AN ANALYSIS OF THE REGIONAL COMPETITIVENESS OF ZIMBABWE'S BROILER ENTERPRISES

BY

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A Thesis Submitted in Partial fulfilment of the Requirements of a Masters Degree in Agricultural and Applied Economics

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December 2011

FACULTY OF AGRICULTURE

The undersigned certify that they have read, and recommended to the Department of Agricultural Economics and Extension for acceptance, the thesis entitled;

AN ANALYSIS OF THE REGIONAL COMPETITIVENESS OF ZIMBABWE'S BROILER ENTERPRISES

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ABSTRACT

The purpose of this study was to analyze the regional competitiveness of Zimbabwe's commercial broiler industry. The study analyzed the country's broiler production system and compared it with regional broiler production. The analysis was done to determine the measures of distortions in the local broiler industry and the competitiveness of broiler production in Zimbabwe given that the local broiler industry was protected from regional competition through import restrictions before the STERP. The main tool of analysis was the Policy Analysis Matrix (PAM). The PAM was used to analyse the private and social profitability of broiler production and the effects of distortions in domestic prices. Indicators of comparative advantage and measures of distortions were used in the analysis. Data were collected by survey of retail prices of inputs and output to construct the budgets whilst international prices were obtained from the internet and converted to the US dollar equivalent using the prevailing official exchange rates. The data were collected between March and July 2011. The quantities of inputs used in production were obtained from key industry players as well as the Ministry of Agriculture. In analysing the relationship between world prices and domestic prices for output and inputs, the Nominal Protection Coefficient (NPC) was used to see the extent of protection in the sector. From the analysis, the NPC on output was found to be 1.38, indicating that domestic broiler meat prices are 38 percent higher than world prices. On inputs used, the research indicated an NPCI of 1.264, implying that domestic prices are 26.4 percent higher than social prices. The DRC was found to be 0.56, implying that the country has a comparative advantage in broiler production. The comparative advantage means that it is profitable to produce locally and save foreign currency that is currently being used to import broiler meat. The study recommends the need to improve the institutional environment to improve the competitiveness of Zimbabwe in general and the broiler sector in particular. Improved broiler production can be enhanced by increase in the production of key inputs for broiler production, maize and soyabean.

Key words: broiler, comparative advantage, competitiveness, PAM, Zimbabwe

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Acknowledgements

I want to express my sincere gratitude to my supervisors Professor M. Rukuni and Mr. G. Mahofa for the support and the inspirational supervision they gave me. Their guidance throughout the research process is appreciated. I would also like Mr. C. Kambanje for some helpful comments. Special mention goes to the AERC in Kenya for providing the funding for the thesis.

I would also like to thank the chairman of the Zimbabwe Poultry Association for giving me valuable information about the Zimbabwean poultry industry and all those who gave me information. Lastly, I want to thank the staff at the Department of Agricultural Economics and Extension for their support throughout my study period and all my classmates for the collective action.

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ACRONYMS

DRC	Domestic Resource Cost
EPC	Effective Protection Coefficient
GDP	Gross Domestic Product
GMB	Grain Marketing Board
GoZ	Government of Zimbabwe
MAMID	Ministry of Agriculture, Mechanization and Irrigation Development
MoF	Ministry of Finance
NPC	Nominal Protection Coefficient
NPCI	Nominal Protection Coefficient on Input
NPCO	Nominal Protection Coefficient on Output
PAM	Policy Analysis Matrix
PCR	Private Cost Ratio
PPR	Private Profitability ratio
SCB	Social Cost Benefit Ratio
SRP	Subsidy Ratio to Producers
ZESA	Zimbabwe Electricity Supply Authority
ZIMRA	Zimbabwe Revenue Authority
ZPA	Zimbabwe Poultry Association

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CHAPTER 1: INTRODUCTION

1.1Background

The meat industry in Zimbabwe consists of the beef, goat, sheep, pig and poultry industries. Of these, goat and sheep are consumed in little amounts in urban settings leaving beef, pig and poultry to take the bigger market share. This leaves much of the meat consumption to be beef and poultry products. Beef constitute more than 50% of meat consumed in Zimbabwe with the remainder being filled by other meat products (FAO, 2005). The decimation of the national beef herd in the severe 1992 drought and other subsequent droughts, coupled with the multipurpose nature of cattle for rural draught power, provision of milk and other social needs and the long production cycle reduces the supply of beef to the market. These limitations of other protein sources provide an opportunity for the local broiler industry to get a bigger market share in meat supply (ZPA 2010). In comparison with cattle, poultry are efficient converters of feed grains into meat.

Livestock contribute significantly to food supply and nutrition, and is a major source of food, particularly of high quality protein, minerals, vitamins and micro-nutrients for the majority of African people. With Africa's human population growing at an average rate of 2.7% over the past 20 years and urbanization growing at a rate of 4.2% over the same period, estimates suggest that 45% (490 million) of Africa's population will live in cities and large towns by 2015 (UN Habitat, 2010). This growing urbanization will further amplify the growth in demand for food of animal origin (coined the *Livestock Revolution*), because the urban population generally has higher incomes than those living in rural areas (Stroebel and Swanepoel, 2010). The increasing urbanization rates affects dietary patterns as urbanization

is associated with occupations less compatible with home food production and consumption often with limited land for cultivation (Mendez et al, 2004). Population growth, urbanization and increasing incomes are likely to continue well into the future and therefore the livestock and poultry sector will play an important role in Zimbabwe in the future.

Globalization of the economy has contributed many new challenges to agribusinesses around the world. Agribusinesses need not only to compete in their domestic market, but also to compete in foreign markets and develop strategies to enter new markets. The issues of competitiveness and comparative advantage have become important for agribusiness managers, governments and policy analysts (Cabral and Scoones, 2006). Companies are finding it increasingly difficult to sustain their financial relevance and growth without producing and marketing competitive products and services. In order to survive and continue to penetrate markets, companies must compete aggressively and in an economically sustainable manner. Nations failing to nurture business in high value added sectors are destined to have a low standard of living, constrained national security and jeopardize their independent political actions and economic destiny (Fritz et al, 2009).

1.2 Primary issue and focus of the study

The study focused on commercial broiler production in Zimbabwe. Commercialisation is characterised by huge capital investments, intensive management and specialisation. The study focused on the major broiler producers. The comparative advantage of the broiler industry will be done by quantifying the production inputs and their prices in domestic (private) and world (social) prices and making comparisons. This was done given that Zimbabwe imports some of the factors of production for broilers. This study applied the gross

margin analysis. The gross margins will be prepared using the requirements for the broiler production using prevailing market prices and adjustments for imported inputs will be done to reflect their local equivalents.

1.3 Overview of the poultry sector in Zimbabwe

Prior to economic decline, the Zimbabwe broiler industry was highly developed, sophisticated, and self-sufficient in production of day old chicks. The industry was also able to meet local demand and made significant exports, including the exports of breeding and production stock to the sub Saharan continent (Zimbabwe Poultry Association, 2009). Broiler production, based on day old chick sales, over the years 2002 to 2007, was fairly stable at approximately 2,320,000 birds per month (Ministry of Agriculture, 2007). This can be projected to have yielded approximately 2,600 tonnes of broiler meat per month (31,300 tonnes per annum) and contributes significantly to meeting the nation's meat requirements. However these sales and contributions to national economy have been affected by the imported broiler meat. This study will determine the competitiveness and comparative advantage of the country's broiler industry after liberalization of broiler meat trade. Of late, the broiler industry has been producing 2 300 tonnes per month with more than 50% of it coming from the small scale producers (The Poultry Site, 2010).

1.4 Statement of the problem

There has been an outcry, particularly from local broiler industry players over low priced imports of broiler meat on their viability and profitability following the relaxation of imports to Zimbabwe. The Zimbabwean poultry producers argue that they have the capacity to supply

the domestic market with its broiler meat requirements and import quotas must only be given to supply market shortfalls should they arise. The broiler producers further argue that the countries that are currently exporting their broiler products to Zimbabwe are using genetically modified maize to feed their birds. Genetically modified maize is available at cheaper prices on the world market but is banned in Zimbabwe –it must be milled upon arrival if imported (Kapuya et al, 2010). This further worsens the local broiler industry players' scenario.

1.5 Research objectives

The overall objective of this study is to investigate whether the country's broiler industry is regionally competitive given current policies and price distortions. Specifically the study aims to achieve the following specific objectives:

i) Characterize broiler production in Zimbabwe.

ii) Establish private and social broiler production costs in Zimbabwe and the price of imported poultry in Zimbabwe

iii) Characterize current agricultural, price and economic policies affecting the broiler industry in Zimbabwe.

1.6 Research questions

Given the nature of the poultry sector in Zimbabwe and the ongoing debate over poultry imports, the following specific questions are to be addressed by this research:

i) What characterises poultry production in Zimbabwe?

ii) Does Zimbabwe have a comparative advantage in broiler production?

iii) How are government policies and distortions affecting poultry competitiveness?

1.7 Research hypotheses

The hypotheses are

i) There has been inadequate maize and soyabean production for broiler feed manufacture in Zimbabwe.

ii) Zimbabwe has a comparative advantage in poultry production compared to South African producers.

iii) The institutional, policy and macroeconomic environment is negatively affecting poultry production in Zimbabwe.

1.8 Justification of the study

This study is justified because of the following reasons:

1. Policy inconsistencies

Since the liberalisation of poultry trade, no analysis has been done to determine the competitiveness and comparative advantage of Zimbabwe's broiler industry. There are no scientifically determined policy measures to regulate the poultry sector. Due to lobby efforts or the lack of lobby efforts by Zimbabwe broiler industry players, there has been intermittent bans and resumptions of broiler meat imports into Zimbabwe since 2009. This research therefore seeks to bring up a quantitative analysis of the broiler industry that will be pivotal in making objective policy decisions for the welfare of the government, broiler producers and consumers. The study will also look at institutions (education, research and extension) and governance and policy for strategic direction change, incentives, and facilitation of

institutional and technological innovation for the development of the broiler industry in Zimbabwe.

2. The emergence of transboundary diseases

The broiler sector in particular provides global public health risks from emerging and re-emerging animal diseases, in particular those transmissible to humans with pandemic potential. In recent years, the emergence of transboundary diseases such as the Highly Pathogenic Avian Influenza (HPAI) has resulted in supply and demand shocks in countries. The demand shock results in the reduction in demand due to consumer panic and associated fall in the price/value of broiler meat and eggs whilst the supply shock results in the reduction in broiler supply as a result of bird mortality from disease or from control measures. In trade, this helps in designing regulations to govern trade as well as the implementation of sanitary and phytosanitary (SPS) measures to protect human health. The presence of transboundary diseases helps in designing trade policies to reduce the exposure of the broiler production to external supply and demand shocks (Birol *et al* 2010).

1.9 Scope and limitation of the study

The focus of this study was on competitiveness of commercial broiler producers. Though large producers are vertically integrated from the production of chicks up to the marketing, with diverse enterprises form broilers, eggs and the supply of day old chicks, the study was limited to the broiler value chain from day old chicks to the marketing stage only. The study focused on the competitiveness of broiler production given imports from the region. The data collected was limited to the period between April and June 2011.

1.10 Organization of the thesis

This research is organized into seven chapters. The first chapter gave a background to the problem being investigated, the research objectives, hypotheses and questions. The chapter also gives justification for undertaking the study including the scope and limitation of the study. The second chapter reviews empirical and theoretical literature on the broiler sector and competitiveness and comparative advantage. The third chapter presents the methodology used in undertaking the study. This chapter gives a description of the study area, sampling procedure and sample size, data collection, analytical methods, theoretical and empirical framework and description of variables in the model.

The fourth chapter characterizes the broiler production systems using descriptive statistics. The fifth chapter establishes the social and private costs of broiler production in Zimbabwe using the Policy Analysis Matrix and gross margin (GM) analysis. The sixth chapter measures the effects of current agricultural, trade and economic policies on the competitiveness of broiler production in Zimbabwe. The last chapter (Chapter 7) presents the summary, conclusions, areas for further study and policy implications of the study.

1.11 Summary

The first chapter laid the foundation for the study. The problem statement was presented together with the objectives of the study, the study hypotheses, the research questions and the key issues to be looked at in the study. The justification for the study was also presented as well as the expected contribution of the project to policy debates in Zimbabwe and how it is expected to contribute to policies towards trade and agricultural development in general and

the poultry sector in particular. The chapter was concluded by giving the general layout (road map) of the study.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of the literature. Literature will be reviewed from economic theory, empirical analysis and this will help in the design of a conceptual framework for the study. The chapter briefly highlights developments in the global poultry industry over the last two decades and reviews some of the theoretical literature on competitiveness and trade. The chapter also reviews some empirical studies that were carried out to measure competitiveness and studies on broiler industries.

2.1 The Zimbabwe poultry industry

In Zimbabwe, the poultry production system consists of the commercial and subsistence systems. Subsistence poultry production is extensive, based on scavenging coupled with low input/output system. Although village chicken are characterised by low productivity (30-80 small eggs per hen per year, high chick mortality rates, low body weights, etc.), they are hardy, tolerant to diseases and used to poor nutrition (Pedersen, 1998). The traditional production system uses indigenous breeds that roam the villages or farms freely in search of feed, whereas in the commercial system exotic and high producing birds are intensively reared and fed. The commercial broiler production is characterized by high growth in consumption and trade than any other major agricultural sector (Kumar et al, 2011). Structural changes in poultry production and marketing have been driven by the growing demands of urban markets due to globalisation, urbanisation and changing lifestyles, tastes and preferences (Mendez and Popkin, 2004). In Zimbabwe, the poultry industry is internationally linked through the international trade.

2.2 Developments in the global poultry sector

The broiler sector has undergone major transformations since the 1990s resulting in growth in demand due to urbanisation, population growth, trade and high expenditure elasticities for livestock products such as chicken (Narrod et al., 2008; Steinfeld and Chilonda, 2006). Supply has been able to match demand mainly due to technology developments in breeding and nutrition (Upton, 2008) supported by relatively inexpensive sources of feed. Demand and supply have shifted towards developing and emerging economies, where broiler meat and eggs have seen a huge expansion in both consumption and production (Steinfeld and Chilonda, 2006). Africa's human population has grown at an average rate of 2.7% over the past 20 years. The continent's population is expected to reach 1.2 billion by 2015. Africa's urban population has been growing at an even higher average rate of 4.2% over the last 20 years and it is estimated that by 2015 about 490 million people (approximately 45% of the total population) will live in cities and large towns. This growing urbanization will further amplify the growth in demand for food of animal origin, because the urban population generally has higher incomes than those living in rural areas.

