

**COMPETITIVENESS OF BROILER CHICKEN VALUE CHAIN IN  
SOUTHWESTERN NIGERIA**

**By**

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## **CERTIFICATION**

I certify that this work was carried out by Femi Stephen Oyebade Awoyomi in the Department of Agricultural Economics, Faculty of Agriculture, University of Ibadan, Nigeria

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## **DEDICATION**

I dedicate this thesis to God Almighty who created me, spared my life from death that claimed the life of my maternal grandmother and makes all things beautiful in His time!

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Great is the faithfulness of God for fulfilling His promise of “I will have mercy on whom I will have mercy” on me. I can see the light at the end of the tunnel and I have acquired knowledge to totally depend on God!

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## ABSTRACT

Broiler chicken is a major source of income and also contributes to gross domestic product in Nigeria. The total ban on broiler chicken meat importation was a government policy introduced to increase participation and protect local Broiler Value Chain (BVC) actors. However, smuggling of imported products still persists and may affect competitiveness of the locally produced broiler chicken. Empirical studies on market-led profitability of key actors in BVC in southwestern Nigeria are scanty. Therefore, competitiveness of BVC in southwestern Nigeria was investigated.

A three-stage sampling procedure was used. Ogun and Oyo States were selected based on prevalence of poultry production in Southwestern Nigeria. Ten Local Government Areas-LGAs (4 from Ogun and 6 from Oyo) proportionate to size were selected based on LGAs with highest production of broiler chicken. Using structured questionnaire, data were collected from 419 randomly selected actors (broiler chicken producers-176, processors-60 and marketers-183). Socioeconomic characteristics observed were age, Household Size (HS), Number of Income Earners (NIEs), sex, Marital Status (MS), level of education, Association Membership (AM), and Years of Experience (YE). Other variables studied were participation decision factors (credit access and tax), inputs, outputs and their prices. Indicators of competitiveness used were Private Profitability (PP >1), Private Cost Ratio (PCR <1) and Effective Protection Coefficient (EPC >1) for government policy. Data were analysed using descriptive statistics, policy analysis matrix and double hurdle model at  $\alpha_{0.05}$ .

Age, HS and NIEs were  $38.0 \pm 7.6$ ,  $4.7 \pm 1.9$  and  $2.4 \pm 1.6$  for producers;  $37.6 \pm 8.1$ ,  $4.0 \pm 2.3$  and  $4.9 \pm 1.3$  for processors and  $38.7 \pm 8.2$ ,  $4.4 \pm 1.5$  and  $5.1 \pm 1.7$  for marketers, respectively. Major actors were male (54.4%), married (50.6%) and 61.3% had tertiary education. Transportation (0.1479) was Participation Increasing Decision Factor (PIDF) for producers, while selling price (-0.1389) and inadequate water (-0.0001) were Participation Reducing Decision Factors (PRDFs). Tax (0.3082), HS (0.1017) and AM (0.2531) were PIDFs for processors. Credit access (0.2570) and theft (0.1401) were PIDFs for marketers, while AM (-0.1163) and tax (-0.1096) were PRDFs. Intensity of Participation Increasing Decision Factors (IPIDFs) for producers were MS (0.00094) and YE (0.0001), while inadequate water (-0.0003) was IPRDF. Selling price (-0.0001) was IPRDF for processors. The YE (0.0001) and AM (0.0008) were IPIDFs for marketers, while tax (-0.0011), credit access (-0.0005) and selling price (-0.2818) were IPRDFs. Marketers had highest PP (₦2,042,471.95), while processors had the highest social profit (₦2,666,268.46). The PCR ranged from 0.51 to 0.61, while EPC ranged from 0.91 to 3.46 for all BVC actors. The PP of producers decreased by 26.6%, 36.2% and 56.7% with 20%, 40% and 60% increase in the price of inputs, respectively. The PP (₦590,361.35, ₦1,985,199.82 and ₦2,042,471.95), PCR (0.69, 0.61 and 0.54) and EPC (3.46, 0.76 and 0.91) were all positive indicating competitiveness for producers, processors and marketers, respectively.

Broiler chicken value chain was competitive in southwestern Nigeria with marketers being the most competitive, while producers were the most policy protected actors.

**Keywords:** Broiler chicken, Participation decision factors, Value chain actors, Policy protected actors.

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

Broiler chicken generally referred to as chicken meat (*Gallus gallus domesticus*) is primarily raised and slaughtered for meat (David *et al.*, 2016). Broiler chicken meat is relatively inexpensive, high in protein and micronutrients, socially and religiously acceptable to all (Jolaosho, 2014; Omodele *et al.*, 2014). Boiler chicken has an increasing demand over the recent decades and its future outlook in developing countries due to increase in population, rising incomes, low cost, high nutritional value and suitability for further processing is assured (Armah, 2010; Petracci *et al.*, 2015). Broiler currently takes a bigger market share of the poultry industry globally due to short production and processing cycles (Chikangaidze, 2011). Mitchell (2016) reported that production of broiler chicken has witnessed an increase, grew by 11,200 tonnes between 2000 and 2013 and that in Africa, Nigeria with 170,000 tonnes of production was the 5<sup>th</sup> largest producer of broiler chicken in 2013. However, Nigeria broiler chicken was not insulated from the near collapse from 273,000 tonnes in 2009 to 145,000 tonnes in 2011 with a slow recovery that account for the 170,000 tonnes in 2013 (Mitchell, 2016).

In most parts of sub-Saharan Africa, broiler chicken enterprise is the most commercialized of all the livestock industry and considered the most important sub-sector of the poultry industry with many farming households investing substantial part of their resources into input supplying, production, processing and marketing nodes of the broiler chicken value chain (Ja'afar-Furo *et al.*, 2010). Broiler chicken plays an important role in subsistence agriculture, food and financial security (Ugwu, 2009; Schneider *et al.*, 2010) and has an increased capacity for commercialization within the livestock subsectors of agriculture (Heise *et al.*, 2015). The attractiveness of broiler sub-sector is not limited to its potential for income generations but its significant contribution to improving the general welfare of

the actors (input suppliers, producers, processors and marketers) most of whom are farmers (Akinwumi *et al.*, 2010). Producers are those actors that focus solely on the production activities such as clearing of farmland, construction of pens, buying of day old chicks and work to ensure broiler chicken are raised for the market among others activities. The processors add value by carrying out all activities of slaughtering, dressing and packaging broiler chicken for consumption. Marketers are aggregators who are either wholesalers or retailers of live broiler chicken. They collect, trade and advise broiler chicken producers and processors. In Nigeria, as in other countries of the world, broiler chicken enterprise remains a major source of income and contributes to gross domestic product of the country.

African Competition Forum (2014) maintained that poor implementation of trade liberalization in West Africa has not only impacted the poultry markets negatively but has severely dealt with the competitiveness of the broiler chicken value chain in the region. Nigeria remains non-importer of broiler chicken but there are available data on illegal importation of broiler chicken into the country due to decreased production, ineffective trade policy and excess demand. In Nigeria, large import of frozen broiler chicken freely flows into the country despite a total ban of imported poultry products; ninety percent (90%) of Benin`s import of poultry, most especially frozen broiler chickens, are being smuggled or informally re-exported to Nigeria (Andriamananjara *et al.*, 2009; Akinwumi *et al.*, 2010). In addition, high costs of production, lack of breeders, crude marketing and processing technologies, public health concerns, non-availability of record on competitiveness and comparative advantage in the global poultry trade (Perry *et al.*, 2005) among other constraints are associated with broiler business in developing countries (Gning, 2005).

In order to promote the economy of West African countries, several countries have banned some or all poultry imports in an effort to protect the domestic industry (Heise *et al.*, 2015). The end-result of any actor-focused broiler chicken value chain trade policies is to build and support domestic production capacity for a competitive broiler chicken products that can be introduced not only into the local but world markets. Transforming the poultry agriculture most especially broiler chicken value chain into a more profitable business has

also been the concern of Nigeria government not only because of the emerging market and huge opportunities for youth employment (Oladeebo and Ambe-Lamidi, 2007) but to address high magnitude of undocumented or smuggled poultry imports and poor implementation of trade liberalization which have negative impact on the broiler chicken value chain (Andriamananjara *et al.*, 2009; Heise *et al.*, 2015).

Like in many developing economies, Nigerian government accepts a strategic trade policy option, among other protectionist policies, of building back the local broiler chicken value chain with a total ban on importation of poultry products (Heise *et al.*, 2015). In addition, to restriction of importation of live broiler chicken, full support of local actors in form of subsidized inputs (especially on feeds, drugs and vaccines) and border control of illegal smuggling of broiler chicken products are examples of steps in addressing several constraints and challenges facing actors participating in the broiler chicken value chain (Heise *et al.*, 2015; Abah, 2015; Bah and Gajigo, 2019).

Menka (2016) emphasized that import substitution has been on top of the prevailing strategy for spurring economic growth in developing countries since it was first theorized in the 18th century by Alexander Hamilton with emphasis on protecting a developing country from cheap imports through production subsidies or import tariffs. While this poultry-focused trade policy option is laudable and most applicable to broiler chicken value chain, the activities of key actors participating in broiler chicken value chain are rarely documented, not fully understood and improperly linked to government policies with a no well thought-out incentive trade policy option that could guarantee competitiveness of the broiler chicken value chain in the long-run.

It remains an appropriate task, given the nature of Nigeria's poultry agribusiness and broiler chicken enterprise in particular, to investigate the activities of the key actors as it relates to the profitability and competitiveness of the broiler chicken value chain; for adequate policy formulations. This study, therefore, identified the increasing importance of the broiler chicken enterprise in southwestern Nigeria, provides an understanding of the profile of key actors, determines associated demographic and socioeconomic factors such as age, gender, marital status, level of education, membership of association, household size and income earners among others that influence actors' decision to participate (as

well as level of participation) and analyze the competitiveness of the broiler chicken production, processing and marketing nodes in southwestern Nigeria.

## **1.2 Statement of Research Problem**

Broiler chicken value chain is a good source of income and employment to many farming households in southwestern Nigeria. However, these actors face severe competition due to influx of imported broiler chicken from different parts of the world. In addition, to this challenge, there were reported cases of many poultry farms identified as abandoned due to many interrelated factors holding up the envisaged progress of massive expansion of the local market when the Federal government made and implemented policy of total ban on broiler chicken (Heise *et al.*, 2015).

The work of Wang *et al.* (2018) and Gebremedhin (2015) revealed the link between farmers' socioeconomic characteristics and several challenges and constraints associated with collapse of farms. Studies by Moreki (2011) and Etuah *et al.* (2013) further indicate that improving competitiveness of broiler chicken value chain remain unresolved as a result of disregard of demographic and socioeconomic factors influencing the decisions of the actors in policy making. The decisions by any actor to participate and the intensity of participation in agricultural value chain are complex and more related to socioeconomic characteristics of the actor (Gebremedhin, 2015; Wang *et al.* 2018). Some of these factors often increase or decrease participation and the intensity of participation (Wang *et al.*, 2018). Therefore, the demographic and socioeconomic factors that influence daily decisions being taken by farmers are therefore likely to have more bearing on the income generating activities and the competitiveness of actors in the broiler chicken value chain (Heise *et al.*, 2015). This study included demographic and socioeconomic factors of key actors for an understanding of how they affect participation and intensity of participation. Current trade policy intended for the expansion, profitability and competitiveness of the input supply, production, processing and marketing nodes of the broiler chicken value chain remains a big challenge due to influx of smuggled broiler chicken meat into Nigeria. In fact, the impact of the current government policy of total ban of the importation of broiler chicken meat on the actors is not clear. The question as to whether the government trade policies help broiler chicken value chain expand or shrink remains scarcely

answered in empirical literature. This study is an attempt to provide an answer to this question as well as a guide to solving this problem.

Production node which has been categorized into small, medium and large scales based on the work of Pagani *et al.* (2008) has a tradable input component that is generally classified as high and constitutes more than 70% of total cost component (e.g. maize). The tradable inputs exert negative impact on the profitability of the production node of the broiler chicken value chain and have become a must-address agribusiness trade policy issue for a competitive broiler chicken value chain. Aside the constraints of scarce foreign exchange for the importation of these tradable inputs, an average actor faces the challenge of unstable exchange rate that negatively impact the competitiveness of the broiler chicken value chain. The impact of government policy on broiler chicken value chain actors is expected to remove all bottlenecks and make all nodes competitive. The study carried out sensitivity analysis on different exchange rates associated with tradable inputs in order to develop and implement favourable trade policy for Nigeria.

Local actors in the broiler chicken value chain expect incentives or grant that are both financial and non-financial. This expectation reinforces the need to develop and implement a favourable local trade incentive policy that will increase participation (as well as intensity of participation) of the actors for a sustainable and competitive broiler chicken value chain. However, the challenge is that majority of the actors rarely accept existence of any subsidy or incentive in the broiler chicken value chain. An average broiler chicken producer most likely expects an incentive to be cash-based; discount on purchase of day old chicks, feeds and other farm tools. This study investigated the existence of subsidy and carried out sensitivity analysis to see the level of incentive that could cushion the shock of scarcity of dollar and the unstable exchange rate and cost of input among others.

In summary, this study fills the knowledge gap by examining socioeconomic factors associated with participation (including intensity of participation) in the broiler chicken value chain, identifying key actors, their constraints and challenges and evaluate competitiveness of the key nodes of broiler chicken value chain in the southwestern Nigeria. The study sets out and clearly brings to fore major and significant determinants of

actors' decision to participate (as well as levels of actors' participation) in broiler chicken value chain activities.

Given the aforementioned, the following questions were addressed by this study.

1. What are the socioeconomic profiles of the broiler chicken value chain actors?
2. What are the factors that influence the participation and intensity of participation of actors in each identified node of broiler chicken value chain?
3. Are the identified broiler chicken value chain's nodes competitive with or without policy-protected effect on the actors and their activities?
4. What are the constraints to participation and intensity of participation in the broiler chicken value chain?

### **1.3 Objectives of the Study**

The major objective of the study focused on determining the competitiveness of broiler chicken value chain in Southwestern Nigeria. Main focus of the study was on the producers, processors and marketers, who the key actors are participating in the production, processing and marketing nodes respectively. The specific objectives of this study are to:

1. Profile key actors of the broiler chicken value chain.
2. Identify factors that influence participation and intensity of participation of the main actors in the broiler chicken value chain.
3. Analyse the competitiveness and effect of existing policies on key actors along the major nodes of the broiler chicken value chain
4. identify constraints to effectiveness and efficiency of participation in broiler chicken value chain

### **1.4 Justification of the Study**

This study seeks to add to knowledge on broiler chicken value chain in Nigeria and it brings to limelight the needed research-based findings on the profitability of an important sub-sector of the poultry business. The study gives a clearer understanding of the broiler chicken value chain with focus on the production, processing and marketing nodes and the actors that are participants in them. The characteristics of the key broiler chicken value chain actors are documented with a data-based findings on their socioeconomic

characteristics, profits and the competitiveness of each node. The primary drive for using socioeconomic factors as drivers of actors' decision to participate (as well as their intensity of participation) in the broiler chicken value chain is based on previous studies by Gebremedhin (2015) and Heise *et al.* (2015) that reinforced the inclusiveness of socioeconomic and demographic factors; they incorporate all aspects of the actors and their entire farming household. Gebremedhin (2015) used socioeconomic and demographic characteristics such as age, gender, family size, level of education, access to credit and year of experience among others in the Heckman double hurdle model adopted for the value chain analysis of poultry. Kyaw *et al.* (2018) used age, gender, education status, household size, price, membership of association, among others while Tarekegn and Wodebo (2018) gather data on household size, level of education, family size, breed type owned and number of poultry owned as socioeconomic variables in an econometric model to estimate decision factors of actors in a poultry value chain study.

Studies on the competitiveness of broiler chicken are scarce. There has been an increase in research efforts over the last few decades on the competitiveness of various agricultural commodity value chains but without considerable effort on broiler chicken value chain. In fact, most previous studies have been generalised on the layer (egg) value chain (Ibrahim *et al.*, 2009; Tijjani *et al.*, 2012; Yusuf *et al.*, 2016). This gap established a great research concern based on global accepted importance of broiler chickens in food and financial security. This study is therefore focused solely on broiler chicken and will measure the competitiveness of the entire broiler chicken value chain sub-sector of the poultry industry. The result of the study will reveal not only the profitability and competitiveness of each node but also the points of upgrade for actors with less policy-protected incentives when the competitiveness as well as the comparative advantage of each node in the broiler chicken value chain are examined.

The study captured and modeled participation as well as intensity of participation decisions factors in broiler chicken value chain using socioeconomic variables which were not included in previous poultry value chain studies. This was made possible by the use of Double Hurdle Model to capture and analyze socioeconomic variables. The study proceeded to determine the decision-influencing factors (increasing or decreasing) of



actors participating at the production, processing and marketing nodes of the broiler chicken value chain in Southwestern Nigeria. The choice of double hurdle model was based on its robustness: the model combines the benefits of probit model, which estimates factors that influence participation in the first hurdle, with the Tobit (truncated regression model) that estimates factors that define the intensity of participation in the second hurdle. Policy Analysis Matrix (PAM), a robust Value Chain Analytical tool that was developed by Monke and Pearson (1989) was also used to analyze and measure the profitability, the competitiveness as well as the comparative advantages of the production, processing and marketing nodes of the broiler chicken value chain. The choice of Policy analysis matrix, on the other hands, hinges on the need for an analytical model that will not only capture the profitability but measures efficient use of inputs, competitiveness and comparative advantage and the effects of government policies and interventions on the actors in the broiler chicken value chain. Methodologically, these two analytical tools help for a better understanding and modeling of socioeconomic factors that are connected to participation and indicate the status of the competitiveness of broiler chicken value chain in the study area.

In summary, this study reveals the most competitive and the least policy-protected nodes of the broiler chicken enterprise in southwestern Nigeria. It provides clearer and research-based findings on profitability and competitiveness of broiler chicken value chain in southwestern Nigeria. In fact, the outcomes and recommendations are useful to policy makers in developing a sustainable broiler agribusiness policy-induced programme.

### **1.5 Plan of Study**

The entire study is divided into six chapters with chapter one being an introduction to the study. Chapter two discussed research methodology and conceptual framework, literature review, trade theories relevant to competitiveness of broiler chicken value chain, theory of competitiveness, theory of comparative advantage, theory of utility, methodological review, the double hurdle model, double hurdle estimations, empirical literature review and lessons learnt and gaps identified from literature reviewed. Chapter three is focused on research methodology with study area, types of data, sampling procedure and sampling size, analytical techniques and models fully discussed. Chapter four centered on the results and discussions of socioeconomic characteristics of the actors: distribution of age, gender,

marital status, level of education, membership of association, household size and income earners were analysed. Also, mapping of the broiler chicken value chain with key processes, activities and actors, product flow and key actors identified for the broiler chicken value chain in the study area. Finally, determinant of participation decisions and factors Influencing Intensity of participation were analysed. Chapter five was devoted to the measurement of competitiveness and comparative advantage of broiler chicken value chain in Southwestern Nigeria. Also covered in chapter five were analyses of the effects of policies on competitiveness of the producers, processors and marketers. In addition, sensitivity analysis was completed to determine the effects of change in domestic price, world price and exchange rate of inputs on competitiveness of the broiler chicken value chain. The chapter ended with the identification of major constraints to participation in broiler chicken value chain in Southwestern Nigeria. Chapter six contains the summary of findings, conclusion, policy recommendations and contribution to knowledge.

#### **1.6. Limitations of the Study**

The study is limited to production, processing and marketing nodes of the broiler chicken value chain. Therefore, data on input supplying and consumption nodes of the broiler chicken were not collected nor captured in this work.

Data collected and used for the analysis was based on the current income generating activities of the actors and does not cover previous years. It is therefore important to categorize the data as static although sensitivity analysis was introduced to address this in the policy analysis matrix.

The marketers referred to in the study is limited to those that are involved in the wholesale and retail activities of buying and selling of live broiler chicken in the study area.

## **CHAPTER TWO**

### **THEORETICAL REVIEW, LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

#### **2.1 Theoretical Review**

##### **2.1.1 Trade Theories Relevant to Competitiveness of Broiler Chicken Value Chain**

Development of poultry agriculture and support for all its value chains are linked to robust trade policies deeply rooted in trade theories (FAO, 2013). These theories are relevant to the study of competitiveness of any agricultural value chain; be it crop or livestock. The most common and the simplest of the trade theories is the neoclassical factor-endowment based theory of free trade with its major assumptions of the existence of only two countries and two commodities (Oluyole, 2016). Neoclassical trade theories assume countries or trade actors operate under a perfectly competitive market conditions and that trade relationships should be mutually beneficial to both actors even with unequal productivity (Sen, 2010). The theory is associated with neoclassical economist, David Ricardo who assumed labour was the only factor of production being used by producers; the two actors-countries and equally assumes free trade as the best option for production efficiency (Meoqui, 2014; Siddiqui, 2018). Porter (1990) on the other hand, postulates that there are two drivers of competitive advantage: cost advantage and differentiation (Oluyole, 2016)

##### **2.1.2 Michael Porter's Theory of Competitive Advantage**

The theory postulates that there must be inherent national endowment that drives competitive advantage of a nation, state or group. Michael Porter's theory emphasizes the need for a country to identify and create new factor advantage, such as skilled labour, disruptive innovations, access to market, government policies among others for a long-term cost-effectiveness and competitive advantage. The theory focuses researchers and policy makers on having a clearer understanding of profit-enhancing decision factors that could help increase both short-run profit and competition for a sustainable business in the long run. To practically apply Michael Porter's theory to a broiler chicken value chain

enterprise with key actors, there is need to consider and address the five competitive forces highlighted by Porter (1990) listed as:

- i. Competitive forces within the broiler chicken value chain; locally and globally
- ii. Potential of new entrants into broiler chicken value chain.
- iii. The power of input suppliers in the broiler chicken value chain.
- iv. The power of broiler chicken value chain customers and associated demand related issues
- v. The threat of substitutes to broiler chicken products.

Michael Porter`s theory is a theoretical framework that helps to build a sustainable value chain business model and when appropriately applied with an incentive-node-focused competitive trade policies and strategies by policy makers and government could guarantee a stable, profitable and sustainable broiler chicken business. In this study, Michael Porter theory is relevant to the understanding of factors that are associated with actors` decision to participate including intensity of participation and current government policies affecting broiler chicken value chain in Nigeria.

### **2.1.3 Richardian Theory, Comparative Cost and Trade Surplus**

Richardian theory focuses on general equilibrium model with the assumption of a common factor of production being fixed and is available to only two countries producing two similar goods. It is a theory with the concept of the invisible hand where each international free trade participant benefit by concentrating on the production of goods in which it has an absolute advantage (Sen, 2010). The theory exemplified a situation where every nation exports goods it could produce at the lowermost costs and imports goods it could produce at the maximum cost. It emphasizes that a nation without absolute advantage over its trade partners, in terms of cost of production of goods, can enjoy the benefit of foreign trade with a relative advantage in another good if she sell her products abroad.

### **2.1.4 Heckscher-Ohlin Theory of Resource Endowment**

Heckscher-Ohlin theory, as a factor-endowment based theory of free trade, sets a groundwork for the principle of resource endowment with a foundation for basic understanding of exportation of capital-intensive goods by capital-abundant country and exportation of labour-intensive goods by labour-abundant country (Sen, 2010). This theory is often referred to as natural resource abundance theory and its proposition is that a country with cheaper goods will definitely export produce in exchange for goods for which she has less relative abundance. Heckscher-Ohlin situates that a country will specialize in producing and exporting those commodities which require relatively intensive use of locally abundant factors of production and that relatively capital-abundant country will export capital-intensive commodities while relatively labour-abundant country will export labour-intensive commodities.

### **2.1.5 Theory of Competitiveness**

Competitiveness has no one-fit-all definition that captured all what the concept is all about. Schwab (2013) defines competitiveness as set of institutions, policies, and factors that determine the level of productivity of the economy of a nation. Competitiveness has also been described as the ability of a country to produce and exchange goods and services that are abundant in a country for the goods and services that are scarce in another country (Altomonte *et al.*, 2012). In a corporate perspective, a firm's competitiveness is its economic strength against its rivals in the global marketplace where products, services, people and innovations move freely despite the geographical boundaries (Chao-Hung and Li-Chang, 2010; Altomonte *et al.*, 2012 and Siudek and Zawojaska, 2014). All these definitions clearly show that the competitiveness of a nation in terms of its products is an indication of the social and economic sustainability of the country. The competitiveness of Nigeria broiler chicken value chain can be defined or measured in term of the degree to which the country, in a free market economy with no government intervention, can produce, process and actively market her broiler chicken or participate in both local and global poultry marketplace for an increased contribution to her GDP.

In this study, determining the competitiveness of broiler chicken value chain in Nigeria is the main focus and the benefits of looking at competitiveness in this direction include

addition to knowledge on socioeconomic characteristics of broiler chicken value chain actors that affect their participation decisions and thereby increasing or decreasing profitability, competitiveness, comparative advantage and favourable policies among others.

### **2.1.6 Theory of Comparative Advantage**

Faccarello (2015) states that the theory of comparative advantage explains the direction of the flows of trade between countries and determine the gains each country gets from its participation in international exchanges. The key to comparative advantage, according to Oluyole (2016), is the idea of opportunity cost and that relative resource abundance is the driving force of the theory. Therefore, its application to value chain research is indispensable for a deeper understanding of key actors participating in the value chain.

### **2.1.7 Theory of Utility**

Broiler chicken value chain actors make rational participation and intensity of participation decisions that are based on preference and maximization of benefits often referred to as profits. Key actors in broiler chicken value chain make decision on which node to participate in and the intensity of participation once the income to be derived is higher than or exceed the alternative benefits from another nodes. Discrete random utility theory has been appropriately used to capture satisfactions or profits being derived by value chain actors in each node of production, processing and marketing in agriculture. In this study, application of the theory of utility helps to explain income being derived by value chain actors as they make choices about the node of the broiler chicken value chain that gives higher value in terms of profit/price per kg or total revenue as value addition activities are being increased or decreased. For illustration, a broiler chicken producer or processor or marketer desires to maximize utility in terms of income or by making rational participation and intensity of participation decision on which node of the broiler chicken value chain to participate in; which is a function of the independent variables characterized as decision factors and subject to constraints. Such broiler chicken producer or processor or marketer, within the broiler chicken value chain, have options of selecting the node and maximizing profit subject to value chain constraints as given below:

Let denote the utility that a typical broiler chicken value chain actor  $i$  gets from selecting alternative  $g$ ,  $h$  and  $j$  for production, processing and marketing nodes respectively for  $Y_i =$  income or revenue (Naira per Kg).

$$U_{ig} = (\beta_g X_i + \varepsilon_g) > U_{ih} = (\beta_h X_i + \varepsilon_h), > U_{ij} = (\beta_j X_i + \varepsilon_j) \quad g \neq h \neq j \quad (2.1)$$

Where Utility (U) in equation (2.1) is a quasi-concave, continuous and non-decreasing utility function. It is important to note that  $U_{ig}$ ,  $U_{ih}$  and  $U_{ij}$  represent the perceived maximum utility in terms of revenue derived by the  $i^{\text{th}}$  broiler chicken actor from any of the production, processing and marketing nodes of the broiler chicken value chain  $g$ ,  $h$  and  $j$ , respectively.  $X_i$  represent vector of independent variables determining participation and or intensity of participation decision of broiler chicken actors;  $\beta_g$ ,  $\beta_h$  and  $\beta_j$  are estimated parameters for producer, processor and marketer; while  $\varepsilon_g$ ,  $\varepsilon_h$  and  $\varepsilon_j$  are error terms that are presumed to be independent and distributed identically. The probability given that the  $i^{\text{th}}$  broiler chicken value chain actor would prefer a node is given below:

$$P(X = 1 / X) = P(U_{ik} > U_{ip} / X) \quad (2.2)$$

The equation in (2.2) indicates that broiler chicken value chain actor would only prefer a node that gives highest returns or utility in terms of improved revenue and that actor would not go for low-revenue generating node of the broiler chicken value chain. The relationship between the observable discrete choice and the latent continuous net income is shown below:

$$Y_{ig} = 1, \text{ if } U_{ig} > 0 \text{ and,} \quad (2.3)$$

$$Y_{ig} = 0, \text{ if } U_{ig} < 0, \quad (2.4)$$

The dependent variable  $Y_i$  includes revenue or income from all nodes or specific node of the broiler chicken value chain which generate(s) revenue or income opportunities for broiler chicken value chain actor(s).

## 2.2 Methodological Review

This methodological review section focuses on the Double Hurdle Model, Profit Margin Analysis and Policy Analysis Matrix in order to expound their adoption in the study.

These models were discussed below:

### 2.2.1 The Double Hurdle model

Based on the work of Gebremedhin, 2015; Abah, 2015; Juyoung, 2018 and Akwasi *et al.* (2019) selection of double mode is considered appropriate for the analysis of Broiler chicken value chain. Actor or farming households are assumed to first decide whether to participate in any node of the broiler chicken value chain and then secondly, to decide how much (in quantity) to produce. Therefore, this leads to running two models in one hence we have: 1) Choice/Selection model/ Participation model and 2) Outcome model/ Quantity produced or processed or sold model

The Double-Hurdle Model was proposed by Cragg (1971) and it is a modification of the Tobit Model and the Heckman Model because it is more flexible. The difference between the Heckman Model and Double-Hurdle Model is that Heckits assume that in the second stage, there will be no zero observation once the first stage is passed, whereas the Double-Hurdle still considers that there might be a possibility of a zero observation which may arise from the individuals' choice or random circumstances (Cragg,1971).

$$\text{First stage: Participatory stage, } P(D = 1) = X\alpha + \mu \quad (2.5)$$

$$\text{Second stage: Quantity purchased, } Y = ZB + E \quad \text{given that } D > 0 \quad (2.6)$$

Participation model is estimated using Probit Model while the outcome model is estimated using truncated normal regression.

