industry .

The study’s findings also showed a high response rate (66.6 percent) in agreement with the statement ‘’The poultry sector is devastated with poor disease control’’. The high responses from the qualitative analysis indicates respondents’ agreement with this statement. This is in confirmation with what other intellectuals (Maikasuwa and Jabo 2011; Birol, Asare-Marfo and Yakhshilikov 2010) found in their studies, in Nigeria and Ghana respectively, that failure to control poultry diseases can severely lower profit or lead to huge loss of capital. Therefore, applying effective biosecurity measures is crucial to successful poultry production, as it decreases the cost of disease treatment and reduces losses.

The study's finding shows a high response rate (58.8 percent) in agreement with the statement ''Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper''. Most respondents, according to the qualitative analysis, agree with this statement. This confirms what other scholars (Woolverton and Frimpong 2013; Kwadzo *et al*. 2013; Banson *et al.* 2015; Avevor 2016) found in their research conducted in Ghana that the expensive nature of local chicken products is not only a challenge to consumers but also a recipe for the demise of the domestic poultry industry.

6.3.3 Ghana's Poultry sector policies

Regarding the RQ3 ''How are government policies being implemented to enhance competitiveness of the poultry industry?'' the study's findings showed a high response rate (93.4 percent) in disagreement with the statement ''government has flexible and friendly policies for the poultry sector''. This statement, according to the qualitative analysis, was vehemently disagreed by the respondents. This finding confirms what other researchers (Kusi *et al*. 2015: 484) discovered in their studies in Ghana that the GoG has unfavourable policies for the local poultry industry.

The findings from the study revealed a high response rate (71.0 percent) in disagreement with the statement ''Do you receive any support from the government in the form of financial subsidies''. This finding confirms what other scholars (Kusi, Agbeblewu, Anim and Nyarko 2015a: 482; Kato and Greeley 2016; Norman *et al.* 2016) discovered in their studies done in Ghana, Tanzania and Ghana respectively that the GoG is not assisting poultry farmers in terms of financial subsidies and thereby crippling the industry.

The study's finding showed a high response rate (67.7 percent) in disagreement with the statement ''Do you receive any support from the government in the form of loan facilitation''. This finding confirms what other scholars (Mwirigi, Gakure and Oteino 2019) found in their research conducted in Kenya that farmers are unable to provide

collateral which is the banks requirement for loan acquisition and consequently denied loans.

The study's findings showed a high response rate (61.3 percent) in disagreement with the statement ''government has put effective policies in place to ban the importation of cheap, frozen chicken products''. This finding substantiates what other researchers (Wooverton and Frimpong 2013; Alhassan *et al.* 2014; Ayisi and Adu 2016) established in their studies in Ghana that government policies that seek to ban chicken imports remain on paper due to GoGs perceived apathetic role towards the local poultry industry.

However, approximately half of the respondents according to the qualitative analysis, are of the view that implementation of a ban should not, in the interim, be encouraged until local production has improved, otherwise it may encourage smuggling of chicken products from the neighbouring countries as found in The Poultry Site (2016).

The findings from the current study showed a high response rate (66.1 percent) in agreement with the statement ''Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse. Most respondents, according to the qualitative analysis, agree with this statement. This finding agrees with what other scholars (Gyau 2011; Kusi *et al.* 2015) found in their research in Ghana that government policies in favour of the poultry industry are hardly implemented.

6.3.4 Strategies to improve competitiveness of the poultry industry

In response to the RQ4 ''What strategies could be adopted to expand the poultry sector's competitiveness?'' the findings from the study indicated a high response rate (50.0 percent) in agreement with the statement '' preparing own feed is cheaper than buying from the market''. Similarly, responses from the qualitative analysis

indicate that majority of the respondents agree with this statement. This finding confirms with the studies carried out by researchers (David *et al.* 2013) in South Africa that farmers can reduce cost of production and ensure quality by preparing their own feed.

The findings from the current study showed a high response rate (53.2 percent) in agreement with the statement ‘’farmers can reduce feeding cost by using their own farm manure as fertilizers to produce maize at cheaper cost’’. Most respondents, according to the qualitative analysis, agree with this statement. This finding confirms what other scholars (Agyenim Boateng, Zickermann and Kornahrens 2006; Enujeke 2013) found in their studies, in Ghana and Nigeria respectively, that effective application of poultry manure can increase crop production considerably.

Findings from the study showed a high response rate (85.5 percent) in agreement with the statement ‘’consumers will be more attracted to fresh local chicken products if the price is cheaper’’. Similarly, majority of the respondents from the qualitative analysis agree with this statement. This finding confirms what other academics (Al-Hassan, Larvoe and Adaku 2013; Banson *et al.* 2015) found in their research conducted in Ghana that price is a vital determination of consumers’ purchasing decision.

The study’s findings indicated a high response rate (57.4 percent) in agreement with the statement ‘’Value can be added to local output by processing and packaging’’. This outcome is in confirmation of what other intellectuals (Kwadzo 2013; Wang, Shen, and Gao 2018) found in their studies in Ghana that value addition enhances competition and creates greater success for an organisation.

Findings from the current study revealed a high response (98.4 percent) in agreement with the statement ‘’input subsidy from government can reduce production cost and enhance productivity’’. Equally, most respondents from the

qualitative analysis agree with this statement. This finding confirms what other scholars (Kusi, Agbeblewu, Anim and Nyarko 2015a: 482; Norman *et al.* 2016) discovered in their studies in Ghana that government subsidies serve as incentives to enable farmers boost productivity.

The study's findings showed a high response rate (58.1 percent) in agreement with the statement''. Education could improve disease control and improve poultry production''. This discovery reinforces what other academics (Kusi, Opata, and Tettey-Wayo 2015b: 70) found in their studies in Ghana that farmers' knowledge about bio-security measures, record keeping, as well as basic production techniques can improve productivity and enhance competitiveness.

In a nutshell, the fourth objective, regarding 'proposing strategies that can boost production and improve the poultry industry', is accomplished. The findings reveal that farmers are able to increase production, gain large market share and be more competitive, by employing efficient cost strategies, differentiating local products through value addition, as well as by forming cooperatives.

Moreover, the VC model for poultry competitiveness for SMS poultry producers in Ghana proposes strategies to enhance production and boost the local poultry industry's competitiveness. By embracing the VC model, it is anticipated that farmers would reduce production cost drastically and boost productivity right from the production stage one where quality inputs are sourced at cheaper cost. Then production would increase at the stage two as farmers, through efficient management practices, utilise quality inputs effectively to achieve optimum results. With quality chicken products, processed and packaged at cheaper cost at the final production stage, marketing challenges would be overcome.

6.4 Conclusion

The study's key findings, in relation to the objectives and research questions, were discussed in this chapter. This comprised a discussion on variables, like operations of SMS poultry farmers in enhancing competitiveness of the poultry industry, which accomplished the study objective one. Additionally, challenges that militates against the development of the poultry industry were discussed in relation to objective two. In order to address objective three, government policies on subsidies, banning of imported chicken products as well as lack of policy implementation on the part of GoG were considered. To accomplish objective four, strategies have been proposed to boost production and enhance competitiveness of the industry.

Moreover, a conceptual framework that evolved from the theories in chapter two, proposes a model captioned ''A VC model for poultry competitiveness for SMS poultry producers in Ghana'' has been included. The opinion of the researcher is that the model, when adopted, would decrease the high production cost, optimise productivity and enhance the domestic poultry industry's competitiveness.

The subsequent chapter highlights the inferences and suppositions from this chapter's discussions, while offering recommendations that emanated from the research findings.

CHAPTER SEVEN
CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

An indication has been made in the previous chapter in relation to the achievement of the set objectives. To accomplish objective four, strategies have been proposed to boost production and boost the competitiveness of the domestic poultry industry. The conceptual framework which evolved from the theories articulated in chapter two, which proposes a model captioned ‘’A VC model for poultry competitiveness for SMS producers in Ghana’’ has been factored in this chapter to create a pathway for the SMS producers to enable them reduce high production cost, maximize productivity and achieve competitiveness.

This chapter also highlights the conclusions drawn from the study objectives as well as the inferences and suppositions from previous chapter’s discussions, while offering recommendations that evolved from the research findings.

7.2 Conclusions with regards to objectives

Conclusions reached on the study findings are presented in this section, with the analyses set out in chapter five for each of the supporting study objectives.

7.2.1 First supporting objective

The purpose of this objective was to examine the operations of Ghana’s SMS poultry farmers in enhancing the domestic poultry industry’s competitiveness. The operations of local farmers are characterised by a low level of education, poor management skills, lack of capital and lack of farmers’ cooperatives. From the study, it has been established that:

Educating farmers with regards to bio-security measures and their efficient application can assist in controlling diseases that devastate farms and cause high

bird mortality. Farmers are unable to find alternative ways of reducing the exorbitant cost of production, such as utilising unconventional feed that are cheap and readily available. Additionally, farmers have not been able to differentiate their products through value addition to attract more consumers and to gain large market share.

Good management skill is a success factor to a profitable poultry business (Baliyan and Marumo 2016: 215). Unfortunately, most farmers are unable to manage their farms well by cutting cost and increasing production. Consequently, they quit the poultry business because they see it as unprofitable.

Furthermore, farmers do not receive adequate assistance from veterinary officers, due to the latter's scant numbers. This has resulted in farmers using their experience, rather than relying on technical knowhow, to improve productivity and be more competitive.

Formation of cooperatives fosters unity among farmers and enhances productivity, while with the cooperatives, farmers can achieve much. They can procure hatcheries to produce quality and less expensive DOCs. Sourcing input at discount prices can also be effected through cooperatives. Farmers' cooperatives can enable them obtain input subsidies, such as tractors, and low interest loans to engage in mass production of feed and benefit from scale economies to enhance poultry production. Through cooperatives, farmers can procure processing plants, as well as a cold depots, where they can process and store their products, respectively.

The seasonality of local poultry production to meet festive occasions, such as Christmas and Easter, is caused by the excessive production cost and a poor market for local products. Most farmers instead grow layers for eggs, which are less competitive compared to raising broilers for meat.

7.2.2 Second supporting objective

This objective examined the challenges that militate against development of the poultry industry in Ghana. Grounded on the discussion in the preceding chapter, it is established that:

Excessive production cost, of which feed forms the bulk, challenges farmers the most. The soaring prices of maize and fishmeal contribute to the high cost of production, with other input costs made up of the cost of DOCs, and drugs and vaccines.