Consumption of broiler meat in developing economies is growing more rapidly than for all other meats (Upton, 2008). The small group of exporting countries supplying most of the international trade in broiler products includes Brazil and Thailand. The broiler sector has been quick to take advantage of economies of scale and has rapidly become consolidated and integrated. This change has been especially rapid in countries that trade internationally. The ownership of global breeding chains is concentrated in a very small number of companies. in the USA, eastern China, part of Brazil and Thailand poultry value chains have consolidated around fewer, larger production and processing units (Binsheng and Yijun, 2008, NaRanong,

2008). Concentration of the sector, together with increasing requirements to meet animal health, food safety and quality standards, have raised the barriers for smallholder producers and small scale processors to participate in growing markets. Small and medium scale commercial production has been able to expand very fast to meet demand gaps in areas immediately surrounding many large cities of the developing world, but faces rising pressure as markets develop and value chains become more organised.

At the same time there have been droughts in major cereal producing countries, reducing the ability of suppliers to respond. Higher costs of feed translate to lower margins for poultry producers and elevated food prices for consumers. Broilers are very efficient feed converters and feed research is exploring many avenues, including ways to exploit alternative energy sources and ways of unlocking nutrients (Chadd, 2008). Cereal prices are likely to increase by a further 10 to 15 percent by 2015 (von Braun, 2007) with consequent impacts on poultry product prices.

2.3 The emergency of transboundary poultry diseases

Problems that affect poultry sales are mainly associated with diseases, consumer reactions to the diseases, and the measures taken to control them. The greatest impact of disease on the poultry sector has come from Highly Pathogenic Avian Influenza (HPAI). The disease disrupted global poultry markets in 2004 and 2005 (Morgan, 2006). The disease also affected the livelihoods of poultry keeping households in Sub Saharan Africa as families lost poultry and assets/wealth (Birol et al, 2010). Response to HPAI has affected the structure and production pattern of the global poultry sector, shifting sources of production and accelerating changes in the pattern of exports and imports. It has also pushed national poultry

value chains in some countries towards concentration and intensification at a much faster rate than might otherwise have occurred, and is creating a long-overdue interest in bio security and market hygiene (Sims, 2008). Despite difficulties caused by disease outbreaks, total production and the volume of international trade in poultry products have continued to grow, with shift towards processed products and a growing interest in creating compartments. These represent attempts by the private sector to reduce the uncertainties and costs associated with disease. The issue of diseases and the vertical and horizontal integration of global poultry production systems threaten the survival of smaller production systems (McLeod et al, 2009).

2.4 Zimbabwe's trade policy

Zimbabwe has, prior to the Short Term Economic Recovery Program of 2009, pursed an inward looking policy of import substitution since the days of UDI. The policies targeted two things- the reduction of external dependence on imports of industrial products and increasing the size of the agro-industrial and manufacturing sectors and to expand output. Government industrial and trade policies sought to create jobs and competitive goods through industrialists and farmers. The government provided incentives to domestic producers who could develop the capacity to produce for certain needs from within. At the same time, the protection of the domestic market cushioned the industrialists against foreign competition. This practice, however, eventually undermined qualitative industrial productivity (Zwizwai et al, 1999). These investment regulations and foreign exchange allocation mechanism were used to prevent duplication of investment by barring entrepreneurs wishing to start new firms that would produce goods already in domestic production. In addition, imports of goods that competed with domestic production were not permitted (Doris and Rukovo, 1992). As a

result, the 1960s witnessed the diversification of both the industrial sector (textiles, fuels, mineral processing, etc) and the economy at large (a vast array of commercial agriculture, forestry and export processing activities).

The post-independence trade policy did not seek world market penetration for industrial produce. Instead, the trade policy thrust sought four things:

1. Accessible markets for agricultural raw materials and products;

2. Preferential treatment in markets where quality and competition would be obstacles to surmount, given the domestic base which was still short of major skills, capital and

3. Technology, and,

4. The publicity and attraction of foreign investment.

The government reinvigorated the trade policy, thereby diversifying outside markets. However, Zimbabwe tightened its hold on the regional market (GATT, 1994).

2.4.1 Import substitution in post independence Zimbabwe

The post independence government continued to implement ISI policies but in the framework of a socialist ideology that aimed at reducing income inequalities in an attempt to address the non-egalitarian nature of past development policies (Doris and Rukovo, 1992). Import substitution industrial development after independence occurred at a slower pace compared to the pre-independence era partly because the shallow phase of ISI, which involved consumer product projects, had been exhausted. Further ISI opportunities lay in the deeper phase that required huge capital outlays, greater technological capabilities and detailed economic, financial and technical feasibility studies (Doris and Rukovo, 1992).

In post independence Zimbabwe, the government also promoted exports through such schemes as the export retention scheme, the incremental export bonus scheme and the export processing zones (Zwizwai et al, 1999). There was therefore a period during which ISI was encouraged under a protective trade regime and, at the same time, exports were encouraged through the foreign exchange allocation system. In 1991, government adopted the World Bank-sponsored economic structural adjustment program (ESAP). The decision to make this dramatic policy change came about because of the deep economic problems that the country was facing in the second half of the 1980s. The country was experiencing stagnant economic growth, low levels of investment and export growth, a high budget deficit and inflation, growing unemployment and a decay of infrastructure (Doris and Rukovo, 1992).

2.5 Theoretical framework

The argument for trade between countries is based on the theory of comparative advantage. Countries trade because they do not have a comparative advantage in producing all commodities (Mankiw, 2004). Countries specialize in producing things that they can produce at least cost and trade for what they cannot produce at least cost. There are gains and losses in trade and this leads to trade restrictions. Differences in opportunity cost and comparative advantage create the gains from trade. When each country specializes in producing the good for which it has a comparative advantage, total production in the economy rises, and this increase in the size of the economic pie can be used to make everyone better off. As long as two countries have different opportunity costs, each can benefit from trade by obtaining a good at a price lower than the opportunity cost of that good.

International trade allows countries to exchange goods and services with the use of money as a medium of exchange. With trade, there is greater variety of goods available for consumption – international trade brings in different varieties of a particular product from different destinations. This gives consumers a wider array of choices which will not only improve their quality of life but as a whole it will help the country grow. Trade ensures efficient allocation and better utilization of resources since countries tend to produce goods in which they have a comparative advantage. Trade also promotes efficiency in production as countries will try to adopt better methods of production to keep costs down in order to remain competitive. Countries that can produce a product at the lowest possible cost will be able to gain a larger share in the market. Therefore an incentive to produce efficiently arises. This will help standards of the product to increase and consumers will have a good quality product to consume. More employment could be generated as the market for the countries' goods widens through trade. International trade helps generate more employment through the establishment of newer industries to cater to the demands of various countries (Yarbrough and Yarbrough, 2000).

There are two prominent theories of trade based on comparative advantage: the Ricardian theory and the Heckscher-Ohlin theory. The Ricardian theory assumes that comparative advantage arises from differences in technology across countries while the Heckscher-Ohlin theory suggests that technologies are the same across countries. Instead, the Heckscher-Ohlin theory attributes comparative advantage to cost differences resulting from differences in factor prices across countries. The predictions of classical trade theories are based on the principle of comparative advantage which derives from relative price determination, i.e. differences in pre-trade relative prices across countries, underlined by supply and demand

factors. According to the Heckscher-Ohlin theory, a country's comparative advantage is determined by its relative factor scarcity (i.e. its factor endowment ratios, relative to the rest of the world or a set of countries) (Yarbrough and Yarbrough, 2000).

The Heckscher–Ohlin Theorem states that countries export those commodities which require, for their production, relatively intensive use of those productive factors found locally in relative abundance. The twin concepts of relative factor intensity and relative factor abundance are most easily defined in the small dimensional context in which the basic theory is usually developed. Two countries are engaged in free trade with each producing the same pair of commodities in a purely competitive setting, supported by constant returns to scale technology that is shared by both countries. Each commodity is produced separately with inputs of two factors of production that, in each country, are supplied perfectly inelastically. Following the Ricardian distinction, commodities are freely traded but productive factors are internationally immobile. Although one country may possess a larger endowment of each factor than another, the presumed absence of returns to scale guarantees that only relative factor endowments are important. The home country is said to be relatively labour abundant if the ratio of its endowment of labour to that (say) of capital exceeds the corresponding proportion abroad. This is known as the physical version of relative factor abundance. An alternative involves a comparison of autarky relative factor prices in the two countries: the home country can be defined to be relatively labour abundant if its wage rate (compared with capital rentals) is lower before trade than is the foreign wage (relative to foreign capital rentals). Since autarky factor prices are determined by demand as well as supply conditions, these two versions need not correspond. In particular, if the home country is, in the physical

sense, relatively labour abundant it might nonetheless have its autarky wage rate relatively high if taste patterns at home are strongly biased towards the labour intensive commodity compared with tastes abroad. In such a case the trade pattern reflects the autarky factor–price comparison: the home country exports the physically capital-intensive commodity. Thus the Heckscher–Ohlin theorem is more likely to hold if relative factor abundance is defined in terms of relative factor prices prevailing before trade. The procedure typically followed the relative prices of goods play a fundamental role in the classical and neoclassical theories of trade.

It is the difference in relative prices across countries -whether due to technological reasons or factor endowments variations- that generate potential gains from trade and ultimately drive production specialization in a competitive, costless-trade setting. Under relatively general conditions and absent trade costs, specialization and trade induce relative price equalization across countries. (Yarbrough and Yarbrough, 2000)

In addition to the above, (Savvides, 2000) highlighted that competitive analysis should focus on the following factors:

1. **Technology factors:** Advanced production technology, flexibility of supply, efficient processing of information, purchasing economies, production economies, patents, licences.

2**.Human factors**: Labour skills, experience, motivation, knowledge areas, training quality, creativity and culture, an efficient organisational structure, management quality and expertise, quick decision-making, corporate synergies,

3**.Other factors**: Access to capital, efficient internal communication channels, market leadership in related markets, joint-ventures, successful related products, strong institutional

image and advertising effectiveness, an efficient/wide distribution channel coverage, good relations with agents, exclusive agencies, superior service ability.

2.6 Production theory

The production of broilers in Zimbabwe can be represented by a production function;

$Q^i = f [X_1^T, X_2^T .....X_n^T , X_1^{NT}, X_2^{NT} ..... X_n^{NT}]$

Where,

Q^i represents the *i*th firm's output

X_1^T to X_n^T X tradable inputs and

X_1^{NT} to X_n^{NT} non tradable inputs (Sadoulet and deJanvry, 1995).

In the current study, nontradable inputs will be land, labour, capital, water whilst electricity, feeds concentrates, maize and fuel will be the tradable inputs. The composition of tradable and nontradable will form the basis of determining the competitiveness of Zimbabwe's broiler production enterprises.

2.7 The gravity model

The rise in the flow of trade has led to an increase in the number of studies investigating the sources of trade. The gravity model has long been the workhorse model used to explain bilateral trade. Based upon Newton's Law of Gravitation, the gravity model predicts that the volume of trade between two economies should increase with their size (proxied by real GDP) and decrease with transactions cost (measured as bilateral distance). Even though the gravity model initially suffered from a weak theoretical foundation, it has recently become

extremely popular in the empirical trade literature (Robert et al, 1999). The reasons for its popularity are four-fold. First, modern theories of trade based on differentiated products provide an improved theoretical foundation for the gravity equation. Second, the gravity model has proved quite successful in estimating bilateral trade flows. Third, there has been an increased interest in empirically testing the trade effects of regional trading arrangements. Fourth, there has been a new interest among economists in the subject of geography and trade (Frankel, 1997). At the core, the gravity model predicts that bilateral trade should increase with GDP and decrease with distance.

2.8 Definition of key terms/concepts

2.8.1Competitiveness

The conceptual leap from the economic cost-based notion of comparative advantage to the broader notion of competitiveness adds a wide range of more qualitative issues. It also introduces a new set of observation variables into the discussion, drawn from business analysis. The classic treatment of these issues is found in Porter (1990). These are outlined in table 1. According to Porter, a host of commercial and management factors will affect a firm's ability to compete in the international marketplace. These include:

1. Factor conditions,
2. The structure of market demand,
3. Interaction with related and supporting industries in the cluster,
4. The determinants of firm strategy, structure, and rivalry,
5. The role of government, and
6. An element of "chance."

These elements are visualized by Porter are summarised in the table 1. The diagram supports Porter's argument that: Competitive advantage can be created or, at the very least, raised significantly and that the improvement of competitiveness within an economy should be a key element of national export strategy.

This means strategic initiatives should address competitiveness issues not only at the level of the individual product and service sector but at the national level as well (Porter, 1990).

Table 1: Determinants of National Competitive Advantage

Determinant	General conditions of Porter
Factor Conditions	• Factor endowment (human resources, physical resources, knowledge resources, capital resources, infrastructure) must be low-cost or uniquely high-quality • Factors must be effectively deployed (allocative efficiency, technology) • Focus on advanced factors (IT infrastructure, highly skilled workers, sophisticated research institutes) over basic factors • Focus on specialized over generalized factors • Respect for dynamic renewal of factor qualities • Whether factors are created (invented, innovated) or simply inherited
Demand Conditions	• Composition of home demand (what sectors, how sophisticated are buyers, how well do home buyers anticipate global trends) • Size and pattern of growth of home demand (economies of scale/learning, breadth of market demand, rate of growth, how early is local demand, how rapidly is local market saturated) • Mechanisms by which nation's domestic preferences transmitted to foreign markets (are local buyers internationally mobile, what kinds of linkages to potential foreign buyers)
Related and Supporting Industries	• Competitive advantage cannot simply be in one industry alone, other related and supporting industries also need to be competitive, and the linkages among them need to work smoothly • Having home-based suppliers accords significant competitive advantage in terms of the ability to coordinate, innovate, and upgrade versions using feedback loops • Having competitive firms in related industries in the home market can encourage important synergies and actually lead to creation of new competitive industries
Role of Government	• Factor conditions affected by government through subsidies, capital market policies, education policies, price controls/subsidies, public infrastructure investments, etc. • Local demand conditions shaped by government via the setting of local market regulations or as a major buyer in the local market • Related and supporting industries affected by government via regulations of business environment, media and advertising, telecommunications market • Firm strategy, structure, and rivalry affected by government via capital market regulations, tax policies, anti-trust laws • Government also affects the overall "diamond" via macroeconomic policy
Chance	• Random shocks can also have immediate repercussions for the business environment. These may include acts of pure invention, major technological discontinuities, discontinuities in input costs such as oil shocks, significant shifts in world financial markets or interest rates, demand surges, political decisions by governments, and wars or natural disasters

Source: Porter, 1990

2.8.2 Value chain analysis

Value Chain Analysis describes the activities that take place in a business and relates them to an analysis of the competitive strength of the business. It traces the collection of activities that are performed to design, produce, market, deliver, and support a firm's products. The ability of industry to compete depends on how it is structured along the value chain. The activities of a business could be grouped under two headings (Porter, 1990):

(1) **Primary Activities** - those that are directly concerned with creating and delivering a product (e.g. component assembly); and

(2) **Support Activities**, which whilst they are not directly involved in production, may increase effectiveness or efficiency (e.g. human resource management). It is rare for a business to undertake all primary and support activities. Support activities include firm infrastructure, human resource management, technology development and procurement that a firm may develop a competitive advantage in any one of these areas (Ankli, 1992).Value Chain Analysis is one way of identifying which activities are best undertaken by a business and which are best provided by others (out sourced).