The Double-Hurdle Model contains two equations. This is written as:

$$d_i^* = Z_i' \alpha + \mu_i \quad (2.7)$$

$$y_i = X_i' \beta + v_i \quad (2.8)$$

$$\begin{pmatrix} \alpha \\ \mu \end{pmatrix} \sim N \left[ \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2 & 0 \\ 0 & \sigma_2^2 \end{pmatrix} \right] \quad (2.9)$$

Diagonally, from the covariance matrix, the two error terms are assumed to be independently distributed. The first hurdle is then represented by:

$$d_i = 1 \text{ if } d_i^* > 0 \quad (2.10)$$

$$d_i = 0 \text{ if } d_i^* \leq 0 \quad (2.11)$$



The second hurdle closely resembles the Tobit Model:

$$y_i^* = \max(y_i^{**}, 0) \quad (2.12)$$

Finally, the observed variable,  $y_i$  is determined by the interaction of both hurdles as follows:

$$y_i = d_i y_i^* \quad (2.12)$$

The decision of whether to participate in any node of the broiler chicken value chain and about the size of Y can be jointly modelled, if they are made simultaneously by the actor; independently, if they are made separately; or sequentially, if one decision is made first and affects the other one (this is the dominant model). If the independence model applies (which was the initial position of Cragg (1971), the error terms are distributed as follows:

$$\mu_i \sim N(0, 1) \quad (2.13)$$

$$v_i \sim N(0, \sigma^2) \quad (2.14)$$

If both decisions are made jointly (the Dependent Double-Hurdle) the error term can be assumed to have a bi-variate normal distribution defined as:

$$(\mu_i, v_i) \sim \text{BVN}(0, \psi) \quad (2.15)$$

Where,

$$\psi = \begin{bmatrix} 1 & \rho\sigma \\ \rho\sigma & \sigma^2 \end{bmatrix} \quad (2.16)$$

The model allows the analysis of both the factors determining decisions of broiler chicken actors to participate and those factors responsible for the extent of participation to differ. This model (DH) permits the possibility of zero observations in the second hurdle by recognizing the fact that zero income or expenditures can be observed which could be attributed to one or many factors such as the random effect (or data reporting problem), respondents are simply not interested in participating or in the activity or the possibility of the survey period being too short to allow actors or participants to report any income among others. For this study, the double hurdle regression was used to examine factors

that influence participation and intensity of participation of the main actors in the broiler chicken value chain.

Ogundari and Arifalo (2013) used the double-hurdle model, which allows for the analysis of both consumption or participation decisions and quantity or intensity of participation for Fresh Vegetable (FV) to differ. The study was based on data from the 2003/2004 Nigeria Living Standard Survey (NLSS), and the empirical findings show that an average household in the sample considered the demand for FV to be a luxury good; across income groups, households in the low and high-income groups considered the demand for fresh fruit to be a necessity and a luxury good, respectively, while all households, regardless of income, considered the demand for fresh fruit to be a necessity and a luxury good. As a result, demand for FV is higher in households with younger members than in households with older members.

### **2.2.2 Double Hurdle Estimations**

Double Hurdle model estimates capture the two decision making processes of an average actor in any of the three nodes of the broiler chicken value chain (implied as production, processing and marketing in this write up). The first of the two decision making processes is to either participate or not in any broiler chicken income generating activities. The second decision on the desire level of participation is conditional on the positive outcome of the first decision of broiler chicken actor`s decision to participate. Key variables of Double Hurdle model are the dependent (income or revenue or volume in Naira/Kg) and independent variables (socioeconomic and demographic characteristics of the actors). The dependent variable denoted as  $Y_i$  includes all income generating activities of the actor in chosen node of the value chain measured in terms of total revenue.

$Y_i$  = revenue (Naira/Kg)

$X_i$  = various socioeconomic and demographic variables that influence actors' decision to participate in all or specific activities of identified node(s) of the value chain. These variables include age, gender, marital status, household size, years of education, association or group membership, number of income earners, payment of tax, access to

credit and price per kg among other variables (Gebremedhin, 2015; Abah, 2015; Juyoung, 2018; Akwasi *et al.* (2019).

### **2.2.3 Profit Margin Analysis**

Marketing margin has been studied in many fields by many researchers. Gebremedhin (2015) while working on Value Chain Analysis of Poultry in Adwa Wereda, Central Zone of Tigray, Ethiopia observed that the concept of marketing margin should be defined as the difference between the price being paid by the final consumers and that which was obtained by producers. Profit margin is used interchangeably with marketing margin and is calculated as the difference between the selling and purchasing prices of products and or services in agribusiness. In profit margin analysis, there are three major components namely: the revenue, the cost and the profit. The cost of producing a product determines the final selling price and it increases as the processing and marketing costs are added. Therefore, the size of the profit margin depends not only on the largeness of the selling price (the product's quality is however key) but also on the smallness of the size of the marginal cost of production, including the cost of processing and marketing operational activities.

Gebremedhin (2015) concluded that marketing margin is a convenient descriptive statistical method that could be employed in expressing how revenue accrued from consumers to value chain actors are shared at different nodes or levels.

### **2.2.4 The Policy Analysis Matrix**

The Policy Analysis Matrix (PAM) is a robust tool developed by Monke and Pearson (1989) in measuring the effect of policy on the production systems. Other researchers such as Masters and Winter-Nelson (1995) had improved on Policy Analysis Matrix such that its usefulness in determining the competitiveness, efficient use of input, comparative advantage and the effectiveness or degree of government interventions has been documented and accepted as a simplified analytical tool with theoretical assumptions and empirical simplifications (Adeoye *et al.*, 2014). Policy Analysis Matrix is a reliable tool and results from it are easy to interpret by researchers making the outcome of any agricultural research work where it has been used for analysis relevant and

easy to communicate those who are not economic experts but are policy-makers(Oluyole, 2016).

Simplified, measuring competitiveness with PAM in value chain research work helps to focus on estimates of private and social profits; given the current policies, technologies, inputs and output prices (Pearson *et al.*, 2003; Adeoye *et al.*, 2014). A critical look at the PAM reveals that there are three rows and five columns. The first row of the PAM is for the calculation of the private profits, being measured by obtaining the difference between two variables: observed costs and revenue; both at the market prices (private values) received by the actors. It is important to note that the first row in the PAM is derived from the analysis of private budgets of the node or actor where costs of tradable inputs and Domestic Factors (DFs) (based on the prices observed in local markets) are duly subtracted from the revenues; derived from the observed market prices. On the second row of the PAM is for the calculation of the social profit which is being obtained by the difference between observed revenues and costs; valued at the social prices. Also, note that the second row in the PAM is derived from the analysis of social budgets of the node or actor where costs of tradable inputs (based on import parity prices) are duly subtracted from the revenues; calculated from prices in international markets.

Level of competitiveness is therefore measured or determined based on the result of either positive or negative values of both private and social profit estimates. A positive profit values at private prices are strong indication of competitiveness of the value chain activities while negative profit values at private prices are clear indications that income generating activities or the systems are not competitive. Likewise, a positive profit values at social prices are strong indication of comparative advantage of the value chain nodes and its activities while negative profit values at social prices are clear indications that the nodes and actors-income generating activities or the systems does not have comparative advantages. On the third row, we have divergence between the private and social prices or observations measured; an indicator that private prices are either the same or differ from social prices of revenues, costs, and profits. There are two main explanations for any observed divergence in PAM analysis. The first being is often been categorized as market failure-factors such as market imperfections, monopolies or monopsony and externalities among others. Any of these trigger or lead to inefficient pricing signals. The second and

more widespread source of divergence between the private and social prices is the existence of distorting government policies. In literature, efficient policies has been identified and also known to offset market failures while all other policies distort the economy; moving it away from its most efficient allocation of inputs and outputs. The two sources of divergences-market failures and distorting policies-cause private prices to differ from social prices of revenues, costs, and profits. The basic framework for the Policy Analysis Matrix is shown in Table 2.1.

**Table 2.1: Policy Analyses Matrix**

Items	Revenues	Costs		Domestic Profits
		Cost of Tradable Inputs	Cost of Factors	
<b>Private Prices</b>	$A = Y_i^p P_i^p$	$B = \sum a_{ij} P_j^p$	$C = \sum a_{ij} P_k^p$	$D = A - (B + C)$
<b>Social Prices</b>	$E = Y_i^s P_i^s$	$F = \sum a_{ij} P_j^s$	$G = \sum a_{ij} P_k^s$	$H = E - (F + G)$
<b>Divergences</b>	$I = A - E$	$J = B - F$	$K = C - G$	$L = D - H \equiv I - (J + K)$

**Source:** Monke and Pearson, 1989.

Where:  $P^p_j$  and  $P^s_j$  = private and social prices for broiler chicken products (N)

$P^p_j$  and  $P^s_j$  = private prices (PP) and social prices (SP) of tradable inputs for broiler chicken products (N)

$P^p_j$  and  $P^s_j$  = private and social prices of Domestic Factors (DFs) for broiler chicken products

$P^p_j$  and  $P^s_j$  = broiler chicken products

$a_{ij}$  = quantity of tradable inputs and DFs

A = revenue measured in private price

B = cost of tradable inputs measured in private price

C = cost of DFs measured in private price

D = private profit

E = revenue measured in social price

F = cost of tradable inputs measured in social price

G = cost of DFs measured in social price

H = social profit

I = output transfers

J = Input transfers

K = Factor transfers

L = Net transfers

### 2.2.5 Major Indicators of Policy Analysis Matrix

**(i) Nominal Protection Coefficient (NPC):** NPC is a simple indicator of the incentives or disincentives in place, defined as the ratio of domestic price to a comparable world (social) price. NPC can be calculated for both output (Nominal Protection Coefficient of Output- NPCO) and input (Nominal Protection Coefficient of Input- NPCOI) (Elsedig *et al.*, 2015). It is an indicator of the nominal rate of protection for consumers measuring the ratio between the average price paid by consumers (at farm gate) and the border price (measured at farm gate level). Nominal Protection Coefficient shows the ratio between the price paid for a product upon entering the country and the price paid inside the nation by consumers. Both imported and exported goods have their own ratios to show the level of additional fees added to products between the point of import or origin and the final consumer or buyer. A higher ratio indicates more government charges and taxes are added to the border price, which raises the amount being paid by consumer on imported agricultural products.

The NPCO for tradable outputs or the NPCI for tradable inputs is frequently used to calculate the ratio of the observed domestic price to the selected world price. For example if the NPCI of broiler chicken producer is greater than one ( $>1$ ), it indicates that broiler chicken producers are taxed when they buy any tradable inputs. On the other hand, if the NPCI of broiler chicken producer is less than one ( $<1$ ), it indicates that producers in value chain production nodes enjoy incentive an indication of tradable inputs are subsidized. An NPCI that equals one ( $\text{NPCI} = 1$ ) indicate a neutral condition (Elsedig *et al.*, 2015).

**(ii) Effective Protection Coefficient (EPC):** EPC can be calculated using the PAM table entries in Table 2.1. The ratio obtained compares value added in domestic prices ( $A - B$ ) with value added in world prices ( $E - F$ ).  $\text{EPC} = (A - B)/(E - F)$ . The purpose of the EPC is to show the joint effect of policy transfers affecting both tradable outputs and tradable inputs in the broiler chicken value chain.

**(iii) Profitability Coefficient:** This measures the impact of total transfers on private profits (the proportion of private profits to social profits). Therefore  $\text{PC} = D/H = (A - B - C)/(E - F - G)$ .

- (iv) **Subsidy Ratio to Producers (SRP):** SRP is a unified metric for measuring all transfer effects. The SRP indicates how much the system's revenues are increased or decreased as a result of transfers. It is the output tariff equivalent, if the net effect of all policy transfers were carried out solely through a tariff on output. This ratio is a comparison of the net transfer to the value of output in world prices, or  $SRP = L/E$ .
- (v) **Measure of Divergence:** Distorting policies or market failures are the root causes of divergences. Differences in observed market prices and efficiency prices are due to either source of divergence. In Table 2.1. divergences in revenues is measured with I symbol (often caused by distortions in output prices), divergences in tradable input costs is measured with J symbol (often caused by distortions in tradable input prices), divergences in domestic factor costs is measured with I symbol K (often caused by distortions in domestic factor prices), and the net transfer effect represented by the symbol L (resulting from summation of all divergences).

### 2.2.6 The Concept of Tradable and Non-tradable Inputs

Tradable goods in broiler chicken value chain (such as maize, chemicals, feed concentrates, fuel and electricity) are those inputs needed for production but are being sold or traded in the international agribusiness marketplace without the intervention of the government and any other restrictive practices. Chikangaidze (2011) stated that non-tradable inputs are capital, land, labour and water while tradable inputs include maize, feeds concentrates, electricity and fuel. He further stated that non-tradable are those inputs or raw materials (and services) that are needed for production, processing and marketing for which the cost of international transportation is too high to justify exports but not low enough to justify imports.

It is essential to differentiate between tradable and non-tradable inputs because the composition of tradable and non-tradable will form the basis of determining the competitiveness of key nodes in value chain analysis (Anja *et al.*, 2009). While determining the prices of tradable and non-tradable (inputs and outputs) could be difficult because of lack of acceptable markets for them, different methods and techniques such as



shadow pricing of the tradable and non-tradable was recommended by Chikangaidze (2011).

### **2.2.7 The Concept of Shadow Pricing of Tradable Inputs**

Local market prices of factor inputs do not often reflect scarcity values. For example, the world prices for broiler tradable inputs (such as maize) will serve as shadow prices after adjustments have been made for the costs of importing or exporting the goods (such as the costs of transport, storage facilities and insurance among others). Shadow pricing therefore can be assessed or determined by using world price of products or services that are freely traded on international markets but with caution due to possibility of distorted exchange rates (Chikangaidze, 2011).

## **2.3 Empirical Review**

### **2.3.1 The Empirical Studies on Double Hurdle Model**

Nwigwe *et al.* (2009) applied double hurdle on the study of Socioeconomic Factors Affecting Intensity of Market Participation among Smallholder Yam-Based System Farmers in Oyo North Area of Nigeria. Probit and Tobit econometrics models were used to identify factors influencing or determining farmers' decisions in selling yam and intensity of participation. In the study, socioeconomic as well as demographic characteristics of the actors directly linked to volume of production, farmers' sales, consumptions and other market options being used were captured. In addition, major constraints of the farmers to market participation identified were inadequate storage facilities among others. The results obtained by this research effort shows that access to market information, contact with extension agents, transportation cost, farm size, and access to credit facility were among the major factors affecting market participation among farmers. It is instructive to note the policy recommendation of policy and institutions that support access to productive assets and expanded markets.

Genereuse (2009) carried out study on factors influencing women participation in coffee value chain in Huye District, Rwanda with Double Hurdle model adopted to analysed women participation, the extent of their participation and the key factors that influence intensity of participation in coffee value chain. The study identified women as an

important actors in agribusiness value chain and emphasised that their decision making ability is critical in the development of the agriculture in developing economies. The study therefore proceeded to characterised women in Coffee Value Chain, identified factors influencing their decision to participate and the key factors influencing the intensity of women participation. Among the 246 households sampled, 134 were participants while 112 were non participants. The findings of the study show that women are more in lower income generating activities and their participation is highest in processing node. Socioeconomic factors influencing women participation were land size, access to credit and training while factors influencing intensity of participation were land size, extension services, training and membership of farmer group. The study recommends policies that promoting land use consolidation, better access to training and extension services and access to credit services for increased actors` participation and higher intensity of participation in Coffee Value Chain.

Wang *et al.* (2018) applied Double Hurdle econometric model in determining factors influencing participation and intensity of participation decisions for a sample of wetland owners in coastal Louisiana. The Participation model's dependent variable was a dummy variable, while the independent variables were age, participation in other commercial-based activities, hunting lodge/camp, active management, and land type. The intensity of participation model's dependent variable was income, while the independent variables were education, land ownership, years of ownership, and total acreage of other type of land. The study's findings revealed that, among other things, age, participation in other income-generating activities, active management, and total acreage of brackish marsh were significant factors in actors' participation decisions. On the other hand, education, land ownership, year of ownership, total acreage of other type of land, total acreage of freshwater marsh, and total acreage of brackish marsh were identified as significant factors influencing actors' participation intensity decisions. The study concludes that the decision to participate in income-based activities and the intensity of participation, are related to socioeconomic characteristics of the actors. In conclusion, policy instruments for effective coastal wetland management, under private ownership, and related programs are therefore critical if increase participation and intensity are to be achieved.

Simtowe and Zeller (2008) applied double Hurdle model in a study on the Impact of Access to Credit on the Adoption of hybrid maize in Malawi as an Empirical test of an Agricultural Household Model under credit market failure. In a Double-Hurdle model, switching regression was used on credit constrained and unconstrained households, with the assumption that households, in order to maximize utility, make decision to grow a local maize variety that is not subject to the growing season liquidity constraints and hybrid maize which is subject to the growing season liquidity constraint. The result of the study reveals that there is significant variation in terms of impact of access to credit on credit constrained and unconstrained households hence access to credit is a major participation-enhancing factor in income-generating activities in agricultural value chain.

Reyes *et al.* (2012) also used double hurdle regression analysis, while working on Market Participation and Sale of Potatoes by Smallholder Farmers in the Central Highlands of Angola, to estimate the factors influencing marketing decisions among potato growers. The study reinforces the robustness of Double Hurdle approach in estimating the factors associated with farming household decision making in agricultural value chain studies. In fact, the study captured reported zero sales which reflects optimal choice of the household in economics theories. The study allows for the possibility of factors influencing the decision to participate (in this case, to sell a crop) be different from those factors that determine actors` decision on the volume or how much to sell. The results of the double hurdle which focused more on gender of the household Head, productive assets ownership, transaction costs and quantity of produced or sold indicate that female-headed households produced less than male-headed household but male-headed households significantly participate in selling potatoes than female-headed household; owning productive assets and access to government extension service positively affect both participation and quantity being sold in the market; transaction costs negatively affect quantity being sold among others. The need for policy and institution support for female-headed households to foster increase participation and higher volume of supply was recommended.

### **2.3.2 The Empirical Studies on Policy Analysis Matrix (PAM)**

PAM was appropriately used by Adeoye and Oni (2014) who conducted study on competitiveness of plantain production systems in Southwestern Nigeria. The study, though focused on crop production systems, highlighted the status of competitiveness and comparative advantage of plantain value chains in Nigeria. Data were obtained from 260 producers randomly selected and analysed using PAM. The results revealed that the production node was privately and socially profitable, with a domestic resource cost ratio ranging from 0.16 to 0.19 and a social cost benefit ratio ranging from 0.20 to 0.23, indicating that Southwestern Nigeria had a comparative advantage in the commodity's production. The study recommends formulation of policies which are consistent with the country's goals of agricultural transformation, food security and economic development.

Afolabi *et al.*, (2013) worked on livestock value chain and used budgetary techniques and gross margin analyses instead of Policy Analysis Matrix to assess the profitability of poultry value chain. Result showed that the poultry egg production is profitable with a net income of ₦ 2,011,857 per annum. The profitability ratios further reveal that for every ₦1 investment made there is a potential return of N0.43 net farm income.

Sangawongse *et al.* (1999) had earlier examined Agricultural Land Use System in The Highland Areas of The Mae Chaem Catchment using the Policy Analysis Matrix (PAM). The study investigated the profitability (private and social) of dominant crops grown in the Karen communities and evaluated the impact of economic and social policies on different land use systems. The result revealed that paddy rice was profitable measured in private and social prices and should be supported with policy and institution framework. Results further revealed that upland rice was non-profitable measure in private and social prices and that all actors participating in income generating activities of the upland rice value chain should only be encouraged to grow on the highlands with required incentive and infrastructures provided. The result further revealed that rain-fed soy beans and upland corn were only socially profitable and not privately profitable. The likely reason for the outcome being that these two crops were affected by government tax policy.

Chagomoka *et al.* (2014) worked on Value Chain Analysis of Traditional Vegetables from Malawi and Mozambique using the Policy Analysis Matrix (PAM). The study emphasised

that traditional vegetables value chain has high revenue potential and contributed substantially to rural household incomes. The study was cross-sectional survey of 240 respondents using participatory approach to identify potential outlets and target crops. The outcomes revealed that traditional vegetable sales contributed about 35% and 30% of smallholders' income in Malawi and Mozambique respectively. Linkages between value chain actors were found to be weak; mostly based on spot market transactions, except for those between retailers and supermarkets, which were based on relationship marketing.

Carron *et al.* (2017) worked on the broiler chicken system in Nairobi, Kenya using a value chain framework to understand how broiler chicken product flows including governance and sanitary risks associated with the broiler chicken value chain. Importance of participating in broiler chicken as shapers of lives, source of food and income was emphasized. The study predicted an increase in consumption of broiler chicken based on future economic and population growth of the country. In Kenya, the study emphasized that, meeting up with the future estimated demand for broiler chicken by 2030 will require a 292.8% growth in production from the current 56.9 metric tonnes; if the current trade policies and the prices of poultry inputs and outputs remain constant. The focus of the study on understanding broiler chicken value chain systems, its chains and associated risk using value chain analysis was novel. The study however exclude participation decision factors and competitiveness of key actors in the broiler chicken value chain in Kenya. These were identified gaps and the focus of this thesis.

Adjimoti (2013) worked on Market Participation among Cassava Value Chain Actors in Rural Benin and identified market access as an important factor that can guarantee the integration of smallholders or rural households` who participate along agricultural value chains in the national economy. The result of the study was an eye opener on constraints that may affect access to markets and prevent actors from taking full advantage of income generating activities in any node of agricultural value chain. Key aspect of the result of the work was that majority of actors (67%) are using the informal market for their products with lack of information, communities' collective actions and infrastructure. The study emphasized the need to address the issue of lack of synergy between different actors so as to create more income generating opportunities in agricultural value chain.

### 2.3.3 Value Chain Analysis

The value chain approach in Agriculture allows one to understand how farming activities are organized by examining the structure and dynamics of different actors involved in income generating nodes like what is obtainable in manufacturing industry (Zengeni, 2014).

The origin of value chain analysis is generally being discussed from two distinct traditions: the French 'filière concept' and Wallerstein's concept of a commodity chain (Raikes *et al.*, 2000; Bair 2005). From both, a couple of derivatives have emerged with the well-known Porter's concept of the value chain; Gereffi's global commodity chain, and Humphrey's world economic triangle with the last two joined to the concept of the global value chain. The 'filière concept' was developed in the 1960s at the Institut National de la Recherche Agronomique (INRA) and the Centre Internationale en Recherche Agronomique pour le Développement (CIRAD) as an analytical tool for empirical agricultural research. The concept was used to gain a more structured understanding of economic processes within production and distribution systems for agricultural commodities (Raikes *et al.*, 2000). The general filière concept has been applied to the domestic value chains stopping at national boundaries (Kaplinsky and Morris, 2002). In the 1970s, Wallerstein (1974) developed the concept of commodity chains, embedded in the world systems theory, which is an elaboration of the dependency theory. The concept of a commodity chain is the base for the further developed global commodity chain by Gereffi and others (Raikes *et al.*, 2000). It seeks to explain the dynamics of the distribution of value chain activities in a capitalist world economy. The main driver is the international division of labor between different regions due to varying labor-intensities of production and manufacturing activities within a chain (Anja *et al.*, 2009).

According to Nguyen (2010) value chain is defined as a range of activities conducted by individual or organizational stakeholders to provide product or service from the beginning to the end users. Peterson *et al.* (2005) stated that value chain determines the character, nature and value of the product at the time of receipt by the end user. In agribusiness, value chain has to do with the conception of how agricultural raw materials often referred to as inputs are gathered and transformed through the value adding processes until the

product is in the consumers` dining table for final consumption. Value chain is very useful in understanding the building blocks of competitive advantage; hence the creation of value by people, households or communities is vital for economic development (Khaleda, 2012).

#### **2.3.4 Broiler Chicken Value Chain in Nigeria**

In Nigeria, a country with an estimated population of over 200 million birds and increasing demand for source of protein, the future outlook of the broiler chicken value chain as source of income and employment has continued to be positive (Suleiman *et al.*, 2017). Broiler chicken is relatively cheap, rich in nutrients, culturally and religiously accepted, and has been identified as an enterprise with a rapid turnover in terms of production, processing and distribution to final consumers. None of the input supplying, Production, processing, marketing and consumption nodes of broiler chicken value chain has religious restriction either at the commercial or subsistence level (Adebayo, 2005).

There has been decline in the contribution of import to national poultry consumption in recent times NBS (2006). This has provided opportunity for local actors most especially producers. There exists a policy of total ban on importation of broiler chicken into Nigeria with government expectation of creating a more favourable agribusiness environment that supports higher returns on investments for local broiler chicken value chain actors. This total trade-restriction policy will continue to have future positive impact on broiler chicken outputs due to short production cycle, increased demand and large population of local consumers of broiler chicken in the country (Suleiman *et al.*, 2017).

There are many factors associated with the farmers` participation decisions in income generating farm activities most especially in broiler chicken value chain. The need to understand socioeconomic characteristic of farmers, who are key actors, in broiler chicken value chain, cannot be overemphasized. Socioeconomic and demographic variables need to be identified and investigated for a farmer-focused and competitive value chain trade policy options. Node-related problems such as poor access to credits facility, high cost of inputs (especially feeds), disease outbreak, limited space, low pricing of local broiler chicken products, influx of smuggled broiler chicken among others that are associated with income generating activities of broiler chicken value chain actors remained unsolved

due to neglect of socioeconomic and demographic variables in policy making for government intervention (Adeyonu 2016).

#### **2.3.4.1 Input Node of Broiler Chicken Value Chain**

There are many inputs required for production, processing and marketing of broiler chicken. Direct inputs needed for production include housing and equipment, day old chick, feeds, vaccines and drugs. Among these inputs, feed account for approximately 70% of the cost of production. Feed prices are determined by many factor; mostly the cost of ingredients used for its production. Main nutrients in poultry feed are protein, carbohydrates, fat and oil, minerals and vitamins. In Nigeria there is no record of imported feeds for broiler chicken in that all broiler chicken feeds are compounded locally. However feed ingredients like maize, soybean, amino acids and some additives are imported. Furthermore, premises are sourced both locally and by importation. Type of feed found in the market includes growers' mash, layers' mash, chicks' mash, broiler starter and broiler finisher. The price of feed is highly unstable and its availability depends on supply of major ingredients or components: wheat brand, seed cake and fish (Asaph, 2014).

Feed Milling is an important aspect of input supplying node of the broiler chicken value chain. Among equipment used in feed milling are crushers, mixers, pelleting machine, wheel barrows, spades and sacks. Feed milling has been reported to be a profitable aspect of agribusiness despite several constraints and challenges of lack of access to finance and capital, expensive feed ingredients, unreliable power supply and pilfering.

Vaccine and drugs has been identified as indispensable inputs in broiler chicken production. Shortage or inaccessibility to vaccine and drugs at the right time is costly and a major constraint to livestock production and broiler chicken value chain in particular. Nigeria market is saturated with both locally manufactured and imported vaccine and drugs products for poultry enterprise most especially for broiler chicken production.

Housing and equipment are mostly fabricated locally though there is no ban or restriction on importation of poultry equipment in Nigeria. Some of the equipment that are essential



in the broiler chicken value chain include battery cages, manually operated and automated drinkers and feeders, debeakers, incubators and hatchers among others.

#### **2.3.4.2 Production Node of Broiler Chicken Value Chain**

Production of farm crops and raising of livestock are major part of agriculture in many part of the world. The production activities in broiler enterprise range from those activities prior to the arrival of the day old chicks such as land clearing, brooder, grower and finisher stages as well as the marketing of broiler chicken to processors and marketers (Etuah, 2014).

Broiler chicken production has been documented as one of the best approaches to meeting the excess demand over supply of a safer sources of animal protein. However, efficient production in the broiler chicken value chain is assured when favourable climatic and trade environment are created. In terms of climatic environment, 18<sup>0</sup> to 22<sup>0</sup> comfort zone with a body temperature of 105<sup>0</sup> to 107<sup>0</sup> is required for broiler chicken production. In addition, broiler chicken are less tolerant of heat than cold. Production equipment and facility required for quality broiler chicken products include watering and feeding troughs among others. Trade policy on supply of inputs into poultry farms, most especially feed that constitutes 70% and DOCs, has been the greatest challenge in Nigeria; as in the rest of the world.

In this study, production of broiler chicken value chain were classified into small, small: <1000; medium: >1000 - <5000 and large scales: large:  $\geq$  5000. The work of Pagani *et al.* (2008) and Uchendu *et al.* (2015) were used as a guide and modified to arrive at this decision. While Pagani *et al.* (2008) modified the four grouping by FAO into five as rural: a few  $\leq$  200; backyard: a few – 1,500; small scale: 500-<2500; medium-scale: >2,500-10,000 and commercial: > 10,000 birds, Uchendu *et al.* (2015) classified poultry enterprise by scale of production into Backyard:  $\leq$  250; small: 250-<2000; medium: 2000-5000; large:  $\geq$  5000 birds. Investment decisions or considerations into the type and scale of poultry production enterprises to set up are often based on such factors as the location of the farm, system of production to be adopted, type of birds to be reared, cost of feeding as well as vaccination, available extension service, risks management structure and the technical knowledge of the owners.