There is a high prevalence of poultry diseases that result from farmers' inability to afford drugs and vaccines or by them ignoring bio-security measures. The issue of poultry diseases is quite critical because it leads to the high mortality of the poultry birds, thereby causing financial losses to farmers.

Poor marketing is a serious challenge confronting the local poultry industry, while high cost of production eventually leads to expensive local chicken products. What has exacerbated the plight of farmers, is the influx of cheap, imported chicken products that threaten the survival of the local industry, as farmers are unable to compete intensely. Consequently, most poultry businesses are folding because they have lost a large market share to the importers.

7.2.3 Third supporting objective

This objective assesses existing government policies that seek to heighten the poultry industry's competitiveness. It was acknowledged that:

Not much has been achieved in terms of local poultry sector policies. The support farmers receive from the government, in terms of financial and input subsidies, is inadequate. Farmers cannot access loans to expand their businesses, as banks require collateral before loans are granted, considering the risky nature of

agribusiness. This means that farmers are unable to increase production due to a low capital base and inadequate support from the government.

The implementation of government policies leaves much to be desired. There is no enforcement of legislation that seeks to reduce taxes on poultry feed and other inputs, which could cut production costs. Tariffs on imported poultry products are insignificant, thus promoting the surge of poultry imports. Additionally, the 40 percent quota importers are to source from local producers before any import permit is issued, has never been implemented.

The local industry is not protected from unfair external competition. From the perspective of farmers, a ban on cheap imported chicken products can be a panacea to the collapse of the local industry. Regarding a ban, however, it was concluded that domestic production will not be enough to satisfy the ever-spiralling demand for poultry products by Ghanaians, which will cause a shortage and hence, an upsurge in the price of chicken, as well as the smuggling of chicken from neighbouring countries. Therefore, a ban on chicken imports should, in the interim, not be encouraged until production has been increased.

7.2.4 Summarised VC model for SMS poultry producers to achieve competitiveness

The VC model for poultry competitiveness proposed in the conceptual framework in chapter 2, has been provided and summarised in this section as a pathway for the poultry producers to cut down high production cost, optimise productivity and be competitive. The various stages: 1, 2, and 3 indicate the summary of activities farmers can perform to achieve competitiveness.

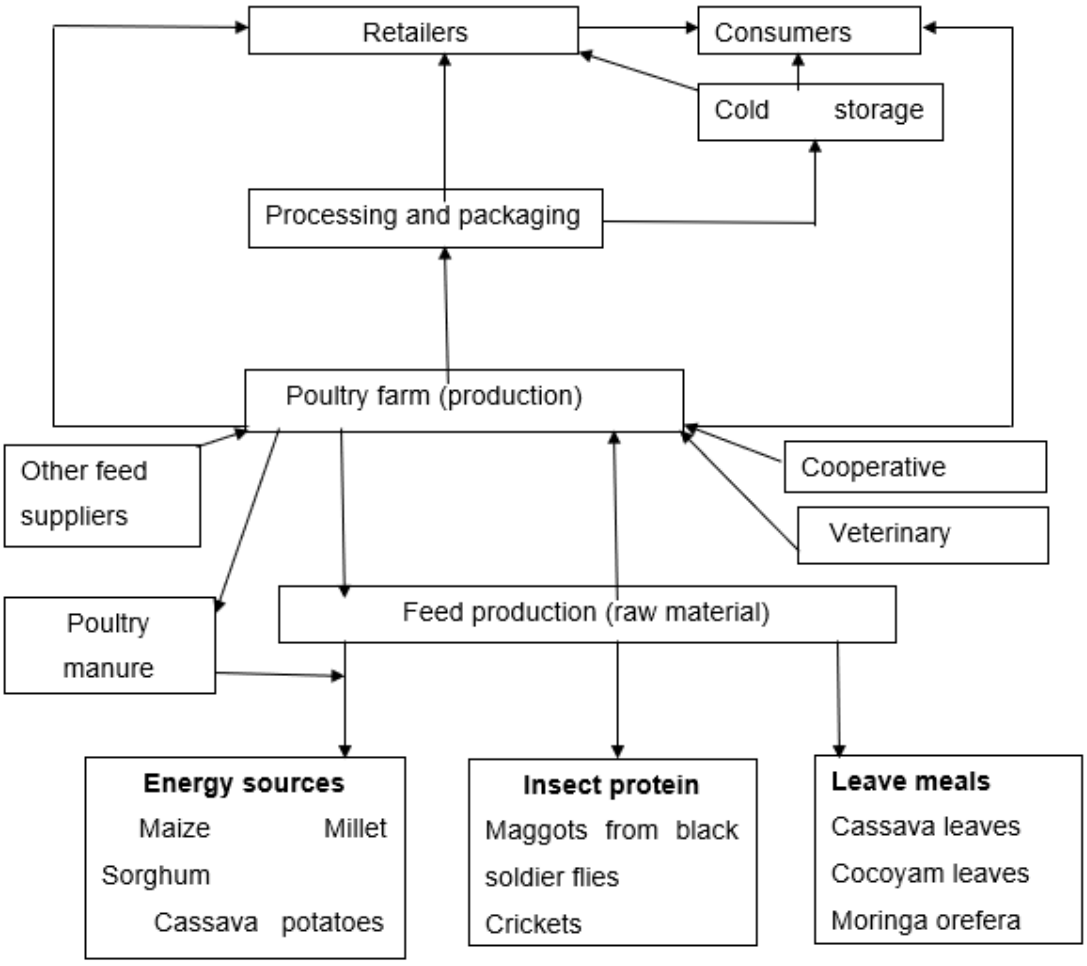

Figure 7.1. A value chain model for poultry competitiveness

(i)Stage 1: **Input supplies.**

Farmers can produce own raw materials such as maize, soybeans, sorghum, millet and cassava at cheaper cost to reduce high production cost. The application of poultry manure, as organic fertilizer, can greatly increase crop yield to boost the production of these crops at cheaper cost.

Moreover, the high cost of protein ingredients such as fish meal and soy meal can be minimized as farmers culture on a large scale insects, particularly crickets, maggots from black soldier fly and termites, as protein and incorporate them in the

poultry feed ration cost effectively. These insect proteins can substitute a greater percentage of fish meal, which is not only highly expensive but sometimes unavailable. In addition, leaf meals from cassava, cocoyam and moringa can complement cassava meal in poultry diet, as well as improving the hue of the meat and making it more attractive to consumers. Another sure way of cutting down cost is through preparation of own feed which is cheaper than buying from the market, while also ensuring that birds are provided with quality feed.

The formation of a farmers' cooperative fosters unity among farmers and enhances productivity. A lot can be achieved through farmers' cooperatives. They can procure hatcheries to produce quality and less expensive DOCs, in addition to which sourcing input at discount prices can be effected through the cooperatives. Input may be purchased in bulk through the cooperatives to reduce transportation cost, and also be discounted. Through cooperatives farmers can integrate backwards into mass production of quality but cheaper feed ingredients such as maize and soybean to feed their flock. Additionally, the 40 percent quota importers are to source from local producers before any import permit is issued, can be effectively implemented if farmers have a cooperative cold depot where their chicken products are stored.

(ii)Stage 2: Production process.

To ensure that the poltry birds are successfully raised from day one up to the point of sale, farmers must perform the following activities: Farmers must provide good housing for brooding and raising of the chicken. Chicks must be bought from good sources and be provided with sufficient amount of heat through the use of charcoal stove heaters to minimize cost, especially when electricity becomes too expensive. The chicken house must be well ventilated and spacious to avoid heat stress and overcrowding respectively. Provide poultry birds with quality feed as well as clean and sufficient water supply to facilitate better growth.

Make routine visits to the poultry house to check the health and growth of the poultry birds as well as to quarantine sick birds and dispose off dead ones. Observe strict bio-security measures such as foot bath which can disinfect foot wears to prevent diseases and mortality. Keenly follow the vaccination regime to prevent diseases such as newcastle and gumboro which can cause serious economic loss. Keep farm records regularly to evaluate growth performance of the poulty birds as well as to assess the expenditure, income and profitability of the business.

(iii) Stage 3: Processing, storage and marketing

In order to gain large market share, value can be added to local chicken products to make it more attractive to consumers. Farmers can procure small scale chicken abattoirs through their cooperatives to process their chicken, package and label them so as to differentiate local products from the imported ones. The processed chicken products must be stored in the cooperative depots or individual's refrigerators where retailers and individual consumers can buy from.

Farmers can reduce the price of local chicken to attract consumers. Selling of live poultry birds at the farm gate can cut down the cost of processing and packaging, transportation, and refrigeration.

By adopting the VC model for poultry competiveness and keenly performing all the activities right from stage 1 to 3, it is perceived that local producers can reduce cost to the barest minimum, optimize production, add value to their products and be competitive in the market flooded with cheap, imported local chicken products.

7.3 Implications of the study

This study has one main proposition: contribution to the poultry industry.

7.3.1 Contribution to the poultry industry

Basically, this research would contribute to the understanding of every stakeholder's role in Ghana's poultry industry, in promoting and sustaining a robust poultry industry through formulation and implementation of pertinent polices. The challenges that confront the poultry industry include the high cost of production, poultry diseases, a poor market, the low level of education of poultry farmers, as well as their poor management skills, and the fierce competition from imports.

The expectation is that this study effectively impacts MoFA, the custodian of the poultry industry, to pressurise the government to effectively formulate and implement policies that would promote the development of the industry. The study revealed the apathetic role played by the GoG has crippled the growth of the industry. It is high time the government took pragmatic measures to revamp the poultry industry and ensures its competitiveness.

One sure way of reorganising and revamping the poultry sector, is to adopt the VC model for poultry competitiveness developed for this study, with an emphasis on increasing production at lower cost to gain economies of scale, and by adding value to local poultry products. This model could be an ideal tool for examining how the poultry industry could provide quality chicken products for consumers cost effectively.

By adopting the VC model poultry producers would be encouraged to grow insects such as black soldier fly maggots and termites on large scale to feed their chicken at cheaper cost, while also using the insect waste as well as poultry manure as fertilizer to boost crop production. Thus, poultry producers could maximize production and gain large market share.