2.8.3 Linking value chain analysis to competitive advantage

What activities a business undertakes is directly linked to achieving competitive advantage. For example, a business which wishes to outperform its competitors through differentiating itself through higher quality will have to perform its value chain activities better than the opposition. By contrast, a strategy based on seeking cost leadership will require a reduction in the costs associated with the value chain activities, or a reduction in the total amount of resources used.

2.9 Tradable and nontradable inputs

It is also necessary to distinguish between tradables and non-tradables inputs and outputs. Tradable goods and services as those goods or services that are, or can be, traded on international markets without the interference of governments, monopolies or other restrictive behaviour. Non-tradables are those goods and services for which the production cost and international transport cost is too high to make exports profitable, but too low to justify imports (Hansen, 1978). Calculation of the economic prices of tradable and non-tradable inputs and outputs presents several challenges. For instances there is no market for some non-tradables or there may be a lack of information on prices that do exist for both tradable and non-tradables. In order to derive the shadow prices of tradables and non-tradables, different methods and techniques were used.

2.9.1 Shadow pricing of tradables: maize, chemicals, feed concentrates, fuel, electricity

There are two main approaches that economists use in determining shadow prices. The first is the world price method that takes into account the world prices of products and services, especially with regard to those goods that are freely traded on international markets (Little and Mirrlees, 1974). When local market prices do not reflect scarcity values, world prices serve as a shadow price after adjustments have been made for the costs of importing or exporting the goods, namely the physical costs of transport, storage, insurance, etc. This approach is, however, not always desirable because exchange rates themselves may be distorted, i.e. they often do not reflect scarcity values. Also, not all inputs and outputs are traded internationally, hence the second approach, the opportunity cost method. Here the

opportunity costs, or the production that is given up elsewhere by withdrawing these inputs from alternative use, is used as the shadow price of inputs. In the case of the shadow price of outputs, the additional incremental benefit achieved by undertaking a project relative to the situation if the project had not been undertaken is used (Gittinger, 1982).

In practice both of these approaches are used to calculate shadow prices. Conventionally, the world price method is used where projects substitute imports or promote exports, i.e. where the inputs or outputs are internationally tradable. Locally purchased inputs are valued at international prices where the possibility exists that they could be imported or exported. In this study the world price approach was used as the principle method to estimate the economic prices of tradables. In this regard the conversion method and the tariff protection method were used to calculate the economic price of tradables. The conversion method entails that the world price of goods and services are determined and adjusted with the cost-insurance-and-freight component of imported goods and services.

This approach is denoted by the following equation (Jourbet et al, 2010):

$$CIFW_{ij} = (IntP_{ij} + TransC_{ij} + Ins_{ij}) \times ExhRij$$

Where;

$CIFW_{ij}$	=	Cost-insurance-freight-value of imports in domestic prices;
$IntP_{ij}$	=	International market price in US $;
$TransC_{ij}$	=	Transport cost;
Ins_{ij}	=	Insurance;
$ExhR_{ij}$	=	Exchange rate in local currency/US$;
i	=	product identification; and
j	=	year.

2.9.2 Shadow pricing of non-tradables: labour, land, water

In any production process the use of non-tradable inputs is plentiful. In this study labour will be regarded as non-tradable.

1. Labour

Labour can be skilled labour, semi-skilled labour and unskilled labour. A distinction must be made between skilled and unskilled labour. Distortions in the labour market, which cause the price of labour to deviate from its marginal product, necessitate the calculation of shadow prices for labour. In the case of labour, the convention is to disaggregate labour according to the level of skills. However, farm/industry workers in Zimbabwe are generally unskilled, and the skilled managers are too few compared to the workers who do the most work on broiler production hence, it is justified to treat all labour as unskilled and therefore non-tradable. As a result, the use of a shadow wage rate that is less than the market wage is unjustified (Gittinger, 1982). To determine the prevailing wage rate, personal communication with poultry producers was used whilst the minimum wage for unskilled farm workers will be used as the shadow price. It is important however to note that broiler production is a delicate process where mortalities can be very substantial if no proper care and maintenance of the chickens is done. The wage rate for broiler production tends to be higher than the minimum wage as producers also provide incentives to their unskilled labour such as meals, protective clothing and subsidised chicken which will increase production costs (ZPA, 2011).

2. Land

Gittinger (1982) defined the economic cost of land (opportunity cost) as the net value of production forgone when the use of land is changed from its "without" use to its "with" use;

measured in border prices. In the absence of a market value that reflects the opportunity cost to use land, Monke and Pearson (1986) state that the rental value can be used instead. If there is a competitive market in renting or leasing land, the analyst can consider the rental value as indicative of the contribution of land to the alternative output.

3. Water

Water in Zimbabwe's urban and farming areas can be regarded as one of the scarcest resources available. This means that one unit of water used in one sector reduces the water available to be used in other sectors by one unit. Hence, one can attach a scarcity value to water which relates to its opportunity cost.

2.10 Review of empirical studies

This section looks at the studies on poultry production and studies that were done using the methodology used in this research and the insights contained therein. PAM analysis can be used for individual commodity systems in different locations, farming business types, and technologies. The most commonly used tool to quantitatively assess agricultural pricing policies are the domestic resource cost (DRC) and the effective protection rate (EPR). Both are modified ratios of domestic prices to international prices. These measures are often calculated at different levels of the value chain of specific commodities and reported as summary indicators of the Policy Analysis Matrix (Croppenstedt et al, 2007). The PAM is used mostly to determine the competitiveness of agricultural enterprises in different countries or regions.

In their study on assessing the competitiveness of Indian cotton production (Samarendu, Mohanty and Cheng Fang, 2001) using the Policy Analysis Matrix Approach, found out that

cotton is not efficiently produced in the second largest cotton producing state in the country. Without government interventions, farmers shift away from cotton to more profitable crops such as sugarcane and groundnut in this state. Cheng Fang and John C. Beghin (2002) found out that China has a comparative advantage in labour-intensive crops, and a disadvantage in land-intensive crops. The study highlighted that competitiveness varies across regions depending on the economic conditions of each region.

In Zimbabwe, a comparative economic advantage of crop production was done by measuring the private and social profitability, resource cost ratios, and sensitivity to world prices and yields of different crops produced by the various farming system sectors in the five agro ecological zones in Zimbabwe. The results indicated that crops were competitive depending on the regions in which they were grown and the sector that grew them (commercial, small scale or subsistence (Sukume et al, 1999). Comparative advantage was found in ground nuts and sunflower and finger millet whilst most government policy focused on maize subsidies yet maize did not have a comparative economic advantage. The study findings indicated that the emphasis on maize production may not be warranted and that removal of maize subsidies would boost the production of other crops. The study also found out that only the government bore the cost of subsidies (Sukume et al, 1999). The study indicated that using the PAM to measure comparative advantage can be useful in quantitative policy analysis and helps in government policy formulation.

McLeod et al (2009) analysed the major structural changes that have occurred in poultry production and marketing in recent decades driven by the growing consumer demand for cheap animal protein. Due to international integration, poultry industry has evolved that utilizes economies of scale and advanced technology. In developing countries poultry is still

done in less intensive systems. Increasing external pressures on the poultry sector arising from social, economic and environmental factors are strengthening the trend towards intensification. The authors concluded that smallholder poultry production will continue to serve two needs: supporting livelihoods of poor rural households and as a source of lean meat for growing populations in non-agricultural areas.

2.11 Summary

This chapter reviewed literature on production and trade. The chapter also reviewed literature on poultry production in Zimbabwe. The distinction between tradable and non tradable inputs was also made. Studies on the competitiveness and comparative advantage of various farming enterprises were also analysed.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The main objective of this chapter is to develop a framework for measuring and analysis of the competitiveness of broiler enterprises in Zimbabwe. The chapter also presents the research instruments, sampling methods and the population sample used in the study. Both primary and secondary data will be used. Primary data were collected through a survey of poultry producers using semi structured interviews. Some data like production of maize, prices, and quantities of imports was obtained through secondary sources. These include publications form the government statistics department (ZimStat), the Ministry of Agriculture and statistics from the ZPA and other sources of secondary data. The study will focus on the major broiler producers mainly in the Harare Metropolitan Province. Lastly comparing past trends in poultry production, volumes traded and other economic factors will be useful in analysis of factors affecting broiler imports and exports.

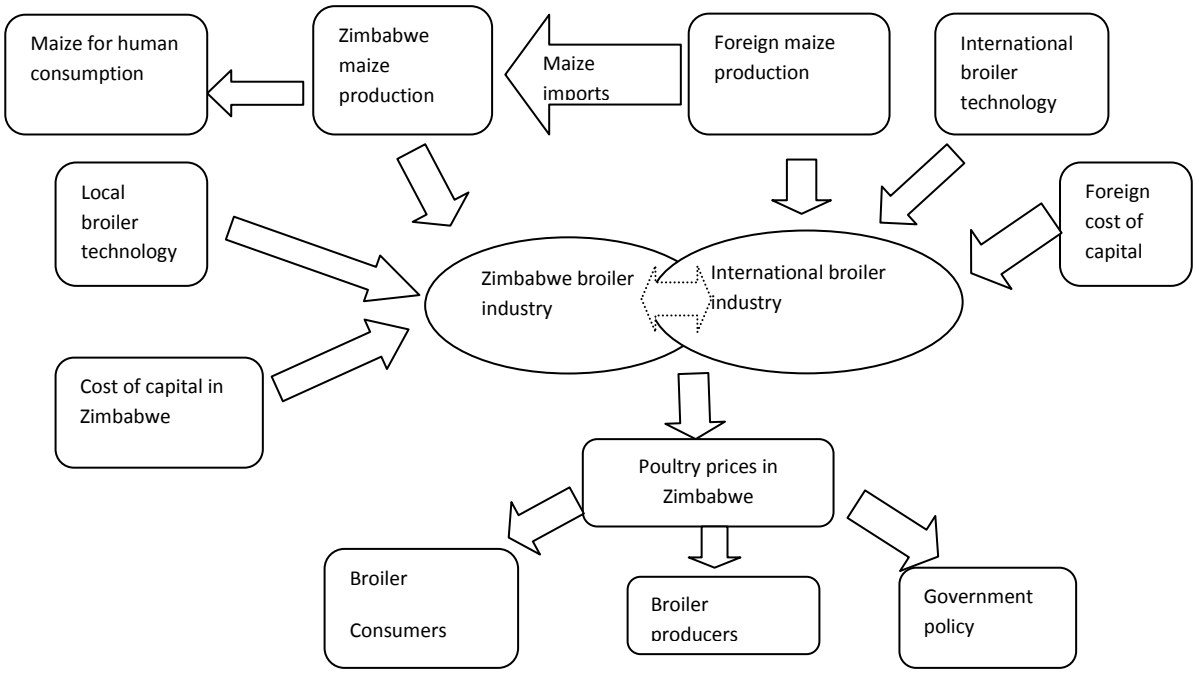
3.1Conceptual framework

There is a link between the local broiler industry and the foreign broiler sector and they both play a role in determining broiler meat prices in Zimbabwe. The Zimbabwean broiler sector has been protected from international competition over the years. In addition, Zimbabwe has not been able to produce enough maize to meet domestic food requirements for some time. The maize imports are used for human consumption as well as for stock feeds. Interests are currently very low globally as the world recovers from the recession of 2008 -2009 but remain very high in Zimbabwe making it difficult for domestic poultry players to borrow to

boost production (ZPA, 2009). The midterm fiscal policy review of July 2010 indicated that lending rates remain very high in Zimbabwe compared to other regional economies and this was negatively affecting productivity in all sectors of the economy (GoZ, 2010). Due to continued economic decline of the last decade, the Zimbabwean broiler producers have not been able to use advanced and efficient technology that has increased production in other countries such as South Africa and Brazil (The Poultry Site, 2010). There are numerous instances where the South African Poultry Association accuses Zimbabwean poultry industry of trying to ban their low cost products on the Zimbabwean market.

The differences in technology, prices, and economic conditions prevailing in the world broiler industry and the Zimbabwean broiler industry are illustrated in the conceptual flow diagram below. The interaction of high domestic costs of production and low global costs leads to Zimbabwean broiler meat prices that are a concern to producers and consumers and leaves policy makers (Government) with the task of designing and implementing appropriate policies for the benefit of all stakeholders.

Figure 1 below conceptualizes the linkage between the broiler industry in Zimbabwe and the international broiler industry after the country opened its boarders to international trade in broiler in 2009. The diagram illustrates the differences between the foreign and local factors affecting broiler production in Zimbabwe and the implications of international broiler trade on Zimbabwean consumers, producers and government policy.