Breeder production is an indispensable aspect of broiler chicken production. It involves the rearing of parent stock and more capital intensive at the short run but more profitable at the long run. Both males (cocks) and females (hens) birds are housed although in separate pens. At maturity either natural mating is allowed or artificial insemination is carried out to produce fertile eggs by the hens. The fertile eggs are then sent to the hatchery for day old chicks' production. The broiler chicken houses or pens and all the equipment must be purchased and made ready for day old chicks; cleaned and disinfected. The floors of the pens are filled with fresh but dry wood shavings. A day before the arrival of the chicks, the brooder pens are pre-heated to ensure a uniform temperature throughout the brooder area. The drinkers and feeders are then placed at appropriate positions within the brooder house. An hour before the arrival of the chicks, feeders and drinkers are filled with feed and water respectively. Glucose is added to the water in order to give the day old chick instant energy (Etuah, 2014; Oloso *et al.*, 2020)

Brooding is another important aspect of production and it ranged from two to three weeks. During this brooding period, the chicks are given first Gumboro and Newcastle diseases vaccines; the chicks are served with quality broiler starter feeds with regular attention in terms of visit to observe the condition (temperature) of the chicks. Broiler chicken production requires regulated heat because abnormal heat could be fatal leading not only high mortality rate but the collapse of the farm.

The grower stage is another duration and it ranged from four to five weeks during which the chicks are transferred from the brooder houses into the main pens. The second Gumboro and Newcastle vaccinations are expected to be carried out at this stage while the chicks are fed with broiler grower. The final stage is the finisher stage which ranged from two to three weeks. During this stage, the birds are fed on broiler finisher feed. The birds are considered matured and ready for the market.

Below are the three major broiler chicken production systems in Nigeria:

### **1. Small Scale Broiler Chicken Production**

In small scale broiler chicken production, including all associated support offered by other key actors in the processing and marketing nodes, lowest level of knowledge, skills and technologies are needed. While it far higher than normal backyard poultry, it is usually on

low scale of operation and with little external intervention in terms of veterinary inputs or labour.

## **2. Medium Scale Broiler Chicken Production**

In medium broiler chicken production and its associated processing and marketing operations, middle level of knowledge and skills are required or needed. Production technologies essential for increase productivity are introduced and used while the use of veterinary extension officer are common but rarely do residential veterinary officer found.

## **3. Large scale or commercial Broiler Chicken Production**

In large scale commercial broiler chicken production system and all associated processing and marketing processes and activities that are linked with it, highest level of knowledge, skills and technologies are essential and often a must have for the managers and key staff. The commercial broiler chicken production requires huge capital, labour, technology and demand attention of professionals most especially as veterinarians.

### **2.3.4.3 Processing Node of Broiler Chicken Value Chain**

Agricultural processing is a value additions methods significantly associated with increase in farm production (Ryan and Hodbod, 2018). Globally, processing activity has been recognized as an important part of agriculture and it often acts as market stabilizer; in terms of supply and demand equilibrium. Many researchers among whom are Eze *et al.*, (2010); Ryan and Hodbod (2018) maintained that commercial processing of agricultural produce (including livestock) into finished products requires favourable government policies; not only to increase production but also to achieve increased processing and distribution of agricultural products. Gebremedhin (2015) highlighted lack of sanitary procedures as a concerns associated with processing of agricultural value chain. Islam (2003) identified other constraints that require government policy intervention to include low level of education among farmers, high cost of equipment, poor storage facilities and lack of basic knowledge of the application of technological procedures in processing node of broiler chicken value chain.

In conclusion, identifying increasing or decreasing decision factors (such as gender, association membership, access to credit, number of chicken owned, level of education,

household size, number of income earners among others) that exert significant influence on processors` participation and intensity of participation within the processing node of agricultural value chain need to be examined for effective policy-decision on expanded agricultural product market.

#### **2.3.4.4 Marketing Node of Broiler Chicken Value Chain**

Marketing activities in broiler chicken value chain involve all actions and decisions of actors participating in identifying, buying and selling of broiler chicken for the benefits of final consumers. There are many marketing channels available to broiler chicken producers in Nigeria but broiler chicken are generally sold to the final consumers through the middlemen (wholesalers and retailers) at the farm-gate and in the broiler chicken live markets. The wholesalers and retailers sell broilers chicken to caterers, hotels, supermarkets and the final consumers. Middlemen are peculiar and work closely with farmers with access to information on quantity and prices of broiler chicken ready for the market (Taru *et al.*, 2010).

Profitability or competitiveness of any agricultural value chain, broiler chicken value chain in particular, can only be determined when the farm products (broiler chicken) are brought to the market for access and purchase by the final consumers to happen. At the marketing node, we have the middlemen (wholesalers or retailers) who are bulk buyers of agricultural products from different producers. They are known for negotiation with producers, make purchase and add value by repackaging and then transport agricultural products to markets for higher profit margins.

There are farming households with focus solely on marketing node of agribusiness enterprises. They carry out income generating activities by identifying and visiting farms, local markets and farmers` cooperatives hubs. There are many issues, challenges and constraints associated with them and the activities, they carry out in the value chain that could affect participation and intensity of marketing

#### **2.4 Determinants of Competitiveness in Agricultural Value Chain**

Agricultural competitiveness can be described as the capability of an agricultural enterprise to encounter competition, rise up and to emerge successfully (Akinwumi *et al.*,

2010). Competitiveness earlier defined as a multidimensional and relative concept by Juyoung (2018) vary with time and context (Ambastha *et al.*, 2004). It can be viewed as the capacity of an individual or ability of an agricultural firm to conceptualize a product (that meet the need of a specific consumer segment at a given price and standard), mobilise resources to produce such value adding product for profits and be more successful than others over time.

There are many factors associated with competitiveness of agricultural value chain in Nigeria. Some of these factors include but not limited to socioeconomic characteristics of key participants, technology, input supply and costs, product quality, social capital endowments and macroeconomic environment, risks and trade policies (Akinwumi *et al.*, 2010).

## **2.5 Lessons Learnt and Gaps Identified from Literature Reviewed**

Many of the reviewed studies emphasized the need for a clear understanding of trade concepts and theories as a key driver for agricultural policy makers to create or develop policy options or frameworks for a competitive broiler chicken value chain. It was clear that robust trade policies for farmer-focused, market expansion and competitiveness are deeply rooted in sound trade theories.

The empirical review of relevant studies revealed the robustness of the two selected models, Double Hurdle and PAM, in determining factors influencing key actors decisions to participate (intensity of participation) and for analysis of the competitiveness of any agricultural products, respectively. Indicators of PAM as incentive construct, such as the NPC, EPC, PC among others when obtained will reveal the impacts of current policies on the broiler chicken value chain.

Most studies revealed researchers used either gross margin analysis or PAM to determine profitability or competitiveness of agricultural value chain without measuring decision-factors of value chain actors. Modelling socioeconomic variables that could influence actors` participation in agricultural value chains were mostly omitted. This study observed the omission, proceeded using double hurdle model to analyse socioeconomic variables

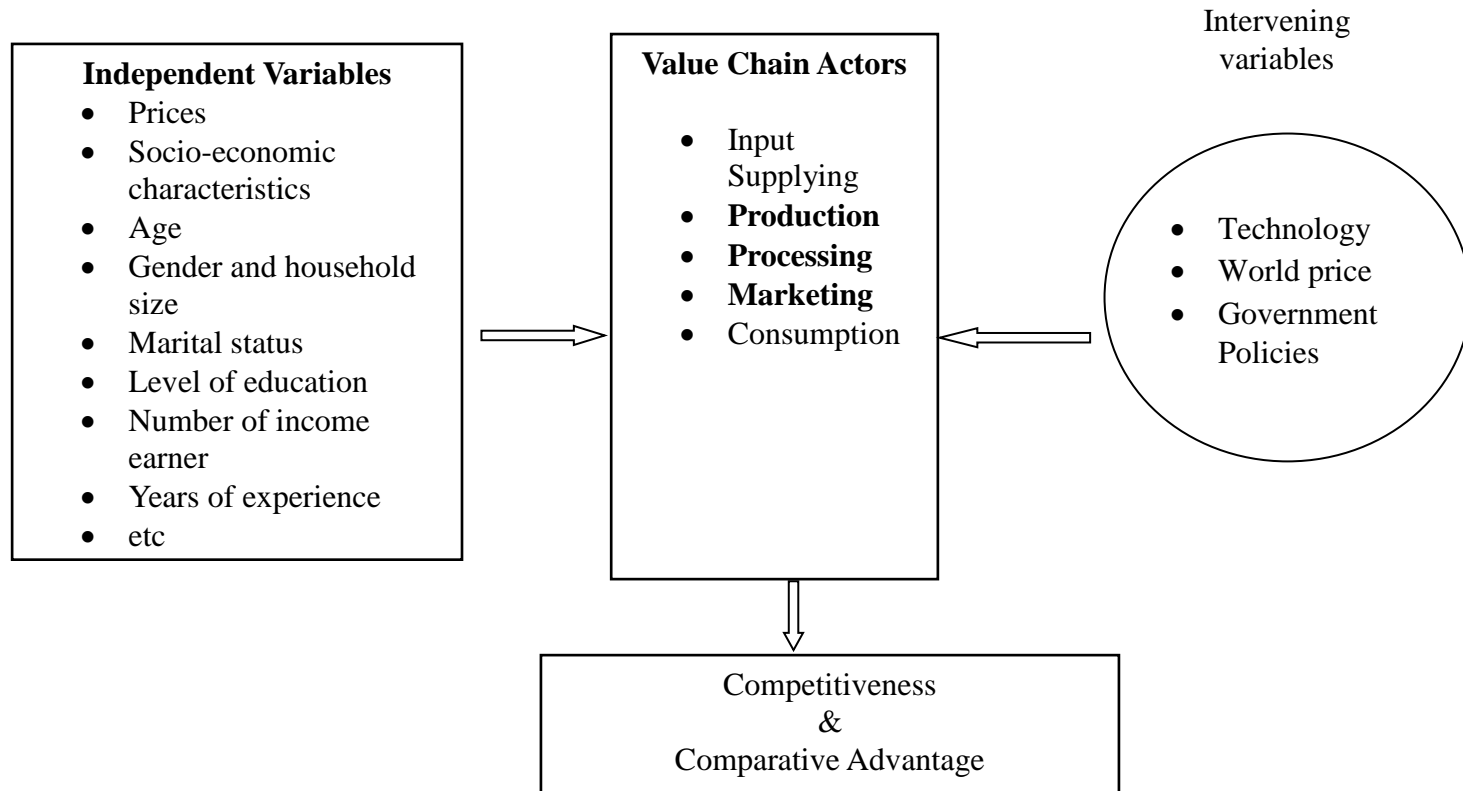
and modeled the increasing or decreasing decision-factors for participation and the level or intensity of participation of broiler chicken actors in Southwestern Nigeria.

This study is also different from all reviewed studies including that of Carron *et al.* (2017) that worked on broiler with focused on governance and sanitary risks in Kenya. The study employed Policy Analysis Matrix to determine competitiveness of broiler chicken value chain in the study area. In addition, sensitivity analysis was done to ascertain the impact of positive or negative shocks on exchange rate, tradable inputs among others. In addition, double hurdle model was used to analyse for socioeconomic variables that were increasing or decreasing decision-factors for participation and level or intensity of participation by producers, processors and marketers in the broiler chicken value chain.

## **2.6 Conceptual Framework**

Broiler chicken value chain encompasses all income generating activities, processes and flow of products and information from and to key actors participating in the conception, input supply, transportation, production, processing, marketing and consumption of broiler chicken meat. In figure 2.1, the modified broiler chicken value chain framework adapted from Afutu (2011) and Chikangaidze (2011) was developed and showed the actors as input suppliers, producers, processors and marketers (wholesalers and retailers) within the broiler chicken value chain. The concept of value chain therefore encapsulates different activities that link together all actors participating in any income generating activities or value addition within the broiler chicken value chain. The inter and intra node relationships help and guarantee broiler chicken products are produced, processed and distributed to reach the final consumer (Gebremedhin, 2015). Value chain therefore encompasses all range of income generating activities being carried out by all actors; from the conception to input suppliers who procure and deliver inputs needed in production and processing. All actors work harmoniously to ensure broiler chickens are profitably (privately and socially) produced, processed and marketed to final consumers.

## Conceptual Framework for Broiler Chicken Value Chain



**Figure 2.1: Modified Broiler Chicken Value Chain Adapted from Afutu (2011) and Chikangaidze**

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Study Area

The study was carried out in Southwestern Nigeria. The region is comprised of six states: Lagos, Ogun, Oyo, Osun, Ekiti and Ondo. There is high prevalence of poultry production in many of these states with Oyo and Ogun states being major producers of broiler chicken, selected for the survey. The indigenes of these states are primarily of the Yoruba ethnic group and majority of the inhabitants are farmers who engage in farm income generating activities in the production, processing and marketing of food crops and livestock as source of full or supplementary livelihood. Many of the inhabitants earn salaries as civil servants either in government or in private establishments.

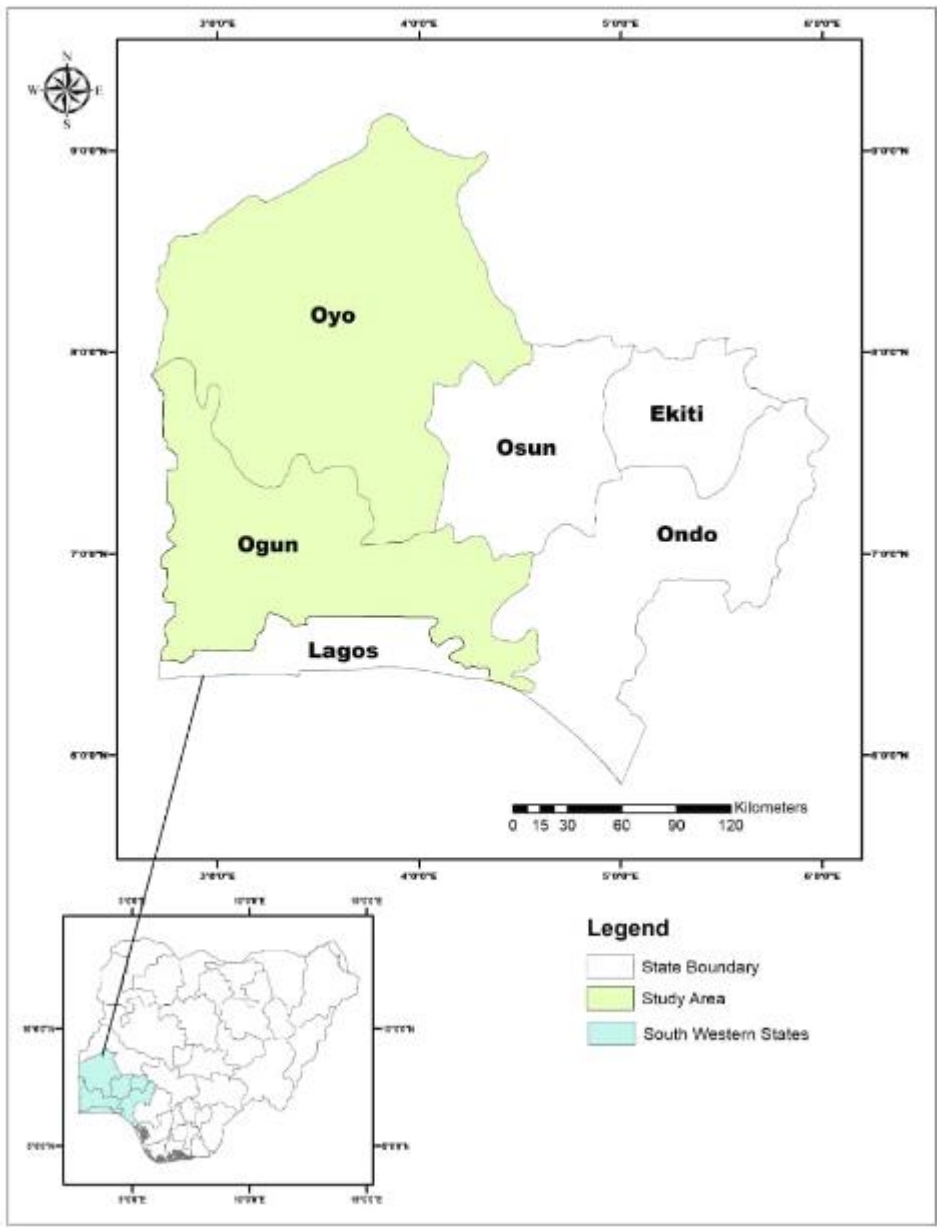
Oyo state has thirty-three local government areas and seven major cities are: Ibadan, Ogbomosho, Shaki, Igboho, Kisi, Iseyin and Oyo (Adisa and Akinkunmi, 2012; Ige and Atanda, 2013). Oyo State is located between Latitudes 20 38' and 40 35' East of the Greenwich meridian and longitudes 70 5' and 90 10' North of the equator (Eguaroje *et al.*, 2015). The mean maximum temperature is 26.46 °C, minimum 21.42 °C and the relative humidity is 74.55% while the annual average temperature is between 24 and 32 °C with the average annual relative humidity of 80% and average annual precipitation between 1007 and 1703 mm (Eguaroje *et al.*, 2015). The state has two ecological zones, forest and derived savannah, favourable for crop, fishery and livestock production (Adisa and Akinkunmi, 2012). The mean total rainfall for Oyo State is 1420.06 mm, falling in approximately 109 days with two peaks for rainfall as June and September while the dry season starts from November and ends in February (Ogolo and Adeyemi, 2009). The major occupation of the people are farming and trading (Adesiyani *et al.*, 2007) with a climate adjudged to be the most suitable for broiler chicken production, processing and marketing in Nigeria (Adisa and Akinkunmi, 2012).



Ogun State has her capital in Abeokuta encompassing a land area of 16,409 square kilometers. The state is located between latitude 7<sup>0</sup> 00' North and longitude 3<sup>0</sup> 35' East, bound to the south by Lagos state while the northern borders are Oyo and Osun States. The state is bound to the East by Ondo State and shares an international boundary with the Republic of Benin to the West. According to the 2006 national census, the population of Ogun State is 3,751,140, with females accounting for 1,886,233 and males accounting for 1,864,907. Nearness of the state to Lagos is one of her potentials with huge endowment of natural and human resources. Ogun has twenty (20) Local Government Areas (LGAs) and its main cities are Abeokuta (the state capital), Sagamu, Ilaro, Aiyetoro, Ijebu-Ode and Ijebu-Igbo. The indigenes of Ogun State are primarily of the Yoruba ethnic group comprising mainly the Egbas, Yewas, Aworis, Eguns, Remos and Ijebus. Main religions being practised are Christianity and Islam.

The two states have high prevalence of poultry production within the Southwestern Nigeria hence suitable for the study of competitiveness of broiler chicken value chain.

The Map of the Study Area is shown in Figure 3.1.



**Fig: 3.1: Map of Study Area**

### **3.2 Source and Types of Data**

Both primary and secondary data were obtained and used for this study. The primary data were obtained through field survey using 3 sets of semi-structured questionnaires. The socioeconomic and demographic data obtained from broiler chicken actors include age, gender, marital status, level of education, household size and access to credit among others. Others were participation decision factors variables (credit access and tax), inputs, outputs and their prices. Primary data were complemented with secondary information from published and unpublished materials. Questionnaires were administered to the study respondents while some key informants were interviewed to obtain further information needed to support the objectives of the study. The data collection exercise took place between November 2015 and April 2016. The administration of the questionnaires took an average of 20 minutes to complete while each interview session lasted a period of about 50 minutes. The timeline allowed the respondents ample opportunity to provide the relevant data without any form of pressure. The pre-test phase of the survey instruments helped in rephrasing some of the initially constructed questions and reshaping the entire questionnaire in such a way as to maximize both the survey time and the quality of data obtained.

### **3.3 Sampling Procedure and Sample Size**

A preliminary investigation on broiler chicken value chain was carried out in order to have basic understand of all activities and actors that are participants in the broiler chicken value chain. Poultry Association of Nigeria (PAN) provided needed guidance and information during the administration of the questionnaires. PAN has a national spread in each geopolitical zone of Nigeria with headquarter in Abuja. The association is centrally controlled but further divided into chapters at state level. Each state has autonomy and divides into smaller interstate zones for ease of administration. In southwestern Nigeria, there are six state chapters: Lagos, Ogun, Ekiti, Ondo, Osun and Oyo. Ogun chapter has six zones; two from each of the three senatorial district of the state. These zones are as: Ogun central comprising of Egba/Mowe.Ijebu, Ogun west comprising of Ijebu and Remo, Ogun west comprises of Yewa and Ota while Oyo chapter has five zones as listed below: Ibadan I; Ibadan II, Ogbomosho/Ajisafe; Saki/Oke-Ogun/Iseyin and Awe/Oyo/Afijo. The major activities identified were: input supplying, production, processing and marketing activities with producers, processors and marketers (wholesalers and retailers) as actors. However, production, processing and marketing nodes were selected for the study.

The study adopted a three-stage sampling procedure with Ogun and Oyo States purposively selected based on prevalence of commercial poultry production, processing and marketing in Southwestern Nigeria. Ten Local Government Areas-LGAs (four from Ogun and six from Oyo) proportionate to size were selected based on LGAs with highest production of poultry. Data were randomly collected from four hundred and sixty four (464) broiler chicken actors in the ratio 3:1:3 for producers, processors and marketers, respectively using semi-structured questionnaires. Four hundred nineteen (419), representing 90.3% of the administered questionnaires from one hundred and seventy six broiler chicken producers; sixty broiler chicken processors and one hundred and eighty three marketers, were used for the analysis. The remaining questionnaires could not be used because they were partially completed with important information omitted. Data collected and used for the analysis was based on the previous income generating activities of the actors in 2015 with an average production cycle of three and seven for producer and marketer.

**Table 3.1 Sampling Procedure of all Actors**

<b>State</b>	<b>Local Government Area</b>	<b>Number of all Actors Sampled</b>	<b>Number of Actors-Analysis</b>	<b>Response Rate (%)</b>
<b>Oyo</b>	Iddo	37	35	94.59
	Afijio	37	29	78.38
	Atiba	38	32	84.21
	Oyo West	37	35	94.59
	Oyo East	37	35	94.59
	Ibadan South West	38	36	94.74
	<b>Total</b>	<b>224</b>	<b>202</b>	<b>90.18</b>
<b>Ogun</b>	Ado Odo/Ota	60	53	88.33
	Odeda LGA	60	51	85.00
	Abeokuta North	60	58	96.67
	Ewekoro	60	55	91.67
	<b>Total</b>	<b>240</b>	<b>217</b>	<b>90.42</b>
<b>Total</b>		464	419	90.30

**Table 3.2 Sampling Procedure of Producers**

<b>State</b>	<b>Local Government Area</b>	<b>Number of Producers Sampled</b>	<b>Number of Producers-Data Analysis</b>	<b>Response Rate (%)</b>
<b>Oyo</b>	Iddo	16	15	93.75
	Afijio	16	15	93.75
	Atiba	16	15	93.75
	Oyo West	16	15	93.75
	Oyo East	16	15	93.75
	Ibadan South West	15	15	100
	<b>Total</b>	95	91	95.79
<b>Ogun</b>	Ado Odo/Ota	25	21	84
	Odeda LGA	25	20	80
	Abeokuta North	25	25	100
	Ewekoro	25	20	80
	<b>Total</b>	102	85	83.33
<b>Total</b>		197	176	89.3401

**Table 3.3 Sampling Procedure of Processors**

<b>State</b>	<b>Local Government Area</b>	<b>Processors Sampled</b>	<b>Processors-Data Analysis</b>	<b>Response Rate (%)</b>
<b>Oyo</b>	Iddo	5	5	100
	Afijio	5	5	100
	Atiba	6	5	83.33
	Oyo West	5	5	100
	Oyo East	5	5	100
	Ibadan South West	6	6	100
	<b>Total</b>	32	32	100
<b>Ogun</b>	Ado Odo/Ota	9	7	77.78
	Odeda LGA	9	6	66.67
	Abeokuta North	9	8	88.89
	Ewekoro	9	7	77.78
	<b>Total</b>	36	28	77.78
<b>Total</b>		68	60	88.24

**Table 3.4 Sampling Procedure of Marketers**

<b>State</b>	<b>Local Government Area</b>	<b>Number of Marketers Sampled</b>	<b>Number of Marketers-Data Analysis</b>	<b>Response Rate (%)</b>
<b>Oyo</b>	Iddo	16	15	93.75
	Afijio	16	15	93.75
	Atiba	16	15	93.75
	Oyo West	16	15	93.75
	Oyo East	16	15	93.75
	Ibadan South West	16	15	93.75
	<b>Total</b>	97	94	96.91
<b>Ogun</b>	Ado Odo/Ota	25	21	84.00
	Odeda LGA	25	23	92.00
	Abeokuta North	25	25	100.00
	Ewekoro	25	20	80
	<b>Total</b>	102	89	87.25
<b>Total</b>		199	183	91.96



### **3.4 Choice of Models, Analytical Techniques and Procedures**

The choice of double hurdle model was based on its robustness: the model combines the benefits of probit model, which estimates factors that influence participation in the first hurdle, with the Tobit (truncated regression model) that estimates factors that define the intensity of participation in the second hurdle. The choice of policy analysis matrix, on the other hands, hinges on the need for an analytical model that will not only capture the profitability but measures efficient use of inputs, competitiveness and comparative advantage and the effects of government policies and interventions on the actors. Comparison of producers, processors and marketers were made using the selling price /kg, profitability and PAM ratios at private and social prices to rank them. This helps to identify the most profitable, competitive and protected node in the broiler chicken value chain. As earlier stated, the data collected, analysed and the results is for previous year of production, processing and marketing activities in the broiler chicken value chain with an average of three cycles in a year. Details of the procedures for the achievement of the objectives of the studies is in section 3.5.1 to 3.5.8

#### **3.4.1 Profiling Actors in the Broiler Chicken Value Chain (Objective 1).**

Profiling of the actors using descriptive statistical tool such as frequency, mean and percentages was done in order to discover socioeconomic and demographic characteristic of the actors in the broiler chicken value chain in southwestern Nigeria. The descriptive-analytical narrative used were on socioeconomic and demographic characteristic such as age of household head (years), gender (1 = male, 0 = female), household size (number), experience (years), membership of group or cooperative, level of education, among others. Some of these socioeconomic and demographic variables were introduced into the double hurdle mode employed to determine associated factors that influence decisions of actors to participate as well as intensity of their participation in the broiler chicken value chain in the study area.

#### **3.4.2 Justification of the use of Socioeconomic and Demographic Variables in the Model.**

There exist relationship between socioeconomic characteristics and the productivity of farmers. Arato *et al.* (2017) applied rural web framework to understand the socioeconomic complexity that impact agricultural value chain and the outcome of the study established a framework that models actors` socioeconomic factors as appropriate for studying income generating activities in

agricultural value chain. In addition, influence of individuality and personality characteristics of an average farming household had been identified by Tarekegn and Wodebo (2018); Alemayehu *et al.* (2018); Wang *et al.* (2018); Heise *et al.* (2015) and Gebremedhin (2015) as important variables for understanding of key decision being made by actors in agriculture value chain. The heart of the use of socioeconomic characteristics in determining factors that influence participation (as well as intensity of participation) rest on the theory of utility; which emphasized the rationality of an average farming household. The concept of rationality or maximization of satisfaction brings to limelight the influence of socioeconomic characteristics factors in most decisions or decision making processes of an average farming household. An actor within a value chain strive not only to participate but to improve the economic standard of his household through maximization of agricultural income generating activities as he participates in any of input supply, production, processing and marketing nodes of the broiler chicken value chain among others.

The acceptance of the use of socioeconomic variables (SEVs) in estimating participation (as well as intensity of participation) decision factors of farming households have been reported by many researchers. Heise *et al.* (2015) identified factors that constitute strength, weakness, opportunities and threat in the poultry sector (of which broiler chicken value chain is core) as age structure, household size, level of education, employment rate/number of income earner, taxes, membership of association/cooperatives, land availability, access to credit, farm and marketing experience, price, storage facility, water, corruption/pilfering among others. Some of these factors constitute the explanatory variables used for the double hurdle analysis. Kyaw *et al.* (2018) and Alemayehu *et al.* (2018) studies revealed that the use of SEVs helps not only to determine agricultural productivity of farmers but brings to limelight issues that are directly impacting profitability of farming households for policy attention and for increasing participation and higher intensity of participation of actors.

Participation of actors in income generating activities in most agricultural value chain, broiler chicken in particular, has been be linked to central roles of economic, ecological, reproductive, environmental, social and cultural impacts on the farming households in developing countries (Alemayehu *et al.*, 2018). Farming households' participation in commercial agriculture, has been reported to be very low due to many constraints and challenges that are correlated to their

socioeconomic and demographic peculiarities (Kyaw *et al.*, 2018 and Alemayehu *et al.*, 2018). Therefore, development of programme and strategies that could lead to an improved livelihood for the farming households, enhancement sustainable agribusiness enterprises and lead to competitive value chain in general can be achieved by deep dive into socioeconomic factors that are drivers of participation as well as intensity of participation decisions being made by actors in the agricultural value chains.

Gebremedhin (2015) reported that gender, being one of the hypothesized socioeconomic variables, was found to positively influence farming households` participation and that having household head as a female increases the probability of an average farming household`s decision to participate in the poultry value chain. Household size and level of education were also found by Tarekegn and Wodebo (2018) to positively influence farming households` participation and both variables increase the probability of an average farming household decision to participate in the poultry value chain. Farmers with large household size are more advantageous in farming most especially in poultry enterprises where many hands are needed for feeding and other onerous tasks. Level of education makes farming activities simple for an average farmer with little or no support or advice from extension advisors. Education increases farmers` knowledge, managerial skills, negotiation and adoption of value-added production, processing and marketing techniques and expertise. Year of experience and number of income earners have been established to have direct relationship with agricultural productivity. An increase in the number of income earners is beneficial and therefore expected to positively impact agricultural productivity of farming households. Year of experience in farming most especially in poultry business reduces incompetence, inefficiency, loss and general failure of agricultural enterprises

The a priori expectations of the movement of the socioeconomic factors used as explanatory variables (indicated with a positive and or negative signs) associated with participation and intensity of participation decision in the double hurdle model are stated and clarified below:

- i.  $X_1$  (gender): This is captured as a dummy (male = 1, and female = 0). The coefficient for gender is expected as positive which implies that an average male actor would more likely participate and or intensify participation thanF an average female key actor in any of the broiler chicken value chain node (Adeyonu, 2016; Alemayehu *et al.*, 2018).