Moreover, the VC model focuses on differentiating local products from imported products through quality, processing and packaging. According to Porter (1980), two

principal strategies of achieving a competitive advantage in an industry and creating value, are low cost and differentiation. Eventually, value addition also creates greater success for an organisation (Van Vliet 2010). Therefore, quality of local chicken products would be assured to meet the demands of consumers satisfactorily.

Additionally, the VC model would serve as a panacea to the woes of local poultry producers regarding the importation of cheap chicken products that not only flood the local market but also cripples the local poultry industry. By increasing production at a cheaper cost and by adding value to local chicken products, consumers would be attracted and patronize these products. Consequently, local poultry producers would keep the foreign competitors at bay and would not necessarily be worried about a ban on chicken imports as there would be a spiralling demand for local chicken products.

The understanding and adopting of this VC model could be a means of achieving competitive edge, through narrowing the current gap in production cost and optimising productivity.

7.4 Limitations

The chief constraint of the current research, is that it is restricted to SMS poultry farmers in Ghana's BA region. Although this region contributes largely to the country's poultry production, contributions from the Ashante and Greater Accra regions cannot be overemphasised.

Additionally, the findings of this study cannot be generalised, as this research needs to be conducted in other regions of Ghana, in order to further substantiate the dependability of the study results, prior to any generalisation being made.

Another significant limitation is the inability of farmers to divulge the necessary information required for the research, due to their low level of education. However,

this setback was overcome with the help of a research assistant, in taking the time to explain every questionnaire to the level of the respondents.

Lastly, the research did not address policy making officials in the MOFA.

7.5 Recommendations of the study

The study, grounded on the results discussed in the preceding chapter, proposes taking the following steps to improve Ghana's poultry industry. The proposition is presented two-fold: for the poultry industry and for further research.

7.5.1 Recommendations for the poultry industry

The poultry industry, with the aim of contributing to the Millennium Goal agenda for food security and sufficiency in supplying cheap protein to consumers, and also creating employment for the resource poor, is not sustainable. The reason behind this is inadequate government support, as well as SMS poultry producers' inability to increase chicken production, mainly due to high overhead costs. Effective and efficient implementation of government policies that seek to promote the industry, coupled with training and educating SMS poultry farmers with regards to ways of improving production, are critical to the survival, development and competitiveness of the industry.

This study proposes the following recommendations, inferred from the findings and the conclusions:

7.5.1.1 Implementation of poultry sector policies

The findings of the research reveal government policies that enhance development and competitiveness of the poultry industry in Ghana are inadequate, as farmers do not feel the impact of these policies in their operations. Subsidies meant to boost local poultry production do not impact the industry's competitiveness. The study

consequently recommends the following measures be taken to rectify this anomaly, that:

The GNAPF be involved in policy formulation and implementation that could impact its members positively.

Government subsidies for farmers should be channelled through the GNAPF to enable farmers easy access.

Agricultural loans should attract low interest rates and must be easily available and accessible by farmers.

Establishing hatcheries for the production of day old chicks (DOCs), as well as processing plants for processing and packaging, in order to add value to local products, will eventually enhance the production and the domestic industry's competitiveness.

Training of more veterinary officers to assist farmers with modern methods of improving production at cheaper cost is imperative. Veterinary officers must train farmers where bio-security measures are concerned, as well as in ways of administering vaccines and medicine to prevent the prevalence of diseases.

There must be regular farmers' workshops and training concerning farm management, so as to equip these farmers with the requisite skills so they may effectively manage their farms. Thus, farmers can efficiently manage poultry waste, enhance chicken production cost effectively and add value to their products. In this respect, the research proposes collaboration between MoFA and veterinary officials on one side and farmers on the other, in ensuring competitiveness of the local industry.

The GoG must take gradual steps to control the influx of imported chicken products while, simultaneously, improving local production to sustain the nation's high demand.

Tariffs on poultry imports that usually find their way into the general revenue, must be channelled to a special fund, with which to improve production and boost the poultry industry's competitiveness.

7.5.1.2 Offsetting production challenges

The study identified the high production cost and marketing as the main challenges confronting the local poultry industry's growth and competitiveness. Consequently, this study recommends prompt and immediate steps:

Farmers must form cooperatives to enable them to engage in large production of raw materials to upscale chicken production.

Establishing hatcheries for the production of DOCs, processing plants for processing and packaging to add value to local products, as well as procuring a cold depot, from where chicken products can be sold to retailers and consumers; these will go far in enhancing production and the marketing of local products.

Chicken manure should be used as organic fertiliser to enhance feed production, as well as a substrate to culture maggots to replace fishmeal whose price has recently soared.

Efforts must be made to augment maize and soybean production through the provision of agricultural subsidies as well as effective utilisation of farm manure to ensure availability and cheaper feed for the poultry industry.

Unconventional but efficient feed from energy and protein sources be used to substitute for highly expensive conventional feed, with prices that have escalated the overhead cost of production.

Local poultry products must be promoted through the media, as this will appeal to consumer conscience to patronise ‘made in Ghana’ products.

7.5.2 Further research

The current study’s aim was to investigate and assess Ghana’s SMS poultry farmer operations, along with challenges faced by these farmers, and to evaluate local poultry policies. The recommendation is that further research be conducted, based upon the research findings, to explore the following research areas/questions:

Additional research at other regions where SMS poultry farmers operate and have the same challenges, only then will the study have a full impact on the local poultry industry as a whole.

Further studies should be conducted on strategies to upscale the production of broilers (birds grown purposely for meat), as well as IC that can be easily reared at a lower cost, in order to meet the ever-spiralling demand for chicken.

More research must be done on unconventional feeds for chicken, to examine their efficacies, as well as their associated limitations. In this way, the cheap, available, unconventional feeds can help reduce cost and enhance productivity.

Organic poultry farming should be encouraged in Ghana as a way of reducing production cost and also producing healthy chickens that are grown humanely in their natural environment.

Contract farming should be considered in Ghana, as practiced in countries such as the USA, EU member states and SA. SMS poultry farmers would, in this manner, be encouraged to engage in continual poultry production and also be relieved of the high cost of production.

Stringent measures must be taken to ensure implementation of government policies. For instance, the 40 percent quota importers are to source from local producers before an import permit is issued, will encourage local producers to increase production with the assurance of a ready market.

7.6 Conclusion

The current study accomplished the main aim and primary objectives emanating from the RQs to be addressed. A theoretical foundation for crafting competitive strategies to improve Ghana's local poultry industry and make it competitive was established. A poultry VC model captioned ''A VC model for poultry competitiveness SMS poultry producers in Ghana'' was developed as a pathway for local producers to minimize the exorbitant production cost and boost productivity. The limitations of this study has been stated, as well as the recommendations for future research.

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APPENDICES

APPENDIX A1: Introductory Letter

Faculty of Management Sciences
Department of Entrepreneurial Studies and Management

Date: 18 August 2017

Introductory Letter

Dear Participant

I am a PhD candidate of the Department of Entrepreneurial Studies and Management of the Durban University of Technology, completing my studies with research, titled “An investigation of strategies to increase competitiveness of the poultry industry in the Brong Ahafo region of Ghana’’

I would like to include you in my research study. The objective of the study is to explore strategies to improve competitiveness of the poultry industry in Ghana. I then ask your consent to be part of the study.

I moreover wish to guarantee your anonymity and the confidentiality of any information solicited from you through interview, questionnaire or by any other method. Rest assured that all information collected through interviews and/or by any other method, will be used only for the purpose of this research and will be destroyed afterward.

Thank you for your time and cooperation.

Sincerely

_____
Isaac Yeboah
Research candidate
Cell: +27 734195700
E-mail: yeboahizak@yahoo.com

_____
Dr Baruti B Amisi (PhD)
Supervisor
Cell: 0836838297
baruti.amisi@gmail.com

APPENDIX A2: Letter of Information

LETTER OF INFORMATION

Title of the research study: "*An investigation of strategies to improve competiveness of the poultry industry in the Brong Ahafo region of Ghana"*.

Principal investigator/researcher: Isaac Yeboah [MBA – General. Regent Business School; BA Degree].

Supervisor: Dr Baruti B Amisi (PhD)

Brief Introduction and Purpose of the study: The poultry industry in Ghana was a force to reckon within the 1970 and 1980's, in terms of meat production, employment creation and income generation. The sector received the full support of the government, as new, state-owned poultry farms and hatcheries were established to boost poultry production. The industry now faces a huge challenge, with the influx of cheap, frozen chicken from the USA and the EU. The two, main, national poultry farms in Pomadze and Afariwaa Farms, as well as many privately owned farms, have closed down, due to fierce competition by importers of frozen chicken products and a lack of government support. Consequently, many people have lost their jobs due to the closure of these farms. Most of the research done on the poultry industry in Ghana has, thus far, concentrated on production cost, marketing, profitability, prospects and challenges of the sector. However, less attention, if any, has been devoted to strategies that may increase competitiveness of the poultry industry and discourage the importation of frozen chicken which is collapsing the sector. This

research fills that gap, by way of exploring the strategies required to revamp and increase the competitiveness of the Ghana poultry industry.

Outline of the procedures: Data will be collected from the officers from the Ministry of Food and Agriculture (MOFA) and the veterinary service, GNAPF, and poultry product consumers. A non-probability sampling method will be used to sample 100 respondents from the above-mentioned groups. A semi-structured, open-ended interview questionnaire will be used to tap the specialised knowledge of the experts in the field, so as to obtain the salient information required for the research. Data collected will be analysed using the statistical package of social sciences (SPSS) version 23, with the assistance of a statistician.

Risks or Discomfort to the Participant: It is the desire of the researcher to ensure the comfort of all participants and as a result, it is not envisaged or intended to create any risk or discomfort whatsoever, to respondents in their participation in the research. Therefore, the researcher will not be liable for any form of injury during and or after the study.

Benefits: The researcher anticipates that respondents, mostly being poultry farmers, as well as officers from MoFA and veterinary services, will gain more insight into strategies to improve the poultry industry in Ghana. In addition, the outcome will challenge all stakeholders in the poultry industry to pool their efforts in revitalising the sector and enhance its competitiveness. It is further envisaged that more farmers will be motivated by the outcome of this research, to go into poultry production. The outcome will, finally, serve as a conference paper and reference material for future research.