Source: Own Conceptualisation

Figure 1: Conceptual Framework of the broiler industry in Zimbabwe

3.2 Study area

This study was conducted in the Harare Metropolitan Province. Harare is the commercial and administrative capital of the Republic of Zimbabwe where the major economic activities are found. Harare's population of approximately 2,800,000 with 1,600,000 in its metropolitan area makes it an urban sector where the reliance on commercial broiler products is high (USAID, 2006). Harare is also the centre of all major economic, political and commercial

activities and the main destination for people moving from rural areas. Harare also contains the major broiler producing companies like Irvines, Hubbard, Lunar and companies that manufacture broiler feeds like Agrifoods, Windmill, and Blue Ribbon among others. Because of its size and the level of economic activity, Harare Metropolitan Province was purposively selected for the study. It is the major market for meat including broiler products and contains all the major broiler producers

3.3 Sampling design

The target population of this study was commercial broiler producers in the Harare Metropolitan Province, registered or not registered with the Zimbabwe Poultry Association. The study interviewed four large scale producers using semi structured interviews. The chairman of the Zimbabwe poultry Association, The technical Manager at Irvine's, the manager at Lunar Chickens and the Department of Livestock Production were interviewed and they gave information on the quantities of the various inputs used in production. Prices were obtained by surveying five major retail outlets and four stock feed suppliers. The companies did not reveal much information citing confidentiality.

3.4 Data requirements and analysis

The data requirements for constructing a PAM include yields, input requirements, and the market prices for inputs and outputs. Additional data such as transportation costs, storage costs; production subsidy, import/export tariffs and exchange rate are also required to calculate social prices. The study therefore uses both secondary and primary data to address

the hypotheses to be tested in the study. The data requirements, key variables and data sources are listed in the table below:

Table 2: Summary of key variables and data sources

Key Variables		Data sources
1)Broiler producers characteristics	location, level of integration, operations, buildings, types of companies/ industry marketing channel, mechanisation, feed sources, membership to professional bodies, constraints to production	Primary and secondary source
2) Production statistics	Maize, soyabean, broilers	Primary and secondary data
3) Private prices	Maize, soyabeans, labour, electricity, transport	Secondary and Primary data sources
4) Social prices	Import parity prices, tariffs	Secondary data
5)Institutional environment	Competitive indicators	Secondary data

3.5 Analytical framework

Competitiveness of broiler production was done in three analytical chapters. The first part, characterization of broiler production, was done from primary data using descriptive statics. This section uses mostly descriptive statistics and general firm characteristics were discussed. The second analysis was done using the PAM. The PAM used both primary and secondary data. The third analysis was done by interpretation of the PAM results and determinants of competitiveness and comparative advantage indicators on broiler farmers as well as the effects of current policies on production The chapter will also describe access to production resources, type of technology used as well as the level of vertical and horizontal integration of broiler producers in all categories.

3.6 The policy analysis matrix

The central purpose of PAM analysis is to measure the impact of government policy on the private profitability of agricultural systems and on the efficiency of resource use. Private profitability and competitiveness are the key issues in agricultural incomes and the current arguments from broiler farmers that profitability has been affected by imports. Social profitability and efficiency are central to economic planning - the allocation of resources among sectors and the growth of aggregate income in the economy and on what policy options to pursue. The approach is particularly well suited to empirical analysis of agricultural price policy and farm incomes, public investment policy and efficiency, and agricultural research policy and technological change. The primary strength of the PAM is that it allows the disaggregation of the production activities, assessment of the effects of policy induced transfers, and individual and net effects of seemingly conflicting sets of policies, therefore making it usage very straightforward (Nelson and M. Panggabean,1991). PAM suffers a weakness of the assumption of fixed input-output coefficients; however, it can readily accommodate such parameter changes using sensitivity analysis (simulation). The basic format of the PAM as shown in Table 3 is a two-way accounting identities. The PAM table consists of private and social profitability in its first and second rows and divergences in its third row (Monke and Pearson, 1989). The private profits evaluated at market prices and social profits evaluated at social or efficiency prices. If there are no market distortions, the two are often the same. If, however, there are market failures or distortions then the two would diverge from one another. Their divergence acts as a signal for policy intervention.

Table 3: The Framework of the Policy Analysis Matrix

	Revenue	Costs		Profit
		Tradable	Non Tradable	
Private Price	A	B	C	D
Social Price	E	F	G	H
Divergence	I	J	K	L

Source: Monke and Pearson, 1989

Following Pearson and Monke (1989), the symbols (capital letters) are defined as follows:

A Revenues in private prices (market prevailing prices, also called accounting prices).

B Costs of tradable inputs (such as fertilisers, seeds, plastic mulch, etc.) in private prices.

C Costs of domestic factors (such as labour, capital, etc.) in private prices.

D Private Profits (D=A-B-C).

E Revenues in social prices (economic efficiency prices or shadow prices).

F Costs of tradable inputs (such as fertilisers, seeds, plastic mulch, etc.) in social prices.

G Costs of domestic factors such as (labour, capital, etc.) in social prices.

H Social profits (H = E-F-G).

I Output Transfers (I = A-E)

J Input Transfers (J=B-F)

K Factor Transfers (K=C-G)

L Net Transfers (L=D-H or L=I-J-K)

The PAM brings in tools that enable to determination of the competitiveness and comparative advantage of the broiler sector. Competitiveness is the ability to earn profits and maintain market share. Profitability is the most important element of competitiveness, as it relates benefits (revenues) and costs (expenditure), and productivity is the most important underlying factor. Anything that would increase profitability and productivity would therefore increase

competitiveness. Comparative advantage is the relative efficiency of domestic production of a commodity in comparison to competing commodities or trading partners (Schwab, 2010). Under this theory, countries specialize in those goods and services where they have a comparative advantage, and then total output and economic welfare can be increased. At a national level, comparative advantage shows the relative efficiency in production of commodities in terms of net foreign currency earnings (Nelson and M. Panggabean, 1991)

3.7 Tools to measure comparative advantage and distortions

The PAM will produce various indicators to measure the comparative advantage of the broiler industry in Zimbabwe as well as the measures of distortions in the in the industry. The table 4 below highlights the economic indicators derived from the PAM framework.

Table 4: Economic indicators derived from PAM

NPC	**Nominal Protection Coefficient**	**(A/E)**
NPCO	Nominal Protection Coefficient on output	A/E
NPCI	Nominal Protection Coefficient on input	B/F
EPC	Effective Protection Coefficient	[(A-B)/(E-F)]
DRC	Domestic Resource Cost	G/(E-F)
PCR	Private Cost Ratio	C/(A – B)
SRP	Subsidy Ratio to Producers	L/E =(D-H)/E
PC	Profitability Coefficient	D/H

Source: Monke and Pearson, 1989.

3.8 Gross margins

Gross margin analysis was used to analyse the private profitability of broiler production is privately profitable. Gross margins were obtained by subtracting total variable costs from total revenue. A positive gross margin showed that the enterprise is privately profitable.

GM = TR-TVC

For this study, variable costs will include the purchase of feeds, chemicals, labour, rents and taxes. The costs will also include costs associated with production, marketing and transportation. Despite their limitations, GMs are useful in quantifying costs and returns of the different broiler enterprises.

3.9 Characterisation of price distortions effects on broiler production

This analytical chapter critically evaluates the effects of government's economic policies (fiscal, monetary, agricultural, trade, technology) on the competitiveness and comparative advantage of Zimbabwe's broiler enterprises. The study will make use of the budgets developed in the above section to compare social and economic prices of the factors of production used in broiler production and characterise the price distortions in domestic broiler production. Characterisation will also include the international, institutional and economic sectors under which broiler production is done and this will include the macroeconomic environment, the production of the basic input required for production-maize and soyabean

3.10 Policy Simulation

Sensitivity analysis provides a way of assessing the impact of changed assumptions and errors in estimating profitability. It can be applied to both private and social estimations. It involves changing key data, parameters, or assumptions to study the effects on major results. Sensitivity analysis will be done to assess the impact of changes in prices, exchange rates and policy on the competitiveness of broiler production.

3.11 Limitations of the Study

The first major constraint to the study is the shortage of reliable secondary data. The national production statistics from ZimStat are not up to date with the recent data being production figures up to 2003. There was the general unavailability of adequate secondary information from all the stakeholders. Efforts were however made to make the data representative of the broiler enterprises in Zimbabwe despite resource constraints.

3.12 Summary

This chapter presented the methods that were used for measuring the competitiveness of broiler enterprises in Zimbabwe. The chapter also presents the research instruments, sampling methods and the population sample used in the study. A brief description of the study area and the justification for selecting it was given as well as the sampling framework and the limitations of the study.

CHAPTER 4: TRENDS IN SOYABEAN, MAIZE AND POULTRY PRODUCTION IN ZIMBABWE

4.0 Introduction

This is the first analytical chapter. The purpose of the chapter is to characterise broiler production in Zimbabwe. Trends in broiler, maize and soyabean production will be analysed using data from secondary sources. It is essential to analyse the trends in maize and soyabean production as well because they are the key inputs for broiler production. In addition to the key ingredients, the chapter will also analyse the broiler value chain and general characteristics about broiler producers in Zimbabwe. Broiler production is usually done in conjunction with egg production and production of day old chicks for sale and this will also be analysed. To increase firm competitiveness, some firms do both vertical and horizontal integration and with this in mind, the extent of vertical integration within producers will be analysed from procurement of inputs to the processing, packaging and marketing of broilers, day old chicks and eggs.

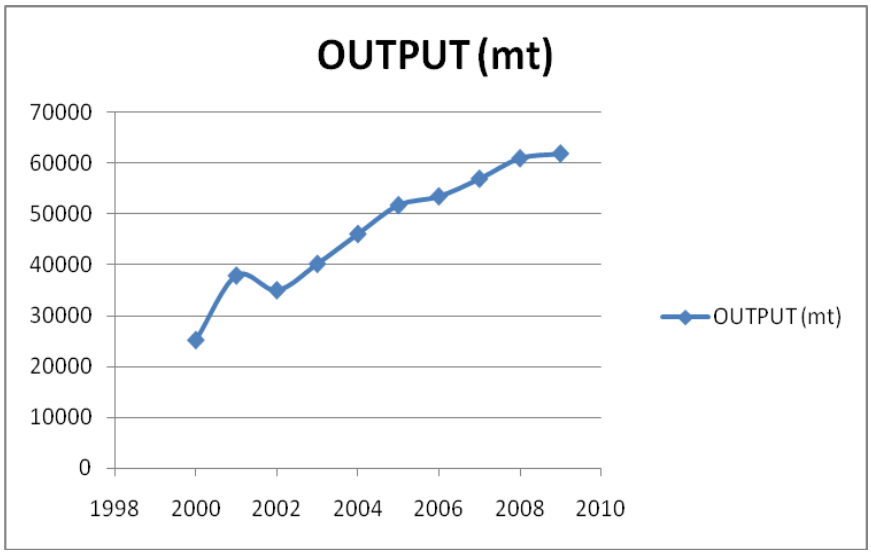
4.1 Aggregate broiler production

The commercial broiler production sector has been dominated by three vertically integrated breeding companies which produce and market day old chicks, broiler meat and eggs. They also operate contract grower schemes where farmers are contracted to rear broilers to slaughter weight on behalf of companies. National day old chick production is approximately 30 million chicks per annum for broilers, 2 million sexed pullets and 227,000 as hatched layers. The demand for poultry products has been growing steadily. Currently Zimbabwe is

experiencing shortage of some products. Low crop production due to crop input availability problems has limited availability of stock feed and, therefore, livestock production (The poultry site, 2010). In general, there has been a shortage of meat on the local markets, while export of meat and dairy products has been drastically reduced. In addition, disease incidence has been high in all classes of animals, further reducing productivity (MAMID, 2009).

Despite the challenges that have been experienced in shortages of inputs – soybean and maize especially in 2009, coupled with the hyperinflationary period of 2008 and the subsequent introduction of imports after dollarization, the country's commercial broiler sector has continued to produce for the market despite the existence of what they claim are cheap imports. The figure below show the trend in broiler production since 2000.

Figure 2: Broiler production in Zimbabwe 2000-2009 (metric tons)



Source: FAOSTAT

4.2 Feed manufacturing

All the broiler producers surveyed produce their own feeds and the country has seen the proliferation of small stock feed manufacturers in recent years. The main feed producers are Blue Ribbon and Agrifoods whilst oil processing companies such as Olivine industries, United Refineries, National Foods and Surface investments are also key source of soyacake used in feed formulation (Kapuya et al, 2010). The broiler companies are mostly located within the greater Harare area on farms for bio security reasons. Feed is in most cases manufactured on site, with firms having developed linkages with suppliers from imports or through locally produced inputs or through contract soyabean and maize farming.

4.3 Mechanisation and infrastructure

The production of broiler from day old chicks until they are ready for processing is done in specially built brooding rooms where feed and water are given manually. Temperature is controlled by infrared lights which use electricity. Chicks require additional warmth to keep them warm from day old up to about 3 weeks when they have developed feathers. This is a critical period in broiler management as high mortalities can occur due to exposure.

All the firms surveyed in the study have buildings on site for the various activities that are carried out for the breeding, production of day old chicks, production of broilers and layers, feed mills and marketing. Buildings include offices for administration and coordination of all the activities of the firm, feed mills, brooding houses, processing machinery, packaging facilities, storage facilities, and equipment to handle and transport both raw materials and the processed commodity. In addition, some houses for housing workers are also available on some firms.

4.4 Water and electricity

Some of the major broiler producers use water from the city of Harare therefore the industrial charges of water per cubic meter from Harare City council will be used. Due to erratic water supplies from Harare, some producers have onsite water supplies through their own boreholes. Zimbabwe imports 400 kilowatts of energy per month from regional countries therefore electricity will be treated as a tradable commodity (www.indexmundi.com, 2011). The social price for electricity will be determined by the average global price for a Kilowatt of electricity. These prices are converted to domestic currencies using market exchange rates and finally, marketing costs are added to compare with farm gate prices. Due to electricity load shedding, some firms have contingent electricity supply plans for maintenance of critical equipment like storage facilities through generators.

4.5 Types of companies/ industry

The broiler industry in Zimbabwe is dominated by large public listed companies that are part of some very established companies that have undergone backward integration to increase broiler products supply. Innscor Africa Limited with a 49% stake in Irvine's, has invested aggressively in Irvine's Zimbabwe Private Limited to boost day-old chick production and broiler processing, to buttress its growing fast foods division (The Poultry Site, 2011). The acquisition was engendered to foster backward integration with Zimbabwe's largest producer of broiler and eggs — key raw materials for its fast foods retail division, the group's flagship, which it operates under a number of international franchises.

The other large company in the broiler sector, Hubbard (formerly Ross Breeders) a subsidiary of CFI Holdings have an agreement with Hubbard Flex for the exclusive distribution of

Hubbard Flex products in Zimbabwe and neighbouring countries Botswana, Malawi and Zambia. The Hubbard flex brand of broiler has good characteristics including the flexibility for different needs and circumstances, with excellent liveability and uniformity, ease of management, good feed conversion, health, meat yields and reproduction (Hubbard, 2005).