- ii.  $X_2$  (Marital Status): The a priori expectation of the sign of the coefficient for marital status is positive. This implied that an average actor that is married is more likely to participate and or increase intensity of participation in income generating activities of any node of the broiler chicken value chain for addition source of income for family livelihood (Gebremedhin, 2015).
- iii.  $X_3$  (Age): the coefficient sign for age (in years) on participation and intensity of participation decision is expected to be positive or negative. The expectation is that as an average actor increases in age, he or she becomes more experienced production, processing and marketing activities. In addition maturity in age should have positive influence in the art of management of external issues for higher profitability as the age increases (Abah, 2015).
- iv.  $X_4$  (Level of education in years): The a priori expectation for education is a positive coefficient. Increase in number of years spent in school is expected to have positive impact on decisions of actors. Higher level of education increases is expected to impact an average key actor decision to participation. Educated actors who are investors known better the benefits of using new technologies that increases profit and competitiveness Gebremedhin (2015).
- v.  $X_5$  (household size): The coefficient of household size of an average actor is expected to be positive. The reason being that an average actor with large household size is an indication of availability of many members of the family as cheap source of labor for broiler chicken operation such as feeding of chicks and cleaning of the poultry pens.
- vi.  $X_6$  (Number of Income Earners): Number of income earners was used based on the work of Gebremedhin, 2015 rather than total income because it indicates how varied the source of income of actors and how risk associated with income-related shock are likely to be mitigated within the farming household in the broiler chicken value chain (Adeyonu, 2016). This assumption is based on the belief that no matter the amount of income available from an average actor, the risk is lowered with higher number of income earners in a farming household. Hence, the coefficient of the explanatory variable (number of income earners) of an average actor is expected to be positive. The more the number of income earners the high the probability of inflow of finance or funds into any of the production, processing and marketing nodes of the broiler chicken value chain.

- vii. X<sub>7</sub> (Year of experience): The a priori expectation is a positive coefficient of year of experience. The higher the number of year in any broiler chicken value chain, the higher the probability of an increase in profit and competitiveness. Agribusiness value chain requires experience measured in number of years in production or processing or marketing.
- viii. X<sub>8</sub> (Membership of Association): The a priori expectation of the coefficient of membership of association expressed as a dummy variable (if member=1 and 0, otherwise) is positive. The expectation is that joining an association such as Poultry Association of Nigeria or any other group or cooperative should be added advantage to an average actor in the broiler chicken value chain due to many benefits such as collective price bargaining, bulk purchase of inputs and concessionary interest rates obtainable in most agricultural cooperatives.
- ix. X<sub>9</sub> (Payment of Tax): The a priori expectation of the coefficient of Payment of Tax is negative. The expectation is that an average actor often expects near zero tax regime in broiler chicken value chain. The higher the tax incentive the higher the probability of decision to participate and or increase participation as well as intensity of participation in the broiler chicken value chain; and vice versa.
- x. X<sub>10</sub> (Access to credit): The expected response is to be expressed as a dummy (assuming value of 1, if yes and 0 otherwise). The a priori expectation is that access to credit will increase probability of participation as well as financial capability of the farming households to increase volume of production. Amount of credit available to actors was not intended or captured in the instrument used for data collection.
- xi. X<sub>11</sub> (Price per Kg): The a priori expectation of the coefficient of Price per Kg is positive. The expectation was that as the price per kg of broiler chicken increases the supply side should expand while the demand will shrink. The analysis reveals variability in the selling prices within and among nodes of the broiler chicken value chain. For normal goods, a decrease in price per kg of broiler chicken should therefore be an incentive to buy more by the final consumer thereby creating additional demand or market for the actor. This additional demand or market is not disincentive to producers, processors and marketers.

### **3.4.3 Mapping of Actors, Processes and Activities in the Broiler Chicken Value Chain**

The mapping was done based on the analysis of participants, core activities and processes using products, function and information with the aid of flow-chart. Broiler chicken actors were identified and properly linked. Processes such as input supplying (e.g feeds and day-old chicks), production, processing and marketing that link actors were identified. The flow of products (bought from or sold among actors) were mapped and indicated in percentage (%).

### **3.4.4 Participation and Intensity of Participation in the Broiler Chicken Value Chain (Objective 2)**

Based on the work of Ogundari and Arifalo, (2013); Sanusi, (2011) and Obayelu *et al.* (2009), Cragg Double Hurdle model was identified to be robust and appropriately employed in determining factors that influence both participation and intensity of participation in the broiler chicken value chain. These researchers had highlighted the model's assumption that was based on two chronological but independent decisions (or hurdles) that actors make; the first hurdle is to make a decision to participate or not and then the decision on intensity of participation as the second hurdle. The model combines the benefits of probit model, which estimates determining factors that influence participation of actors in the first hurdle, with the Tobit (truncated regression model) that estimates factors that determine the intensity of participation of actors in the second hurdle (Ogundari and Arifalo, 2013).

The dependent variables in the probit model was a binary variable (Yes =1, 0 otherwise) while the average quantity of broiler chicken a producer, processor and marketer produced, processed, and sold (measured in naira) respectively was the dependent variable of the tobit (truncated regression) model. Independent variables in the probit and tobit models were the profiles of actors, in terms of their socioeconomic and demographic characteristic such as age, gender, marital status, household size, years of education, association or group membership, number of income earners, payment of tax, access to credit and price per kg among others, in each node of the broiler chicken value chain. The marginal effect of the independent variables were estimated since the models allow the observable and unobservable factors that affect participation to be the same or differ from those that determine intensity of participation.

In the first hurdle, probit model was used to estimate participation decision factors of actors in the production, processing and marketing nodes of the broiler chicken value chain as given below:

$$d_i^* = z_i\gamma + \mu_i, \mu_i \sim N(0,1) \quad (3.1)$$

So that

$$d_i = \begin{cases} 1 & \text{if } d_i^* > 0 \\ 0 & \text{if } d_i^* \leq 0 \end{cases} \quad (3.2)$$

Where  $d_i^*$  is the unobserved latent variable representing the participation hurdle and  $d_i$  is the observed binary variable; a respondent is given the value 1 if she/he participates in a node of the broiler chicken value chain, 0 otherwise and  $\mu_i$  is the random and normally distributed error with a mean of 0 and variance of 1.

The dependent variable  $Y_i$  in the probit model was determined with a Yes=1 and 0 otherwise.

The independent variables in the probit model were the profiles of actors, in terms of their socioeconomic and demographic characteristic such as age, gender, marital status, household size, years of education, association or group membership, number of income earners, payment of tax, access to credit and price per kg among others, in each node of the broiler chicken value chain.

In the second hurdle, Tobit model was used to estimate the intensity of participation decision factors of actors in terms of the output measured in revenue; for each of the nodes (production, processing and marketing) of the broiler chicken value chain as given below:

$$y_i^* = x_i\beta + v_i, v_i \sim N(0, \sigma^2) \quad (3.3)$$

$$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (3.4)$$

Where  $y_i^*$  stands for the unobserved latent variable and  $y_i$  is the revenue when the hurdles are overcome. Essentially, broiler chicken value chain revenue  $y_i$  is equal to the latent variant  $y_i^*$  if and only if the latent variable takes positive values and the first participation stage is fulfilled

normally. In equations (3.1) and (3.3)  $\gamma$  and  $\beta$  are parameters to be estimated, and  $z$  and  $x$  are the explanatory variables in the two equations;  $i = 1,2,3,4,\dots,n$  which is the number of individual observations.

The profile of the actors in terms of their socioeconomic and demographic characteristic such as age, gender, marital status, household size, years of education, association or group membership, number of income earners, payment of tax, access to credit and price per kg among others were modelled as variables that could influence their decisions to participate and the intensity of participation in selected nodes based on the work of Gebremedhin, 2015; Abah, 2015; Juyoung, 2018 and Akwasi *et al.* (2019).



**Table 3.5: A Priori Expectations and Measurement of Variables**

S/N	Variables	Description	Measurement	Sign	Authors
1	Gender	Sex of respondent	Male = 1, female = 0	±	Adeyonu (2016); Gebremedhin (2015)
2	Marital status	Marital status of respondent	Married = 1, otherwise = 0	±	Adeyonu (2016); Gebremedhin (2015)
3	Age	The age of respondent as at last birthday	Years	±	Gebremedhin (2015); Abah, 2015
4	Education	Number of years spent on formal education	Years	+	Adeyonu (2016); Gebremedhin (2015)
5	Household size	Total number under the same roof and being care for by the family	Number of persons	+	Adeyonu (2016); Gebremedhin (2015)
6	Income Earner	Total Number of household members gainfully Employed	Number of persons	+	Abah, 2015
6	Experience	Years spent in the business	Number of Years	+	Murekefu (2013)
7	Tax	Evidence that tax is being paid by actor	Yes = 1, no = 0	±	Afutu (2011)
8	Price per kg	Price of 1 kg of broiler sold	Price/kg	+	Afutu (2011)
9	Water	Availability of water/cheaper sources.	Amount spent in Naira	±	Abah, 2015
10	Electricity	Amount spent on electricity	Amount spent in Naira	±	Abah, 2015; FAO (2017)
11	Transportation	Amount spent on transportation of inputs and output,	Amount spent in Naira	±	Juyoung, 2018
12	Theft/Pilfering	Report of Theft/Pilfering	Yes = 1, no = 0	±	Heise <i>et al.</i> (2015)
13	Land Availability	Rent/Cost of land in Naira	Amount spent in Naira	±	FAO (2017); Gebremedhin (2015)
14	Group/Association	Membership of farmer/business association	Members; yes = 1, no = 0	±	Akwasi <i>et al.</i> (2019)
15	Training	Attended any Poultry Management Training	Attended; yes =1, no = 0	±	FAO (2017); Gebremedhin (2015)
16	Access to Credit	Access to credit in the last 12 months	Access; yes=1, no=0	±	Eze <i>et al.</i> (2010); Gebremedhin (2015)
17	Storage facility	Availability of storage facility	Access; yes=1, no=0	±	Eze <i>et al.</i> (2010)

### **3.4.5 Analysis of Competitiveness and Effects of Existing Policies on the Broiler Chicken Value Chain (Objective 3)**

Policy Analysis Matrix (PAM) by Monke and Pearson (1989) was used to assess the competitiveness and effect of existing policies on the actors. The model was employed to estimate the profitability and competitiveness of the nodes (production, processing and marketing) of the broiler chicken value chain. In measuring competitiveness of the broiler chicken value chain with PAM, focus is on estimates of private and social profits; given the current policies, technologies, inputs and output prices.

There are three rows and five columns in PAM with the first row for the calculation of the private profits, being estimated by obtaining the difference between two variables: observed costs and revenue; both at the market prices (private values) received by the actors. The first row is derived from the analysis of private budgets of the node or actor where costs of tradable inputs and domestic factors (based on the prices observed in local markets) are duly subtracted from the revenues; derived from the observed market prices. On the second row, the calculation of the social profit which is obtained by the difference between observed revenues and costs; valued at the social prices. Also, the second row is derived from the analysis of social budgets of the node or actor where costs of tradable inputs (based on import parity prices) are duly subtracted from the revenues; calculated from prices in international markets.

Level of competitiveness is therefore determined based on the results of either positive or negative values of private profit estimates for all actors. Positive and higher profit at private prices are strong indications of higher level of competitiveness compared to lower or negative profit at private prices. Likewise, a positive and higher level of profit values at social prices are strong indication of comparative advantage of the value chain node and its activities while lower or negative profit values at social prices are clear indications that the nodes and the actors-income generating activities or the systems have lower or no comparative advantages.

On the third row, we have divergence between the private and social prices measured; an indicator that private prices are either the same or differ from social prices of revenues, costs, and profits.

### 3.4.6. Measurement and Indicators of Competitiveness of Nodes

#### 3.4.6.1 Private Profitability (PP)

Private profitability (PP) of each node of the value chain is measured by the total revenue less the cost of inputs; both at measured at private prices. The PP of producers, processors and marketers indicate how competitive these actors are. Private Profit is given as  $D = A - (B + C)$  and calculated as shown below:

$$PP = Y_i^p P_i^p - \left( \sum a_{ij} P_{ij}^p + \sum a_{ik} P_{ik}^p \right) \quad (3.5)$$

Where:

PP = private profit (~~₦~~)

i = broiler chicken

ij = tradable input of the broiler chicken node i

ik = non tradable input or domestic factor of the broiler chicken node i

$Y_i^p$  = Quantity of broiler chicken in kg

$P_i^p$  = Private Price of broiler chicken in (~~₦~~)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^p$  = Private Price of tradable inputs in (~~₦~~)

$a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^p$  = Private Price of non-tradable inputs in (~~₦~~)

An actor with positive profit ( $PP > 0$ ) measured at private price is an indication that the node is competitive at the private price. An node with profit ( $PP = 0$ ) measured at private price is an indication that the actor earn normal profit at private price given the current technologies, cost of inputs, policy while a node with negative profit ( $PP < 0$ ) measured at private price is a sign that the node is non-competitive at the current level of technologies, costs of input, and government trade policy, among others.

#### 3.4.6.2 Social Profitability (SP)

Social profitability (SP) of each node of the value chain is measured by the total revenue less the cost of inputs; both at measured at social prices. The SP of producers, processors and marketers indicate how competitive these actors are. Social Profit is given as  $H = E - (F + G)$  and calculated as shown below:

$$Y_i^s P_i^s - ( \sum a_{ij} P_j^s + \sum a_{ik} P_k^s ) \quad (3.6)$$

Where:

SP = Social profit (~~N~~)

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non tradable input or domestic factor of the broiler chicken node i

$Y_i^s$  = Quantity of broiler chicken in kg

$P_i^s$  = Social Price of broiler chicken in (~~N~~)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^s$  = Social Price of tradable inputs in (~~N~~)

$a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^s$  = Social Price of non-tradable inputs in (~~N~~)

An actor with social profit (SP>0) measured at social price is an indication that the node is competitive at the social price. A node with profit (SP=0) measured at social price is an indication that an average actor earns normal profit at social price given the current technologies, cost of inputs, government policy while a node with negative profit (SP<0) measured at social price is a sign that the node is non-competitive at the current level of technologies, costs of input, and government trade policy, among others.

### 3.4.6.3 Private Cost Ratios (PCR)

Private cost ratio (PCR) indicates the level of competitiveness of the broiler chicken value chain. The PCR reveals the total value of domestic factors relative to the total value addition both measured at the private or market prices. Lower PCR indicates higher level of competitiveness of the node or the entire value chain being investigated. In this study, PCR was used to measure the efficient use of resources by an average actor in participating in production, processing and marketing nodes of the broiler chicken value chain. The ratios obtained indicate the ability of an average actor to pay domestic factors employed in each node of the broiler chicken value chain (inclusive of returns to capital) and the level of competitiveness remains.

$$\frac{\sum a_{ik} P_k^p}{Y_i^p P_i^p - \sum a_{ij} P_j^p} \quad (3.7)$$

Where:

PCR = Private Cost Ratio

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non-tradable input or domestic factor of the broiler chicken node i

$Y_i^p$  = Quantity of broiler chicken in kg

$P_i^p$  = Private Price of broiler chicken in (N)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^p$  = Private Price of tradable inputs in (N)

$a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^p$  = Private Price of non-tradable inputs in (N)

The PCR <1 indicates that broiler chicken were efficiently produced, processed and sold by an average producer, processor and dealers (wholesalers and retailers), respectively at private prices with excess profits made. On the other hands, The PCR>1 indicates that broiler chicken were inefficiently produced, processed and sold by an average producer, processor and dealers (wholesalers and retailers), respectively at private prices with losses or shortages recorded. The PCR =1 indicates that broiler chicken were efficiently produced, processed and sold by an average producer, processor and dealers (wholesalers and retailers), respectively at private prices with normal profits made.

#### 3.4.6.4 Domestic Resource Cost (DRC)

The DRC measures (in monetary value) resources needed domestically to generate additional value in foreign exchange earnings from export at social price. The DRCs indicate the level of comparative advantages of each node in the broiler chicken value chain. The DRC reveals the total value of domestic factors (DFs) relative to the total value addition that are generated for export both measured at the social prices. Lower DRC indicates higher level of comparative advantage of the node or the entire value chain being investigated. In this study, DRC ratios obtained indicate the ability of an average actor to pay domestic factors employed in each node of the broiler chicken value chain (inclusive of returns to capital) and generate foreign exchange.

$$\frac{\sum a_{ij} P_k^s}{Y_i^s P_i^s - \sum a_{ij} P_j^s} \quad (3.8)$$

Where:

DRC = Domestic Resource Cost

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non tradable input or domestic factor of the broiler chicken node i

$Y_i^s$  = Quantity of broiler chicken in kg

$P_i^s$  = Social Price of broiler chicken in (N)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^s$  = Social Price of tradable inputs in (N)

$a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^s$  = Social Price of non-tradable inputs in (N)

The DRC <1 indicates that broiler chicken were efficiently produced, processed and sold by an average producer, processor and dealers (wholesalers and retailers), respectively at social prices with foreign earning made on behalf of the country. On the other hands, the DRC >1 indicates that broiler chicken were inefficiently produced, processed and sold by an average producer, processor and dealers (wholesalers and retailers), respectively at social prices with depletion of the foreign exchange earnings of the country. The DRC=1 indicates that broiler chicken was efficiently produced, processed and sold by an average producer, processor and dealers (wholesalers and retailers), respectively at private prices but without foreign exchange gains or loss by the country.

### 3.4.6.5 Private-Benefit Cost Ratio

The private benefit cost ratio (PBCR) is the proportion of private revenues to private costs. It indicates the amount generated by each naira invested in inputs (tradable and non-tradable) in private prices. PBCR for each node was estimated and comparison of ratios across production, processing and marketing nodes of the broiler chicken value chain was made to the level of competitiveness at private prices. The PBCR is  $A/(B + C)$  as given below: is given below:

$$\frac{Y_i^p P_i^p}{\sum a_{ij} P_{ij}^p + \sum a_{ik} P_{ik}^p} \quad (3.9)$$

Where:

PBCR = Private Benefit Cost Ratio

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non tradable input or domestic factor of the broiler chicken node i

$Y_i^P$  = Quantity of broiler chicken in kg

$P_i^P$  = Private Price of broiler chicken in (N)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^P$  = Private Price of tradable inputs in (N)

$a_{ik}$  = Quantities of non tradable inputs

$P_{ik}^P$  = Private Price of non tradable inputs in (N)

### 3.4.6.6 Social Benefit-Cost Ratios (SBCR)

The social benefit cost ratio (PBCR) is the proportion of social revenues to social costs. It indicates the amount generated by each naira invested in inputs (tradable and non-tradable) in social prices. PBCR for each node was estimated and comparison of ratios across production, processing and marketing nodes of the broiler chicken value chain was made to the level of competitiveness at social prices. The SBCR is  $E/(F + G)$  as given below:

$$\frac{Y_i^s P_i^s}{\sum a_{ij} P_j^s + \sum a_{ik} P_k^s} \quad (3.10)$$

Where:

SBCR = Social Benefit-Cost Ratios (SBCR)

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non tradable input or domestic factor of the broiler chicken node i

$Y_i^s$  = Quantity of broiler chicken in kg

$P_i^s$  = Social Price of broiler chicken in (N)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^s$  = Social Price of tradable inputs in (N)

$a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^s$  = Social Price of non-tradable inputs in (N)

### 3.4.6.7 Nominal Protection Coefficient (NPC)

Nominal Protection Coefficient (NPC) is a measure and also an indicator of the incentives or disincentives being enjoyed by actors at the time when the survey was carried out. It has been defined by Elsedig *et al.* (2015) as the ratio of domestic price to a comparable world (social) price. NPC was calculated for both output as Nominal Protection Coefficient of Output (NPCO) and for input as Nominal Protection Coefficient of Input (NPCI). NPC It is an indicator of the nominal rate of protection for consumers measuring the ratio between the average price paid by consumers (at farm gate) and the border price (measured at farm gate level). Nominal Protection Coefficient shows the ratio between the price paid for a product upon entering the country and the price paid inside the nation by consumers. Both imported and exported goods have their own ratios to show the level of additional fees added to products between the point of import or origin and the final consumer or buyer. A higher ratio indicates more government charges and taxes are added to the border price, which raises the amount being paid by consumer on imported agricultural products.

The NPCO for tradable outputs or the NPCI for tradable inputs is frequently used to calculate the ratio of the observed domestic price to the selected world price.

The NPCO is given as A/ E below:

$$\frac{\sum Y_i^p P_i^p}{\sum Y_i^s P_i^s} \quad (3.11)$$

The NPCI is given as B/ F below:

$$\frac{\sum a_{ij} P_j^p}{\sum a_{ij} P_j^s} \quad (3.12)$$

Where:

NPCO = Nominal Protection Coefficient of Output

NPCI = Nominal Protection Coefficient of Input



- i = Broiler chicken
- ij = Tradable input of the broiler chicken node i
- ik = Non tradable input or domestic factor of the broiler chicken node i
- $Y_i^p$  = Quantity of broiler chicken in kg
- $P_i^p$  = Private Price of broiler chicken in (~~N~~)
- $Y_i^s$  = Quantity of broiler chicken in kg
- $P_i^s$  = Social Price of broiler chicken in (~~N~~)
- $a_{ij}$  = Quantities of tradable inputs
- $P_{ij}^p$  = Private Price of tradable inputs in (~~N~~)
- $a_{ij}$  = Quantities of tradable inputs
- $P_{ij}^s$  = Social Price of tradable inputs in (~~N~~)

For example if the NPCI of broiler chicken producer is greater than one ( $>1$ ), it indicates that broiler chicken producers are taxed when they buys any tradable inputs. On the other hands, if the NPCI of broiler chicken producer is less than one ( $<1$ ), it indicates that producers in value chain production nodes enjoys incentive an indication that tradable inputs are subsidized. An NPCI that equals one ( $\text{NPCI} = 1$ ) indicate a neutral condition (Elsedig *et al.*, 2015).

#### 3.4.6.8 Effective Protection Coefficient (EPC)

The EPC measures in ratio, the difference between the total revenue and estimate of tradable inputs at private prices to the difference between the total revenue and estimate of tradable inputs at social price. The calculation as in the PAM table entries in Table 2.1. compares the value added in domestic prices (A – B) with value added in world prices (E – F).  $\text{EPC} = (A-B) / (E - F)$ . EPC reveals the joint effect of policy transfers affecting both tradable outputs and tradable inputs in the broiler chicken value chain.

The EPC is given as  $(A-B) / (E - F)$  below:

$$\frac{Y_i^p P_i^p - \sum a_{ij} P_{ij}^p}{Y_i^s P_i^{ps} - \sum a_{ij} P_{ij}^s} \quad (3.13)$$

Where:

EPC = Effective Protection Coefficient

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non tradable input or domestic factor of the broiler chicken node i

$Y_i^p$  = Quantity of broiler chicken in kg  
 $P_i^p$  = Private Price of broiler chicken in (₦)  
 $Y_i^s$  = Quantity of broiler chicken in kg  
 $P_i^s$  = Social Price of broiler chicken in (₦)  
 $a_{ij}$  = Quantities of tradable inputs  
 $P_{ij}^p$  = Private Price of tradable inputs in (₦)  
 $a_{ij}$  = Quantities of tradable inputs  
 $P_{ij}^s$  = Social Price of tradable inputs in (₦)

An EPC >1 indicates current trade policies that provide positive incentives to actors while EPC <1 indicates negative incentives to the actor.

### 3.4.6.9 Profitability Coefficient

Profitability coefficient was measured as a ratio of profit at private price to profit at social price. It indicates the impact of total transfers on private profits (the proportion of private profits to social profits). PC is an extension of the EPC and a proxy for the net policy transfer (Oluyole, 2016) It is a ratio that indicates the effectiveness of either efficient or distorting policies in the broiler chicken value chain. The PC ratio is an indicator of level of efficiency of actor and compares the value additions or private profit (D) to the value addition or social profit (H).

The PC is given below:

$$\frac{Y_i^p P_i^p - (\sum a_{ij} P_j^p + \sum a_{ik} P_k^p)}{Y_i^s P_i^s - (\sum a_{ij} P_j^s + \sum a_{ik} P_k^s)} \quad (3.14)$$

Where:

PC = Profitability Coefficient  
 i = Broiler chicken  
 ij = Tradable input of the broiler chicken node i  
 ik = Non tradable input or domestic factor of the broiler chicken node i  
 $Y_i^p$  = Quantity of broiler chicken in kg  
 $P_i^p$  = Private Price of broiler chicken in (₦)  
 $a_{ij}$  = Quantities of tradable inputs  
 $P_{ij}^p$  = Private Price of tradable inputs in (₦)  
 $a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^p$  = Private Price of non-tradable inputs in (~~N~~)

$Y_i^s$  = Quantity of broiler chicken in kg

$P_i^s$  = Social Price of broiler chicken in (~~N~~)

$a_{ij}$  = Quantities of tradable inputs

$P_{ij}^s$  = Social Price of tradable inputs in (~~N~~)

$a_{ik}$  = Quantities of non-tradable inputs

$P_{ik}^s$  = Social Price of non-tradable inputs in (~~N~~)

A broiler chicken node with  $PC > 1$  is an indication that current policy transfers income (or provides incentive or subsidy) to the node. A  $PC < 1$  indicates current policy that transfers income away from the productive node (or introduce a tax) while a broiler chicken node with  $PC = 1$  is an ideal or unrealistic situation where there is no divergence in profit identity (no difference between the private profit and social profit) of the node or system. In such case, the revenues and costs in private prices will be the same as revenues and costs in social prices. This therefore means  $A = E$ ,  $B = F$ ,  $C = G$ , and  $D = H$  in the policy analysis matrix.

#### 3.4.6.10 Subsidy Ratio to Producers (SRP)

SRP is an incentive indicator and a unified metric for measuring all transfer effects. The ratio indicates how much any node's revenues are increased or decreased as a result of transfers. It is the output tariff equivalent, if the net effect of all policy transfers were carried out solely through a tariff on output. This ratio is a comparison of the net transfer to the value of output in world prices.

In PAM, SRP equals  $D-H/E$  as given below:

$$\frac{\left[ \sum Y_i^p P_i^p - \left( \sum a_{ij} P_{ij}^p + \sum a_{ik} P_{ik}^p \right) - Y_i^s P_i^s - \left( \sum a_{ij} P_j^s + \sum a_{ik} P_{ik}^s \right) \right]}{\sum Y_i^s P_i^s} \quad (3.15)$$

Where:

PC = Profitability Coefficient

i = Broiler chicken

ij = Tradable input of the broiler chicken node i

ik = Non tradable input or domestic factor of the broiler chicken node i

$Y_i^p$  = Quantity of broiler chicken in kg

$P_i^p$  = Private Price of broiler chicken in (~~N~~)

$a_{ij}$  = Quantities of tradable inputs  
 $P_{ij}^p$  = Private Price of tradable inputs in (N)  
 $a_{ik}$  = Quantities of non-tradable inputs  
 $P_{ik}^p$  = Private Price of non-tradable inputs in (N)  
 $Y_i^s$  = Quantity of broiler chicken in kg  
 $P_i^s$  = Social Price of broiler chicken in (N)  
 $a_{ij}$  = Quantities of tradable inputs  
 $P_{ij}^s$  = Social Price of tradable inputs in (N)  
 $a_{ik}$  = Quantities of non-tradable inputs  
 $P_{ik}^s$  = Social Price of non-tradable inputs in (N)

### 3.4.7 Sensitivity Analysis

Based on the static nature of the data collected and the sensitivity of output (measured in profits per kg at private and social prices) to input variables (measured in price per kg at private and social prices), most especially feed components, a sensitivity analysis which is often referred to as “what if” was carried out to address the issues of shocks or risk such as change in local/world price of inputs, exchange rate volatility and change in government policies among others. Sensitivity analysis helps to bring to limelight the level of incentive that could cushion adverse shocks such as scarcity of input or unstable exchange rate among others.

The key variables used for the sensitivity analysis were average prices, profits and cost of inputs of the actors. The based outputs of the producers, processors and marketers were held constant while cost of inputs were increased or decreased at 20, 40 and 60 percent, respectively to reveal the effect of change in policy on the competitiveness of the broiler chicken value chain based on the works of Adeoye, (2015) and Oluyole, (2016).

In summary, the issue of static nature of the data, possibility of risk and uncertainty due to change in policy were address with the sensitivity analysis on the results of Policy Analysis Matrix. The variants of output (measured in profits per kg at private and social prices) obtained from the sensitivity analysis when we have policy-induced variants of cost of input (measured in price per kg at private and social prices) as a result of shocks or change in government revealed the boundaries of the current government policy of total

ban on importation of broiler chicken on profitability and competitiveness of the broiler chicken value chain.

### **3.5 Identification of Constraints to Participation and Intensity of Participation in Broiler Chicken Value Chain (Objective 4)**

Major constraints limiting the entire broiler chicken value chain were identified by the actors, examined with a descriptive statistics and summarised in table with the frequency and the percentage (%) of the highest and lowest constraint within the node and the entire broiler chicken value chain.

## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

#### 4.1 Socioeconomic Characteristics of Actors in the Broiler Chicken Value Chain

This chapter discussed the results of the double hurdle analysis and revealed the profile of the key actors in broiler chicken value chain in the study area. There can be no overemphasis on the need to include socio-economic and demographic variables of broiler chicken key actors in order to identify the significant participation and intensity of participation of these actors in revenue-generating activities of the broiler chicken value chain. This will help in developing well-articulated actor-focused trade policies for a profitable and highly competitive broiler chicken value chain in Nigeria.

Socioeconomic characteristics and associations entrenched in poultry value chains had been raised by Akinwumi *et al.* (2010) as important risk factors that could reduce not only the profitability but now the competitiveness' of the broiler chicken value chain. Socioeconomic and demographic characteristics had been identified as key determinants of farming households' decision to invest and or participate in income generating activities in the poultry value chain. Socioeconomic and demographic variables identified to be associated with` either or both participation and intensity of participation in each node of broiler chicken value chain were gender, age, marital status, educational status, membership of association, household size and number of income earners (Jolaosho, 2014). Adeyonu (2016) considered age, gender, marital status, household size, religious, education and experience in poultry enterprise as factors that could determine participation in poultry farming. In Table 4.1 to 4.7, detailed profile of the broiler chicken value chain actors (their socioeconomic and demographic characteristics) in southwestern Nigeria was explicit.

#### **4.1.1 Age Distribution of Broiler Chicken Value Chain Actors**

In Table 4.1, the age distribution of key actors in the broiler chicken value chain are presented with the age range of 25 years and 64. Result show that majority (65.9%) of broiler chicken value chain actors were between the age range of 25 and 40 years. The mean age of broiler chicken value chain actors was  $38.23 \pm 7.95$  years. The study by Jolaosho (2014) and Suleiman *et al.* (2017) were in line with the result of this study in that they found out that majority 77% and 70% of poultry producers respectively, were below 50 years. This result is in line with a priori expectation that majority of actors in the value chain should be of economically active age since poultry enterprise needs agile and active human resource. The result therefore implied that Southwestern Nigeria is endowed with manpower that are active and with productive capability for broiler chicken value chain's rigorous activities. In addition, having a large population of key actors who are young, active and productive will lead to swift acceptance of value chain innovative ideals, technology and government programme. Young broiler chicken value chain actors are more likely to also invest more of their time, energy and resources on implementing any advice that could lead to increased income from the production, processing and marketing nodes.

#### **4.1.2 Age Distribution of Broiler Chicken Producers**

In Table 4.1, the age distribution of broiler chicken producers were presented with minimum and maximum age of 25 years and 64 years respectively. Result showed that 68.1% of broiler chicken producers were between the age range of 25 years (minimum age) and 40 years. The mean age of the broiler chicken producers were  $38.00 \pm 7.6$  years. This mean age is within the range of 44 and 35.4 years reported by Jolaosho (2014) and Akwasi *et al.* (2019) respectively. The result is also consistent with the finding of Suleiman *et al.* (2017) that indicates a majority (70%) of poultry producers were within the age of 21-40 years. The result is a clear indication that production node of the broiler chicken value chain requires participation of economically active human resource factor and an indication of positive future outlook for broiler chicken business in terms of availability of economically active actors in the study area. The likelihood of higher level of efficiency from the active farming population (often required in broiler chicken production) could be guaranteed (Adebayo and Adeola 2005). The entire broiler chicken value chain will benefit from having larger proportion of young producers who are within the active age and are more likely to accept, swiftly, value chain innovative ideals and

programme. This category of worker are more likely to also invest more on their time, energy and resources on implementing any advice that could lead to an increase in income from their production activities.

#### **4.1.3 Age Distribution of the Broiler Chicken Processors**

In Table 4.1, the age distribution of broiler chicken processors were presented with minimum and maximum age of 25 years and 55 years respectively. Result showed that majority (63.3%) of broiler chicken processors were between the minimum age ( $\leq 30$ ) and 40 years. The mean age of broiler chicken processor was  $37.62 \pm 8.10$  years compared to mean age of 32.1 years reported by Akwasi *et al.* (2019). The result is a clear indication that broiler chicken value chain processors just like the producers were in their economically active and productive age in the study area. This offers opportunity for youth empowerment and a great potential for broiler chicken value chain development as a source of employment in Southwestern Nigeria (Adebayo and Adeola, 2005). The study by Suleiman *et al.* (2017) found that 47.5% of poultry processors were within the age of 21-30 years further buttressed the finding of this study and reinforced the benefit of having a larger proportion of youthful actors participants in broiler chicken processing node. Younger generation of active actors are more likely to accept value chain innovative ideas, strategies and programme. It could be concluded that economically active and productive actors within the processing nodes are more likely to make financial investment decisions and promptly implement any advice that could lead to increased intensity of income generating activities.

#### **4.1.4 Age Distribution of the Broiler Chicken Marketers**

In Table 4.1, the age distribution of broiler chicken marketers were presented with minimum and maximum age of 25 years and 62 years respectively. Result showed that 64.5% of broiler chicken marketers were between the age ranged of minimum age and 40 years. The mean age of broiler chicken marketers was  $38.65 \pm 7.95$  years compared to mean age of 39.8 years reported by Akwasi *et al.* (2019). Young and active actors are enthusiastic about searching for information, making rational business decisions and taking calculated risks that could lead to profitable and sustainable farm businesses. The result indicates that majority of actors participating in the marketing nodes of broiler chicken value chain were young, active and in their productive age.



**Table 4.1: Age Distribution of Broiler Chicken Value Chain Actors**

<b>Age</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<= 30	27	15.3	15	25.0	35	19.1	77	18.4
31 - 40	93	52.8	23	38.3	83	45.4	199	47.5
41 - 50	41	23.3	19	31.7	51	27.9	111	26.5
51 - 60	13	7.4	3	5.0	13	7.1	29	6.9
61+	2	1.1	-	-	1	.5	3	.7
Total	176	100.0	60	100.0	183	100.0	419	100.0
Mean	38.00		37.62		38.65		38.23	
Std. Dev.	7.63		8.10		8.21		7.95	
Minimum	25		25		25		25	
Maximum	64		55		62		64	

## **4.2 Gender Distribution of the Broiler Chicken Value Chain Actors**

The distribution of the broiler chicken value chain actors, based on gender, is presented in Table 4.2 with the majority being male (54.4%) while 45.6% were female. The result is in line with a priori expectation that more male will be identified with the production of broiler chicken because poultry activities is highly laborious and female add less value compared to male actors (Akwas *et al.*, 2019). The finding is also supported by Olorunwa (2018) who reported dominance of value chain by male (73%) most especially in the production node.

### **4.2.1 Gender Distribution of the Broiler Chicken Producers**

The result indicates that majority (79.5%) of the broiler chicken value chain producers were male while 20.5% were female. The dominance by male of the production node of the broiler chicken value chain is in line with the a priori expectation and could be attributed to many factors some of which are: laborious activities required at the production node and direct focus of incentive for increased participation on males farmers by extension agents (Okoh *et al.*, 2010). In addition, women are often referred to as lacking capability for difficult tasks required of farming activities (Akwas *et al.*, 2019). The result is similar to the findings by Suleiman *et al.* (2017) where majority (71.3%) of poultry producers were males and 28.7% were females. The implication is that for increase participation of female-gender in the production node, there is need to introduce modern equipment that can be handled by female into broiler chicken production.

### **4.2.2 Gender Distribution of the Broiler Chicken Processors**

The result of the analysis indicates that processing node of broiler chicken value chain was found to be gender neutral with equal percentage (50.0%) of the processors being male while 50.0% were female. The result is contrary to the finding by Gebremedhin (2015) with majority (66.7%) of poultry processors being female while only 33.3% were male.

### **4.2.3 Gender Distribution of the Broiler Chicken Marketers**

The result of the gender distribution analysis revealed that majority of the marketers in the broiler chicken value chain were female (68.3%) while only 31.7% were male. The results implied that female dominated marketing node contrary to dominance of the production and the processing nodes by male actors; an indication that participation in broiler chicken

value chain was gender-based in the study area. The a priori expectation on gender distribution was a higher participation of more female than the male because of low-cost capital outlay required in the broiler chicken marketing node compared to high-cost of capital outlay required of production and processing activities. The result that 89.2% of women were traders by Akwasi *et al.* (2019) supports this finding and calls for policy-induced actions that will encourage women to diversify and be involved in production node and processing.

**Table 4.2: Gender Distribution of the Broiler Chicken Value Chain Actors**

<b>Gender</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Female	36	20.5	30	50.0	125	68.3	191	45.6
Male	140	79.5	30	50.0	58	31.7	228	54.4
Total	176	100.0	60	100.0	183	100.0	419	100.0

#### **4.2.4 Marital Status of Broiler Chicken Value Chain Actors**

The result in Table 4.3 shown that a little over the half (50.6) of the actors in the broiler chicken value chain were married. This result when compared with the marital status of the actors in each node of the broiler chicken value chain indicates that there were more married actors in the production and processing nodes but fewer married actor in the marketing node with 73.9%, 65.6% and 49.4% respectively.

#### **4.2.5 Marital Status of Broiler Chicken Producers**

Table 4.3 shows the marital status of the producers. The result indicates that majority (73.9) were married. The result is in line with Jolaosho (2014) who reported a dominance of production node by married actors with 84%. Having more married actors involved in income generating activities of any node of the broiler chicken value chain increases the probability of havin more hands available, from their wives and children, for poultry farming activities that often lead to an increased participation, productivity and intensity of participation.

#### **4.2.6 Marital Status of Broiler Chicken Processors**

Table 4.3 shows the marital status of processors. The result showed that majority (65%) of actors participating in the processing node of the broiler chicken value chain were married. The result was in line with a priori expectation of majority of the actors in the processing nodes being married. The work of Gangwar (2010) that majority of households derive their livelihood from processing activities within the broiler chicken value chain supports the finding of this study. It implied that activities within the broiler chicken processing node are being carried out an average actor with the support from additional hands in the family. During the festive period, the pressure on broiler chicken marketers and processor becomes feasible to consumers with need for additional hands to support in different processing activities. The salient observations made on the field was the manner in which processors get more broiler chicken processed by having their spouses and grown-up children involved in canvassing for customers to buy broiler chicken for immediate manual dressing for a affordable fee that was minimal. It could be concluded that income generating activities of broiler chicken processing node is not primarily for

value addition nodes but directly generating employment for majority of household who are married.

#### **4.2.7 Marital Status of Broiler Chicken Marketers**

Marital status of marketers is presented in Table 4.3. The result revealed that majority (76.5%) of marketers in the broiler chicken marketing node were single. The result is line with a priori expectation of the dominance of the marketing by unmarried who are aggressive, economically active and often found in selling and canvassing for customers for any household consumer products. The result, however, contradicted the finding of Gebremedhin (2015) who reported that majority (83.3%) of poultry marketers were married with only 16.7% as single. In conclusion, the result implied and agreed with earlier findings by Adebayo and Adeola (2005) that broiler chicken value chain is a good source of employment especially for young school leavers and graduates in southwestern Nigeria. The pressure on broiler chicken marketers increases during the festive period and additional hands support is often required either having family member most especially actor`s spouse or grown-up children involved.

**Table 4.3: Marital Status of Broiler Chicken Value Chain Actors**

<b>Marital Status</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Single	46	26.1	21	35.0	140	76.5	207	49.4
Married	130	73.9	39	65.0	43	23.5	212	50.6
Total	176	100.0	60	100.0	183	100.0	419	100.0

#### **4.2.8 Level of Education of Broiler Chicken Value Chain Actors**

Table 4.4 shows the result on the levels of education of the actors. Basic formal educational is proper and essential bedrock for input purchasing, basic accounting, sales and report writing among other activities. Result of the analysis indicates that majority (61.3%) of broiler chicken value chain actors earned minimum of tertiary education. The result is in line with Adeyonu (2016) who had reported that majority (64%) of poultry farmers had post-secondary education. Gebremedhin (2015) also reported that more educated and learned processors (58.3%) and marketers (65.5%) were engaged in poultry business. The result is in line with a priori expectation that more educated actors will be involved in income generating activities of the broiler chicken value chain. The implication of having higher proportion of actors educated to tertiary level of education implied that all nodes of the broiler chicken value chain are being run and managed by enlightened actors who will be willing to accept new ideas and innovations. In fact educated farmers are enablers of increased participation and could be linked to the level of profitability and competitiveness in southwestern Nigeria.

#### **4.2.9 Level of Education of Broiler Chicken Producers**

The result of the study indicates that majority (70.5%) of actors in the broiler chicken value chain production nodes attained tertiary level of education. Result indicates that 22.2% of producers in the broiler chicken value chain attained secondary level of education. It could be inferred from the result that 92.7% of producers in broiler chicken value chain had a minimum of secondary level of education. It implied that actors in the production node are learned and well educated to read, write and communicate with likelihood of positive impact on income generating activities and decision making of the producers within the broiler chicken value chain. This could be linked to the result of production node and favourable PAM ratios obtained on costs, turnover, profits and the level of competitiveness of the production node of broiler chicken value chain. High level of education of an average producer will attract special skills required in to the production node where effective supervision and sound management skills are required.



### **4.3 Level of Education of Broiler Chicken Processors**

The result of the analysis indicates that majority (65%) of the actors participating in the processing node of broiler chicken value chain attained secondary and tertiary level of education. With 48.3% and 16.7% having tertiary and secondary level of education respectively. The result is in line with a priori expectation and also implied that processing nodes of the broiler chicken value chain had educated and learned actors. The result is also in line with Gebremedhin (2015) who reported that majority (58.3%) of processors had secondary level of education. However, the 15% of actors with no formal education is a great concern. With this findings, the need for upgrade of value-adding processing node of the broiler chicken value chain, such as the training of actors on how to read manuals and operate broiler chicken processing equipment, could be achieved with ease.

#### **4.3.1 Level of Education of Broiler Chicken Marketers**

The result of analysis indicates that majority (92.1%) of actors in the marketing node attained secondary level of education and above. Out of this percentage, majority (58.8%) attained tertiary level of education. The result of this study is in line with a priori expectation that more educated actors will be involved in broiler chicken marketing node because they are likely to have done exploratory market research and identified marketing node as both the fastest income generating and the most profitable node of broiler chicken value chain. The result is supported by Gebremedhin (2015) who had reported that more educated and learned marketers (65.5%) were engaged in marketing node of poultry business. The result is an indication that selling of broiler chicken is no longer for the illiterate and the possibility of introduction of technologies (such as digital marketing) as more educated actors are getting involved in selling of broiler chicken is high.

**Table 4.4: Level of Education of Broiler Chicken Value Chain Actors**

<b>Educational Status</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No Formal	4	2.3	9	15.0	4	2.2	17	4.1
Koranic	-	-	5	8.3	1	.5	6	1.4
Adult Literacy	1	.6	-	-	6	3.3	7	1.7
Training								
Primary	8	4.5	7	11.7	7	3.8	22	5.3
Secondary	39	22.2	10	16.7	61	33.3	110	26.3
Tertiary	124	70.5	29	48.3	104	56.8	257	61.3
Total	176	100.0	60	100.0	183	100.0	419	100.0

### **4.3.2 Membership of Association Distribution of Broiler Chicken Value Chain Actors**

Table 4.5 summarizes the findings of the analysis on association members among all key actors. Membership of association is a proxy for social capital and there is a positive relationship between membership of a group or an association and participation (and intensity of participation) in any agribusiness value chain. The result indicates that majority of the broiler chicken actors (62.8%) were non-members of any association. The result implied that majority of broiler chicken value chain actors in southwestern Nigeria do not have social capital nor enjoyed any benefit of belonging to Poultry Association of Nigeria (PAN) or any farmers` group. This is contrary to a priori expectation of a majority of actors belonging to a group or association most especially Poultry Association of Nigeria and the findings of Afutu (2011) with majority of the broiler actors being a members of a group or any farmers` association. This could be associated with many factors like access to low interest loan, poor or non-availability of veterinary extension service and most importantly decreased beneficial services of purchase of bulk or subsidized inputs being rendered to majority of members by poultry association or any other farmers` group..

### **4.3.3 Membership of Association Distribution of Broiler Chicken Producers**

The result of data analysis on the membership of association among broiler chicken producers is shown in Table 4.5. It reveals that 76.7%, 70.0% and 62.8% of producers, processors and marketers do not belong to any farmers` association in broiler chicken value chain. Higher percentage of non-membership of association among the actors in the production node is a clear indication of inability to obtain farm-related benefits such as loan from farmers` association or cooperatives in the study area. This result is contrary to a priori expectation as only minority (23.3%) of the actors in the production node see the need to belong to any farmers` association. The observation made on the field was clear: majority of actors in the production (that belong to one association or the other) recognizes that being a member of farmers association is no longer beneficial because regular fees must be paid to the association without any benefit or impact on their farms and the bottom-lines; revenue and profit.

#### **4.3.4 Membership of Association Distribution of Broiler Chicken Processors**

The result of data analysis on the membership of association among broiler chicken processors in the broiler chicken value chain is shown in Table 4.5. The result indicates that majority (70.0%) of broiler chicken processors in the broiler chicken value chain do not belong to any group or association. Though the result is slightly lower than that of the producers, it is contrary to a priori expectation that more poultry processor will belong to one farmer association or the other. This result implied that fewer (30.0%) broiler chicken processors were member of any association hence majority (70.0%) of broiler chicken processors in southwestern Nigeria do not find being a member of any farmer associations (such as Poultry Association of Nigeria) as advantageous in making broiler chicken processing more profitable and competitive in Southwestern Nigeria.

#### **4.3.5 Membership of Association Distribution of Broiler Chicken Marketers**

The result of data analysis on the membership of association among broiler chicken marketers in the broiler chicken value chain is shown in Table 4.5. The result indicates that majority (53.0%) of broiler chicken marketers in the broiler chicken value chain belong to a farmers` group or association while (47.0%) broiler chicken marketers do not belong to any association. This result of membership of association for marketers is the highest when compared with producers (23.3%) and processors (30%). This could be interpreted that majority (53.0%) of broiler chicken marketers in the broiler chicken value chain in southwestern Nigeria were members of Poultry Association of Nigeria or any farmers` group. Membership of association as a marketer, aside being a source of low interest credit, could help in price-fixing and bestows on an actor the benefit of being an informant or ability to gather crucial market information on inputs and outputs.

**Table 4.5: Membership of Association Distribution of Broiler Chicken Value Chain Actors**

<b>Member of association</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Non-Member	135	76.7	42	70.0	86	47.0	263	62.8
Member	41	23.3	18	30.0	97	53.0	156	37.2
Total	176	100.0	60	100.0	183	100.0	419	100.0

#### **4.3.6 Household Size Distribution of Broiler Chicken Value Chain Actors**

The result of household size distribution of all actors is shown in Table 4.6. The result indicates that the household size range from 1 to 10 persons with average household size of  $4.45 \pm 1.83$  member. Result indicates that majority (90.5%) of broiler chicken actors have at least six members in their households while only 9.5% of broiler chicken actors have seven and above members in their households. This result implies that broiler chicken value chain node is characterized by average household size. It could be inferred that broiler chicken value chain have available human resource mostly needed for broiler chicken value chain operational activities.

#### **4.3.7 Household Size Distribution of broiler chicken Producers**

The result of data analysis on household size distribution for broiler chicken producers in the broiler chicken value chain is shown in Table 4.6. The result indicates that the household size for broiler chicken producers range from 1 to 10 persons with means household size of  $4.67 \pm 1.85$ . Result indicates that majority (87.5%) of broiler chicken producers have at least six members in their households while only 12.5% of broiler chicken actors have seven and above members in their households. The result indicates that 41.5% of broiler chicken producers have four or fewer members of households, 46% have 5-6 members of households, 11.4% have 7-8 members of households and 1.1% have members of households equal or greater than 9. This result implies that broiler chicken value chain production node is characterized by average household size. It could be deduced that broiler chicken production node has available human resource mostly needed for broiler chicken value chain daily production activities.

#### **4.3.8 Household Size Distribution of broiler chicken Processors**

The result of household size distribution for broiler chicken processors is shown in Table 4.6. The result indicates that the household size for broiler chicken processors range from 1 to 10 persons with means household size of  $3.97 \pm 2.32$ . Result indicates that majority (94.9%) of broiler chicken processors have at least six members in their households while only 5.1% of broiler chicken processors have seven and above members in their households. The result indicates that 55.0% of broiler chicken processors have four or fewer members of households, 39.9% have 5-6 members of households, 3.8% have 7-8

members of households and 1.6% have members of households equal or greater than 9. This result implies that broiler chicken value chain processing node is characterized by average household size. It could be inferred that broiler chicken processing node has available human resource mostly needed for broiler chicken value chain daily processing operational activities.

#### **4.3.9 Household Size Distribution of broiler chicken Marketers**

The result of data analysis on household size distribution for broiler chicken marketers in the broiler chicken value chain is shown in Table 4.6. The result indicates that the household size for broiler chicken marketers range from 1 to 10 persons with means household size of  $4.39 \pm 1.59$ . Result indicates that majority (95.9%) of broiler chicken marketers have at least six members in their households while only 4.1% of broiler chicken marketers have seven and above members in their households. The result indicates that 54.6% of broiler chicken marketers have four or fewer members of households, 41.3% have 5-6 members of households, 7.9% have 7-8 members of households and 1.7% have members of households equal or greater than 9. This result implies that broiler chicken value chain marketing node is characterized by large household size. It could be inferred that broiler chicken marketing node has available human resource mostly needed for broiler chicken value chain daily processing operational activities.

**Table 4.6 Household Size Distribution of Broiler Chicken Value Chain Actors**

<b>Household size</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
≤4.00	73	41.5	33	55.0	100	54.6	206	49.2
5.00 - 6.00	81	46.0	19	31.7	73	39.9	173	41.3
7.00 - 8.00	20	11.4	6	10.0	7	3.8	33	7.9
≥9.00	2	1.1	2	3.3	3	1.6	7	1.7
Total	176	100.0	60	100.0	183	100.0	419	100.0
Mean	4.67		3.97		4.39		4.45	
Std. Deviation	1.85		2.32		1.59		1.83	
Minimum	1		1		1		1	
Maximum	10		10		10		10	



#### **4.4 Income Earners Distribution of the Broiler Chicken Value Chain Actors**

The result of analysis on the number of income earners in the pool data for the entire broiler chicken value chain (production, processing and marketing nodes) is shown in Table 4.7. The result indicates that the number of income earners for broiler chicken actors range from 1 to 10 household members with means and standard deviation of  $3.93 \pm 2.07$  for the entire broiler chicken value chain while the means and standard deviations were  $2.39 \pm 1.62$ ,  $4.90 \pm 1.27$  and  $5.09 \pm 1.68$  for broiler chicken producers, processors and marketers respectively. The result indicates that majority (89%) of broiler chicken actors have at least six members in their households as income earners and 61.8% of broiler chicken marketers have four or fewer members of households as income earners, 27.2% have 5-6 members of households as income earners, 8.6% have 7-8 members of households and 2.4% have members of the households equal or greater than 9.

The result is in line with the a priori expectation of a positive relationship between the number of income earners and the decision of actor to participation and the level of participation. Multiple sources of informal and cheaper funds will impacts productivity, profitability and competitiveness and lower risk associated with single income earner in a farming household (Gebremedhin, 2015; Adeyonu, 2016). Therefore, the result has shown that an average actor within the value chain have varied informal source of finance and that risk associated with income-related shock are more likely to be mitigated. The result of the analysis revealed that number of income earner was found to be associated with decision of an average actor to participation and intensity of participation. This result implies that broiler chicken value chain node is characterized with diverse sources of income with most of their household gainfully employed with other income generating activities which often serve source of finance mostly needed for production, processing and marketing in the broiler chicken value chain.

##### **4.4.1 Income Earners Distribution of Broiler Chicken Producers**

The result of data analysis on number of income earners for producers is shown in Table 4.7. The result indicates that the number of income earners for broiler chicken producers range from 1 to 10 household members with means and standard deviations of income

earners of  $2.39 \pm 1.62$ . The result indicates that majority (96%) of producers have at least six members in their households as income earners while only 4% of broiler chicken producers have seven and above members in their households as income earners. The result further indicates that 89.2% of broiler chicken producers have four or fewer members of households as income earners, 6.8% have 5-6 members of households as income earners, 2.8% have 7-8 members of households and 1.1% have members of households equal or greater than 9.

This result implies that broiler chicken production node is characterized by high number of income earners. It could be inferred that broiler chicken production node have most members of the household gainfully employed with part of the income being invested into broiler chicken value chain production.

#### **4.4.2 Income Earners Distribution of Broiler Chicken Processors**

The result of data analysis on number of income earners for processors is shown in Table 4.7. The result indicates that the number of income earners for an average broiler chicken processor range from 1 to 10 household members with means and standard deviations of income earners of  $4.90 \pm 1.27$ . The result indicates that majority (91.6%) of processors have at least six members in their households as income earners while only 8.4% of broiler chicken processors have seven and above members in their households as income earners. The result further indicates that 38.3% of broiler chicken processors have four or fewer members of households as income earners, 53.3% have 5-6 members of households as income earners, 8.4% have 7-8 members of households as income earners and no household with 9 and greater members as income earners. This result implies that broiler chicken processing node is characterized by high number of income earners. It could be inferred that broiler chicken processing node have most members of the household gainfully employed.

#### **4.4.3 Income Earners Distribution of Broiler Chicken Marketers**

The result of data analysis on number of income earners for marketers is shown in Table 4.7. The result indicates that the number of income earners for broiler chicken marketers range from 1 to 10 household members with means and standard deviations of income earners of  $5.09 \pm 1.68$ . Result indicates that majority (81.5%) of marketers have at least six

members in their households as income earners while only 18.5% of broiler chicken marketers have seven and above members in their households as income earners. The result further indicates that 43.2% of broiler chicken marketers have four or fewer members of households as income earners, 38.3% have 5-6 members of households as income earners, 14.2% have 7-8 members of households as income earners and 4.4% have members of households that equal or greater than 9 as income earners. This result implies that broiler chicken marketing node is characterized by lowest number of income earners. The result is in line with a priori expectation that household with fewer member income earners will seek for quick and faster sources of additional income.

**Table 4.7 Income Earners Distribution of the Broiler Chicken Value Chain Actors**

<b>No of Income Earners</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<= 4.00	157	89.2	23	38.3	79	43.2	259	61.8
5.00 - 6.00	12	6.8	32	53.3	70	38.3	114	27.2
7.00 - 8.00	5	2.8	5	8.3	26	14.2	36	8.6
9.00+	2	1.1	-	-	8	4.4	10	2.4
Total	176	100.0	60	100.0	183	100.0	419	100.0
Mean	2.39		4.90		5.09		3.93	
Std. Deviation	1.62		1.27		1.68		2.07	
Minimum	1		2		2		1	
Maximum	10		8		9		10	

#### **4.4.4 Mapping of Actors, Processes and Activities in the Broiler Chicken Value Chain**

Mapping of the actors, key processes, activities and flow of broiler chicken is in Figure 4.1. The mapping revealed the key actors as producers, processors, marketers (wholesalers and retailers) and the consumers. Identified major processes in broiler chicken value chain were input supplying, production (day old chicks and broiler chicken), processing and marketing.

#### **4.4.5 Product Flow and Key Actors in Broiler Chicken Value Chain**

The flow of products within the broiler chicken value chain, is shown in Figure 4.1. Broiler chicken producers sell majority of their broiler chicken to broiler chicken wholesalers (51%), broiler chicken retailers (27%), broiler chicken processors (12%) and directly to the final broiler chicken consumers (10%). The broiler chicken wholesalers sell to corporate institutions like cooperative societies (20%), eateries and supermarkets (5%), broiler chicken retailers (10%), broiler chicken processors (6%) and final broiler chicken consumers (20%). The broiler chicken retailers sell to other broiler chicken retailers (5%), the broiler chicken processors (2%) and the final broiler chicken consumers (35). The broiler chicken processors process and sell to supermarket (5%) and the final broiler chicken consumers (15%). The corporate institutions like cooperatives sell direct to the final broiler chicken consumers (10), eateries and supermarkets sell to the final broiler chicken consumers (10)

#### **4.4.6 The Producers in the Broiler Chicken Value Chain**

Broiler chicken producers are one of the key actors identified in broiler chicken value chain in southwestern Nigeria. Their major responsibility is the raising of the broiler chicken for slaughter. In making chicken meat available to final consumers directly or through other actors, they invest capital and human resources and made all other input purchases most especially the day-old chicks from the hatchery, feeds, and medications among others. They perform daily, weekly and other activities in ensuring broiler chicken are raised for local and international markets. Most broiler chicken producers in the study areas own their feed mills and buy medicine directly from veterinary shops. There was no record of export of broiler chicken products by any of the broiler chicken producers during the field survey.