Reason(s) for withdrawal from the study: Participation in this research is voluntary and thus participants may opt out at any stage of the study, without any legal implications or any consequences whatsoever. The researcher will ensure that the rights of participants are respected to the letter. However, participants may withdraw

their participation on grounds of illness, personal reasons, coercion, insecurity or any similar reasons.

Remuneration: Participants may not receive any financial benefits from participation. However, copies of the findings may be given to organised bodies, such as MOFA, the veterinary services and GNAPF, for reference purposes.

Costs of the study: Participants will not be asked to bear any cost throughout the study. It is the responsibility of the researcher to take charge of all expenses relating to the study.

Confidentiality: The names of all participants will remain anonymous. Any information of any form, given in support of the study, will solely be used for research purposes.

Persons to contact in the event of any problems or queries: Please contact the researcher, Isaac Yeboah (+27 734195700; yeboahizak@yahoo.com) or my supervisor, Dr. Baruti B. Amisi (0836838297; baruti.amisi@gmail.com) or the institution on 0313732900

General: Participation is voluntary. Participants will be sampled from GNAPF in Brong Ahafo region, officers from the MoFA and the veterinary services, and poultry product consumers.

Thank you
Isaac Yeboah
Student Number: 21452751
Tel: +27734195700

APPENDIX A3: Questionnaire- Small and Medium-scale poultry farmers

Faculty of Management Sciences

Department of Entrepreneurial Studies and Management

QUESTIONNAIRE 1

SMALL AND MEDIUM-SCALE (SMS) POULTRY FARMERS

Preamble: This research focuses on "An investigation of strategies to improve competiveness of the poultry industry in the Brong Ahafo region of Ghana''.

The researcher wishes to investigate whether Government policies and strategies of the small and medium scale (SMS) poultry farmers are effectively applied to promote the competitiveness of the poultry sector Ghana.

I would be very much appreciative if you could assist me answer the attached questionnaire. Your anonymity and the confidentiality of the information provided is assured. The information will be used for the purpose of this research only.

Part A

This questionnaire is designed for small and medium scale farmers from Ghana National Association of Poultry Farmers (GNAPF) in the BrongAhafo region.

The title of the research is **"***An investigation of strategies to improve competiveness of the poultry industry in the BrongAhafo region of Ghana''*.

All the information provided here will be treated in the strictest confidence and will only be used for research purposes.

Thank you.

Section I: Basic information

Please kindly tick or state accordingly.

1. Name of farmer…….

2. Farm location/village……

3. Farm capacity (number of birds)……

4. Age: 15-20 years □, 21-30 years □, 31-40 years □, 41-50 years □, 50+ years □

5. Educational background: Degree □, Diploma □, High School □, Non-formal □, Other (s): state …….

6. Number of years in poultry production: Less than 2 years □, 2-4 years □, 5-7 years □, 8-10 years □, 10+ years □

Section ii. Please indicate a tick (√) against each of the statements/questions under each of the following options: ''1:SA = Strongly Agree'', ''2:A = Agree'', ''3: U = Uncertain'', ''4:D = Disagree'' and ''5:SD = Strongly Disagree''.

Statements/Questions	**SA**	**A**	**U**	**D**	**SD**
	1	**2**	**3**	**4**	**5**
Challenges facing the poultry production					
1. Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo.	1	2	3	4	5
2. High cost of local poultry production impedes competitiveness.	1	2	3	4	5
3. Farmers are quitting the poultry industry because it is not profitable anymore.	1	2	3	4	5
4. High cost of input is a factor to production	1	2	3	4	5
5. The poultry sector is devastated by poor disease control.	1	2	3	4	5
Poultry sector policies in Ghana					

6. Government has flexible and friendly policies for the poultry sector.	1	2	3	4	5
7. Do you receive any support from the government in terms of:					
	1	2	3	4	5
i. Financial subsidies	1	2	3	4	5
ii. input subsidies iii. Loan facilitation	1	2	3	4	5
8. The role of government in enhancing competitiveness of the poultry industry is inadequate.	1	2	3	4	5
9. Government has put effective policies in place to ban the importation of cheap, frozen chicken products.	1	2	3	4	5
10. Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse.	1	2	3	4	5
Strategies to improving competitiveness of the Ghanaian poultry industry					
11. Preparing own feed is cheaper than buying from the market.	1	2	3	4	5
12. Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost.	1	2	3	4	5
13. Input subsidy from government can reduce production cost and enhance productivity.	1	2	3	4	5
14. The high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries.	1	2	3	4	5

15. Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper.	1	2	3	4	4
16. Stakeholders input into poultry policies could improve the competitiveness of the poultry industry.	1	2	3	4	5
17 Value can be added to local output by processing and packaging.	1	2	3	4	5
18. Education could improve disease control and improve poultry production	1	2	3	4	5

Part B:

Interviews with open-ended questions

Please provide answers to the following statements in the spaces provided below. You may attach a new sheet if the space provided is not enough.

19. What other challenges face the poultry industry in Brong Ahafo region?

……

……

……

20. How do the challenges stated in question (19) above affect the competitiveness of the poultry industry?

……

……

……

21. In your opinion, what is the level of government support to the poultry industry?

……

……

……

22. What is the impact of the government policies and support on the poultry industry?

……

……

……

23. What, in your opinion, could be done to improve the competitiveness of the poultry industry?

……

……

APPENDIX A4: Questionnaire- Consumers of poultry products

Faculty of Management Sciences

Department of Entrepreneurial Studies and Management

QUESTIONNAIRE 2

Designed for consumers

Preamble: This research focuses on "An investigation of strategies to improve competiveness of the poultry industry in the Brong Ahafo region of Ghana''.

The researcher wishes to investigate whether Government policies and strategies of the small and medium scale (SMS) poultry farmers are effectively applied to promote the competitiveness of the poultry sector Ghana.

I would be very much appreciative if you could assist me answer the attached questionnaire. Your anonymity and the confidentiality of the information provided is assured. The information will be used for the purpose of this research only.

Part A

Basic consumer information

Please kindly tick or state accordingly

1. Name of consumer……

2. Age 15-20 years □, 21-30 years □, 31-40 years □, 41-50 years □, 51 years and above □,

3. Family size: 0 - 2 □, 3 – 5 □, 6+ □

4. Number of times you consume chicken in a week. Once □, Twice □, Trice □, Four times □, More than five times □

Part B

Below are questions to guide strategies to improving the competitiveness of the poultry industry.

You are kindly requested to read each statement carefully. Please, indicate a tick (√) against each of the statements/questions under each of the following options: ‘’1:SA = Strongly Agree’’, ‘’2: A = Agree’’, ‘’3: U = Uncertain’’, ‘’4: D = Disagree’’ and ‘’5: SD = Strongly Disagree’’.

Statements/Questions	**SA**	**A**	**U**	**D**	**SD**
	1	2	3	4	5
1. Imported chicken products is preferred to the local one.	1	2	3	4	5
2. Imported chicken is relatively cheaper, compared to local chicken.	1	2	3	4	5
3. Consumers prefer imported chicken because it is always available on the market.	1	2	3	4	5
4. The imported chicken taste better than the local one.	1	2	3	4	5
5. Consumers will shift from imported chicken to local chicken if the price is relatively cheaper.	1	2	3	4	5
6. Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook).	1	2	3	4	5

Part C

Interviews with open-ended questions

Please provide answers to the following statements in the spaces provided below. You may attach a new sheet if the space provided is not enough.

1. Any other reason why you prefer imported chicken products to the local one

……

……

……

2. What you think could be done by the local poultry producers to make the product appealing to consumers

……

……

……

3. What do you think could be done to by the local poultry producers to make the product appealing to consumers?

……

……

……

4. What is your view about the banning of imported chicken products?

……

……

……

APPENDIX A5: Questionnaire- MoFA and veterinary officers

Faculty of Management Sciences

Department of Entrepreneurial Studies and Management

QUESTIONNAIRE 3

Designed for MoFA and veterinary officers

Preamble: This research focuses on "An investigation of strategies to improve competiveness of the poultry industry in the Brong Ahafo region of Ghana''.

The researcher wishes to investigate whether Government policies and strategies of the SMS poultry farmers are effectively applied to promote the competitiveness of the poultry sector Ghana.

I would be very much appreciative if you could assist me answer the attached questionnaire. Your anonymity and the confidentiality of the information provided is assured. The information will be used for the purpose of this research only. No other use will be made of the data gathered without your expressed opinion.

Please can you answer the following questions? Where the space provided is not sufficient you may add an additional paper.

1. List five main challenges confronting the poultry industry in Ghana.

i……

……

…….

ii……
……
……
iii……
……
……
iv……
……
……
v……
……
……

2. How do the above challenges militate against the competitiveness of the local poultry industry?

……
……
……

3. What are some of the government policies put in place to ensure competitiveness of the poultry industry?

……
……
……

4. Do you think these policies are well implemented to promote the growth of the poultry industry? Give a reason for your answer.

……
……
……

5. How can the above stated shortcomings be addressed?

……

……

……

6. Will a ban on importation of cheap, frozen chicken products improve the competitiveness of the poultry sector? Give a reason for your answer.

……

……

……

7. What opportunities are there for the poultry farmers to exploit to reduce cost and boost production?

……

……

……

8. Can government subsidy be a strategy to increasing the competitiveness of the industry? Explain.

……

……

……

9. Do you think the local poultry industry can be competitive considering the high level of importation of cheap, frozen chicken? Give a reason for your answer.

……

……

……

10. In your opinion, what steps must be taken by government, as well as poultry farmers, to make the local poultry products attractive to consumers?

……

……

……

APPENDIX A6: Proposal Approval Letter

23 October 2017

Reference: Proposal Approval: Mr. I Yeboah

Student number: 21452751

Dear Mr. I Yeboah

PhD IN MANAGEMENT SCIENCES (BUSINESS ADMINISTRATION)

This serves to confirm the approval of your research proposal by the Faculty Research Committee, at its meeting on **21st September 2017**, as follows:

1. Research proposal and provisional dissertation title:

   An investigation of strategies to improve the competitiveness of the poultry industry in the Brong Ahafo region of Ghana.

   Supervisor: Dr. B. Amisi

   Co-supervisor: N/A

   Please note that any proposed changes in the thesis/dissertation title require the approval of your supervisor/s, the Faculty Research Committee, as well as ratification thereof by the Higher Degrees Committee.