Lunar Chickens is a relatively new producer of broiler products in the Zimbabwean market. It consists of a broiler, layer and egg sections. The company is now a significant player in the local market and with ambitions to venture into export markets. Lunar is a fully integrated broiler producer that breeds and rears its own livestock, processes, distributes and markets fresh, frozen and value-added broiler. In addition to this Lunar produces day old chicks, table eggs and hatching eggs. The company is also involved in the sale of eggs, point of lay pullets and chicken meat, live, fresh or frozen. (www.lunarchickens.com, 2011).

In addition to the three major companies, there are over 400 medium and small scale producers who are members of the ZPA. These are subcontracted by the large companies (mainly Irvine's) or sell their broilers independently (ZPA, 2011).

4.6 Marketing channel

The marketing of broiler products is done through established retail outlets. Marketing mostly involves packaging in 2kg or 5kg packs of frozen chicken pieces through major retail outlets in Zimbabwe. Some products- eggs and live birds are also sold to the general public or to middlemen for resale.

4.7 Maize production

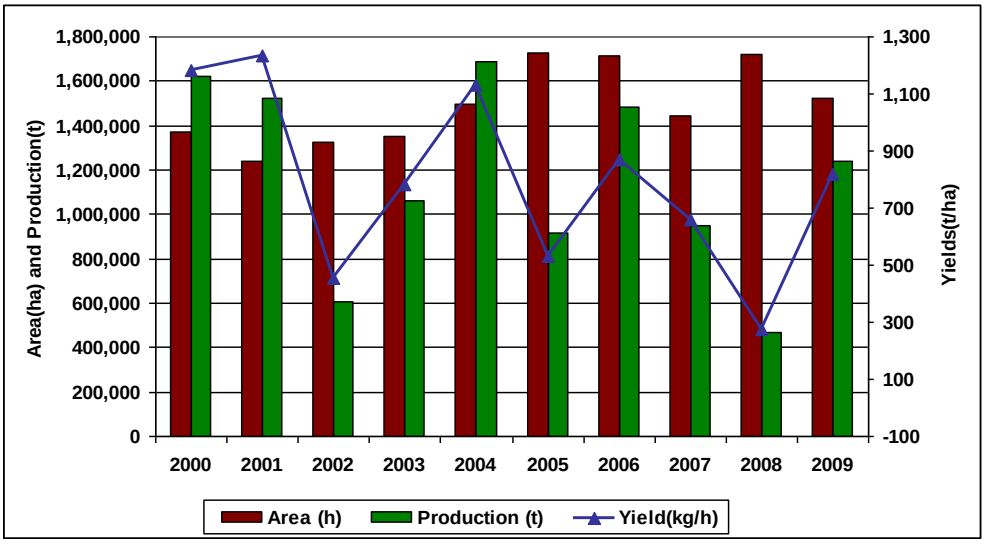
Maize is the most important grain crop in Zimbabwe, being both a major feed grain and a staple food for the majority of the population. FAO (2008) reported that maize and maize

products accounted for 43% of the total dietary energy supply (DES) between 2003 and 2005; and the average per capita food consumption of maize and maize products was 120 kg/yr between 2004 and 2008. More than half of the maize produced is consumed by humans, with about 10 % being utilised by the animal feed industry, while the remainder gets used for seed and other industrial purposes (FAO, 2009).

4.7.1 Production Background and policy environment

At least 1.2 million hectares of maize should be planted to meet the domestic human consumption requirements of 1.825 million tonnes, on average. Generally, the total maize area planted trend has been increasing over time, with marginal declines in 2003 and 2006. Total area harvested has remained above 1.317 million hectares since 2001 and has been above the 1990's average of 1.301 million. Figure 3 below shows that area harvested peaked in 2005 and 2007 to above 1.7 million hectares.

Figure 3: Maize area harvested, production and yield



Source: FAOSTAT

The observed gains in maize area harvested have however not been matched with an increase in yield. Yield has fallen below the 1990's average of 1.25 tons per hectare; with the worst yield being recorded in 2001 and 2007. Maize output has dropped to 575 000T in 2007, the lowest since the 1992 drought. Although maize output increased marginally in 2008, production still remains less than half of national requirements. This estimate is against the government targeted area planted of 2 million hectares and the Social Transformation and Economic Recovery Program's (STERP's) forecast of the country meeting 80% of its maize requirement. Nonetheless, the countries will most likely produce less than half of its national requirement and this will be due to the challenges of input supply bottlenecks and lack of funding currently facing farmers as well as the impending drought.

4.7.2 Trade and domestic policies

Several programs have been pursued through government funded initiatives from 2000 to date to improve maize output. Such programs mainly involved provision of subsidised inputs at concessionary interest rates, including, The Government Input Scheme (2000), the Productive Sector Facility (PSF) introduced in 2004, the Agricultural Sector Productivity Enhancement Facility (ASPEF), introduced in 2005 and the provision of seed and fertilizer through the SADC Agricultural Inputs Support Initiative (2008) that primarily targeted smallholder farmers in communal, old resettlement, and small scale commercial areas. Other facilities included the fertilizer support to farmer unions, conservation agriculture supported by the European Union, South Africa, and Spain.

Despite all these efforts, there have been recurrent and persistent maize deficits that have triggered increased imports and food aid into the country. The aforementioned demand and supply block variables are all captured in the food balance sheet as shown in Table 5 below.

Table 5: Zimbabwe's Maize Balance Sheet (Millions of Tonnes)

Season	Production	Imports	Food Aid	Expor	Consumptio	Ending	Balance
2001/02	1.526	0.318	0.014	0	1.404	0.420	-0.318
2002/03	0.605	0.764	0.343	0	1.185	0.150	-0.764
2003/04	1.509	0.340	0.361	0	1.237	0.120*	-0.340
2004/05	1.686	0.530	0.178	0	1.517	0.120*	-0.530
2005/06	0.915	0.686	0.053	0	-	0.120*	-0.686
2006/07	1.485	0.251	0.062	0	-	-	-0.251
2007/08	0.953	0.600	0.158	0	-	-	-0.600
2008/09	0.471	0.500	0.028	0	-	-	-0.500

Source: FAOSTAT, 2011

Average annual domestic utilization of maize grain between 2001/02 and 2008/09 is an estimated 1.98 million tonnes. FAO (2008) reports the total domestic maize utilisation to be 1.825 million tonnes, while government estimates it at roughly 2.5 million after including other discretionary stock uses. The net stocks have been consistently negative, indicating that Zimbabwe has been a net importer of maize over the last decade. The collapse of the strategic grain reserve in 1998 has led to zero maize exports and an eventual export ban in 2000. Over the three year period 2006/07 – 2008/09, maize imports and food aid have accounted for approximately one-third to two-thirds of total supply.

4.7.3 Grain storage and trade

Zimbabwe's grain storage industry has been dominated by a pervasive GMB monopoly that emanated from the controlled marketing of maize and other grain commodities. In the 1980's, a country-wide network of silos was established as part of an expansion drive that was meant to absorb the previously marginalised communal farmers into mainstream grain markets. This

established infrastructure has ensured the dominance of the GMB in grain storage. Currently, the nation's total storage capacity is estimated at 5 million tonnes. The silo grain storage consists of 10 main depots, with bulk grain being stored in grain complexes with a total storing capacity of 733 500 tonnes; while bagged grain can be stored at all depots on hard stands and in sheds with a capacity of taking up to 4 266 500 tonnes. The liberalization of maize trade in the 1990s has led to the emergence of private grain storage companies like Croplink, Intergrain and Staywell.

After the 1992 drought, a Strategic Reserve Policy (SRP) was in principle, briefly followed through the implementation of a strategic reserve policy which subscribed 500 000 tonnes of physical stock and 400 000 tonnes of monetary equivalent to fill the national human grain requirement of 900 000 tonnes as a measure to ensure consistent maize supply in the event of a droughts or other market shocks (Muir-Leresche and Muchopa, 2006). However, this storage policy, as was the case with other storage policies in the past, has been largely discretionary. This policy eventually became unsustainable in 1998 due to the escalating GMB debt.

Deregulation from 1994 to 2000 had put the state owned GMB silos under economic pressure to operate within a free market system, to compete with other grain storage companies. The deregulated situation with multiple owners of stored grain meant more sophisticated and cost effective administration and diversity of market information required for efficient competition among private warehouses, GMB and on-farm storage. the GMB rents out its infrastructure to traders for private storage purposes at bulk storage rates of US$0.10/tonnes/day and bagged grain is charged at US$0.15/tonnes/day and it is believed that over 65% of volumes are now being stored and traded in the private sector. While larger

millers have vertically integrated themselves to assume their own storage, they have also directly engaged private traders, with private storage prices offered by companies such as Croplink being generated through ‘bids’ and ‘offers’ in a free market.

4.7.4 Processing

Zimbabwe’s secondary industry consists of dry and wet milling sectors. The dry milling sector is involved in the processing of maize to maize meal for human consumption and stock feed, while the wet milling sector is involved in beer manufacture. Large-scale millers like the GMB, National Foods and Blue Ribbon Foods usually perform agro-processing activities in conjunction with commodity trading, logistics, polythene bag as well as packaging manufacturing and sometimes agricultural support services as part of their integrated functions. The large- and medium-scale millers are mostly situated in the industrial sites of towns and cities. These do not cater for individual clients requiring their maize milled, but rather mill on a large-scale; selling refined and straight run maize meal to individuals, retailers, wholesalers in the formal markets. Medium-scale millers normally cater for small, informal retailers whilst the large-scale millers cater for established retailers. The small-scale millers are mostly situated around high density areas in major cities and towns and also in rural areas.

4.7.5 Retailing and consumption

Zimbabwe currently utilises 1,825 million tonnes of mealie-meal per annum. Maize imports are attracting zero tariffs meaning that Brazilian, Argentinean, and South Africa free on board (fob) prices have become an important reference point for domestic market participants in

their price discovery processes. To calculate the prices at which buyers can opt for between local or international grain, the market buyers use an import/export parity calculation. For example, if grain millers can buy imported maize (including the cost of transport, insurance, the tariff, the exchange rate, etc.) for cheaper than locally produced maize, they will do so until local producers are able to supply maize as cheaply. This is called an import parity price, a regime at which Zimbabwe is currently operating in since the nation turned into a net maize importer in recent years.

The supply and demand factors that are currently affecting maize prices include weather conditions; consumer preferences; government policies, such as export bans and tariff applications; regional trade agreements, changes in living standards; market expectations; and technology. Currently, the landed price for maize ex-Harare from Randfontein South Africa is US$226/ton (FAOSTST, 2011) while domestic farmers can only produce profitably at US$285/ton and the GMB is selling at US$325/ton, making imports more attractive for millers relative to local grain.

4.8 Maize and the feed industry

The above situation points to maize shortages for feeds manufacturing and has resulted in companies devising ways to survive under such as situation. Most of the broiler industry players have vertically integrated, developing their own feed mills on stations (for example Irvine's) or by engaging in contract farming to boost the supply of maize (for example Lunar chickens). The maize situation has also seen broiler companies relying on maize imports than local supplies. Irvine's in particular has an onsite feed mill on its Waterfalls farm with a capacity to produce 900 tonnes of feed per week (Newsday, September 10, 2010).

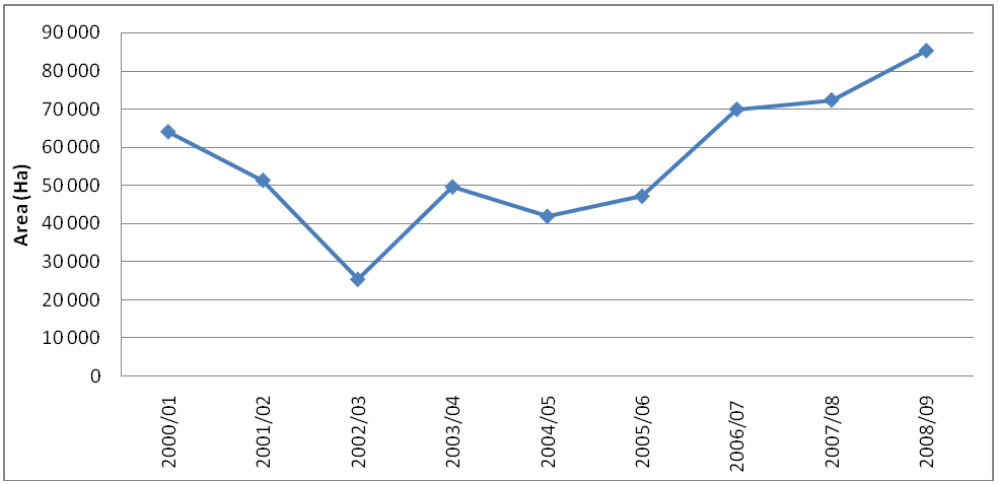
4.9 Soyabean production

Soyabean is important as a source of protein for both livestock and human populations. The popularity of soybean is also generally attributed to its multi-purpose benefits as a cash and food crop, making its associated production, processing, consumption, and marketing activities much more lucrative. The crop's nitrogen fixing abilities make it a perfect rotation option with crops such as maize and wheat as it reduces input costs and therefore capital requirements for resource constrained farmers. Soyabean marketable products include seed, soybean cake, soymilk, soy yoghurts and soybean oil. In Zimbabwe Soya beans contribute 30% of all the cooking oil production while cottonseed contributes 50% (GoZ, 2008). Approximately 95% of all soybean seed produced in Zimbabwe is destined for the processing industry for the production of soybean oil. Soybean oilcake (also referred to as meal), a by-product of the oil extraction process, is sold to feed manufacturers domestically and in the region (particularly South Africa).

4.9.1 Production background and policy environment

Estimates place the number of producers as roughly equivalent to that of maize farmers given diversification and crop rotation practices within Zimbabwe. Statistics from the Ministry of Agriculture (MAMID) show that area harvested for soybean has been gradually increasing since the 2004/05 season. As shown in figure 4 below, the steady increase in soybean area harvested came after the three consecutive years of decline from 2000/01 to 2002/03, reaching decade low levels of 34,000Ha that season. The area harvested has however peaked in 2008/09 to 85,200Ha from 41,800Ha in 2004/05.