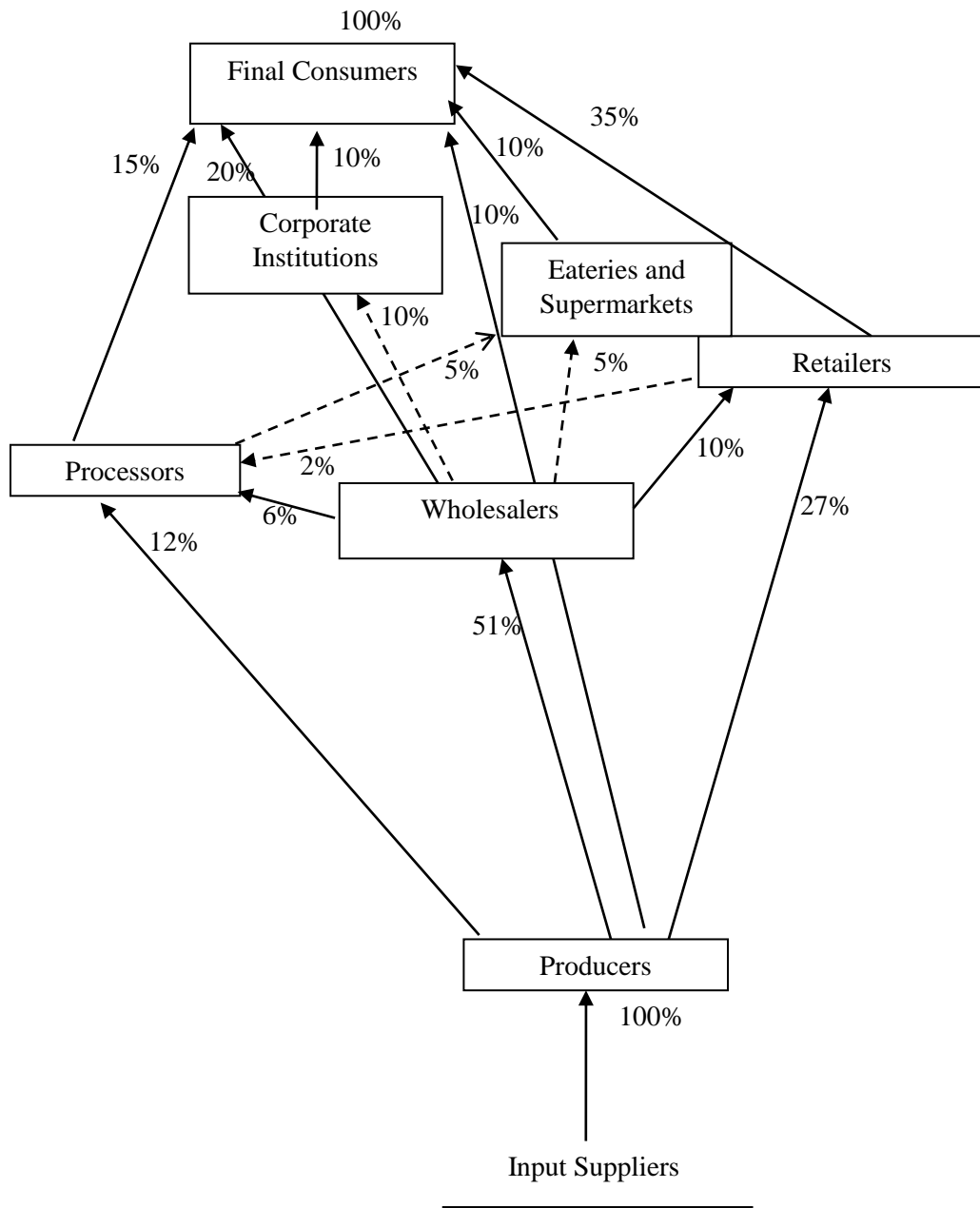


Fig. 4.1 Mapping of Actors, Processes and Activities in the Broiler Chicken Value Chain  
Adapted from Adeoye *et al.* (2014)

#### **4.4.7 The Processors in the Broiler Chicken Value Chain**

The value chain mapping as shown in Figure 4.1 indicates that broiler chicken processors are involved in dressing of broiler chicken starting from the slaughtering, de-feathering, chilling, cutting, weighing, packaging and other value adding activities. It was discovered during the field survey that broiler chicken processors stayed very close to broiler chicken wholesalers and broiler chicken retailers, mostly in an open space in the market place; resemblance as broiler chicken abattoirs. There was no record of involvement of broiler chicken processors in processing activities for exportation of processed broiler chicken during the field survey

#### **4.4.8 The Marketers in the Broiler Chicken Value Chain**

Among all the actors, the marketers are the most visible; they have access to many poultry farms, source for broiler chicken, sell and markup with margin to ensure broiler chicken value chain is profitable. The result of the value chain mapping revealed that there were many intermediaries involved in the marketing node of broiler chicken value chain. Among these intermediaries were two key actors: the broiler chicken wholesalers and retailers. While the broiler chicken wholesalers buys in large quantities, the broiler chicken retailers buy in smaller quantities. These intermediaries were more active and are major influencers within the marketing nodes of the broiler chicken value chain. They have unwritten contracts with large broiler chicken producers; mostly integrated farms and have links with broiler chicken processors for dressed and seasoned broiler chicken products. Regular purchase and prompt delivery to restaurants and big supermarkets were common among wholesalers and retailers.

In summary, broiler chicken marketers buy broiler chicken from the broiler chicken producers. They sell to other broiler chicken marketing intermediaries (mostly wholesalers and retailers) who sell to corporate institutions like cooperative societies (20%), eatery and supermarkets (5%), broiler chicken retailers (10%), broiler chicken processors (6%) and final broiler chicken consumers (20%). The broiler chicken retailers sell to other broiler chicken retailers (5%), the broiler chicken processors (2%) and the final broiler chicken consumers (35%). The broiler chicken processors process and sell to supermarket (5%) and the final broiler chicken consumers (15%). The corporate

institutions like cooperatives sell direct to their members who are final broiler chicken consumers (10), eatery and supermarkets sell to the final broiler chicken consumers (10). The results of mapping show that broiler chicken producers often transport broiler chicken to the marketers (in the marketplace) for value addition and higher prices. There was no record of export of broiler chicken products by any of the marketers during the field survey.

#### **4.5 Participation Decisions Factors of Key Actors in Broiler Chicken Value Chain**

Table 4.8 summarizes the participation decisions factors of the actors. The a priori expectation is that socioeconomic factors influence decisions of key actors to either increases or decrease participation in broiler chicken value chain in southwestern Nigeria. The explanatory socioeconomic variables in the model were primarily for the evaluation and modelling of factors influencing participation decisions of key actors in the three identified nodes of broiler chicken value chain. The result indicates that the maximum likelihood estimates of the first hurdle, probit regression model, fits the data reasonably. The log-likelihood was -64.6413 with a Chi-square value of 22.83 which was found to be significant at  $p < 0.05$ . The information included in the model were on age, gender, marital status, years of education, household size, broiler chicken rearing experience, access to credit, payment of tax, price of chicken per kg, availability of water, supply of electricity, transportation, theft/pilfering, member of association among others.

These explanatory variables collectively explain factors influencing both participation and intensity of participation decisions of key actors in each nodes of broiler chicken value chain in southwestern Nigeria. The result indicates that household size and access to credit were significant participation decision factors at  $p < 0.01$ ; price of chicken (in per kg), inadequate water, poor transportation, member of association, payment of tax and theft/pilfering were significant participation decision factors at  $p < 0.05$  while marital status, year of education, gender and inadequate land were significant participation decision factors at  $p < 0.10$  of all key actors. Contrary to a priori expectation rearing experience and poor supply of electricity were not significant participation decision factors of broiler chicken value chain actors in southwestern Nigeria.



#### **4.5.1 Determinants of Participation Decisions of Broiler Chicken Producers**

The result of the analysis of participation decisions factors for producers using double-hurdle model is presented in Table 4.8. The result indicates that price of chicken (in per kg), inadequate water and poor transportation were significant participation decision factors at  $p < 0.05$  while only marital status was significant participation decision factors at  $p < 0.10$  of producers in broiler chicken value chain actors in southwestern Nigeria.

**Table 4.8: Maximum Likelihood Estimates of the Generalized Double-hurdle Model of Broiler Producers**

Variables	Participation		Intensity	
	Marginal Effect	Std. Error	Marginal effect	Std. Error
Gender	0.0932	0.0665	0.00004	0.00043
Marital status	0.1208*	0.0680	0.00094**	0.00039
Years of education	-0.0010	0.0044	0.00009**	0.00005
Household size	-0.0054	0.0078	-0.00018*	0.00010
Rearing experience	0.0067	0.0156	0.00001	0.00004
Payment of tax	-0.0050	0.0068	-0.00053	0.00047
Price per kg	-0.1389**	0.0657	0.00000	0.00000
Inadequate water	-0.0001**	0.0001	-0.00028**	0.00040
Poor supply of electricity	0.0025	0.0690	0.00055	0.00039
Poor transportation	0.1479**	0.0660	0.00019	0.00036
Theft/Pilfering	0.0119	0.0629	-0.00078	0.00037
Inadequate land	-0.0309	0.0631	-0.00024	0.00044
Chi-Square	22.83		24.09	
Prob > chi2	0.0438**		0.0198	
Log likelihood	-64.641		792.966	

\*\*\*, \*\* and \* is significant at 1%, 5% and 10% level respectively

#### **4.5.2 Determinants of Participation Decisions of Broiler Chicken Processors**

The result of the analysis of participation decisions factors for processors is presented in Table 4.9. The result indicates that household size was the only significant participation decision factors at  $p < 0.01$ ; member of association and payment of tax were significant participation decision factors at  $p < 0.05$  while year of education was the only significant participation decision factors at  $p < 0.10$  of processors in broiler chicken value chain actors in southwestern Nigeria.

**Table 4.9: Maximum likelihood estimates of the generalized Double-hurdle Model of Broiler Processors**

<b>Variables</b>	<b>Participation</b>		<b>Intensity</b>	
	Marginal Effect	Std. Error	Marginal Effect	Std. Error
Marital status	-0.04121	0.15287	0.00085	0.00197
Age	-0.01072	0.01066	-0.00010	0.00014
Years of education	-0.01902*	0.01095	0.00014*	0.00015
Household size	0.10171***	0.03945	0.00061	0.00047
member of association	0.25309**	0.11306	0.00045	0.00149
Payment of tax	0.30816**	0.12371	0.00271	0.00153
Price per kg	0.00163	0.00101	0.00003***	0.00001
Inadequate water	-0.18634	0.11503	0.00068	0.00155
Poor transportation	0.06254	0.12944	-0.00087	0.00154
Inadequate man power	-0.37061	0.24086	-0.00355	0.00310
Lack of training	0.38927	0.30922	0.00474	0.00422
Chi-square	19.84		29.59	
Prob > chi2	0.0476		0.0018	
Log likelihood	-24.813		217.048	

\*\*\*, \*\* and \* is significant at 1%, 5% and 10% level, respectively

### **4.5.3 Determinants of Participation Decisions of Broiler Chicken Marketers**

The result of the analysis of participation decisions factors for processors using double-hurdle model is shown in Table 4.10. The findings revealed that credit access was a significant participation decision factor at  $\alpha_{0.05}$ ; membership of association, payment of tax and theft/pilfering were significant participation decision factors at  $\alpha_{0.05}$  while gender and inadequate land were significant participation decision factors at  $\alpha_{0.05}$  of marketer in broiler chicken value chain actors in southwestern Nigeria.

**Table 4.10: Maximum likelihood estimates of the generalized Double-hurdle Model of Broiler Marketers**

Variables	Participation		Intensity	
	Coefficient	Std. Error	Coefficient	Std. Error
Gender	0.11587*	0.06807	-0.00066***	0.00025
Marital status	0.05919	0.07126	-0.00038	0.00029
Age	-0.00041	0.00339	0.00000	0.00002
Years of education	0.00577	0.00745	0.00000	0.00003
Household size	0.00458	0.01921	-0.00004	0.00008
Number on income earners	0.01423	0.01651	-0.00001	0.00007
Marketing experience	-0.00546	0.00473	0.00005**	0.00002
Membership of association	-0.11633**	0.05567	0.00080***	0.00026
Payment of tax	-0.10956**	0.05307	-0.00105***	0.00024
Access to credit	0.25695***	0.07766	-0.00054**	0.00027
Price (kg)	0.00014	0.00011	0.00000**	0.00000
Availability of water	-0.02723	0.06496	0.00032	0.00028
Supply of electricity	0.00041	0.07992	-0.00022	0.00033
Transportation	0.05879	0.05547	0.00052**	0.00025
Theft/Pilfering	0.14010**	0.06075	0.00032	0.00024
Storage Facility	-0.11374	0.08412	-0.00027	0.00032
Availability of land	0.21873*	0.12385	0.00020	0.00035
Man power	0.07636	0.07520	-0.00032	0.00032
Training	0.05635	0.10790	-0.00042	0.00044
Chi-Square	52.05		88.49	
Prob > chi2	0.0001		0.0000	
Log likelihood	-55.257		928.086	

\*\*\*, \*\* and \* is significant at 1%, 5% and 10% respectively

#### **4.6 Factors Influencing Intensity of Participation Decisions of the Broiler Chicken Value Chain Actors in Southwestern Nigeria.**

The result of the analysis of intensity of participation decisions factors using double-hurdle model is presented in Table 4.8 to 4.10. The a priori expectation is that socioeconomic and demographic factors determine intensity of participation and either increases or decrease the quantity in kg of broiler chicken being produced, processed and marketed in the broiler chicken value chain. The explanatory socioeconomic and demographic variables included in this analysis were primarily for the assessment and modelling of significant factors influencing intensity of participation decisions of key actors in the three identified nodes of the broiler chicken value chain in the study area. The information included in the model were presented in in Table 4.8 to 4.10 which include age, gender, marital status, years of education, household size, farming and or marketing experience, access to credit, payment of tax, price of chicken per kg, inadequate water, inadequate supply of electricity, transportation, theft/pilfering, member of association among others. These explanatory variables collectively explain factors influencing intensity of participation decisions of actors in each nodes. The result in Table 4.8 indicates that the maximum likelihood estimates of the first hurdle, probit regression model, fits the data reasonably. The log-likelihood was -64.6413 with a Chi-square value of 22.83 which was found to be significant at  $p < 0.05$ . The result indicates that gender, membership of association, price of chicken (in per kg) and payment of tax were significant intensity of participation decision factors at  $p < 0.01$ ; marital status, level education, inadequate water, access to credit, year of experience and poor transportation were significant intensity of participation decision factors at  $p < 0.05$  while household size and payment of tax were significant intensity of participation decision factors at  $p < 0.10$  of all key actors.

##### **4.6.1 Factors Influencing Intensity of Participation Decision of Broiler Chicken Producers**

The result of analysis indicates that the maximum likelihood estimates of the second hurdle model fits the data reasonably. The log-likelihood was -1299.29 with a chi-square value of 29.02 which was significant at  $p < 0.01$ . The dependent variable was the average

quantity in kg of broiler chicken produced by the broiler chicken producers while explanatory variables in the model were gender, marital status, age of respondents, years of education, household size, rearing experience, payment of tax, price per kg (of broiler chicken produced), inadequate supply of water, poor supply of electricity, poor transportation, corruption and inadequate land.

The result indicates that marital status, year of education and inadequate water were significant intensity of participation decision factors at  $p < 0.05$  of producers to either increase or decrease quantity in kg of broiler chicken to be reared and supply to the market. The result indicates that year of education was found to be a significant intensity of participation decision factor at  $p < 0.05$  of producers to either increase or decrease quantity in kg of broiler chicken output in the study area. Marital status and year of education were not only significant at a  $p < 0.05$  but were positively related to intensity of participation decisions in the broiler chicken production node. This implied that with an increase in the level of education acquired by the producers, there will be a positive increase in the quantity in kg of broiler chicken being produced.

#### **4.6.2 Factors Influencing Intensity of Participation Decision of Broiler Chicken Processors**

The result of the analysis of intensity of participation decisions factors for processors using double-hurdle model is presented in Table 4.9. The result indicates that the maximum likelihood estimates of the second hurdle fits the data reasonably. The log-likelihood was 217.048 with a chi-square value of 29.59 which was significant at  $p < 0.05$ . The dependent variable was the average quantity in kg of broiler chicken being processed by the processor while explanatory variables were marital status, age in year, level of education, household size, member of association, tax payment, average price per kg of broiler chicken processed and inadequate water and poor transportation. The explanatory variables collectively explained intensity of participation decision factors on the quantity or volume of broiler chicken being processed by an average broiler chicken processor in the study area. The result indicates that price per kg of broiler chicken was the only significant intensity of participation decision factors at  $p < 0.01$  while year of education was the only significant intensity of participation decision factors at  $p < 0.10$  for



processors in broiler chicken value chain actors in southwestern Nigeria. The marginal effect of price per kg of broiler chicken was not only statistically significant at  $p < 0.01$  in determining the intensity of participation in broiler chicken node but positively affect the volume of broiler chicken being processed by processors in the broiler chicken value chain. The result indicates that as the price per kg of broiler chicken increases by a naira, the likelihood of an increase in one kg of broiler chicken being processed.

#### **4.6.3 Factors Influencing Intensity of Participation Decision of Broiler Chicken**

##### **Marketers**

The result of the double-hurdle analysis presented in Table 4.10 indicates that the maximum likelihood estimates of the second hurdle, Tobit regression model, fits the data with the log-likelihood of 928.09 and a chi-square of 88.49 which is significant at  $p < 0.01$ . The dependent variable was modelled as the average quantity or volume of broiler chicken sold by the broiler chicken marketers while explanatory variables in the model were gender, marital status, age of respondents, years of education, household size, number of income earners, marketing experience, membership of association, payment of tax, access to credit, average price per kg of broiler chicken sold, inadequate water, poor electricity, poor transportation, theft/pilfering, lack of storage facility, and inadequate land. These explanatory variables collectively explained factors influencing intensity of broiler chicken marketing in the study area.

The result of double-hurdle Tobit analysis indicates that gender, member of association and payment of tax were significant intensity of participation decision factors at  $p < 0.01$  while marketing experience, access to credit, average price per kg of broiler chicken sold and poor transportation were significant intensity of participation decision factors at  $p < 0.05$  associated with or influencing intensity of participation in terms of the quantity in kg being sold by the marketers in the study area.

The result of the analysis further indicates that the coefficient of the gender variable is negative. This implied that an increase in the number of male marketers will decrease largely the quantity of broiler chicken that marketers will sell in the marketplace. The positive coefficient on the marketing experience variable implied that a year increase in the marketing experience of broiler chicken marketers will lead to higher intensity of

participation in selling and marketing of broiler chicken in the study area. The positive coefficient of membership of association variable implied that decision of an average marketer in joining any or additional association will increase intensity of participation in terms of the quantity in kg of broiler chicken to be handled or sold. The negative coefficient on payment of tax variable implied that additional burden of an increment in tax will reduce intensity of participation in broiler chicken value chain in southwestern Nigeria. The negative coefficient of access to credit variable implied that as possible access to credit is being reduced, broiler chicken marketers intensity of participation in the marketing node of the broiler chicken value chain will be negatively impacted.

The price per kg of chicken has negative coefficient, this implied that as the price of locally produced broiler chicken increases the demand for locally produced broiler chicken also reduces and the real purchasing power of an average marketer declines. This is in line with the study by Oloso *et al.* (2020) who unveiled the issue of price differentials in broiler chicken value chain. The study revealed that prices of local broiler chicken products were higher than smuggled (illegally imported) comparative broiler chicken with negative impacts and wrong signals (to both existing and prospective marketers). Direct effect is reduction in participation and intensity of participation on the marketing node of local broiler chicken value chain. Marketers are known to have clear understanding of price signal and are likely to respond with decrease in intensity of participation or supply to keep increased price for as long as possible with the expectation that demand for broiler chicken being reared locally will be affected by decreasing demand due to increase in price per kg of broiler chicken coupled with possibility of smuggled imported broiler chicken meat with relatively lower price.

The positive coefficient of poor transportation variable implied that the declension of transportation system created opportunities and increased the intensity of participation in terms of quantity of kg of broiler chicken marketers sold to the market in the study area; contrary to a priory expectations. It could be inferred that broiler marketers developed coping strategies of cheaper and efficient private transport arrangement or sourcing for broiler chicken from nearby farms within their geographical location or not too far from their corporate buyers.

## **CHAPTER FIVE**

### **MEASUREMENT OF COMPETITIVENESS OF BROILER CHICKEN VALUE CHAIN IN SOUTHWESTERN NIGERIA**

#### **5.1 Measurement of Competitiveness of Broiler Chicken Value Chain Actors**

This chapter presents the results of Policy Analysis Matrix (PAM) which determines the competitiveness, comparative advantage and effect of current government policy on broiler chicken value chain in the study area. Tables 5.1 is the PAM results indicating a private profitability for the broiler chicken value chain. The private cost ratios (the ratio of domestic factor costs to value added in private prices; an indicator of how much an average broiler chicken value chain actor can afford to pay domestic factors but the node still remains competitive) as shown in Tables 5.5 conveys the level of competitiveness at private price, of the three actors in the broiler chicken value chain.

The private profits (PP) and private cost ratios (PCR) of the three selected nodes of the broiler chicken value chain (production, processing and marketing) were measured. The result indicates that profits are being made by the actors participating in the selected nodes of the broiler chicken value chain with ₦590,361.35, ₦1,985,199.82 and ₦2,042,471.95 being the average net private profits at private price per kg were made by an average producer, processor and marketer respectively.

The marketers have the largest average profit, followed by the processors and then the producers. The values of Private Cost Ratio (PCR) were 0.69, 0.61 and 0.54 for an average producer, processor and marketer respectively. The result indicates that an average major actor participating in any of the three major nodes of the broiler chicken value chain earned excess profits broiler chicken and all income generating activities within the broiler chicken value chain are considered profitable in the study area. The

private cost ratio, based on the Policy Analysis Matrix, indicates that marketing node of the broiler chicken value chain is the most privately competitive among the three major nodes of the broiler chicken value chain in the study area. Based on the Private-Benefit Cost Ratio (PBCR), the amount generated by each naira invested in tradable and non-tradable inputs by an average broiler chicken value chain actor in private prices is the highest for the broiler chicken processor with PBCR ratio of 2.21. This is followed by broiler chicken marketer which has PBCR ratio of 2.15 while an average broiler chicken producer has PBCR ratio of 1.75 being the least PBCR ratio as shown in Table 5.5.

Table 5.1: Policy Analysis Matrix of the Broiler Chicken Value Chain in Southwestern Nigeria

Actors		Revenue (₦)		Non-Tradable	Profit (₦)
			Tradable (₦)	(₦)	
Producers	Private Price	7,379,517.75	5,475,126.07	1,314,030.26	590,361.42
	Social Price	5,379,665.83	5,107,699.32	176,777.67	95,188.28
	Divergence	1,999,851.92	367,426.75	1,137,252.59	495,173.14
Processors	Private Price	21,243,273.03	16,153,017.08	3,105,056.13	1,985,199.82
	Social Price	23,358,834.69	18,130,858.32	2,561,708.00	2,666,268.46
	Divergence	-2,115,561.66	-1,977,841.24	543,348.13	-681,068.64
Marketers	Private Price	25,139,476.45	20,699,320.04	2,397,684.46	2,042,471.95
	Social Price	27,148,909.39	22,937,696.62	1,977,394.87	2,233,817.90
	Divergence	-2,009,432.94	-2,238,376.58	420,289.59	-191,345.95

**Table 5.2: Private and Social budget per kg for Broiler Chicken Production in Southwestern Nigeria**

<b>Items</b>	<b>Unity</b>	<b>Qty</b>	<b>Market Price</b>	<b>Social Price</b>	<b>Market Value</b>	<b>Social Value</b>
<b>Revenue</b>	<b>Kg</b>	<b>10,027.34</b>	<b>735.94</b>	<b>536.50</b>	<b>7,379,517.75</b>	<b>5,379,665.83</b>
<b>Tradable</b>						
DOC cost	No	7,353.38	80.23	113.66	589,961.68	835,785.17
Feed	Kg	1,486.98	3,200.00	2,753.99	4,758,314.39	4,095,122.19
Drugs/Vaccine	Vial	3.00	8,000.00	9,700.00	24,000.00	29,100.00
Disinfectant cost	Bottle	5.00	4,200.00	4,403.00	21,000.00	22,015.00
Fuel cost	Litre	250.00	107.40	190.50	26,850.00	47,625.00
Cage/Pen	No	2.00	7,000.00	9,225.58	14,000.00	18,451.16
Drinker	No	20.00	800.00	1,460.04	16,000.00	29,200.80
Rake	No	6.00	1,500.00	1,900.00	9,000.00	11,400.00
Tank	No	2.00	8,000.00	9,500.00	16,000.00	19,000.00
<b>Total</b>					<b>5,475,126.07</b>	<b>5,107,699.32</b>
<b>Non Tradable</b>						
Land Preparation	(N)				75,200.00	48,550.23
Water					100,000.00	50,000.00
Electricity					528,000.00	28,800.00
Rents	No				180,000.00	5,000.00
Transportation					330,830.26	44,428.00
<b>Total</b>					<b>1,314,030.26</b>	<b>176,778.23</b>
<b>Profit</b>	<b>Kg</b>				<b>590,361.42</b>	<b>95,188.28</b>

**Table 5.3: Private and Social budget per kg for Broiler Chicken Processing in Southwestern Nigeria**

<b>Items</b>	<b>Unit</b>	<b>Quantity</b>	<b>Market Price</b>	<b>Social Price</b>	<b>Market Value</b>	<b>Social Value</b>
<b>Revenue</b>	<b>Kg</b>	<b>26,223</b>	<b>810.10</b>	<b>890.79</b>	<b>21,243,273.03</b>	<b>23,358,834.69</b>
<b>Tradable</b>						
Broiler Chicken	Kg	26,223	601.96	680.00	15,785,197.08	17,831,640.00
Labour	(N)	18	20,000.00	15,363.59	361,189.32	277,458.32
Bowl	No	4	712.67	640.00	2,850.68	2,560.00
Knife	No	6	250.00	1,600.00	1,500.00	9,600.00
Bucket	No	6	380.00	1,600.00	2,280.00	9,600.00
<b>Total</b>					<b>16,153,017.08</b>	<b>18,130,858.32</b>
<b>Non Tradable</b>						
Rent	M <sup>2</sup>				132,223.16	113,400.00
Deep Freezer	No	2		98,500.00	197,000.00	197,000.00
Scale	No	6	12,597.22	12,597.22	75,583.34	75,583.34
Transportation	No	26,223	82.10	75.00	2,152,908.30	1,740,916.33
Water	(N)				50,000.00	50,000.00
Packaging Bag	(N)				125,608.33	125,608.33
Gen/Electric bill	(N)				371,733.00	259,200.00
<b>Total</b>					<b>3,105,056.13</b>	<b>2,561,708.00</b>
<b>Profit</b>	<b>Kg</b>				<b>1,985,199.82</b>	<b>2,666,268.46</b>

**Table 5.4: Private and Social budget per kg for Broiler Chicken Marketing in Southwestern Nigeria**

<b>Items</b>	<b>Unity</b>	<b>Qty</b>	<b>Market Price</b>	<b>Social Price</b>	<b>Market Value</b>	<b>Social Value</b>
<b>Revenue</b>	<b>Kg</b>	<b>27,129.32</b>	<b>926.65</b>	<b>1,000.72</b>	<b>25,139,476.45</b>	<b>27,148,909.39</b>
<b>Tradable</b>						
Broiler						
Chicken	Kg	27,129.32	620.00	708.70	16,820,178.40	19,226,545.08
Feed	Kg	341.58	3,200.00	6,600.00	1,093,056.00	2,254,428.00
Labour	(N)	138.00	20,000.00	10,000.00	2,760,000.00	1,380,000.00
Bowl	No	12.00	905.63	640.00	10,867.56	7,680.00
Knife	No	14.00	250.00	1,600.00	3,500.00	22,400.00
Bucket	No	14.00	380.00	1,600.00	5,320.00	22,400.00
Cages	No	2.00	3,202.92	12,121.77	6,398.08	24,243.54
<b>Total</b>					<b>20,699,320.04</b>	<b>22,937,696.62</b>
<b>Non Tradable</b>						
Rent/Building	M <sup>2</sup>	7.00	50,000.00	50,000.00	350,000.00	350,000.00
Transportation	Per Bird	18,087.00	82.10	75.00	1,484,942.70	1,067,246.04
Drinker	No	14.00	2,954.21	2,857.14	41,358.94	40,000.00
Water	(N)				220,000.00	220,000.00
Feeder	No	14.00	2,188.42	2,091.35	30,637.88	29,278.96
Gen/Electricity	(N)				198,131.77	198,257.08
Deep Freezer	No	1.00	35,057.68	35,057.30	35,057.68	35,057.30
Scale	No	7.00	5,365.07	5,365.07	37,555.49	37,555.49
<b>Total</b>					<b>2,397,684.46</b>	<b>1,977,394.87</b>
<b>Profit</b>	<b>Kg</b>				<b>2,042,471.95</b>	<b>2,233,817.90</b>



**Table 5.5: Competitiveness of Broiler Chicken Value Chain**

<b>Chains</b>	<b>Private Profitability (₦)</b>	<b>Private Cost Ratio</b>	<b>Private Benefit-Cost Ratio</b>
Producer	590,361.35	0.69	1.75
Processor	1,985,199.82	0.61	2.21
Marketer	2,042,471.95	0.54	2.15

### **5.1.1 Measurement of Competitiveness of Broiler Chicken Producers**

The result in Table Tables 5.1 to Table 5.4 measured the competitiveness of broiler chicken producers which was found to be competitive. The result indicates that an average producer in broiler chicken node made an average of ₦590, 361.35 as private profit; an indication of a competitive broiler chicken production node. In addition, the result indicates that PCR, an indicator of how much an average broiler chicken value chain actor can afford to pay domestic factors but the node still remains competitive, was 0.69 for an average broiler chicken producer. This result indicates that an average broiler chicken producer participating in production node of the broiler chicken value chain earned excess profits and that the producers' income generating activities within the broiler chicken value chain were both profitable and competitive; in private prices. Furthermore, the private-benefit cost ratio (PBCR) for broiler chicken producers revealed that an average broiler chicken producer generated 1.75 naira for every naira invested in tradable and non-tradable inputs in private prices.

### **5.1.2 Measurement of Competitiveness of Broiler Chicken Processors**

The result in Table 5.5 measured the competitiveness of broiler chicken processors which was found to be competitive. The result indicates that an average processors in broiler chicken node made an average of ₦1,985,199.82 as private profit; an indication of a competitive broiler chicken processing node. In addition, the result indicates that PCR, an indicator of how much an average broiler chicken value chain actor can afford to pay domestic factors and still remains competitive, was 0.61 for an average broiler chicken processors. This result indicates that an average broiler chicken processors participating in processing node of the broiler chicken value chain earned excess profits and that the processors income generating activities within the broiler chicken value chain were both profitable and competitive; measured in private prices. Based on the private-benefit cost ratio (PBCR) for broiler chicken processors, the return by each naira invested in tradable and non-tradable inputs by an average broiler chicken processor in private prices was 2.21.