2. Research budget to the amount of **R15 000.00**

   Please note that this funding is not a scholarship or bursary and is therefore not paid directly to you, but is controlled by the Faculty. Any proposed changes to the use of this funding allocation requires the approval of your supervisor and the Dean. Please note that funding will be re-imbursed to you after the provision of receipts.

The Institutional Research Committee has stipulated that:

(a) This University retains the ownership of any Intellectual Property (patent, design, etc.) registered in respect of the results of your Masters/Doctors Degree in Technology studies as a result of the award and the provisions of the above Act;
(b) Should you find any of the terms above not acceptable then you are given the option to decline the Research budget award to your project in writing.

May we remind you that in terms of Rule G25(2)(b), if you fail to obtain the Masters/Doctors degree within the maximum time period allowed after first registering for the qualification, Senate may refuse to renew your registration or may impose any conditions it deems fit. You may apply to the Faculty Research Committee for an extension.

Please note that you are required to convert your registration from the informal to the formal course and re-register each year.

Please note that the following must be adhered to:

Registration:

1. ensure formal registration has taken place
2. ensure that application for conferment of status has been made in the event of your undergraduate qualification being different to this application
3. ensure that your supervisor has submitted your proposal to the Faculty Research Officer (FRO) for IREC clearance (institutional research ethics committee). This is in the case of Ethics level 2 IREC and level 3 IREC (in the case of a study dealing with vulnerable populations). See guideline attached.

Dissertation submission for examination :

1. ensure that you submit the intention to submit form (PG 5), signed by the HOD and Supervisor
2. ensure that the signed checklist is submitted with the **PG 5**
3. once your dissertation is submitted to the supervisor for examination purposes, communication from here on will only be with you supervisor and not with the faculty.
4. Your supervisor MUST nominate the examiners three months prior to submission of the dissertation/thesis for examination.
5. on submission for examination, please note that three ring bound signed copies must be submitted to your supervisor along with the completed and signed **PG 7** form and **Turn it in report**.
6. feedback will be provided to your supervisor regarding the examination result after the result is ratified by the Higher Degrees Committee (HDC).
7. in the event of a resubmission the reports will be submitted to the supervisor who will communicate with you for revision. Once revision has taken place your supervisor will submit to the FRO for resubmission to the examiners.
8. In the case where there is a discrepancy in examiners results, an Arbiter will be nominated via the HOD and supervisor and tabled at FRC and ratified at HDC. On completion of this process, the Arbiters report will be tabled at FRC and ratified at HDC.
9. Results of the Arbitration process will be communicated to your supervisor

Graduation requirements:

1. Ensure that you submit a completed signed PG10 form
2. one hard bound dissertation/thesis with a pdf version on CD
3. response to post graduate examination form

4. completion of study form (IREC form)

Should you experience any problems relating to your research, your supervisor must be informed of the matter as soon as possible. If the difficulties persist, you should then approach your Head of Department and thereafter the Faculty Research Coordinator.

Please refer to the 2017 General Rule Book and the Postgraduate Students' Guide 2017 concerning the rules relating to postgraduate studies, which include *inter alia* acceptable minimum and maximum timeframes, submission of thesis/dissertations, etc. Please do not hesitate to contact this office for any assistance. We wish you success in your studies.

Kind regards,

Prof R Balkaran

FRC Chairperson: Faculty of Management Sciences

Cc Supervisor: Dr. B. Amisi

Co-supervisor: N/A

APPENDIX A7: Gatekeepers' Letter

MINISTRY OF FOOD & AGRICULTURE

In case of reply the Number and the date of this letter Should be quoted

FAX: 03250– 27473
TEL:03520 – 27270
Our Ref. No: MOFA/RAD/BA/
Your Ref No:

REPUBLIC OF GHANA

OFFICE OF THE BRONG AHAFO
REGIONAL AGRIC. DIRECTORATE
P.O. BOX 86
SUNYANI.

11th January, 2016.

DR. IRT. BARUTI B. AMISI
P.O.BOX 63074 BISHOPS GATE 4008
DURBAN, KWAZULU-NATAL-REP. OF SOUTH AFRICA

LETTER OF ACKNOWLEDGEMENT

This is to acknowledge receipt of your letter requesting permission on respect of Mr. Yeboah Isaac to conduct his research titled **"An Evaluation of Strategies to improve the competitiveness of the poultry industry in the Brong Ahafo Region of Ghana".**

Mr. Yeboah reported to the Regional office of the Ministry of Food and Agriculture in December 2015 to hold discussions with the Regional Director on his research work.

He has been granted permission and access to poultry district in the region.

Mr. Yeboah will be provided with the necessary assistance to enable him carry out his research work.

We do hope his conclusions and recommendation will help in improving the competitiveness of the industry in Ghana.

Thank you.

REGIONAL DIRECTOR OF AGRIC.
(DR. C. T. QUIST)

APPENDIX B1: Frequency and Correlation Tables for Farmers

Reliability Statistics

Cronbach's Alpha	N of Items
0.745	4

Reliability Statistics

Cronbach's Alpha	N of Items
0750	6

Reliability Statistics

Cronbach's Alpha	N of Items
0.853	5

Frequencies

Farm capacity (number of birds)

		Frequency	Percent	Valid Percent
Valid	400	1	1.6	1.6
	500	1	1.6	1.6
	600	4	6.5	6.5
	650	1	1.6	1.6
	700	2	3.2	3.2
	750	1	1.6	1.6
	800	2	3.2	3.2
	854	1	1.6	1.6

1000	10	16.1	16.1
1200	1	1.6	1.6
1500	2	3.2	3.2
2000	9	14.5	14.5
2500	2	3.2	3.2
3000	7	11.3	11.3
3500	3	4.8	4.8
4000	4	6.5	6.5
5000	2	3.2	3.2
6000	2	3.2	3.2
8000	4	6.5	6.5
10000	2	3.2	3.2
12000	1	1.6	1.6
Total	62	100.0	100.0

Number of years in poultry production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 2	4	6.5	6.5	6.5
	2 - 4	13	21.0	21.0	27.4
	5 - 7	14	22.6	22.6	50.0
	8 - 10	13	21.0	21.0	71.0
	> 10	18	29.0	29.0	100.0
	Total	62	100.0	100.0	

heap, frozen chicken products is a serious threat to the local poultry productio

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	41	66.1	66.1	66.1
	Agree	19	30.6	30.6	96.8
	Uncertain	2	3.2	3.2	100.0
	Total	62	100.0	100.0	

High cost of local poultry production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	13	21.0	21.3	21.3
	Agree	46	74.2	75.4	96.7
	Uncertain	2	3.2	3.3	100.0
	Total	61	98.4	100.0	
Missing	System	1	1.6		
Total		62	100.0		

Farmers are quitting the poultry industry because it is not profitable anymore

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	4	6.5	6.5	6.5
	Agree	12	19.4	19.4	25.8
	Uncertain	1	1.6	1.6	27.4
	Disagree	15	24.2	24.2	51.6
	Strongly Disagree	30	48.4	48.4	100.0
	Total	62	100.0	100.0	

High cost of input is a factor to production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	19	30.6	31.1	31.1
	Agree	37	59.7	60.7	91.8
	Uncertain	1	1.6	1.6	93.4
	Disagree	2	3.2	3.3	96.7
	Strongly Disagree	2	3.2	3.3	100.0
	Total	61	98.4	100.0	
Missing	System	1	1.6		
Total		62	100.0		

The poultry sector is devastated by poor disease control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	4	6.5	6.5	6.5
	Agree	10	16.1	16.1	22.6
	Uncertain	7	11.3	11.3	33.9
	Disagree	31	50.0	50.0	83.9
	Strongly Disagree	10	16.1	16.1	100.0
	Total	62	100.0	100.0	

Government has flexible and friendly policies for the poultry sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	1	1.6	1.6	1.6
	Uncertain	3	4.8	4.9	6.6
	Disagree	29	46.8	47.5	54.1
	Strongly Disagree	28	45.2	45.9	100.0
	Total	61	98.4	100.0	
Missing	System	1	1.6		
Total		62	100.0		

Financial subsidies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	3.2	3.2	3.2
	Uncertain	3	4.8	4.8	8.1
	Disagree	44	71.0	71.0	79.0
	Strongly Disagree	13	21.0	21.0	100.0
	Total	62	100.0	100.0	

Input subsidies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	3	4.8	4.8	4.8
	Uncertain	1	1.6	1.6	6.5
	Disagree	44	71.0	71.0	77.4
	Strongly Disagree	14	22.6	22.6	100.0
	Total	62	100.0	100.0	

Loan facilitation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	3	4.8	4.8	4.8
	Uncertain	1	1.6	1.6	6.5
	Disagree	42	67.7	67.7	74.2
	Strongly Disagree	16	25.8	25.8	100.0
	Total	62	100.0	100.0	

ole of government in enhancing competitiveness of the poultry industry is inade

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	19	30.6	30.6	30.6
	Agree	31	50.0	50.0	80.6
	Uncertain	1	1.6	1.6	82.3
	Disagree	4	6.5	6.5	88.7
	Strongly Disagree	7	11.3	11.3	100.0
	Total	62	100.0	100.0	

has put effective policies in place to ban the importation of cheap, frozen chic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	4.8	4.8	4.8
	Agree	7	11.3	11.3	16.1
	Uncertain	2	3.2	3.2	19.4
	Disagree	12	19.4	19.4	38.7
	Strongly Disagree	38	61.3	61.3	100.0
	Total	62	100.0	100.0	

t towards the implementation of policies in favour of the poultry industry is a re

		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	10	16.1	16.1	16.1
	Agree	31	50.0	50.0	66.1
	Uncertain	10	16.1	16.1	82.3
	Disagree	7	11.3	11.3	93.5
	Strongly Disagree	4	6.5	6.5	100.0
	Total	62	100.0	100.0	

Preparing own feed is cheaper than buying from the market

		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	31	50.0	50.0	50.0
	Agree	30	48.4	48.4	98.4
	Uncertain	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

uce feeding cost by using their own farm manure as fertilisers to produce maiz

		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	33	53.2	53.2	53.2
	Agree	29	46.8	46.8	100.0
	Total	62	100.0	100.0	

ut subsidy from government can reduce production cost and enhance product

		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	28	45.2	45.2	45.2
	Agree	33	53.2	53.2	98.4
	Disagree	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

old chicks can be reduced if farmers have access to their own or cooperative i

		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	27	43.5	43.5	43.5
	Agree	35	56.5	56.5	100.0
	Total	62	100.0	100.0	

rs will be more attracted to fresh local chicken products if the price is relative