Figure 4: Soyabean annual area harvested 2000/01 to 2008/09



Source: FAOSTAT

A key observation is that the recorded increases in area harvested have however not been met with reciprocal increases in yield. Yield have not reached above 2.3 tons/ha since 2000/01, with yields ranging between 0.67 tons/ha and 1.4 tons/ha between the 2001/02 and 2008/09 seasons. The soybean industry has established that the general drive for increased soybean production, especially under a prevailing economic environment that is typified by high cost of borrowing and costly scarce inputs has so far failed to adequately expand the production base to levels that meet the plus 300 000 tonnes national soybean demand that can sufficiently provide the local oil manufacturing sector and fulfil export demands. There is a great need to expand local soybean production and usable plant capacity in order to meet the total requirement by the large scale industrial oil pressers. This will allow the country to effectively expand their export markets. Previous and on-going interventions, aimed at increasing domestic soybean production, by Government through the Reserve Bank of Zimbabwe (RBZ), the Soybean Task Force, and the WK Kellogg Foundation funded

programmes under the ARC (since 2004) have not brought the desired results. National average yields have been stagnant over the past 8 years, failing to increase beyond the 2.3 tonnes/ha mark recorded in 2000/01. As such, the programs have not had a significant impact on aggregate national output (Kapuya et al, 2010).

4.9.2 Storage and pricing policy

With soybean being relatively free from government control, farmers have developed on-farm storage. Soybean prices have not only been influenced by the supply and demand factors of soybean seed, but also the supply and demand factors of the local and international soybean seed market. The international soybean seed prices implicitly act as a benchmark for domestic seed and oil prices (MAMID, 2009). Of particular importance now is the situation of the South African and Argentinean soya bean markets that have a significant impact on the local market prices. Domestic soybean producers trade their soybean produce with local processors at import parity prices. This is because Zimbabwe is a deficit producer of soybeans and therefore import tariffs may have an impact on domestic soybean prices. The landing price (cif) for soyabean from Randfontein used in this study was US$ 800 per tonne whilst the local price used was US$1100 (FAOSTAT).

4.9.4 Soybean value chain

It is important to note that the assumed source of soybean seed and oil supply are the domestic farmers and local crushers respectively. This is because Zimbabwe imports less amounts of soybeans and imports a small though unconfirmed amount of crude oil due to strict Sanitary and Phytosanitary (SPS) policy measures that render importation of such

products unviable. Thus, a tonne of raw soybean seed generates, on average, 390 kg of crude oil and 420 kg of cake (Kapuya et al, 2010).

Productivity in the soybean sector has been poor and uncompetitive. Increase in soyabean production can be improved by increased irrigation capacity and refurbishment of available irrigation facilities and farm level financing, reliable supply of low-cost inputs (e.g. Seed, fertiliser and electricity). Soybean supplies are likely to continue to decline throughout the year, even as forecasts of a further decline of soybean output are projected in the following season. Zimbabwe's Soybean market has become heavily reliant on the importation of key production inputs such as seed and fertilizer. Imported inputs have meant that domestic farmer's input costs have risen and remain high, relative to other soybean producers within the region. If current conditions prevail, it is expected that output will continue to decline. (MAMID, 2009).

4.10 Conclusions

This chapter has characterised the broiler production systems in Zimbabwe. This was done by looking at the characteristics of the main broiler breeding companies. The chapter also analysed the maize and soyabean value chains and the constraints to production of these crops. Maize and soyabeans were analysed because they are the key ingredients for broiler feed manufacture in Zimbabwe.

CHAPTER 5: SOCIAL AND PRIVATE COSTS OF BROILER PRODUCTION AND MEASURES OF DISTORTIONS

5.0 Introduction

This chapter provides a quantitative analysis to the competitiveness of the broiler sector in Zimbabwe. The first step is the determination of the inputs and outputs in production and their prices. This chapter derives the social and private costs of producing broilers and the private and social profitability. World prices in most cases form the basis of social valuation and efficiency analysis of agricultural systems whilst private prices are the current distorted market prices. These two prices (private and social) will be used to derive the measures of distortions in the local broiler production. This chapter provides a first level analysis of the magnitude of domestic price distortions. The analysis will be done through a partial equilibrium framework through the PAM.

5.1 Data modelling

The data used in this section was obtained from primary sources- through discussions held with broiler producers, feed manufactures and secondary sources such as the internet, Ministry of agriculture, ZPA and ZimStat. Further information was also obtained from the internet websites such as FAOSTAT. The most difficult tasks for constructing a PAM are estimating social prices for outputs and inputs, and decomposing inputs into their tradable and nontradable components (Yao, 1997). For computing social prices for various commodities including both outputs and inputs, world prices are used as the reference prices in the study. The world prices are adjusted for transportation costs and marketing costs to be

comparable with farm gate prices. For imported commodities, maize, electricity and soyabean, social prices at the farm gate are calculated by adding marketing costs to the respective cost insurance and freight (cif) Randfontein prices (calculated by adding road freight charges to the FOB price) in domestic currency. (Tsakok,1990).

5.2 Maize

Maize is the most important commodity in broiler production, accounting for 60 percent of the composition of feed. The social price for maize used in this study was the Randfontein free on board (fob) price adjusted by including the cost, insurance and freight charges of transporting it to Harare.

5.3 Soyabean

Soya bean has been the major protein feed source of choice for broiler farmers. When intensive broiler production was introduced in Zimbabwe, fishmeal was used as the main protein source. However this became expensive as fishmeal was imported and this led to development of soya bean meal as a substitute for fishmeal (Gadzirayi et al, 2011). In Zimbabwe, broiler producers use cereals as energy sources and oilseeds like sunflower and soya bean, as a protein sources. In most developing countries, the major sources of protein in commercial broiler production are Fishmeal and oil seed cakes. However, these are usually scarce, expensive and used extensively by other livestock and humans. Nutrition accounts for 60-70% of the total production cost in modern broiler production systems. Further, feeding has a great effect in broiler growth, production and egg and meat quality. The social price for

soyabean used in this study was the Randfontein free on board (fob) price adjusted by including the cost, insurance and freight charges of transporting it to Harare.

5.4 Feed

In addition to maize for energy and soyabean for proteins, vitamins, salts and limestone flour are added in making the animal feed. Since most companies make their own feed, the table below shows the components of a broiler starter and broiler finisher used to feed broilers. Vaccines contribute a small proportion of the costs of broiler production therefore for the purpose of this analysis they will be treated as tradable.

Table 6: Ingredient composition of a broiler starter diet formulated

	Broiler Starter (kg)	Broiler finisher (kg)
Maize	548	617.5
Soyabean cake	412	344.0
Vitamins	5.5	4
Salt	3.0	3
Monocalcium phosphate	11.0	11
Limestone Flour	20.5	20.5
Total weight	1000	1000

Source: Gadzirayi et al, 2011

Local prices were found by a survey of major retail outlets whilst social prices were found on the internet. The calculation of domestic prices for broiler starter and broiler finisher is shown in appendix C.

5.5 Labour

Broiler production is a labour intensive enterprise, requiring labour for feeding, cleaning and supply of water hence it is justified to treat all labour as unskilled and therefore non-tradable.

In terms of the wage rate, the average wage rate from interviews with producers is taken as the most realistic estimate of the marginal value product of labour. Zimbabwean laws set minimum wages for all categories of workers form farm workers to workers in industries. For this analysis, the minimum wage for unskilled workers in industry will be used as the social price. To arrive at the wage rate used in this study, the minimum wage for the broiler sector was obtained from the Ministry of labour and the National Employment Council for the Agriculture/broiler sector.

5.6 Electricity

Zimbabwe imports electricity per month from regional countries therefore electricity will be traded as a tradable commodity (ZESA, 2011). The social price for electricity will be determined by the average global price for a Kilowatt of electricity. These prices are converted to domestic currencies using market exchange rates and finally, marketing costs are added to compare with farm gate prices.

5.7 Day old chicks

The opportunity cost of rearing chicks until they are sold is selling day old chicks to independent producers. The major broiler producers are also involved in producing day old chicks for sale to independent broiler producers therefore the price at which they sell to independent producers will be used as the private price for day old chicks.

5.8 Transport costs

Transport costs used were obtained from transport operators and the rate used was US$0.14/tonne per tonne per kilometre. This was assuming that transporting costs about 1 litre of diesel per every 10 km.

5.9 Gross margin budgets

The gross margin was calculated for 10000 broilers assuming that one labourer can manage 10000 broilers. The gross margin budget used in this analysis is found in Annexure A. From the GM, it was found out that for 10000 broilers, using current market (private) prices, the total revenue is 72000 and the total costs are 52130 giving net profit of 19870. This shows that the local producers are making profits given the prevailing prices and market conditions. The gross margin was done assuming that the birds are reared for six weeks because if they exceed the six weeks, it becomes very expensive as beyond that time the birds will not add any meaningful weight (World Poultry News, 2011). The GM budget was done using information obtained from interviews with broiler producers and broiler budgets obtained from the ministry of agriculture.

5.10 The PAM

The basic information needed for compiling a PAM are yields, input requirements, and the market and social prices of inputs and outputs. The major sources of data used for the private account in the PAM are based on primary surveys done on broiler producers and allied industries. The choice of social prices has a significant impact on the calculation of the PAM. The world prices for broiler meat, maize and soybean were used as a reference prices for the study. The U.S. FOB Gulf prices are used as reference prices for maize and soybeans. The

world prices are adjusted to be compared at the farm gate by first adding to them the international transportation cost of the commodity from the originating market to the domestic market for imports. The transportation cost is assumed to be the road freight rates from the Randfontein to Harare for imported commodities. The data on the road freight rates were obtained from the internet. Prices in South African Rands are converted to U.S. dollar terms using the prevailing exchange rate. The social and private budgets for broiler production were used to construct the PAM for shown in table 7 below.

Table 7: The Policy Analysis Matrix for Zimbabwean broiler

	Revenue	Tradables	Factor prices	Profits
Private Prices	72,000.00	40,550.00	11,580.00	19,870.00
Social Prices	45,000.00	28,000.00	9,685.00	7,315.00
Divergences	27,000.00	12,550.00	1,895.00	12,555.00

Source: Own calculations

5.11 Measures of comparative advantage

5.11.1 Domestic resource cost

Comparative advantage, measured by comparing local economic costs of production with international reference prices, can be summarized by the Domestic Resource Cost (DRC) coefficient. The DRC is estimated as the ratio of the economic value of domestic resources (i.e., factors of production) used in production relative to the economic value-added (economic value of output minus the economic value of tradable inputs) generated by the production process. The DRC thus represents the value of domestic resources (expressed in reference prices) spent in order to gain or save a unit of foreign exchange.

In order to see whether a country has a comparative advantage in the production of a product, the DRC should be compared to the exchange rate which reflects the scarcity value of the foreign exchange for the entire economy that is the reference exchange rate. A DRC coefficient which is greater than 1.00 suggests that the firm is using more value in domestic resources than it is gaining in tradable value-added, i.e. is not making efficient use of those domestic resources. A DRC coefficient which is less than 1.00 suggests the opposite, i.e. the firm is gaining more in terms of tradable value-added than it is using in domestic factors of production. In the latter case, the firm is said to demonstrate a comparative advantage, relative to other global producers, in the production of that good. The DRC for broiler production was found to be 0.56, implying that the country has a comparative advantage in broiler production. A comparative advantage implies that Zimbabwe is better off producing broilers domestically than importing. The positive social profits and DRC values of less than 1.0 indicate comparative advantage for commercial poultry production. Comparative advantage implies that the industry would be able to compete against imports if all policies were removed.

5.12 Measures of incentives

5.12.1 The nominal protection coefficient

The nominal protection coefficient (NPC) was used to compare domestic and international prices adjusted for marketing costs and exchange rates. The NPC of a commodity is the ratio of private prices of a commodity to its social price. An NPC less than 1 indicates an implicit tax on production (subsidy in the case of input) and an NPC greater than 1 indicates implicit subsidy on production (implicit tax in the case of inputs).

5.12.2 Nominal protection coefficient on output (NPCO)

The NPCO compares the observed (private) price of an output to its social price (approximated by world prices) and measures the divergences between the two. Therefore, it indicates the degree of output transfer. In this study, the NPCO was found to be 1.38. This means that domestic market price for broiler is 38 percent higher than the world price. Therefore, domestic policies or market imperfections increase the domestic market price of the commodity.

Table 8: Nominal Protection Coefficient on Output (NPCO)

Output	Market Price	Opportunity cost Price	NPCO
Broiler meat	2.5	1.8	1.38

Source: Own calculations

5.12.3 Nominal protection coefficient on input (NPCI)

The table below shows the NPCIs for the tradable and non tradable factors of production.

Table 9: Nominal Protection Coefficient on Input (NPCI)

Tradable factors of production	Market Price	Opportunity cost Price	NPCI
Broiler starter	0.78	0.48	1.625
Broiler finisher	0.74	0.44	1.682
Labour	200	150	1.33
Electricity	1000	800	1.25
Non tradable inputs			
Vaccines	2	1.5	1.33
Day old chicks	0.9	0.75	1.20
Water	2	1.5	1.33
Transport (fuel)	1.4	1.1	1.273
TOTAL	**1207.82**	**955.77**	**1.264**

Source: Own Calculations

The NPCI from this study was 1.264. This means that the domestic market prices for the tradable inputs are 26 percent higher than the world price. Therefore, domestic policies and/or market imperfections increase the domestic market price of the commodity.

5.12.4 Effective protection coefficient

It is a ratio between values added in private prices (A - B) to value added in social prices (E - F) from the PAM framework in table 3. It measures the degree of transfer brought about by product and tradable input-policies (as well as market imperfections) but it doesn't take into account the transfer effects of factor market policies. The EPC was calculated in order to show the net incentive of government policy. The EPC for broiler production was found to be 1.167, implying that there is a net subsidy in its production.

5.12.5 Profitability coefficient

The profitability coefficient measures the impact of policy transfers on private profits. It is measured by dividing the private profits by the social profits. In this study, a profitability coefficient of 2.90 was obtained indicating that policy transfers have permitted profits nearly three times greater than social profits. These high prices in the Zimbabwean broiler market attract imports from the rest of the world.

5.12.6 Private cost ratio

The PCR is the ratio of domestic factor costs to value added in private prices; that is, PCR = C/ (A - B). Value added is the difference between the value of output and the costs of tradable inputs; it shows how much the system can afford to pay domestic factors (including

a normal return to capital) and still remain competitive-that is, break even after earning normal profits, where (A - B - C) = D = 0. The entrepreneurs in the system prefer to earn excess profits (D > 0), and they can achieve this result if their private factor costs (C) are less than their value added in private prices (A - B). Thus they try to minimize the private cost ratio by holding down factor and tradable input costs in order to maximize excess profit.