### **5.1.3 Measurement of Competitiveness of Broiler Chicken Marketers**

The result in Table 5.5 measured the competitiveness of broiler chicken marketers which was found to be competitive. The result indicates that an average marketer in broiler chicken node made an average of ₦2,042,471.95 as private profit; an indication of a competitive broiler chicken marketing nodes. In addition, the result indicates that PCR, an indicator of how much an average broiler chicken value chain actor pay for domestic factors but still remains competitive, was 0.54 for an average broiler chicken marketers. This result indicates that an average broiler chicken marketers participating in marketing nodes of the broiler chicken value chain earned excess profits and that the marketers income generating activities within the broiler chicken value chain were both profitable and competitive; measured in private prices. Furthermore, the private-benefit cost ratio (PBCR) for broiler chicken marketers indicates that the amount generated by each naira invested in tradable and non-tradable inputs by an average broiler chicken marketer measured in private prices was 2.15.

### **5.2 Measurement of Comparative Advantage of Broiler Chicken Value Chain Actors**

The result shown in Table 5.6 measured the comparative advantage of the broiler chicken value chain using social profitability (SP) and domestic resource costs (DRC) indicators. Social profits, an indication of comparative advantage or an efficient use of resources in policy analysis matrix analysis (PAM), were positive for all key actors in the broiler chicken value chain. The result implied that an average broiler chicken value chain actor participating in all identified nodes efficiently used resources in broiler chicken value chain production, processing and marketing activities in the study area. Furthermore, the result revealed that the average social profit of the broiler chicken processor was the highest, while the least socially profitable node was the broiler chicken producer. Broiler chicken value chain, therefore, has prospect of generating foreign revenue from export. The result indicates that Domestic Resource Cost (DRC), a proxy for measurement of social profits, of the key actors in the broiler chicken value chain ranged between 0.02 and 0.65 for an average marketer with lower cost compared with an average producer with

highest cost. The result is in agreement with the study Elsedig *et al.* (2015) that reported DRC of 0.27, 0.63 and 0.96 for medium and small scales actors

The result revealed that it costs less than one unit of domestic inputs to generate an additional unit of foreign income by broiler chicken actor. The result is in tandem with the result of positive values for social profits of all identified nodes of broiler chicken value chain in the study area. The result supports the current policy of total ban on the importation of poultry products which must have contributed to the positive indicators of comparative advantage of the broiler chicken value chain. The result of Policy Analysis Matrix on Social Benefit-Cost Ratios (SBCR) of an average actor (producer, processor and marketer) range from 1.10 and 3.54 indicating all income generating activities in each node of broiler chicken value chain were socially profitable.

### **5.2.1 Measurement of Comparative Advantage of Broiler Chicken Producers**

The result in Table 5.6 measured the comparative advantage of broiler chicken producers which was found to be positive indicating a production node with a comparative advantage. The result indicates that an average producer in broiler chicken node made an average of ₦95,188.28 as social profit; an indication of a comparative advantage of broiler chicken production node. In addition, the result indicates that domestic resource cost (DRC), which is the ratio of domestic factor costs to value added in social prices (an indicator of how much an average broiler chicken value chain producer can pay domestic factors with comparative advantage, was 0.65 for an average broiler chicken producer. This result indicates that an average broiler chicken producer participating in production node of the broiler chicken value chain earned excess social profits and that the producers' income generating activities within the broiler chicken value chain were profitable with a comparative advantage; measured in social prices. Furthermore, the social benefit cost ratio (SBCR) for broiler chicken producers indicates that the amount generated by each naira invested in tradable and non-tradable inputs by an average broiler chicken producer measured in social prices was 1.10.

### **5.2.2 Measurement of Comparative Advantage of Broiler Chicken Processors**

The result in Table 5.6 measured the comparative advantage of broiler chicken processors which was found to be positive indicating a processing node with a comparative

advantage. The result indicates that an average processor in broiler chicken node made an average of ₦2, 666, 268.46 as social profit; an indication of a comparative advantage broiler chicken processing node. In addition, the result indicates that DRC, an indicator of how much an average broiler chicken value chain processor can afford to pay domestic factors and still maintain comparative advantage, was 0.08 for an average broiler chicken processor. This result indicates that an average broiler chicken processors participating in processing node of the broiler chicken value chain earned excess profits and that the processors income generating activities within the broiler chicken value chain were profitable with comparative advantage; measured in social prices. Furthermore, the social benefit cost ratio (SBCR) for broiler chicken processors indicates that the amount generated by each naira invested in tradable and non-tradable inputs by an average broiler chicken processor measured in social prices was 3.54.

### **5.2.3 Measurement of Comparative Advantage of Broiler Chicken Marketers**

The result in Table 5.6 measured the comparative advantage of broiler chicken marketers which was found to be positive indicating a marketing node with a comparative advantage. The result indicates that an average marketer in broiler chicken node made an average of ₦2, 233, 817.90 as social profit; an indication of a comparative advantage of broiler chicken marketing node. In addition, the result indicates that DRC, an indicator of how much an average broiler chicken value chain marketer can afford to pay domestic factors and still retain comparative advantage, was 0.02 for an average broiler chicken marketer. This result indicates that an average broiler chicken marketer participating in processing node of the broiler chicken value chain earned excess profits and that the marketers income generating activities within the broiler chicken value chain were both profitable with comparative advantage; measured in social prices. Furthermore, the social benefit cost ratio (SBCR) for broiler chicken marketers indicates that the amount generated by each naira invested in tradable and non-tradable inputs by an average broiler chicken marketer measured in social prices was 2.18.

**Table 5.6: Comparative Advantage of Broiler Chicken Value Chain**

Chain	Social Profitability (₦)	Domestic Resources Cost (₦)	SBCR
Producer	95,188.28	0.65	1.10
Processor	2,666,268.46	0.08	3.54
Marketer	2,233,817.90	0.02	2.18

### 5.3 Effects of Policies on Competitiveness of Broiler Chicken Producers

Table 5.7 showed protection coefficients which are indicators of incentives available to broiler chicken value chain actors in southwestern Nigeria. The result indicates that profitability coefficients (PC), the ratio of private profits to social profits, of an average broiler chicken producer was 6.20. This coefficient is positive and greater than 1. It indicates that an average broiler chicken producer achieved private profit that was more than six times greater than what would have been if government policy of total ban on importation of broiler chicken products were not implemented.

The NPC indicates the impact of policy (and of any market failures not corrected by efficient policy that causes a divergence between the private and social prices for output) was 1.37 for an average broiler chicken producer. This ratio indicates that an average broiler chicken producer benefited from current government policies and received subsidy, in one form or the other. The result indicates that NPCI, a ratio indicating the effect of policy (and of any market failures not corrected by efficient policy) that causes a divergence between the private and social prices for input was 0.59 for an average broiler chicken producer. This coefficient also indicates that an average broiler chicken producer benefited from current government policies and received subsidy on input, in one form or the other. The result indicates that NPCO, the ratio that depicts the effect of policy (as well as any market failures that are not corrected by efficient policy) on the divergence of private and social prices for output, was 1.37 for an average broiler chicken producer. This NPCO coefficient is in line with NPCI; it indicates that an average broiler chicken producer benefited from current government policies and received subsidy which enhanced profitability and competitiveness of the broiler chicken producer. The result indicate producers are protected and is in line with the study by Elsedig *et al.* (2015) that reported NPCO of 1.17 and 1.22 for medium and small scale broiler chicken producers, respectively.

The result further indicates that Effective Protection Coefficient (EPC) was 3.46 for an average broiler chicken producer. The EPC is greater than 1 and reinforced the current government policies of total ban on importation of broiler chicken products as an effective

policy that protected an average broiler chicken producer and made income generating activities profitable as well as competitive.

#### **5.4 Effects of Policies on Competitiveness of Broiler Chicken Processors**

Table 5.7 showed protection coefficients, indicators of incentives available to broiler chicken value chain actors, based on the result of Policy Analysis Matrix. Nominal protection coefficient (NPC), effective protection coefficient (EPC), profitability coefficient (PC), net transfer (NT) and subsidy ratio to broiler chicken processors (SRP) were major protection coefficients obtained. The Nominal Protection Coefficient (the ratio that indicates the impact of policy, and of any market failures not corrected by efficient policy, that causes a divergence between the private and social prices for output) were 0.98 for an average broiler chicken processor. The ratio indicates that an average broiler chicken processor do no benefit from current government policies and received no subsidy, in any form at all. The result of NPC was less than 1 and implied that an average broiler chicken processor was taxed by government rather than being supported with any form of incentive.

The result indicates that NPCI, the ratio indicating the effect of policy (along with any market failures that are not corrected by efficient policy) on the divergence of private and social input prices was 1.72 for an average broiler chicken processor. This coefficient also indicates that an average broiler chicken processor did not benefit from any current government policies and did not receive subsidy on input, in one form or the other. The result further indicates that NPCO, the ratio that shows the effect of policy (and of any market failures not corrected by efficient policy) that causes a divergence between the private and social prices for output was 0.98 for an average broiler chicken processor. This NPCO coefficient is in line with the result of NPCI; an indication that an average broiler chicken processor did not benefit from current government policies and received no subsidy for an enhancement of profitability and competitiveness of the broiler chicken processing.

The result of PAM indicates that Effective Protection Coefficient (EPC) was 0.76 for an average broiler chicken processor. This EPC that is less than 1 implied that an average processor is not policy protected; an indication that current government policies of total



ban on importation of broiler chicken products may not be a policy intended at protecting an average broiler chicken processor and their income generating activities. The result indicates that profitability coefficients (PC), the ratio of private profits to social profits, of broiler chicken processor was 0.74. This coefficient, though positive but less than 1, was an indication that an average broiler chicken processor achieved private profit that was less than what would have been if government policy of total ban on importation of broiler chicken products were not implemented.

### **5.5 Effects of Policies on Competitiveness of Broiler Chicken Marketers**

Table 5.7 showed protection coefficients, indicators of incentives available to broiler chicken value chain marketers, based on the result of Policy Analysis Matrix. Nominal protection coefficient (NPC), effective protection coefficient (EPC), profitability coefficient (PC), net transfer (NT) and subsidy ratio to broiler chicken marketer (SRP) were major protection coefficients obtained. The Nominal Protection Coefficient (the ratio that indicates the impact of policy, and of any market failures not corrected by efficient policy, that causes a divergence between the private and social prices for output) was 0.93 for an average broiler chicken marketer. The ratio indicates that an average broiler chicken marketer did not benefit from current government policies and received no subsidy, in any form at all. This result of NPC that is less than 1 implied that an average broiler chicken marketer was taxed by government rather than being supported with any form of incentive.

The result indicates that NPCI, the ratio that shows the effect of policy (and of any market failures not corrected by efficient policy) that causes a divergence between the private and social prices of input, was 0.95 for an average broiler chicken marketer. This coefficient indicates that an average broiler chicken marketer marginally benefit from current government policies affecting input being purchased for marketing activities. The result further indicates that NPCO, the ratio that shows the effect of policy (and of any market failures not corrected by efficient policy) that causes a divergence between the private and social prices for output was 0.93 for an average broiler chicken marketer. This NPCO coefficient is against NPCI but is in line with the result of NPC; an indication that an average broiler chicken marketer did not benefit from current government policies and

received no subsidy for enhancement of profitability and competitiveness of marketing activities.

The result of PAM indicates that Effective Protection Coefficient (EPC) was 0.91 for an average broiler chicken marketer. This EPC is less than 1 and implied that an average marketer is not as protected as an average broiler chicken producers with an EPC of 3.46. In fact, it can be inferred as an indication that current government policies of total ban on importation of broiler chicken products may not be a policy intended at protecting an average broiler chicken marketer and their income generating activities.

The result indicates that profitability coefficients (PC), the ratio of private profits to social profit, of broiler chicken marketer was 0.91. This coefficient, though positive but less than 1, was an indication that the achieved private profit of an average broiler chicken marketer was less than what would have been if current government policy of total ban on importation of broiler chicken products were not implemented.

The result of Policy Analysis Matrix indicates that the Net Transfer (NT) at private prices were ₦495, 173.10, (~~₦191346.00~~) and ~~₦681,069.00~~ respectively for an average broiler chicken producer, processor and marketer respectively. The result is in line with the a priori expectation and is supported by Sarkar (2011) who had maintained that value chain actors who are involved in marketing nodes make better profits than actors involved in production and processing nodes. This result further indicates that there is difference between private and social profits; a confirmation that there exist current distortion policy of total ban on importation of broiler chicken being implemented by the government with impacts on broiler chicken value chain actors. Policy Analysis Matrix results indicate, in a single measure, that the Subsidy Ratio to Producers (SRP) of an average producer, processor and marketer in the broiler chicken value chain were 0.49, -0.18 and -0.05, respectively. This could be interpreted that broiler chicken producers enjoy 49% output related incentive while negative coefficient for an average processor and marketer could be levies being incur in form of taxes.

**Table 5.7: Measures of Policies of Incentives on Broiler Chicken Value Chain**

Indicators	Producers	Processors	Marketers
EPC	3.46	0.76	0.91
PC	6.20	0.74	0.91
Net Transfer (₦)	495,173.10	(681,069.00)	(191,346.00)
SRP	0.49	(0.18)	(0.05)
NPCO	1.37	0.98	0.93
NPCI	0.59	1.72	0.95

## **5.6 Sensitivity Analysis of Policy Analysis Matrix of Broiler Chicken Value Chain**

The sensitivity analysis was carried out to measure the effects of positive or negative shocks on actors. The analysis was done with an increase or decrease of 20%, 40% and 60% in domestic price, world price and exchange rate; on the base values. The different levels of competitiveness were measured for each node.

### **5.6.1 Effects of Change in Domestic Price of Inputs on the Broiler Chicken**

#### **Producers**

Table 5.8 shows the effects of changes in prices of domestic inputs on broiler chicken production node. The sensitivity analysis indicates that the Private Profits (PP) of an average broiler chicken producer were negatively affected with a base Private Profits of ₦590, 361.35 reduced to ₦433, 558.36, ₦276,755.37 and ₦119, 952.38 when the cost price of inputs were increased (private price-shocked) by 20%, 40% and 60% respectively. It implied that an increase in base domestic price of input with based NPC of 1.37), under the current policy and technology, would lead to 26.56%, 36.17% and 56.66% reduction in the level of competitiveness of broiler chicken production. This is a clear signal for agricultural policy makers to consider all factors that could increase local input costs thereby reducing the competitiveness of the production node. The result of PCR of an average broiler chicken producer with a base value of 0.38 increased and tended towards 1 with 0.50, 0.64 and 0.83 when the domestic prices of inputs were increased by 20%, 40% and 60% respectively. The result of the sensitivity analysis in terms of Private Cost Ratios (PCRs) of an average broiler chicken producer remained less than one ( $< 1$ ), an indication that broiler chicken production node still remained competitive despite introduction of input price shocks up to 60%. The result of the sensitivity analysis implied that existing government policy of total ban on importation of broiler chicken is effective. Review of current policies that could trigger increase in input price by as high as 60% will make broiler chicken less competitive for large scale production or commercialization. Other Policy Analysis Matrix indicators indicate reduction in competitiveness of the production node from 3.46 from 3.14; 6.20 to 4.55; 0.49 to 0.34 for EPC, Profitability Coefficient (PC) and Subsidy Ratio to Producers (SRP), respectively.

**Table 5.8: Effects of Change in Domestic Price of Inputs on Broiler Chicken Production**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	590,361.35	433,558.36	276,755.37	119,952.38	747,164.35	903,967.34	1,060,770.3
PCR	0.38	0.50	0.64	0.83	0.28	0.19	0.12
NPC	1.37	1.37	1.37	1.37	1.37	1.37	1.37
EPC	3.46	3.14	2.83	2.52	3.77	4.09	4.40
PC	6.20	4.55	2.91	1.26	7.85	9.50	11.14
SP (₦)	95,188.28	95,188.28	95,188.28	95,188.28	95,188.28	95,188.28	95,188.28
DRC	0.65	0.65	0.65	0.65	0.65	0.65	0.65
SCB	0.90	0.90	0.90	0.90	0.90	0.90	0.90
SRP	0.49	0.34	0.18	0.02	0.65	0.81	0.96

### **5.6.2 Effects of Change in Domestic Price of Inputs on Small Scale Broiler Chicken Producers**

Table 5.9 indicates that private profits of small scale broiler chicken producers with a base Private Profits of ₦424,486.10 decreased to ₦263,235.90, ₦101,985.70 and (₦59,264.50) when the domestic cost price of inputs (private price-shocked) were increased by 20%, 40% and 60% respectively. The result implied that an input-cost price shocked policy, under the current policy of total ban on importation of chicken meat, an average small scale broiler chicken producer with Nominal Protection Coefficient of 1.37 will be adversely impacted by increased of input price by 20%, 40% and 60% that will subsequently reduce by 38%, 61.26% and -58% respectively the profitability and competitiveness of an average small scale broiler chicken producer. This is in line with apriory expectation that any policy that tends to increase input costs will lower the revenue and profitability of the any broiler chicken value chain actor. The result of sensitivity analysis indicate that the Private Cost Ratio (PCRs) of an average small scale broiler chicken producer with a base value of 0.45 tends towards 1 with 0.61, 0.82 and 1.12 when an input-cost price shocked policy of an increase by 20%, 40% and 60% respectively were implemented. Notwithstanding that Private Cost Ratios (PCRs) remain less than one ( $< 1$ ), an indication that broiler chicken small scale production would remain competitive, an input-cost price shocked policy will lead to losses when the input-cost price was increased by 60%. This implied that policy makers need to constantly review the impact of subsidies to broiler chicken value chain actors most especially the impact on small scale broiler chicken producers who may find it difficult to upgrade to medium or large scale broiler chicken producers. Other PAM indicators were in tandem with PP and PCR sensitivity results.

**Table 5.9: Effects of Change in Domestic Price of Inputs on Small Scale Broiler Chicken Production.**

<b>Indicators</b>	<b>Base Value</b>	<b>20%</b>	<b>40%</b>	<b>60%</b>	<b>-20%</b>	<b>-40%</b>	<b>-60%</b>
<b>SCB</b>	0.900378	0.900378	0.900378	0.900378	0.900378	0.900378	0.900378
<b>PCR</b>	0.451125	0.613969	0.827269	1.118776	0.322729	0.218895	0.13319
<b>DRC</b>	0.796375	0.796375	0.796375	0.796375	0.796375	0.796375	0.796375
<b>NPC</b>	1.374422	1.374422	1.374422	1.374422	1.374422	1.374422	1.374422
<b>EPC</b>	1.765308	1.556513	1.347718	1.138923	1.974103	2.182898	2.391693
<b>PC</b>	4.758428	2.950837	1.143245	-0.66435	6.56602	8.373611	10.1812
<b>SRP</b>	0.374422	0.194346	0.01427	-0.16581	0.554497	0.734573	0.914648
<b>SP (₦)</b>	89,207.2	89,207.2	89,207.2	89,207.2	89,207.2	89,207.2	89,207.2
<b>PP (₦)</b>	424,486.1	263,235.9	101,985.7	(59,264.5)	585,736.2	746,986.4	908,236.6
<b>PBCR</b>	1.526494	1.272078	1.090353	0.954059	1.908117	2.544156	3.816234
<b>SBCR</b>	1.110644	1.110644	1.110644	1.110644	1.110644	1.110644	1.110644

### **5.6.3 Effects of Change in Domestic Price of Inputs on Medium Scale Broiler Chicken Producers**

Table 5.10 indicates that the Private Profits (PP) of medium scale broiler chicken producers with a base Private Profits of ₦4,680,130.00 reduced to ₦4,214,021.00, ₦3,747,912.00 and ₦3,281,803.00 with an increase of input prices (price-shocked) by 20%, 40% and 60% respectively. With an increase in domestic price of broiler chicken inputs, base Nominal Protection Coefficient of 1.25 and under current policy of total ban on importation of broiler chicken, an average medium broiler chicken producers will be negatively impacted. It, therefore, implied that any input policy (price-shocked) that tends to increasing input costs by 20%, 40% and 60% will reduce by 9.96%, 11.06% and 12.44% respectively the profitability and competitiveness of an average medium scale producer in the broiler chicken value chain in the study area. The result of sensitivity analysis further revealed that the Private Cost Ratio with a base value of 0.12 for an average medium scale producer moved towards 1 with 0.16, 0.20 and 0.24 with an increase of input-cost (price shocked) by 20%, 40% and 60% respectively. Though Private Cost Ratios (PCRs) remains  $< 1$ , an indication that medium scale broiler chicken production node remained competitive. This implied that policy makers need to constantly review the impact of policy in form of subsidies to broiler chicken value chain actors most especially the impact on medium scale broiler chicken producers who may find it difficult to upgrade to large scale broiler chicken producers. Other PAM indicators were in tandem with result of sensitivity on PP and PCR coefficients.



**Table 5.10: Effects of Change in Domestic Price of Inputs on Medium Scale Broiler Chicken Production**

<b>Indicators</b>	<b>Base</b>	<b>20%</b>	<b>40%</b>	<b>60%</b>	<b>-20%</b>	<b>-40%</b>	<b>-60%</b>
	<b>Value</b>						
<b>SCB</b>	0.417666	0.417666	0.417666	0.417666	0.417666	0.417666	0.417666
<b>PCR</b>	0.124303	0.159083	0.198818	0.244648	0.093606	0.066312	0.041886
<b>DRC</b>	0.169745	0.169745	0.169745	0.169745	0.169745	0.169745	0.169745
<b>NPC</b>	1.25641	1.25641	1.25641	1.25641	1.25641	1.25641	1.25641
<b>EPC</b>	1.365574	1.280426	1.195279	1.110132	1.450721	1.535868	1.621016
<b>PC</b>	1.440315	1.296869	1.153424	1.009978	1.58376	1.727206	1.870651
<b>SRP</b>	0.25641	0.172877	0.089344	0.005811	0.339943	0.423477	0.50701
<b>SP (₦)</b>	3,249,380	3,249,380	3,249,380	3,249,380	3,249,380	3,249,380	3,249,380
<b>PP (₦)</b>	4,680,130	4,214,021	3,747,912	3,281,803	5,146,239	5,612,348	6,078,457
<b>PBCR</b>	3.00817	2.506808	2.148693	1.880106	3.760213	5.013617	7.520425
<b>SBCR</b>	2.394258	2.394258	2.394258	2.394258	2.394258	2.394258	2.394258

#### **5.6.4 Effects of Change in Domestic Price of Inputs of Broiler Chicken Processors**

Table 5.11 summarises the effects of change in domestic price of inputs on broiler chicken processing node. The result indicates that the Private Profits (PP) of an average broiler chicken processor were negatively affected with a base Private Profits of ₦1,985,199.82 reduced to ₦1,656,182.90, ₦1,327,165.90 and ₦998,149.01 when the cost price of inputs were increased (private price-shocked) by 20%, 40% and 60% respectively. The result implied that an increase by 20%, 40% and 60% in base domestic price of input, under the current policy and technology, led to 16.57%, 19.87% and 24.79% decline respectively in profitability and competitiveness of the broiler chicken processing in the study area. The result of Private Cost Ratio (PCR) indicates that an average broiler chicken processor with a base PCR of 0.10 increased to 0.14, 0.19 and 0.26 when the cost price of inputs were increased (private price-shocked) by 20%, 40% and 60% respectively. Private Cost Ratios (PCRs) remains  $< 1$ , an indications that competitiveness of broiler chicken processing decreased but the broiler chicken processor continued to add value and the node remained privately profitable in the study area; even with increase in the prices of inputs as high as 60%.

**Table 5.11: Effects of Change in Domestic Price of Inputs on Broiler Chicken Processing**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	1,985,199.82	1,656,182.90	1,327,165.90	998,149.01	2,314,216.80	2,643,233.70	2,972,250.60
PCR	0.10	0.14	0.19	0.26	0.07	0.05	0.03
NPC	0.98	0.98	0.98	0.98	0.98	0.98	0.98
EPC	0.76	0.66	0.57	0.47	0.86	0.96	1.06
PC	0.74	0.62	0.50	0.37	0.87	0.99	1.11
SP (₦)	2,666,268.50	2,666,268.50	2,666,268.50	2,666,268.50	2,666,268.50	2,666,268.50	2,666,268.50
DRC	0.08	0.08	0.08	0.08	0.08	0.08	0.08
SCB	0.28	0.28	0.28	0.28	0.28	0.28	0.28
SRP	-0.18	-0.27	-0.36	-0.45	-0.09	-0.01	0.08

### **5.6.5 Effects of Change in Domestic Price of Inputs of Broiler Chicken Marketers**

Table 5.12 shows the effects of change in domestic price of inputs on the marketing node and indicates that Private Profit of an average broiler chicken marketer with a base Private Profits of ₦2,042,472.00 decreased to ₦1,687,456.00, ₦1,332,440.41 and ₦977,424.64 when the domestic cost price of inputs increased (private price-shocked) by 20%, 40% and 60% respectively. With an input-cost price shocked policy, under the current policy of total ban on importation of chicken meat, an average broiler chicken marketer with Nominal Protection Coefficient of 0.93 will be adversely impacted with 17.38%, 21.04% and 26.64% decrease in profitability and competitiveness of the broiler chicken marketing node. This is in line with a priory expectation that any policy that tends to increase input costs will not only lower the revenue but negatively impact the profitability of an average actor participating in the marketing node of the broiler chicken value chain.

The result of sensitivity analysis indicate that the Private Cost Ratio (PCRs) of an average small scale broiler chicken marketer with a base value of 0.02 tends towards 1 with 0.03, 0.04 and 0.06 when the domestic cost price of inputs (private price-shocked) was increased by 20%, 40% and 60% respectively. Notwithstanding that Private Cost Ratios (PCRs) remain less than one ( $< 1$ ), an indication that broiler chicken marketing node remained competitive with an input-cost (private price-shocked) policy as high as by 60%. This implied that policy makers need to constantly review the impact of subsidies to broiler chicken value chain actors most especially the impact on broiler chicken marketer who may find it difficult to upgrade to large scale broiler chicken wholesalers. Other PAM indicators were in tandem with PP and PCR sensitivity results.

The result of sensitivity analysis indicates that Effective Protection Coefficient (EPC) reduced from the based value of 0.91 to 0.76, 0.60, and 0.50 when an input-cost price shocked policy of an increase by 20%, 40% and 60% respectively were implemented. This implied that when the domestic price of inputs of broiler chicken marketer was increased, the private profit of the marketers were negatively affected making broiler chicken marketing less privately profitable or competitive. The EPC coefficient of less than 1 is an indication that broiler marketing could withstand input shocks and remains competitive based on the current government policy of total ban on importation of broiler chicken in Nigeria.

**Table 5.12: Effects of Change in Domestic Price of Inputs on Broiler Chicken Marketing**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦) *	2,042	1,488	1,332	977	2,398	2,753	3,108
PCR	0.02	0.02	0.04	0.06	0.01	0.01	0.00
NPC	0.93	0.93	0.93	0.93	0.93	0.93	0.93
EPC	0.91	0.76	0.60	0.50	1.06	1.21	1.37
PC	0.91	0.76	0.60	0.44	1.07	1.23	1.40
SP (₦)*	2,234	2,234	2,234	2,234	2,234	2,234	2,234
SCB	0.50	0.50	0.50	0.50	0.50	0.50	0.50
SRP	-0.05	-0.13	-0.22	-0.30	0.04	0.13	0.21

**\*PP & SP in N'000**

### **5.6.6 Effects of Change in World Price of Inputs on Broiler Chicken Value Chain Producers**

The effects of a change in the world price of inputs on the production node are shown in Table 5.13. The result indicates that an increase in the world price of inputs by 20%, 40% and 60% resulted in decrease in the Social Profitability (SP) of broiler chicken production from the base value of ₦95,188.28 to ₦86,158.66, (~~₦267,505.61~~) and (~~₦448,852.55~~) respectively. It implied that an increase in base domestic price of input with based NPC of 1.37), under the current policy and technology, led to 9.49%, 181.03% and 371.54% reduction in the level of competitiveness at social price of broiler chicken production. A decrease in the world price of inputs, on the other hand, by 20%, 40% and 60% resulted in an increase in the Social Profitability (SP) of broiler chicken production from the base value of ₦95,188.28 to ₦276,535.22, ₦457,882.17 and ₦639,229.11 respectively. The result of sensitivity analysis indicates that any increase in the world price of inputs above 20% will make chicken meat production to be socially non-profitable due to inability of an average local broiler chicken to purchase and efficiently use scarce resource in production. A reduction in the world price of inputs of the production node by 20%, 40% and 60% changed the DRC from the base value of 0.65 to 0.34, 0.19 and 0.10 respectively. An increase in the world price of inputs of the broiler chicken production node by 20%, 40% and 60% changed DRC of the producer from 0.65 to 1.67, 13.87 and 1.74 respectively. All DRC values that were less than one (1) indicates that the cost of domestic resources employed in production were lower than the value addition; an indications of the efficient use of domestic resources by the producers. On the other hand, broiler chicken production was not socially profitable when DRC was greater than one (1). The SCB ratio of 1.45, when input price was increase by 60%, is an indication that Nigeria could only improve her comparative advantage in broiler chicken production by massive investment into production of feed inputs like soybean and maize such that price of inputs decreased in addition to subsidy policies that will guarantee access to cheaper credit.