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	29	46.8	46.8	46.8
	Agree	33	53.2	53.2	100.0
	Total	62	100.0	100.0	

nto poultry policies could improve the competitiveness of the poultry industry i

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	21	33.9	33.9	33.9
	Agree	32	51.6	51.6	85.5
	Uncertain	7	11.3	11.3	96.8
	Disagree	2	3.2	3.2	100.0
	Total	62	100.0	100.0	

Value can be added to local output by processing and packaging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	25	40.3	41.0	41.0
	Agree	35	56.5	57.4	98.4
	Uncertain	1	1.6	1.6	100.0
	Total	61	98.4	100.0	
Missing	System	1	1.6		
Total		62	100.0		

Education could improve disease control and improve poultry production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	26	41.9	41.9	41.9
	Agree	36	58.1	58.1	100.0
	Total	62	100.0	100.0	

:hallenges stated in question (19) above affect the competitiveness of the poul					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		3	4.8	4.8	4.8
	Ban will increase local	1	1.6	1.6	6.5
	Chicken imports affects	1	1.6	1.6	8.1
	Climatic change affect	1	1.6	1.6	9.7
	Collapse of local indus	2	3.2	3.2	12.9
	Difficulty in identifying d	1	1.6	1.6	14.5
	Difficulty of acquiring lo	1	1.6	1.6	16.1
	Disease outbreak incre	1	1.6	1.6	17.7
	Diseases affect produc	1	1.6	1.6	19.4
	Diseases are threat to	1	1.6	1.6	21.0
	Farmers receive no vet	1	1.6	1.6	22.6
	Feeding and medicine	1	1.6	1.6	24.2
	High bird mortality	3	4.8	4.8	29.0
	High bird mortality;low	1	1.6	1.6	30.6
	High cost feed and dru	1	1.6	1.6	32.3
	High cost of feed affect	1	1.6	1.6	33.9
	high cost of production	1	1.6	1.6	35.5
	High cost of production	6	9.7	9.7	45.2
	High cost of production	1	1.6	1.6	46.8
	High cost of production	1	1.6	1.6	48.4
	High cost of production	1	1.6	1.6	50.0
	High cost of production	1	1.6	1.6	51.6
	high mortality rate of bi	1	1.6	1.6	53.2
	High production cost bu	1	1.6	1.6	54.8
	Inability to buy feed and	1	1.6	1.6	56.5
	inability to buy more DC	1	1.6	1.6	58.1
	inability to expand busi	1	1.6	1.6	59.7
	inability to increase pro	3	4.8	4.8	64.5
	Inability to increase pro	2	3.2	3.2	67.7
	inability to increase pro	1	1.6	1.6	69.4
	inadequate veterinary s	1	1.6	1.6	71.0
	Increase cost of produ	1	1.6	1.6	72.6
	Influx of imported chick	1	1.6	1.6	74.2
	Lack of technical know-	1	1.6	1.6	75.8
	Lack of veterinary servi	1	1.6	1.6	77.4
	Low demand for local p	1	1.6	1.6	79.0
	Low output	1	1.6	1.6	80.6
	Low patronage of local	1	1.6	1.6	82.3
	low price for local birds	1	1.6	1.6	83.9
	Low production	2	3.2	3.2	87.1
	Low production;local pr	1	1.6	1.6	88.7
	Low production;low pro	1	1.6	1.6	90.3
	Low productivity;less pr	1	1.6	1.6	91.9
	Low profit	1	1.6	1.6	93.5
	Poor disease control w	1	1.6	1.6	95.2
	poultry business now u	1	1.6	1.6	96.8
	Promoting imported pro	1	1.6	1.6	98.4
	unable to expand busi	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

In your opinion, what is the level of government support to the poultry industry?					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		6	9.7	9.7	9.7
	No adequate support	1	1.6	1.6	11.3
	No government suppo	1	1.6	1.6	12.9
	Currently none	1	1.6	1.6	14.5
	Difficulty in identifying d	1	1.6	1.6	16.1
	Educating farmers	3	4.8	4.8	21.0
	imput subsidy	1	1.6	1.6	22.6
	inadequate loan suppo	1	1.6	1.6	24.2
	Lack of government su	1	1.6	1.6	25.8
	Loan facilitation	1	1.6	1.6	27.4
	Low support from the g	1	1.6	1.6	29.0
	Making policies for the	1	1.6	1.6	30.6
	Nil	1	1.6	1.6	32.3
	No clear support;inade	1	1.6	1.6	33.9
	No definite governmen	1	1.6	1.6	35.5
	No government subsid	2	3.2	3.2	38.7
	No government suppor	8	12.9	12.9	51.6
	No real support	1	1.6	1.6	53.2
	No support	5	8.1	8.1	61.3
	Nothing	19	30.6	30.6	91.9
	Only making policies	1	1.6	1.6	93.5
	provision of veterinary c	1	1.6	1.6	95.2
	Train more veterinary o	1	1.6	1.6	96.8
	Veterinary support	1	1.6	1.6	98.4
	Youth in agriculture to p	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

hat is the impact of the government policies and support on the poultry industr					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		14	22.6	22.6	22.6
	Imput subsidy and loa	1	1.6	1.6	24.2
	Low productivity	1	1.6	1.6	25.8
	Ban on imported chicke	1	1.6	1.6	27.4
	Facilitation of loans	1	1.6	1.6	29.0
	Farmers learn from imp	1	1.6	1.6	30.6
	government negligent f	1	1.6	1.6	32.3
	government support ca	1	1.6	1.6	33.9
	Government support w	1	1.6	1.6	35.5
	Improving production	1	1.6	1.6	37.1
	Lack of implementatior	1	1.6	1.6	38.7
	Lack of policy impleme	1	1.6	1.6	40.3
	Loan facilitation;low int	1	1.6	1.6	41.9
	Loan facilitation;low tax	1	1.6	1.6	43.5
	Low productivity	1	1.6	1.6	45.2
	Nil	1	1.6	1.6	46.8
	No effective policies	1	1.6	1.6	48.4
	No government suppor	3	4.8	4.8	53.2
	No impact	16	25.8	25.8	79.0
	No implementation of g	1	1.6	1.6	80.6
	No more bank loans	1	1.6	1.6	82.3
	No policy and support	1	1.6	1.6	83.9
	No policy implementati	5	8.1	8.1	91.9
	partially subsidising far	1	1.6	1.6	93.5
	Policies not implement	1	1.6	1.6	95.2
	Poor policy implementa	1	1.6	1.6	96.8
	Subsidy removed	1	1.6	1.6	98.4
	Veterinary farm visits w	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

n your opinion, could be done to improve the competitiveness of the poultry inc					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		2	3.2	3.2	3.2
	Access to own hatcheri	1	1.6	1.6	4.8
	Adding value through p	1	1.6	1.6	6.5
	Adding value to local pr	1	1.6	1.6	8.1
	Adding value to local pr	1	1.6	1.6	9.7
	Ban chicken imports	1	1.6	1.6	11.3
	Ban chicken imports;in	1	1.6	1.6	12.9
	Ban imported chicken;	1	1.6	1.6	14.5
	Ban imported chicken;a	1	1.6	1.6	16.1
	Ban imported chicken;f	1	1.6	1.6	17.7
	Ban on imported chicke	1	1.6	1.6	19.4
	Ban on imported chicke	1	1.6	1.6	21.0
	Ban will boost local pro	1	1.6	1.6	22.6
	banning of chicken imp	1	1.6	1.6	24.2
	Educating farmers;low	1	1.6	1.6	25.8
	Educating farmers;regu	1	1.6	1.6	27.4
	farmer education on dis	1	1.6	1.6	29.0
	Farmer training prograi	1	1.6	1.6	30.6
	Farmers cooperatives f	1	1.6	1.6	32.3
	Farmers cooperatives;A	1	1.6	1.6	33.9
	Feed subsidy;farmers c	1	1.6	1.6	35.5
	Financial support to far	1	1.6	1.6	37.1
	Government support	1	1.6	1.6	38.7
	government to establis	1	1.6	1.6	40.3
	Imput subsidy	1	1.6	1.6	41.9
	Imput subsidy;tax reduc	1	1.6	1.6	43.5
	Incentives to farmers;a	1	1.6	1.6	45.2
	Incentives to farmers;in	1	1.6	1.6	46.8
	Large scale feed produ	1	1.6	1.6	48.4
	Limit imported chicken	1	1.6	1.6	50.0
	Loan facilitation	2	3.2	3.2	53.2
	Loan facilitation supply	1	1.6	1.6	54.8
	Loan facilitation;emplo	1	1.6	1.6	56.5
	Loan facilitation;imput s	1	1.6	1.6	58.1
	Loan facilitation;machi	1	1.6	1.6	59.7
	Loan facilitation;prepar	1	1.6	1.6	61.3
	Loan facilitation;remova	1	1.6	1.6	62.9
	Loan facilitation;training	2	3.2	3.2	66.1
	Preparing own feed; pr	1	1.6	1.6	67.7
	Preparing own feed;su	1	1.6	1.6	69.4
	Processing and packag	1	1.6	1.6	71.0
	processing and packag	1	1.6	1.6	72.6
	Processing and packag	1	1.6	1.6	74.2
	Producing cheap DOCs	1	1.6	1.6	75.8
	Providing loans with lo	1	1.6	1.6	77.4
	Provision of drugs and	1	1.6	1.6	79.0
	Soft loan availability	1	1.6	1.6	80.6
	Subsidies	3	4.8	4.8	85.5
	Subsidies and loans n	1	1.6	1.6	87.1
	Subsidising feed and c	1	1.6	1.6	88.7
	Subsidy on feed and dr	1	1.6	1.6	90.3
	Supplying input	1	1.6	1.6	91.9
	Tax reduction;preparing	1	1.6	1.6	93.5
	Train farmers on feed p	1	1.6	1.6	95.2
	Train more veterinary o	1	1.6	1.6	96.8
	Training more veterinai	1	1.6	1.6	98.4
	Training more veterinai	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