The PCR expresses the effective income of the non-tradable factors of production – i.e. their cost – devoted to the net earnings of a unit of tradable resource. In this study, the PCR was found to be 0.37. PCR < 1 indicates a surplus profit for the entities involved, since it entails a profit margin on the cost of inputs, whereas PCR > 1 indicates that the value of the tradable goods created is less than the cost of the inputs.

5.12.7 Subsidy ratio to producers

The subsidy ratio to producers is SRP = L / E, the ratio of the net transfer to the social value of revenues. The purpose of this indicator is to show the level of transfers from divergences as a proportion of the undistorted value of the system revenues. If market failures are not an important component of the divergences, the SRP shows the extent to which a system's revenues have been increased or decreased because of policy. In this study, the subsidy ratio to producers was 0.279, indicating that divergences and policy distortions increased the gross revenue of broiler producers by 28 percent.

5.13 Conclusions

This chapter tested the second hypothesis that Zimbabwe has a comparative advantage in broiler production. It was found out that the country has a comparative advantage in broiler

production. The main source of comparative advantage in Zimbabwe is the lower opportunity cost of domestic resources. Production of broilers is a viable business though it has low returns. Zimbabwe has comparative advantage in producing broilers. The exchange rate used has an impact on the DRC. From the study, it is recommended that the Zimbabwe produces broilers because the business is profitable

And the country has comparative advantage in their production. The question that arises is why Zimbabwe is importing broiler meat whilst it can produce it competitively. This may be due to price differentials between Zimbabwe and South Africa with Zimbabwe having higher prices which are an incentive for South African producers to export to Zimbabwe. The country therefore can save foreign currency by producing domestically.

CHAPTER 6: IMPACTS OF INSTITUTIONAL AND MACROECONOMIC POLICIES ON BROILER PRODUCTION

6.0 Introduction

Policies influencing the agricultural sector fall into three categories – agricultural price policies, macro-economic policies and public investment policies. Agricultural price policies are commodity specific. Price policies also can influence agricultural inputs. Macro-economic policies are nation-wide in coverage. Macro policies thus affect all commodities simultaneously. Public investment policies allocate capital expenditures from the public budget. They can affect various agricultural groups – producers, traders, and consumers – differently because they are specific to the areas where the investment occurs. This chapter analyses the institutional environment and the agricultural, macroeconomic and public investment polices influencing broiler production in Zimbabwe.

6.1 Policies affecting the broiler sector

According to the Ministry of Finance, finished consumption goods continue to account for a disproportionate share of Zimbabwe's imports, implying the need for greater support for investment in domestic manufacturing value addition. These imports have made the country's economy a supermarket for those countries whose development policies champion domestic value addition. A deliberate policy is, therefore, necessary in managing importation of finished manufactured goods, given the unsustainable current account deficit, financed through short term capital inflows and arrears accumulation (MoF, 2011). The poultry sector has been affected by imports from South Africa and the rest of the world. Table 10 below shows the broiler meat imports into Zimbabwe

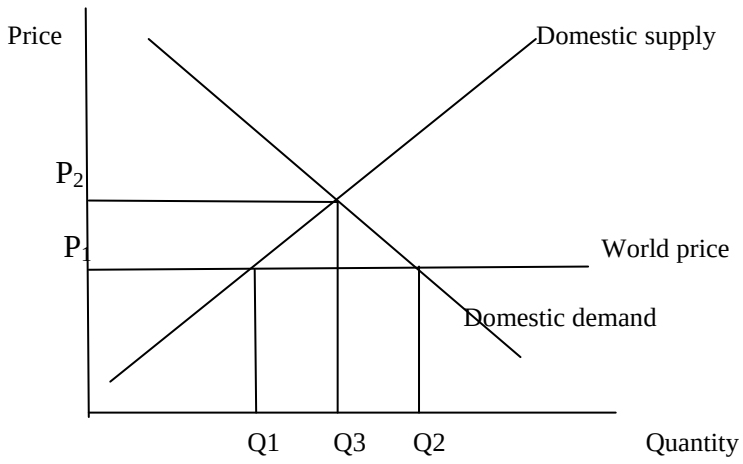
Table 10: Broiler meat imports for Zimbabwe

Period 2009	Imports from South Africa	Imports from Botswana	Imports from the rest of the world	TOTAL
Weight (tonnes)	10502	250	10752	27504
Value (000 US$)	15477	846	16325	32648

Source: UNCOMTRADE, 2011

From the table 10, the country imported broiler meat worth US$32 million in 2009 from South Africa, Botswana and the rest of the world. The DRC indicated that it is economic to produce domestically; therefore there were losses from trade to domestic producers.

Figure 5: Producer losses from trade



The producer losses from trade are illustrated in figure 5. If domestic supply is Q1 and with a lower world price the domestic demand increases from the domestic equilibrium of Q3 to Q2. At the lower world prices, domestic producers will only be able to supply Q1 whilst the deficit (Q2-Q1) is met by imports. The imports therefore makes domestic consumers better

off (they can now buy broiler meat at a lower price), and domestic producers are worse off (they now have to sell broiler meat at a lower price).

6.2 Policy simulation

Following Yao (1997), sensitivity analyses are conducted to test whether the results would be substantially altered by changes in the underlying assumptions. Because social factor price estimates necessarily are approximations of true values, sensitivity analysis of the effects of changes in social factor prices is a key element of the presentation of PAM results. By altering the quantities of inputs and outputs from the values observed under private price incentives, the analyst can also simulate producer response (if any) to the social prices for outputs and inputs.

6.2.1 Policy option 1: A 25% tax on poultry imports

The ministry of finance proposed to charge a 25% import duty on imported meat. The imposition of duty raises the price by 25 percent and the following PAM framework shows the effects of duty.

Table 11: Policy option 1. A 25% tax on poultry imports

	Revenue	Tradables	Factor prices	Profits
Private Prices	72,000.00	40,550.00	11,580.00	19,870.00
Social Prices	56,250.00	28,000.00	10,135.00	18,115.00
Divergences	15,750.00	12,550.00	1,445.00	1,755.00

The levying of duty on imports increase the DRC from 0.56 to 0.36, therefore the duty increases the competitiveness of local broiler production. The NPCO decreases to 28 percent therefore the duty results in transfers from producers.

6.2.2 Policy potion 2. A 10 percent increase in domestic prices

A 10 percent increase in domestic prices of broiler meat results in the increase in the NPCO to 1.76, implying that domestic prices will be 76 percent higher than the global prices.

Table 12: Policy option 2. A 10 percent increase in domestic prices.

	Revenue	Tradables	Factor prices	Profits
Private Prices	79,200.00	40,550.00	11,580.00	27,070.00
Social Prices	45,000.00	28,000.00	9,685.00	7,315.00
Divergences	34,200.00	12,550.00	1,895.00	19,755.00

6.3 Competitiveness of Zimbabwe

The Global Competitiveness Index (GCI) is a comprehensive index for measuring national competitiveness that captures the microeconomic and macroeconomic foundations of national competitiveness. Competitiveness is defined as the set of institutions, policies, and factors that determine the level of productivity of a country (Schwab, 2010). The level of productivity, in turn, sets the sustainable level of prosperity that can be earned by an economy. More competitive economies tend to be able to produce higher levels of income for their citizens. The productivity level also determines the rates of return obtained by investments (physical, human, and technological) in an economy. Because the rates of return are the fundamental drivers of the growth rates of the economy, a more competitive economy

is one that is likely to grow faster in the medium to long run. The concept of competitiveness thus involves static and dynamic components: although the productivity of a country clearly determines its ability to sustain a high level of income, it is also one of the central determinants of the returns to investment, which is one of the key factors explaining an economy's growth potential. Competitive economies are those that have in place factors driving the productivity enhancements on which their present and future prosperity is built. Table 11 below shows the competitiveness indices for Zimbabwe ranked from 1 (lowest) to 7 (highest) under the twelve pillars of competitiveness.

Table 13: The Global Competitive Index for Zimbabwe

	Rank (Out of 139)	**Score (1-7)**
GCI 2009–2010 (out of 133)	132	2.8
GCI 2008–2009 (out of 134)	133	2.9
	Rank (Out of 139)	Score (1-7)
GCI 2010–2011	**136**	**3**
Basic requirements	**137**	**3**
1st pillar: Institutions	105	3.4
2nd pillar: Infrastructure	129	2.4
3rd pillar: Macroeconomic environment	139	2.3
4th pillar: Health and primary education	126	4.2
Efficiency enhancers	**134**	**3**
5th pillar: Higher education and training	115	3.1
6th pillar: Goods market efficiency	130	3.5
7th pillar: Labour market efficiency	129	3.5
8th pillar: Financial market development	105	3.6
9th pillar: Technological readiness	135	2.5
10th pillar: Market size	134	1.8
Innovation and sophistication factors	**122**	**2.9**
11th pillar: Business sophistication	119	3.2
12th pillar: Innovation	122	2.5

Source: The Global Competitiveness Report, 2011

According to the executive opinion survey done to assess the problems faced in doing business in Zimbabwe, the major problem was access to finance while the least cited problem was inflation. Other problems cited included policy instability, inadequate supply of infrastructure government instability and inefficient government bureaucracy. For a factor drive economy like Zimbabwe, it is important to focus mostly on the basic requirements for enhancing competitiveness which are the institutions, the infrastructure, the macroeconomic environment and improvements in health and primary education to improve the country's competitiveness. Table 14 below shows the most problematic factors for doing business.

Table 14: The most problematic factors for doing business in Zimbabwe

Item	Rank out of 30
Access to financing	25.4
Policy instability	19.3
Inadequate supply of infrastructure	17.4
Government instability/coups	11.5
Inefficient government bureaucracy	6.9
Corruption	6.4
Restrictive labour regulations	3.6
Crime and theft	2.8
Poor public health	2.1
Tax rates	1.7
Tax regulations	1.3
Poor work ethic in national labour force	1
Inadequately educated workforce 0.4	0.4
Foreign currency regulations	0.3
Inflation	0

Source: WEF competitiveness report

The dollarization of the economy has resulted in liquidity constraints as indicated by the survey results of table 14. Liquidity constraints reduce firms' the ability to convert assets into cash or to obtain cash to meet short term liabilities and other commitments. For the

broiler industry, these liquidity constraints reduce the capacity to increase output to compete with imports or to satisfy domestic broiler requirements.

6.4 Insights from the competitiveness report

Zimbabwe continues to be among the lowest ranked countries included in the GCI, ranked fourth to last at 136th overall, although there have been some improvements in individual areas. The assessment of public institutions, has improved measurably, increasing from 125th last year to 113th in 2010 to 2011. Improvements have been made in ethics and corruption, government inefficiency, and the security situation. Despite efforts to improve the macroeconomic environment—including the dollarization of its economy in early 2009, which brought down inflation and interest rates doing business in Zimbabwe is still affected by the shortage of finance. Weaknesses in other areas include health, low educational enrolment rates, and official markets that continue to function with difficulty, particularly with regard to goods and labour markets (Schwab, 2011).

6.5 Public investment in agriculture

From the statistics of maize and soyabean production presented in chapter four, it is apparent that Zimbabwe has not been producing enough maize and soyabean for feeding her population and produce extra for feed manufacture. Since feed constitute more than 60 percent of the production costs of broiler, a reliable source of feed is therefore critical for sustained growth of the broiler industry. The Zimbabwean government is a signatory to the Maputo declaration on agriculture and food security which among other things sought to revitalize the agricultural sector including livestock and the removal of constraints to agricultural production and marketing (AU, 2003).

According to the Maputo Declaration of 2003 on Agriculture and Food Security, expenditure on land, agriculture, water and sanitation must be at least 10% of the Budget. The government of Zimbabwe has for this financial year and the projected expenditure for 2012 failed to meet the minimum 8 percent. The decrease in government support for the primary industries supplying raw materials to the broiler industry is likely to have an impact on broiler production, pricing costs and the long term viability and growth of the industry.

Table 15: Budget allocation to Agriculture, Health and Education sectors

Sector	**Share of National Budget Estimates**				
	Targets	2009 Unaudited Actual	2010 Unaudited Actual	2011 Estimate	2012 Estimate
Health: Budget	15%	8.56%	8.58%	9.33%	8.64%
Health: Per Capita	US$34	US$6.57	US$15.07	US20.79	US27.78
Education: Budget	12%	28%	22%	23%	25%
Agriculture: Budget	10%		14%	8%	8%

Source:MoF

Government still needs to meet the requirements of the Maputo declaration by alocating at least 10 percent of the budget towards the agriculture sector to meet the Millenium Development Goals and for sustained growth of the polutry sector which relies heavily on production of mazie and soyabean**.**

6.6 Conclusion

The chapter looked at the factors determinig the competitivenss of Zimbabwe by looking at global competitivess indices. Though some strides have been made in ipmroving the country's competitiveness, much still needs to be done. For Zimbabwe which is still in the

early stages of development (according to the Global Competitivnes Report) there is need to focus on the first four pillars of competitivens - institutions, infrastructure, the macroeconomic environment and health and primary education to increase competitiveness. There is also the need to increase the budgetary allocations to the ministry of agriculture to boost production of inputs essential for the success of the broiler industry.

CHAPTER 7: SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

7.0 Introduction

This chapter summarises the findings of the study. The first section presents a summary of the major findings in the study. After the major findings, there will be conclusions from the study. The last section discusses the recommendations drawn from the study and lastly areas for further research are suggested.

7.1 Summary of results

The first hypothesis tested in this study was:

There has been inadequate maize and soyabean production for broiler feed manufacture in Zimbabwe.

The chapter also analysed the maize and soyabean value chains and the constraints to production of these crops. The production of Maize and soyabeans were analysed because they are the key ingredients for broiler feed manufacture in Zimbabwe. The data from 2000 to 2009 on maize, soyabean and broiler production revealed that maize and soyabean have not been produced in enough quantities to meet food requirements as well as supply the stock feed manufacturing sector. Information on broiler production showed an upward trend despite shortages of inputs and imports of broiler meat from the region and the world. Therefore as can be seen from the results the hypothesis cannot be rejected.

The second hypothesis tested in the study was:

Zimbabwe has a comparative advantage in broiler production compared to South African producers.