	Chi-Square	df	Asymp. Sig.		
Farm capacity (number of birds)	8.355	2	0.015		
Age	8.323	3	0.040		
Educational background	15.548	3	0.001		
Number of years in poultry production	8.484	4	0.075		
Importation of cheap, frozen chicken products is a serious threat t	37	2	0.000		A1
High cost of local poultry production	51.574	2	0.000		A2
Farmers are quitting the poultry industry because it is not profitabl	41.71	4	0.000		A3
High cost of input is a factor to production	81.541	4	0.000		A4
The poultry sector is devastated by poor disease control	36.871	4	0.000		A5
Government has flexible and friendly policies for the poultry sector	46.213	3	0.000		B6
Financial subsidies	74.645	3	0.000		B7a
Input subsidies	76.194	3	0.000		B7b
Loan facilitation	68.968	3	0.000		B7c
The role of government in enhancing competitiveness of the poultr	49.935	4	0.000		B8
Government has put effective policies in place to ban the importati	71.065	4	0.000		B9
Government support towards the implementation of policies in fav	36.871	4	0.000		B10
Preparing own feed is cheaper than buying from the market	28.097	2	0.000		C11
Farmers can reduce feeding cost by using their own farm manure	0.258	1	0.611		C12
Input subsidy from government can reduce production cost and en	28.677	2	0.000		C13
The high cost of day old chicks can be reduced if farmers have ac	1.032	1	0.310		C14
Consumers will be more attracted to fresh local chicken products	0.258	1	0.611		C15
Stakeholders input into poultry policies could improve the compet	35.935	3	0.000		C16
Value can be added to local output by processing and packaging	30.033	2	0.000		C17
Education could improve disease control and improve poultry proc	1.613	1	0.204		C18

Number of years in poultry production					
		Frequency	Percent	Valid Percen	ulative Percent
Valid	< 2	4	6.5	6.5	6.5
	2 - 4	13	21.0	21.0	27.4
	5 - 7	14	22.6	22.6	50.0
	8 - 10	13	21.0	21.0	71.0
	> 10	18	29.0	29.0	100.0
	Total	62	100.0	100.0	

heap, frozen chicken products is a serious threat to the local poultry productio					
		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	41	66.1	66.1	66.1
	Agree	19	30.6	30.6	96.8
	Uncertain	2	3.2	3.2	100.0
	Total	62	100.0	100.0	

High cost of local poultry production					
		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	13	21.0	21.3	21.3
	Agree	46	74.2	75.4	96.7
	Uncertain	2	3.2	3.3	100.0
	Total	61	98.4	100.0	
Missing	System	1	1.6		
Total		62	100.0		

Farmers are quitting the poultry industry because it is not profitable anymore					
		Frequency	Percent	Valid Percen	ulative Percent
Valid	Strongly Agree	4	6.5	6.5	6.5
	Agree	12	19.4	19.4	25.8
	Uncertain	1	1.6	1.6	27.4
	Disagree	15	24.2	24.2	51.6
	Strongly Disagree	30	48.4	48.4	100.0
	Total	62	100.0	100.0	

Input subsidies * Educational background

Crosstab

			Educational background				Total
			Degree	Diploma	High Schoo	Non-Forma	
Input subs	Agree	Count	0	0	2	1	3
		% within In	0.0%	0.0%	66.7%	33.3%	100.0%
		% within Ec	0.0%	0.0%	11.1%	3.7%	4.8%
		% of Total	0.0%	0.0%	3.2%	1.6%	4.8%
	Uncertain	Count	0	0	0	1	1
		% within In	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Ec	0.0%	0.0%	0.0%	3.7%	1.6%
		% of Total	0.0%	0.0%	0.0%	1.6%	1.6%
	Disagree	Count	4	10	8	22	44
		% within In	9.1%	22.7%	18.2%	50.0%	100.0%
		% within Ec	57.1%	100.0%	44.4%	81.5%	71.0%
		% of Total	6.5%	16.1%	12.9%	35.5%	71.0%
	Strongly Dis	Count	3	0	8	3	14
		% within In	21.4%	0.0%	57.1%	21.4%	100.0%
		% within Ec	42.9%	0.0%	44.4%	11.1%	22.6%
		% of Total	4.8%	0.0%	12.9%	4.8%	22.6%
Total		Count	7	10	18	27	62
		% within In	11.3%	16.1%	29.0%	43.5%	100.0%
		% within Ec	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	11.3%	16.1%	29.0%	43.5%	100.0%

Chi-Square Tests

	Value	df	Significanc	t Sig. (2-sic	t Sig. (1-si	oint Probability
Pearson Ch	16.151[a]	9	0.064	0.055		
Likelihood	18.594	9	0.029	0.015		
Fisher's Ex	15.942			0.017		
Linear-by-L	1.442[b]	1	0.230	0.261	0.135	0.039
N of Valid C	62					

a. 12 cells (75.0%) have expected count less than 5. The minimum expected cour

b. The standardized statistic is -1.201.

APPENDIX B2: Frequency and Correlation Tables for consumers

Reliability Statistics

Cronbach's Alpha	N of Items
0.796	3

Imported chicken products is preferred to local one.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Ag	2	10.0	10.0	10.0
	Agree	2	10.0	10.0	20.0
	Disagree	10	50.0	50.0	70.0
	Strongly Dis	6	30.0	30.0	100.0
	Total	20	100.0	100.0	

Imported chicken is relatively cheaper, compared to local chicken.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Ag	10	50.0	50.0	50.0
	Agree	7	35.0	35.0	85.0
	Disagree	1	5.0	5.0	90.0
	Strongly Dis	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

ers go prefer imported chicken because it is always available on the

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Ag	8	40.0	40.0	40.0
	Agree	9	45.0	45.0	85.0
	Uncertain	1	5.0	5.0	90.0
	Disagree	1	5.0	5.0	95.0
	Strongly Dis	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

The imported chicken taste better than the local one

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Ag	2	10.0	10.0	10.0
	Disagree	8	40.0	40.0	50.0
	Strongly Dis	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

will shift from imported chicken to local chicken if the price is relativ

		Frequency	Percent	Valid Percen	mulative Percent
Valid	Strongly Ag	11	55.0	55.0	55.0
	Agree	6	30.0	30.0	85.0
	Disagree	1	5.0	5.0	90.0
	Strongly Dis	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

will be more attractive to consumers if it is more convenient to use (

		Frequency	Percent	Valid Percen	mulative Percent
Valid	Strongly Ag	6	30.0	31.6	31.6
	Agree	13	65.0	68.4	100.0
	Total	19	95.0	100.0	
Missing	System	1	5.0		
Total		20	100.0		

other reason why you prefer imported chicken products to the local

		Frequency	Percent	Valid Percen	mulative Percent
Valid	Already dre	1	5.0	5.0	5.0
	Already dre	1	5.0	5.0	10.0
	Always avai	6	30.0	30.0	40.0
	Always avai	1	5.0	5.0	45.0
	Chap;alway	1	5.0	5.0	50.0
	Cheap	1	5.0	5.0	55.0
	Cheap;avai	1	5.0	5.0	60.0
	Cheap;nea	1	5.0	5.0	65.0
	Cheaper	1	5.0	5.0	70.0
	Cut already	1	5.0	5.0	75.0
	Packaged	1	5.0	5.0	80.0
	Processed	2	10.0	10.0	90.0
	Processed	1	5.0	5.0	95.0
	well packag	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

er reason why you would buy local chicken products instead of impo					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		1	5.0	5.0	5.0
	Better taste	3	15.0	15.0	20.0
	Better taste	1	5.0	5.0	25.0
	Better taste	1	5.0	5.0	30.0
	Better taste	1	5.0	5.0	35.0
	Better taste	1	5.0	5.0	40.0
	Fresh;tasty	3	15.0	15.0	55.0
	High qualit	1	5.0	5.0	60.0
	less fatty;be	1	5.0	5.0	65.0
	Less fatty;p	1	5.0	5.0	70.0
	Preference	1	5.0	5.0	75.0
	Preference	1	5.0	5.0	80.0
	Preference	1	5.0	5.0	85.0
	Presumabl	1	5.0	5.0	90.0
	supposedly	1	5.0	5.0	95.0
	Taste bette	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

ld be done by the local poultry producers to make the product appea					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		1	5.0	5.0	5.0
	Affordable	1	5.0	5.0	10.0
	Affordable,	1	5.0	5.0	15.0
	Be made af	1	5.0	5.0	20.0
	Be made av	1	5.0	5.0	25.0
	Be made av	1	5.0	5.0	30.0
	Cheaper pr	1	5.0	5.0	35.0
	Explore sub	1	5.0	5.0	40.0
	Increase pr	1	5.0	5.0	45.0
	Less exper	2	10.0	10.0	55.0
	Package;ch	1	5.0	5.0	60.0
	packaging	1	5.0	5.0	65.0
	processed	1	5.0	5.0	70.0
	processed	2	10.0	10.0	80.0
	Processed	1	5.0	5.0	85.0
	Processed;	1	5.0	5.0	90.0
	Well packa	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

What is your view about the banning of imported chicken products?					
		Frequency	Percent	Valid Percen	ulative Percent
Valid		1	5.0	5.0	5.0
	Ban to pron	3	15.0	15.0	20.0
	Ban will en	1	5.0	5.0	25.0
	Banning wi	1	5.0	5.0	30.0
	increase lo	1	5.0	5.0	35.0
	Increase lo	1	5.0	5.0	40.0
	Limited loc	1	5.0	5.0	45.0
	Local poult	3	15.0	15.0	60.0
	Poultry farm	1	5.0	5.0	65.0
	Production	1	5.0	5.0	70.0
	Reduce ris	4	20.0	20.0	90.0
	Shortage	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Chi-square test

Test Statistics									
	Age	Family size	Number of times you consume chicken in a week	Imported chicken products is preferred to local one.	Imported chicken is relatively cheaper, compared to local chicken.	Consumers go prefer imported chicken because it is always available on the market.	The imported chicken taste better than the local one	Consumers will shift from imported chicken to local chicken if the price is relatively cheaper	Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook).
Chi-Square	4.000[a]	4.900[b]	7.500[a]	8.800[c]	10.800[c]	17.000[a]	5.200[b]	12.400[c]	2.579[d]
df	4	2	4	3	3	4	2	3	1
Asymp. Sig.	0.406	0.086	0.112	0.032	0.013	0.002	0.074	0.006	0.108

a. 5 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 4.0.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 6.7.

c. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 5.0.

d. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 9.5.

Correlations

			Imported chicken products is preferred to local one.	Imported chicken is relatively cheaper, compared to local chicken.	Consumers go prefer imported chicken because it is always available on the market.	The imported chicken taste better than the local one	Consumers will shift from imported chicken to local chicken if the price is relatively cheaper	Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook).
Spearman's	Imported chicken products is preferred to local one.	Correlation	1.000					
		Sig. (2-tailed)						
		N	20					
	Imported chicken is relatively cheaper, compared to local chicken.	Correlation	0.165	1.000				
		Sig. (2-taile	0.488					
		N	20	20				
	Consumers go prefer imported chicken because it is always available on the market.	Correlation	0.335	-0.397	1.000			
		Sig. (2-taile	0.148	0.083				
		N	20	20	20			
	The imported chicken taste better than the local one	Correlation	0.076	-0.069	0.088	1.000		
		Sig. (2-taile	0.750	0.774	0.712			
		N	20	20	20	20		
	Consumers will shift from imported chicken to local chicken if the price is relatively cheaper	Correlation	-0.067	-0.214	0.396	-0.012	1.000	
		Sig. (2-taile	0.778	0.366	0.084	0.960		
		N	20	20	20	20	20	
	Local chicken will be more attractive to consumers if it is more convenient to use (ready to cook).	Correlation	-0.090	-.564*	0.381	0.285	0.164	1.000
		Sig. (2-taile	0.713	0.012	0.108	0.236	0.502	
		N	19	19	19	19	19	19

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

APPENDIX B1. Cont: Frequency and Correlation Tables for farmers continued

Correlations

			Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo	High cost of local poultry production	Farmers are quitting the poultry industry because it is not profitable anymore	High cost of input is a factor to production	The poultry sector is devastated by poor disease control	Government has flexible and friendly policies for the poultry sector	Financial subsidies	Input subsidies	Loan facilitation	The role of government in enhancing competitiveness of the poultry industry is inadequate	Government has put effective policies in place to ban the importation of cheap, frozen chicken products	Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse	Preparing own feed is cheaper than buying from the market	Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost	Input subsidy from government can reduce production cost and enhance productivity	The high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries	Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper	Stakeholders input into poultry policies could improve the competitiveness of the poultry industry in the poultry industry	Value can be added to local output by processing and packaging	Education could improve disease control and improve poultry production
Spearman's	Importation of cheap, frozen chicken products is a serious threat to the local poultry production in Brong Ahafo	Correlation	1.000																			
		Sig. (2-tailed)																				
		N	62																			
	High cost of local poultry production	Correlation	-0.010	1.000																		
		Sig. (2-taile	0.937																			
		N	61	61																		
	Farmers are quitting the poultry industry because it is not profitable anymore	Correlation	-0.111	0.071	1.000																	
		Sig. (2-taile	0.392	0.584																		
		N	62	61	62																	
	High cost of input is a factor to production	Correlation	-0.169	0.007	.513**	1.000																
		Sig. (2-taile	0.194	0.958	0.000																	
		N	61	60	61	61																
	The poultry sector is devastated by poor disease control	Correlation	0.169	0.183	.305*	0.167	1.000															
		Sig. (2-taile	0.190	0.157	0.016	0.198																
		N	62	61	62	61	62															
	Government has flexible and friendly policies for the poultry sector	Correlation	-0.115	-0.102	0.004	0.060	-0.018	1.000														
		Sig. (2-taile	0.379	0.439	0.976	0.651	0.889															
		N	61	60	61	60	61	61														
	Financial subsidies	Correlation	0.097	-0.129	-0.148	-0.022	-0.223	.435**	1.000													
		Sig. (2-taile	0.454	0.322	0.251	0.863	0.081	0.000														
		N	62	61	62	61	62	61	62													
	Input subsidies	Correlation	0.241	-0.242	-0.183	-0.156	-0.106	.392**	.617**	1.000												
		Sig. (2-taile	0.059	0.060	0.154	0.230	0.411	0.002	0.000													
		N	62	61	62	61	62	61	62	62												
	Loan facilitation	Correlation	0.078	-0.205	-0.127	-0.062	-0.225	.442**	.699**	.743**	1.000											
		Sig. (2-taile	0.545	0.113	0.325	0.633	0.078	0.000	0.000	0.000												
		N	62	61	62	61	62	61	62	62	62											
	The role of government in enhancing competitiveness of the poultry industry is inadequate	Correlation	-0.162	-0.042	.287*	.307*	0.195	0.166	-0.028	-0.024	0.081	1.000										
		Sig. (2-taile	0.208	0.746	0.024	0.016	0.129	0.202	0.828	0.854	0.530											
		N	62	61	62	61	62	61	62	62	62	62										
	Government has put effective policies in place to ban the importation of cheap, frozen chicken products	Correlation	0.009	-0.092	0.215	0.068	0.064	0.095	0.203	-0.080	0.132	-0.103	1.000									
		Sig. (2-taile	0.943	0.479	0.094	0.605	0.620	0.467	0.114	0.537	0.308	0.427										
		N	62	61	62	61	62	61	62	62	62	62	62									
	Government support towards the implementation of policies in favour of the poultry industry is a recipe for its collapse	Correlation	-.313*	-0.124	0.201	0.169	-.257*	0.067	-0.196	-0.198	-0.193	0.132	0.077	1.000								
		Sig. (2-taile	0.013	0.340	0.118	0.194	0.044	0.606	0.127	0.123	0.133	0.306	0.553									
		N	62	61	62	61	62	61	62	62	62	62	62	62								
	Preparing own feed is cheaper than buying from the market	Correlation	0.117	-0.201	-0.047	-0.050	0.066	-0.140	-0.125	0.061	0.120	0.070	0.034	-0.142	1.000							
		Sig. (2-taile	0.365	0.120	0.717	0.701	0.611	0.283	0.333	0.639	0.352	0.587	0.790	0.270								
		N	62	61	62	61	62	61	62	62	62	62	62	62	62							
	Farmers can reduce feeding cost by using their own farm manure as fertilisers to produce maize at cheaper cost	Correlation	0.036	-0.204	0.120	0.081	-0.039	0.073	-0.041	-0.041	0.093	0.104	0.059	0.093	.554**	1.000						
		Sig. (2-taile	0.781	0.114	0.351	0.534	0.764	0.575	0.753	0.752	0.474	0.420	0.649	0.471	0.000							
		N	62	61	62	61	62	61	62	62	62	62	62	62	62	62						
	Input subsidy from government can reduce production cost and enhance productivity	Correlation	-0.048	-0.250	-0.052	-0.117	-0.116	0.167	0.032	0.082	0.007	-0.078	-0.148	0.072	0.216	.341**	1.000					
		Sig. (2-taile	0.712	0.052	0.690	0.369	0.370	0.198	0.807	0.528	0.958	0.548	0.250	0.578	0.092	0.007						
		N	62	61	62	61	62	61	62	62	62	62	62	62	62	62	62					
	The high cost of day old chicks can be reduced if farmers have access to their own or cooperative incubators/hatcheries	Correlation	0.030	0.011	-0.071	-0.075	-0.083	0.223	-0.031	0.023	0.078	0.002	0.039	-0.135	0.141	0.171	.322*	1.000				
		Sig. (2-taile	0.819	0.931	0.582	0.565	0.521	0.085	0.812	0.860	0.549	0.988	0.766	0.296	0.276	0.183	0.011					
		N	62	61	62	61	62	61	62	62	62	62	62	62	62	62	62	62				
	Consumers will be more attracted to fresh local chicken products if the price is relatively cheaper	Correlation	-.299*	-0.016	0.170	0.013	0.006	0.236	-0.018	0.041	0.099	0.097	-0.053	0.183	0.047	-0.028	0.200	-0.041	1.000			
		Sig. (2-taile	0.018	0.902	0.187	0.921	0.964	0.067	0.889	0.752	0.443	0.452	0.684	0.156	0.719	0.828	0.119	0.752				
		N	62	61	62	61	62	61	62	62	62	62	62	62	62	62	62	62	62			
	Stakeholders input into poultry policies could improve the competitiveness of the poultry industry in the poultry industry	Correlation	-.305*	0.012	0.194	.361**	0.109	0.217	-0.039	-0.008	-0.038	0.165	-0.075	0.136	-0.178	0.006	0.083	-0.095	0.223	1.000		
		Sig. (2-taile	0.016	0.928	0.131	0.004	0.397	0.094	0.766	0.949	0.767	0.200	0.562	0.290	0.165	0.963	0.521	0.462	0.081			
		N	62	61	62	61	62	61	62	62	62	62	62	62	62	62	62	62	62	62		
	Value can be added to local output by processing and packaging	Correlation	-0.031	-0.016	.301*	.268*	0.242	0.035	-0.018	-0.024	-0.164	0.103	0.132	0.017	-0.157	0.013	0.065	-0.157	-0.078	0.030	1.000	
		Sig. (2-taile	0.812	0.902	0.018	0.038	0.060	0.788	0.892	0.855	0.207	0.430	0.311	0.898	0.227	0.921	0.621	0.228	0.550	0.819		
		N	61	60	61	60	61	60	61	61	61	61	61	61	61	61	61	61	61	61	61	
	Education could improve disease control and improve poultry production	Correlation	0.007	-0.171	0.134	0.164	.295*	0.004	-0.100	0.084	0.137	.318*	0.044	0.099	0.205	0.076	-0.004	-0.087	0.120	-0.053	0.198	1.000
		Sig. (2-taile	0.959	0.189	0.301	0.205	0.020	0.974	0.440	0.517	0.288	0.012	0.734	0.443	0.110	0.557	0.974	0.500	0.351	0.680	0.127	
		N	62	61	62	61	62	61	62	62	62	62	62	62	62	62	62	62	62	62	61	62

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

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

APPENDIX C: Turnitin Report

EXPLORING THE CHALLENGES IMPACTING THE GHANA POULTRY INDUSTRY AND TO CRAFT STRATEGIES TO BOOST ITS COMPETITIVENESS

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Dr Baruch B Amiso

16. 08. 2022