Chapter 5 analysed the private and social profitability of broiler production and the effects of distortions in domestic prices. Indicators of protection and comparative advantage were used in the analysis. In analysing the relationship between world prices and domestic prices for output and inputs, the NPC was used to see the extent of protection in the sector. From the analysis, the NPC on output was found to be 1.38, indicating that domestic broiler meat prices are 38 percent higher than world prices. On inputs used, the research indicated an NPCI of 1.264, implying that domestic prices are 26.4 percent higher that social prices. The DRC was found to be 0.56, implying that the country has a comparative advantage in broiler production. The hypothesis that Zimbabwe has a comparative advantage in broiler production can therefore not be rejected.

The third hypothesis tested in the study was:

The institutional, policy and macroeconomic environment is negatively affecting broiler production in Zimbabwe.

The competitiveness of Zimbabwe's broiler production was analysed using a Global Competitiveness index (GCI). This index is comprehensive and asses the institutional, economic, legal and other indicators of competitiveness such as health, education, skills classified into three broad categories:

1. Basic requirements
2. Efficiency enhancers and
3. Innovation and sophistication factors

The GCI revealed that the country has made strides in increasing competitiveness but it remains generally uncompetitive. The national budget is also falling short of the Maputo declaration that at least 10 percent of the budget should be allocated to Agriculture. There is therefore a need to address the limitations to the country's competitiveness that will also increase the competitiveness of the country's broiler industry.

The hypothesis that the institutional, policy and macroeconomic environment is negatively affecting broiler production in Zimbabwe cannot be rejected

7.2 Recommendations to the government

7.2.1 Shortage and high cost of feed

Feed costs account for above 70% the cost of producing broiler. The persistent shortages of maize and soyabean and the reliance on imports to meet national requirements pose a threat to the sustainability and development of the broiler sector. Given the preference of human consumption over stock feeds, this implies that less maize will be availed to broiler. This is further worsened by the fact that the countries from which grain is imported are the same countries that are exporting broiler products to Zimbabwe.

7.2.2 The emergency of transboundary diseases

Broiler production is always under threat from diseases such as Newcastle disease and, more recently, Highly Pathogenic Avian Influenza (HPAI). Vaccines need to be made available to contain the threat. Stringent rules on the importation of broiler products may be necessary. All these measures depend on the strength of the veterinary service, which needs restoration. The

supply shocks that can result from bans of imports can be catastrophic so even if there are gains from trade to consumers, the producers and the economy at large will not benefit.

7.2.3 Inadequate energy supply

Energy is needed in all activities along the broiler value chain from production of maize and soyabean, providing electricity lighting and heating, processing and packaging and distribution and storage. The transportation of inputs and outputs require fuel. The shortage of energy (electricity in particular) since 2007 has reduced production in all sectors of the economy and/or increased production costs through the use of generators to drive critical processes like freezing broiler products. There is therefore a need to improve electricity generation and imports to improve productivity of the broiler sector.

7.2.4 Taxing imports

Zimbabwe does not allow the production of genetically modified food but these are finding their way to the Zimbabwean market at prices lower than the local production costs. Taxing cheap imports will boost local production. Extra produce for the feeds manufacture and boost livestock. The supply shocks that can result from bans of imports can be catastrophic so even if there are gains from trade to consumers, the producers and the economy at large will not benefit.

7.2.5 Shortage of foreign currency and finance

The country is facing an acute shortage of foreign currency for purchase of breeding stock, machinery, equipment, veterinary drugs and vaccines. The production for the export markets can

help in generating foreign currency. The financial sector has not been able to fund production due to liquidity constraints.

7.2.6 Monopolistic behaviour in broiler production?

There government must put in place policies to increase the number of participants in the broiler supply chain through expansion of broiler producer base, focusing on smallholder producers through provision of suitable financing, improved production and supply of day-old chicks, promotion of full utilization of production capacity at the newly resettled farms, training of new entrants into the industry, production of self-help production manuals and improvement of broiler extension services. The current situation where the broiler value chain is dominated by three industries may result in the formation of cartels that extract monopoly rents from society. There is also a need to promote the importation or manufacture of appropriate technology for small to medium commercial broiler enterprises. In rural areas, broiler production systems can be developed through development of formal marketing systems, hygienic slaughter facilities, improved feeding systems and farmer training and the promotion of use of green energy like solar.

7.2.7 Trade policies

Zimbabwe being a member of both SADC and COMESA is a signatory to various protocols on trade can implement non tariff barriers to trade in broiler such as quotas, non automatic import authorizations, import levies, cumbersome customs procedures and other restrictive practices to limit imports. After a decade long economic decline, the ‘infant industry’ argument can hold for Zimbabwe’s broiler industry. Protecting the industry from imports from prospering economies

that have had growth for the past decade enables the industry to regain lost ground. On the issue of health, strict SPS measures can be implemented to protect the health of Zimbabweans.

7.3 Recommendations to producers

7.3.1 Increase production

Increased production of day-old chicks (layers and broilers) through improved supply of good quality stock feeds, registration of all stock feed manufacturers, and facilitation of importation of vitamins, minerals and micro-nutrients. There is need for expansion of the broiler producer base, focusing on smallholder producers through provision of suitable financing, improved production and supply of day-old chicks, promotion of full utilization of production capacity at the newly resettled farms, training of new entrants into the industry, production of self-help production manuals and improvement of broiler extension services.

7.3.2 Lobby

A combination of missing and dysfunctional stakeholder organizations creates an institutional environment which is least appropriate for stakeholder participatory processes of public policy formulation (Mano, 2001). The broiler producers need to intensify their lobby efforts and engage with relevant ministries on the issuance of permits. The ZPA must have accurate and timely records of current production statistics so that permits are issued only when domestic production fails to meet demand. This therefore calls for collective action and effective organization on the part of broiler producers.

7.4 Policy implications

Results of the study indicated that the country has a comparative advantage in broiler production as indicated by the DRC. This implies that it is economical to produce locally and save foreign currency by importing broiler products. The NPCs for both output and inputs show that prices of tradables are higher on the domestic markets than on the world market therefore the distortions in the domestic economy are making production costs expensive. On the other hand, the domestic prices for outputs are higher than the world prices and therefore attract imports. Domestic consumers are therefore paying more than what they ought to be paying. There is therefore the need for policies that address the supply side distortions in the broiler supply chain.

7.5 Areas of further research

The PAM is a partial equilibrium model which does not capture the linkages between broiler and other products that are either compliments or substitutes to broiler meat such as beef, pork and non meat foods like vegetable. The analysis is only applicable at sectoral and commodity levels and therefore does not provide a complete picture of the economy wide effects following policy changes. A study on the linkages between broiler and these will help determine policy options in the face of broiler meat shortages. The impact of trade policies on the domestic policies can also be studied. Studies on the possibility of monopoly power on the part of the main producers can be undertaken to determine the possibility of monopoly rents to the detriment of consumers. A detailed value chain analysis of poultry industry from

breeding to the consumer can be undertaken to determine areas that need to be addressed to improve the broiler industry.

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Appendix A

A gross margin budget for 10000 broilers (Private prices)

Target yield (birds)	10,000.00	10,000.00	10,000.00	10,000.00	
Target mass @1.8kg / bird	18,000.00	18,000.00	18,000.00	18,000.00	
Selling price ($/KG)	2.50	3.00	3.40	4.00	
GROSS INCOME ($/10000 BIRDS)	45,000.00	54,000.00	61,200.00	72,000.00	R
TOTAL VARIABLE COSTS (TVC)	39,015.00	39,015.00	39,015.00	53,203.20	
GROSS MARGIN (GM)	5,985.00	14,985.00	22,185.00	18,796.80	P
VARIABLE COST ITEMS					
A. DAY OLD CHICKS AND FEEDS					
1. Day old chicks 10000 @$900/1000	9,000.00	9,000.00	9,000.00	9,000.00	NT
2. FEEDS					
a. BROILERS STARTER					
2kg/bird @US$0.78/kg	9,600.00	9,600.00	9,600.00	13,600.00	T
b. BROILER FINISHER					
4 kg/bird @ US$0.74/kg	17,600.00	17,600.00	17,600.00	25,600.00	T
LABOUR					
4. 1 WORKER FOR TWO MONTHS @ 200/MONTH	400.00	400.00	400.00	400.00	NT
2.PROTECTIVE CLOTHING (work suit + boots)	40.00	40.00	40.00	40.00	NT
5. Vaccines					
a. NDHBI (Day 10) 10 @ $3.50 each	35.00	35.00	35.00	35.00	NT
b.IBD (Day 14) 10 @ $6.50 each	65.00	65.00	65.00	65.00	NT
c.IBD (Day 18)10 @ $6.50 each	65.00	65.00	65.00	65.00	NT
d. Lasota (Day 21) 10 @ $3.50 each	35.00	35.00	35.00	35.00	NT
6. Electricity	30.00	30.00	30.00	1,000.00	T
7. Water					
30 cubic metres @US$ 2/cubic metre	60.00	60.00	60.00	1,000.00	NT
1. Transport costs (inputs)	180.00	180.00	180.00	180.00	T
SUBTOTAL A	37,110.00	37,110.00	37,110.00	51,020.00	
Miscellaneous costs: 2% of SUBTOTAL A	742.20	742.20	742.20	1,020.40	
TVC PRIOR TO PROCESSING	37,852.20	37,852.20	37,852.20	52,040.40	
PROCESSING					
1. Electricity	1,000.00	1,000.00	1,000.00	1,000.00	T
2. Packaging (US$0.10/2kg packets of cutlets)					NT

	900.00	900.00	900.00	900.00	
3. Labour					NT
MARKETING					
1. Transport off firm: (using 7 ton trucks for 100 km) US$0.14/KM	140.00	140.00	140.00	140.00	T
2. 2 workers/vehicle (Driver + Assistant) @ 500/month)	1,000.00	1,000.00	1,000.00	1,000.00	NT
SUBTOTAL B	1,140.00	1,140.00	1,140.00	1,140.00	
2. Miscellaneous costs: 2% of SUB TOTAL B	22.80	22.80	22.80	22.80	
MARKETING COSTS	1,162.80	1,162.80	1,162.80	1,162.80	
TVC	39,015.00	39,015.00	39,015.00	53,203.20	
TVC per Bird	3.90	3.90	3.90	5.32	
TOTAL REVENUE (R)	72,000.00				
TOTAL COSTS NON TRADABLE (NT)	11,580.00				
TOTAL COSTS TRADABLE (T)	40,550.00				
PROFIT (P)	18,796.80				

Annex B

A gross margin budget for 10000 broilers (Social prices)

Target yield (birds)	10,000.00	10,000.00	10,000.00	10,000.00	
Target mass @1.8kg / bird	18,000.00	18,000.00	18,000.00	18,000.00	
Selling price ($/KG)	2.50	3.00	3.40	2.50	
GROSS INCOME ($/10000 BIRDS)	45,000.00	54,000.00	61,200.00	45,000.00	R
TOTAL VARIABLE COSTS (TVC)	39,015.00	39,015.00	39,015.00	37,301.40	
GROSS MARGIN (GM)	5,985.00	14,985.00	22,185.00	7,698.60	P
VARIABLE COST ITEMS					
A. DAY OLD CHICKS AND FEEDS					
1. Day old chicks 10000 @$750/1000	9,000.00	9,000.00	9,000.00	7,500.00	NT
2. FEEDS					
a. BROILERS STARTER (2kg/bird)					
2kg/bird @US$0.48/kg	9,600.00	9,600.00	9,600.00	9,600.00	T
b. BROILER FINISHER					
4 kg/bird @ US$0.44/kg	17,600.00	17,600.00	17,600.00	17,600.00	T
LABOUR					
4. 1 WORKER FOR TWO MONTHS @ 150/MONTH	400.00	400.00	400.00	300.00	NT
2.PROTECTIVE CLOTHING (work suit + boots)	40.00	40.00	40.00	40.00	NT
5. Vaccines					
a. NDHBI (Day 10) 10@$3.59 each	35.00	35.00	35.00	35.00	NT
b.IBD (Day 14) 10@6.50 each	65.00	65.00	65.00	65.00	NT
c.IBD (Day 18) 10 @6.50 each	65.00	65.00	65.00	65.00	NT
d. Lasota (Day 21) 10@$3.50 each	35.00	35.00	35.00	35.00	NT
6. Electricity	30.00	30.00	30.00	30.00	T
7. Water					

30 cubic metres @US$ 2/cubic metre	60.00	60.00	60.00	45.00	NT
	.				
1. Transport costs (inputs)	180.00	180.00	180.00	135.00	T
SUBTOTAL A	37,110.00	37,110.00	37,110.00	35,450.00	
Miscellaneous costs: 2% of A	742.20	742.20	742.20	709.00	
TVC PRIOR TO PROCESSING	37,852.20	37,852.20	37,852.20	36,159.00	
PROCESSING					
1. Electricity	450.00	450.00	450.00	450.00	T
2. Packaging (US$0.10/2kg packets of cutlets)	900.00	900.00	900.00	900.00	NT
3. Labour					NT
MARKETING					
1. Transport off firm: (using 7 ton trucks for 100 km)	140.00	140.00	140.00	120.00	T
2. 2 workers/vehicle (Driver + Assistant) @ 500/month)	1,000.00	1,000.00	1,000.00	1,000.00	NT
SUBTOTAL B	1,140.00	1,140.00	1,140.00	1,120.00	
2. Miscellaneous costs: 2% of B	22.80	22.80	22.80	22.40	
MARKETING COSTS	1,162.80	1,162.80	1,162.80	1,142.40	
TVC	39,015.00	39,015.00	39,015.00	37,301.40	
TVC per Bird	3.90	3.90	3.90	3.73	
TOTAL REVENUE (R)	45,000.00				
TOTAL COSTS NON TRADABLE (NT)	10,135.00				
TOTAL COSTS TRADABLE (T)	28,000.00				
PROFIT (P)	7,698.60				

Annex C

Calculating domestic prices for broiler starter and broiler finisher

1. Broiler starter

Soyabean cake	412	453.2
Vitamins	5.5	55
Salt	3	6
Monocalcium phosphate	11	22
Limestone Flour	20.5	20.7
Total weight	1000	
Milling costs and transport costs/t		45
TOTAL COSTS/ TONNE		780

2. Broiler finisher

Component	Broiler finisher (kg)	Unit cost
Maize	617.5	200
Soyabean cake	344	378.4
Vitamins	4	44
Salt	3	30
Monocalcium phosphate	11	22
Limestone Flour	20.5	20.6
Total weight	1000	
Milling costs and transport costs/t		45
TOTAL COSTS/ TONNE		740