**Table 5.13: Effects of Change in World Price of Inputs on Broiler Chicken Producers**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	590,361.35	590,361.35	590,361.35	590,361.35	590,361.35	590,361.35	590,361.35
PCR	0.38	0.38	0.38	0.38	0.38	0.38	0.38
NPC	1.37	1.37	1.37	1.37	1.37	1.37	1.37
EPC	3.50	7.40	-52.60	-5.80	2.26	1.67	1.33
PC	6.20	-6.85	-2.21	-1.32	2.13	1.29	0.92
SP (₦)	95,188.28	86,158.66	(267,505.61)	(448,852.55)	276,535.22	457,882.17	639,229.11
DRC	0.65	1.67	-13.87	-1.74	0.34	0.19	0.10
SCB	0.90	1.09	1.27	1.45	0.72	0.54	0.36
SRP	0.49	0.68	0.86	1.04	0.31	0.13	-0.05

### 5.6.7 Effects of Change in World Price of Inputs on Small Scale Producers

The sensitivity analysis result, as shown in Table 5.14, reveals that Social Profits of small scale broiler chicken producers with a base Social Profits of ₦89,207.20 resulted to loss of (₦72,043.00), (₦233,293.00) and (₦394,543.00) when the world price of inputs (social price-shocked) were increased by 20%, 40% and 60% respectively. The result implied that with an input price shocked policy, under the current policy of total ban on importation of chicken meat, an average small scale broiler chicken producer with Nominal Protection Coefficient of 1.37 severely impacted by increase in world price of input by 20%, 40% and 60% and subsequently led to 80.76%, 161.52% and 342.28% losses respectively with an average small scale broiler chicken producer having no comparative advantage. In the opposite direction, a drop in the world price of inputs by 20%, 40% and 60% positively impacted the social profitability of an average small scale broiler chicken producer. The base social profit value of ₦89, 207.20 of an average small broiler chicken producer increased to ₦250, 457.40, ₦411, 707.60 and ₦572, 957.80 equivalent of 80.76%, 161.52% and 342.28% respectively with an average small scale broiler chicken producers having increased comparative advantage. A reduction or drop in the world price of broiler inputs by 20%, 40% and 60% changes the Domestic Resource Cost (DRC) of small scale broiler production from 0.80 to 0.53, 0.34 and 0.20 respectively. An increase in the price of input by 20%, 40% and 60% changes the DRC from 0.80 to 1.21, 1.91 and 3.41 respectively. It shows small scale production becomes socially not-profitable with DRCs that are greater than 1 while all DRC values that are less than 1 indicates that the value of domestic resources used in production is lower than the value being added; an efficient use of domestic resources.

In conclusion, under the current government policy and existing technology, an average small scale broiler chicken producer in southwestern Nigeria has comparative advantage in production based on SCB of 0.90. The result is similar to that of Elsedig *et al.* (2015) that reported SCB 0.99 for an average small scale broiler chicken producer. This coefficient (indicating a level of comparative advantage) could be improved upon if trade policy such as guaranteed access to subsidized tradable inputs by an average small scale broiler chicken producer could be designed and implemented.



**Table 5.14: Effects of Change in World Price of Inputs on Small Scale Producers.**

<b>Indicators</b>	<b>Base</b>	<b>20%</b>	<b>40%</b>	<b>60%</b>	<b>-20%</b>	<b>-40%</b>	<b>-60%</b>
	<b>Value</b>						
<b>SCB</b>	0.900378	1.080454	1.260529	1.440605	0.720303	0.540227	0.360151
<b>PCR</b>	0.451125	0.451125	0.451125	0.451125	0.451125	0.451125	0.451125
<b>DRC</b>	0.796375	1.207842	1.914331	3.410464	0.527054	0.337069	0.195864
<b>NPCO</b>	1.374422	1.374422	1.374422	1.374422	1.374422	1.374422	1.374422
<b>NPCI</b>	1	0.833333	0.714286	0.625	1.25	1.666667	2.5
<b>EPC</b>	1.765308	2.231164	3.03104	4.724939	1.460387	1.245288	1.085419
<b>PC</b>	4.758428	-5.89212	-1.81954	-1.07589	1.694843	1.031038	0.740868
<b>SRP</b>	0.374422	0.554497	0.734573	0.914648	0.194346	0.01427	-0.16581
<b>SP (₦)</b>	89,207.2	-72,043	-233,293	-394,543	250,457.4	411,707.6	572,957.8
<b>PP (₦)</b>	424,486.1	424,486.1	424,486.1	424,486.1	424,486.1	424,486.1	424,486.1
<b>PBCR</b>	1.526494	1.526494	1.526494	1.526494	1.526494	1.526494	1.526494
<b>SBCR</b>	1.110644	0.925537	0.793317	0.694153	1.388306	1.851074	2.776611

### **5.6.8 Effects of Change in World Price of Inputs on Medium Scale Producers**

The sensitivity analysis result, as shown in Table 5.15, reveals that the Social Profits (SP) of medium scale broiler chicken producers with a base Social Profit value of ₦3,249,380.00 were reduced to ₦2,783,271.00, ₦2,317,162.00 and ₦1,851,053.00 respectively when increase in the world price of input (social price-shocked) policy by 20%, 40% and 60% respectively. With an increase in the world price of broiler chicken inputs, base Nominal Protection Coefficient of 1.25 and under current policy of total ban on importation of broiler chicken, an average medium broiler chicken producer will be negatively impacted. It therefore implied that any policy or shock that tends to increase the world price of input by 20%, 40% and 60% will reduce by 14.34%, 28.69% and 43.03% respectively the efficiency and comparative advantage of an average medium scale broiler chicken producer in the broiler chicken value chain. In the opposite direction, a drop or reduction in the price of inputs at world market by 20%, 40% and 60% changed social profit from ₦3,249,380.00 to ₦3,715,489.00, ₦4,181,598.00 and ₦4,647,707.00 respectively. It therefore implied that any policy or shock that tends to decrease the world price of input by 20%, 40% and 60% will increase by 14.35%, 28.68% and 43.03% respectively the efficiency and comparative advantage of an average medium scale broiler chicken producer in the broiler chicken value chain.

This result indicates that any increase in the world price of inputs above 60% would make medium scale broiler chicken production to be socially inefficient and not profitable. A drop or reduction in the price of inputs in the world market by 20%, 40% and 60%, however, changed the Domestic Resource Cost (DRC) of medium scale producers from 0.17 to 0.12, 0.09 and 0.05 respectively. An increase in the price of input at the world market by 20%, 40% and 60% changed the DRC from 0.17 to 0.22, 0.29 and 0.36 respectively. This is an indication of efficient use of domestic resources by an average medium scale producer.

In conclusion, under the current government policy and existing technology, an average medium scale broiler chicken producer in southwestern Nigeria has comparative advantage in production based on DRCs that were less than 1 when price-shocked. This coefficient (indicating a level of comparative advantage) could be improved upon if trade

policy such as guaranteed access to subsidized tradable inputs by an average small scale broiler chicken producer could designed and implemented.

**Table 5.15: Effects of Change in World Price of Inputs on Medium Scale Producers**

<b>Indicators</b>	<b>Base</b>	<b>20%5</b>	<b>40%</b>	<b>60%</b>	<b>-20%</b>	<b>-40%</b>	<b>-60%</b>
	<b>Value</b>						
<b>SCB</b>	0.417666	0.501199	0.584732	0.668266	0.334133	0.2506	0.167066
<b>PCR</b>	0.124303	0.124303	0.124303	0.124303	0.124303	0.124303	0.124303
<b>DRC</b>	0.169745	0.222652	0.286419	0.364769	0.125141	0.087027	0.054083
<b>NPCO</b>	1.25641	1.25641	1.25641	1.25641	1.25641	1.25641	1.25641
<b>NPCI</b>	1	0.833333	0.714286	0.625	1.25	1.666667	2.5
<b>EPC</b>	1.365574	1.49267	1.645854	1.834073	1.258422	1.166863	1.087723
<b>PC</b>	1.440315	1.681521	2.019768	2.52836	1.259627	1.11922	1.006976
<b>SRP</b>	0.25641	0.339943	0.423477	0.50701	0.172877	0.089344	0.005811
<b>SP (₦)</b>	3,249,380	2,783,271	2,317,162	1,851,053	3,715,489	4,181,598	4,647,707
<b>PP (₦)</b>	4,680,130	4,680,130	4,680,130	4,680,130	4,680,130	4,680,130	4,680,130
<b>PBCR</b>	3.00817	3.00817	3.00817	3.00817	3.00817	3.00817	3.00817
<b>SBCR</b>	2.394258	1.995215	1.710184	1.496411	2.992822	3.99043	5.985645

### 5.6.9 Effects of Change in World Price of Inputs on Broiler Chicken Processors

The sensitivity analysis result in Table 5.16 revealed that the Social Profits (SP) of broiler chicken processors with a base Social Profit value of ₦2,666,268 decreased to ₦2,456,144, ₦2,246,020 and ₦2,035,896 respectively with an increase in the world price of input (price-shocked) policy by 20%, 40% and 60%. The Effective Protection Coefficient (EPC) increased from 0.78 to 0.81, 0.86 and 0.92 with an increase in the world price of input (price-shocked) policy by 20%, 40% and 60% respectively. However, all EPCs remains less than one ( $< 1$ ) indicating existence of market failure as a result of distorting price policy on world price of input. The result of Social Profitability (SP) indicates that as the world price of input increases (price-shocked), the activities of the processing node remained profitable but less competitive.

With the base effective protection coefficient of 0.76 and under the current policy of total ban on importation of broiler chicken, an average broiler chicken processor will be negatively impacted if world price of tradable input is price-shocked. It therefore implied that any policy (price shocked) that tends to increase the world price of input by 20%, 40% and 60% will reduce by 7.9%, 15.76% and 23.64% respectively the efficiency and comparative advantage of an average broiler chicken processor in the broiler chicken value chain. In the opposite direction, a reduction in the price of inputs by 20%, 40% and 60% at world market changed the social profit from ₦2,666,268 to ₦2,876,392, ₦3,086,516 and ₦3,296,640 respectively. The result of Social Profitability (SP), indicates that as the world price of input increases (price-shocked), the activities of the processing node would remain profitable but less socially competitive.

In conclusion, under the current government policy and existing technology, an average broiler chicken processor in southwestern Nigeria is socially profitable with comparative advantage based on DRCs that are less than 1 when price-shocked. This coefficient (indicating a level of comparative advantage) could be improved upon if trade policy such as reduced import tariff on processing equipment being used by an average broiler chicken processor.

**Table 5.16: Effects of Change in World Price of Inputs on Broiler Chicken Processors**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	1,985,199	1,985,199	1,985,199	1,985,199	1,985,199	1,985,199	1,985,,199
PCR	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NPC	0.98	0.98	0.98	0.98	0.98	0.98	0.98
EPC	0.76	0.81	0.86	0.92	0.72	0.68	0.65
PC	0.74	0.81	0.88	0.98	0.69	0.64	0.60
SP (₦)	2,666,268	2,456,144	2,246,020	2,035,896	2,876,392	3,086,516	3,296,640
DRC	0.08	0.10	0.12	0.15	0.06	0.04	0.03
SCB	0.28	0.34	0.40	0.45	0.23	0.17	0.11
SRP	-0.18	-0.13	-0.07	-0.01	-0.24	-0.30	-0.35

#### **5.6.10 Effects of Change in World Price of Inputs on Broiler Chicken Marketers**

Sensitivity analysis result presented in Table 5.17 showed that Social Profits (SP) of an average broiler chicken marketer with a base Social Profit value of ₦2,233,818 were reduced to ₦1,856,639, ₦1,479,459 and ₦1,102,280 when an increase in world price of input policy of 20%, 40% and 60% respectively were introduced. On the other hand Social Profits (SP) of an average broiler chicken marketer with the same base Social Profit value of value of ₦2,233,818 increased to ₦2,610,996, ₦2,988,176 and ₦3,365,355 when world price of input were decreased by 20%, 40% and 60% respectively. The result implied that whenever the world price of inputs were increased, there would be a reduction in social profit of value chain marketer and that a decrease in world price of inputs would lead to higher level of social profit of an average broiler chicken marketer .In addition, the result showed that the Domestic Resource Cost (DRCs) remain less than one ( $<1$ ) when world price of input were varies at 20%, 40% and 60%. This result implied that Nigeria currently have comparative advantage in broiler chicken marketing. The Social Cost Benefit (SCB) in addition shows that an increase or decrease in price of input at the world market by 20%, 40% and 60%, SCB remain less than one ( $< 1$ ).

The result of sensitivity analysis indicates that with an upswing in the price of input at world market by 20%, 40% and 60% the coefficient of Effective Protection Coefficient (EPC) increased from the based coefficient of 0.91 to 1.08, 1.34 and 1.75 respectively. However, reduction in the price of input at world market by 20%, 40% and 60% led to lower ratio of 0.78, 0.69 and 0.61 of EPC respectively. The coefficient that is lower than one ( $<1$ ) is an indication of socially profitable with comparative advantage activity by an average marketer or an efficient use of resources in policy analysis matrix (PAM). EPC coefficient that is greater than one ( $>1$ ) is an indication of lower level of social profitability and inefficient use of resources. This result of this study implied that, under the current policy of total ban in importation of broiler chicken, increase in world price of tradable inputs would have negative impact on the level of comparative advantage of the marketing node of the broiler chicken value chain in the study area.

**Table 5.17: Effects of Change in World Price of Inputs on Broiler Chicken Marketers**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	2,042,471.95	2,042,471.95	2,042,471.95	2,042,471.95	2,042,471.95	2,042,471.95	2,042,471.95
NPC	0.93	0.93	0.93	0.93	0.93	0.93	0.93
EPC	0.91	1.08	1.34	1.75	0.78	0.69	0.61
PC	0.91	1.10	1.38	1.85	0.78	0.68	0.61
SP (₦)	2,233,818	1,856,639	1,479,459	1,102,280	2,610,996	2,988,176	3,365,355
SCB	0.46	0.55	0.64	0.73	0.37	0.27	0.18
SRP	-0.05	0.05	0.14	0.23	-0.14	-0.23	-0.32



### **5.6.11 Effects of Change in Exchange Rate on Broiler Chicken Producers**

The result of Sensitivity Analysis on effects of change in exchange rate is shown in Table 5.18. With a base profit at private price value of ₦590,361.35, Private Cost Ratio was 0.38, Nominal Protection Coefficient was 1.37; Effective Protection Coefficient was 0.346; Profitability Coefficient was 6.20; Social Profit was ₦95,188.28; Domestic Resource Cost was 0.65; Social Cost Benefit was 0.90 while Social Ratio to Producer (SRP) was 0.49.

The Nominal Protection Coefficient (NPC) remains constant (1.37) when exchange rate increases or changes by 20%, 40% and 60%. A rise in exchange rate by 20%, 40% and 60% will negatively impact the real profits at private price hence the competitiveness of the production node will reduce. The reverse is the case when naira appreciate; making Private Profit coefficient to be higher than the base value and broiler chicken production node becoming more profitable and competitive. The result of analysis further indicates that the Private Cost Ratios (PCR) remained less than one ( $< 1$ ) an indication that broiler chicken production node remained competitive when exchange rate increases or changes by 20%, 40% and 60%. However, Effective Protection Coefficient (EPC) was negative when exchange rate increase by 40% and 60%, implying that only favourable exchange rate will have positive effects on broiler chicken production node. Exchange rate policy, most especially an increase in exchange rate, is aimed at import restriction primarily to protect domestic broiler chicken producers. This could guarantee increased intensity of participation or the quantity of broiler chicken output that are being handled by producers.

While reduction or appreciation in exchange rate could lead to reduction in the cost of importation most especially tradable inputs for producers, it could also create massive opportunity for inflows of broiler chicken through smuggling; if the border reconnaissance is poor. With an increase or depreciation in the exchange rate by 20%, 40% and 60%, Domestic Resource Cost (DRC) coefficient of broiler chicken producers increased from 0.65 to 1.67, 13.87 and 1.74 respectively. A reduction or appreciation in the exchange rate by 20%, 40% and 60% changed the DRC from 0.65 to 0.34, 0.19 and 0.10 respectively. All the DRCs with values  $< 1$  indicates that the production node are socially profitable. An increase in exchange rate decreases comparative advantage of an

average local producer of broiler chicken because the business becomes socially nonprofitable due to indirect pressure on the foreign reserve. The result of Domestic Resource Cost (DRC) indicates that only reduction of exchange rate favors Nigeria's comparative advantage in broiler production.

**Table 5.18: Effects of Change in Exchange Rate on Broiler Chicken Producers**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	590,361	433,558	276,755	119,952	747,164	903,967	1,060,770
PCR	0.38	0.50	0.64	0.83	0.28	0.19	0.12
NPC	1.37	1.37	1.37	1.37	1.37	1.37	1.37
EPC	3.46	6.73	-43.04	-4.21	2.46	1.98	1.69
PC	6.20	-5.03	-1.03	-0.27	2.70	1.97	1.66
SP (₦)	95188	(86,158.66)	(267,505.61)	(448,852.55)	276,535	457,882	639,229
DRC	0.65	1.67	13.87	-1.74	0.34	0.19	0.10
SCB	0.90	1.09	1.27	1.45	0.72	0.54	0.36
SRP	0.49	0.55	0.61	0.67	0.43	0.37	0.31

### **5.6.12 Effects of Change in Exchange Rate on Small Scale Broiler Chicken Producers**

The Sensitivity Analysis result as shown in Table 5.19 is on the effect of change in exchange rate on small scale producers. An average small-scale producer with base Social Profit (SP) of ₦95, 188 was negatively affected by 20%, 40% and 60% increase in exchange rate with ₦72,043, ₦233,293 and ₦394,543 loses respectively. However, an average small scale producer with base Social Profitability (SP) of ₦95, 188 was positively affected by 20%, 40% and 60% decrease in exchange rate which led to increase in SP of ₦250,457.40, ₦411,707.60 and ₦572,957.80 respectively. The result of sensitivity analysis indicates that with a rise or depreciation in the exchange rate by 20%, 40% and 60%, the Domestic Resource Cost (DRC) of small broiler producers changed from 0.80 to 1.21, 1.91 and 3.41 respectively. In contrast, a reduction or appreciation in the exchange rate by 20%, 40% and 60% changed DRC from 0.80 to 0.53, 0.34 and 0.20 respectively. The implication of DRCs with coefficients of less than one ( $< 1$ ) is that an average small scale broiler chicken producers efficiently use scarce resources. This also implied that small scale broiler chicken production node is socially profitable and foreign earning is indirectly being preserved. However, increase in exchange rate led to DRCs with coefficients of greater than one ( $> 1$ ) which implied that an average small scale broiler chicken producers inefficiently use scarce resources. In this case, small scale broiler chicken production node is not profitable at social price and an indication of foreign reserve indirectly being depleted. Other PAM indicators support the inference that only reduction of exchange rate favours small scale producers. For example, Social Cost Benefit (SCB) coefficients were greater than one ( $>1$ ) when exchange rate were increase while SCB coefficients were less than one ( $<1$ ) when exchange rate were decreased. Private Profit (PP) value of ₦424, 486.10, Private Cost Ratio of 0.45, Nominal Protection Coefficient (NPC) was 1.37, Effective Protection Coefficient was 1.77, Profitability Coefficient was 4.75, Social Profit was ₦89207.20, DRC was 0.80, Social Cost Benefit was 0.90 and Social Ratio to small Producer was 0.37. The Nominal Protection Coefficient (NPC) remains constant (1.37) when exchange rate on tradable and non-tradable inputs of broiler production changes by 20%, 40% and 60%. The Private Profits (PP), shows that depreciation or increase in exchange rate will reduce private profits as

well as the competitiveness of the small broiler production node of the value chain; the reverse is the case when the exchange rate is reduced making the private profitability ratio to be higher and broiler production more competitive. The Private Cost Ratios (PCR) remains  $< 1$  at the changes indicating that this node remains competitive. The Effective Protection Coefficient (EPC) was positive throughout implying that such changes have positive effects. The Profitability Coefficient (PC) was negative as exchange rate increases while reduction in exchange rate indicates subsidy is in favor of the node.

**Table 5.19: Effects of Change in Exchange Rate on Small Scale Broiler Chicken Producers**

<b>Indicators</b>	<b>Base</b>						
	<b>Value</b>	<b>20%</b>	<b>40%</b>	<b>60%</b>	<b>-20%</b>	<b>-40%</b>	<b>-60%</b>
<b>SCB</b>	0.900378	1.080454	1.260529	1.440605	0.720303	0.540227	0.360151
<b>PCR</b>	0.451125	0.613969	0.827269	1.118776	0.322729	0.218895	0.13319
<b>DRC</b>	0.796375	1.207842	1.914331	3.410464	0.527054	0.337069	0.195864
<b>NPC</b>	1.374422	1.374422	1.374422	1.374422	1.374422	1.374422	1.374422
<b>EPC</b>	1.765308	1.967269	2.314037	3.048387	1.633117	1.539866	1.470558
<b>PC</b>	4.758428	-3.65387	-0.43716	0.15021	2.338666	1.814362	1.585172
<b>SRP</b>	0.374422	0.374422	0.374422	0.374422	0.374422	0.374422	0.374422
<b>SP (₦)</b>	89,207.2	-72,043	-233,293	-394,543	250,457.4	411,707.6	572,957.8
<b>PP (₦)</b>	424,486.1	263,235.9	101,985.7	-59,264.5	585,736.2	746,986.4	908,236.6
<b>PBCR</b>	1.526494	1.272078	1.090353	0.954059	1.908117	2.544156	3.816234
<b>SBCR</b>	1.110644	0.925537	0.793317	0.694153	1.388306	1.851074	2.776611

### **5.6.13 Effects of Change in Exchange Rate on Medium Scale Broiler Chicken Producers**

The sensitivity analysis result on medium scale producers is shown in Table 5.20. The result indicates that an average medium scale producer with base Social Profitability (SP) of ₦3,249,380 was negatively affected by 20%, 40% and 60% increase in exchange rate which led to ₦2,783,271, ₦2,317,162 and ₦1,851,053 loses respectively. On the other hand, an average medium scale producer with base Social Profitability (SP) of ₦3,249,380 was positively affected by 20%, 40% and 60% decrease in exchange rate which led to increase in SP of ₦3,715,489, ₦4,181,598 and ₦4,647,707 respectively.

The result of sensitivity analysis indicates that with 20%, 40% and 60% increase in the exchange rate, the Domestic Resource Cost (DRC) of medium scale broiler chicken producers changed from 0.17 to 0.22, 0.29 and 0.36 respectively. On the contrary, with a decrease in the exchange rate by 20%, 40% and 60% DRC value of 0.17 changed to 0.13, 0.09 and 0.05 respectively. The implication of DRCs with coefficients of less than one (< 1) is that an average medium scale broiler chicken producers efficiently use scarce resources. The result clearly established the effectiveness of the current policy of total ban of importation of broiler chicken because medium scale broiler chicken production node was socially profitable with foreign earning indirectly preserved with either increase or decrease in exchange rate.

The result of Sensitivity Analysis of medium scale production is shown in Table 5.16 with a base Private Profit (PP) value of ₦4680130.00, Private Cost Ratio of 0.12, Nominal Protection Coefficient of 1.25, Effective Protection Coefficient of 1.36, Profitability Coefficient of 1.44, Social Profit of ₦3249380, Domestic Resource Cost of 0.17, Social Cost Benefit of 0.90 and Social Ratio to Producer of 0.37. The Nominal Protection Coefficient (NPC) remains constant (1.25) when exchange rate on broiler chicken production changed by 20%, 40% and 60%. The Private Profits (PP), indicates that an increase in exchange rate will reduce private profits as well as the competitiveness of medium scale production node of the broiler chicken value chain. The reverse is the case when the exchange rate were reduced making the private profitability ratio to be higher and medium scale broiler chicken production became more competitive. The Private Cost

Ratios (PCRs) were less than one ( $< 1$ ) indicating that medium scale broiler chicken production node remained competitive. The Effective Protection Coefficients (EPCs) were positive when the exchange rate were reduced implying that such changes have positive effects on the competitiveness and comparative advantage of medium scale chicken producers. The Profitability Coefficients (PCs) were negative when exchange rate were increased while reduction in exchange rate led to positive Profitability Coefficients (PCs).



**Table 5.20: Effects of Change in Exchange Rate on Medium Scale Broiler Chicken Producers**

Indicators	Base						
	Value	20%	40%	60%	-20%	-40%	-60%
<b>SCB</b>	0.417666	0.501199	0.584732	0.668266	0.334133	0.2506	0.167066
<b>PCR</b>	0.124303	0.159083	0.198818	0.244648	0.093606	0.066312	0.041886
<b>DRC</b>	0.169745	0.222652	0.286419	0.364769	0.125141	0.087027	0.054083
<b>EPC</b>	1.365574	1.399598	1.440606	1.490994	1.336888	1.312377	1.291191
<b>PC</b>	1.440315	1.514053	1.617458	1.772938	1.385077	1.342154	1.30784
<b>SP (₦)</b>	3,249,380	2,783,271	2,317,162	1,851,053	3,715,489	4,181,598	4,647,707
<b>PP (₦)</b>	4,680,130	4,214,021	3,747,912	3,281,803	5,146,239	5,612,348	6,078,457
<b>PBCR</b>	3.00817	2.506808	2.148693	1.880106	3.760213	5.013617	7.520425
<b>SBCR</b>	2.394258	1.995215	1.710184	1.496411	2.992822	3.99043	5.985645

#### **5.6.14 Effects of Change in Exchange Rate on Broiler Chicken Processors**

The result of Sensitivity Analysis with focus on processing node is in Table 5.21 The result indicates that an average processor with base Social Profitability (SP) of ₦2,666,268.5 was negatively affected by 20%, 40% and 60% increase in exchange rate which decreased to ₦2,456,144.5, ₦2,246,020.6 and ₦2,035,896.7 respectively. However, an average processor with base Social Profitability (SP) of ₦3,249,380 was positively affected by 20%, 40% and 60% decrease in exchange rate which led to increase in SP of ₦2,876,392.4, ₦3,086,516.3 and ₦3,296,640.2 respectively. The result of sensitivity analysis further indicates that with an increase in the exchange rate by 20%, 40% and 60%, the DRC of broiler chicken processor changed from 0.08 to 0.10, 0.12 and 0.15 respectively. Conversely, a decrease in the exchange rate by 20%, 40% and 60% changed DRC of 0.08 to 0.06, 0.04 and 0.03 respectively. The implication of DRCs with coefficients of less than one ( $< 1$ ) is that an average broiler chicken processor efficiently use scarce resources. The result of Domestic Resource Cost (DRC) clearly established the effectiveness of the current policy of total ban of importation of broiler chicken because broiler chicken processing node was socially profitable with foreign earning indirectly preserved with either increase or decrease in exchange rate.

The result indicates that an average broiler chicken processor with base Private Profitability (PP) of ₦1,985,199.80 was negatively affected by 20%, 40% and 60% increase in exchange rate which decreased to ₦1,656,182.9, ₦1,327,165.9 and ₦998,149.01 respectively. On the other hand, an average broiler chicken processor with base Private Profitability (PP) of ₦1,985,199.80 was positively affected by 20%, 40% and 60% decrease in exchange rate which led to increase in PP of ₦2,314,216.80, ₦2,643,233.70 and ₦2,972,250.60 respectively. The result implied that an increase in exchange rate reduced the private profits of an average broiler chicken processor while the private profits increased as the exchange rate is reduced by 20%, 40% and 60%.. The Private Cost Ratios (PCR) remained less than one ( $< 1$ ) an indication that processing node would remain competitive. The Effective Protection Coefficient (EPC) decreased from 0.76 to 0.70, 0.64 and 0.56 with 20%, 40% and 60% increase in exchange rate, respectively. On the other hands, Effective Protection Coefficient (EPC) increased from 0.76 to 0.82, 0.86 and 0.90 when exchange rate of input decrease by 20%, 40% and 60% respectively but EPC remained less than one ( $< 1$ ).

**Table 5.21: Effects of Change in Exchange Rate on Broiler Chicken Processors**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	1,985,199.8	1,656,182.9	1,327,165.9	998,149.01	2,314,216.8	2,643,233.7	2,972,250.6
PCR	0.10	0.14	0.19	0.26	0.07	0.05	0.03
EPC	0.76	0.70	0.64	0.56	0.82	0.86	0.90
PC	0.74	0.67	0.59	0.49	0.80	0.86	0.90
SP (₦)	2,666,268.5	2,456,144.5	2,246,020.6	2,035,896.7	2,876,392.4	3,086,516.3	3,296,640.2
DRC	0.08	0.10	0.12	0.15	0.06	0.04	0.03
SCB	0.28	0.34	0.40	0.45	0.23	0.17	0.11
SRP	-0.18	-0.22	-0.25	-0.28	-0.15	-0.12	-0.09

### **5.6.15 Effects of Change in Exchange Rate on Broiler Chicken Marketers**

The result of Sensitivity Analysis on change in exchange rate and its effect on marketing node is presented in Table 5.22. The result indicates that an average marketer with base Social Profit (SP) of ₦2,233,817.90 negatively affected by 20%, 40% and 60% due to increase in exchange rate which decreased the base value to ₦1,856,638.90, ₦1,479,459.80 and ₦1,102,280.80 respectively. On the other hand, an average marketer with base Social Profit (SP) of ₦2,233,817.90 positively affected by 20%, 40% and 60% due to decrease in exchange rate had an increase in SP of ₦2,610,996.90, ₦2,988,176.00 and ₦3,365,355.00 respectively.

The result of sensitivity analysis on effects of change in exchange rate on the Domestic Resource Cost (DRCs) ratio further indicates that with a 20%, 40% and 60% increase in the exchange rate, Domestic Resource Cost (DRC) of an average broiler chicken marketer changed from 0.02 marginally to 0.03, 0.05 and 0.07 respectively. However, a reduction or appreciation in the exchange rate by 20%, 40% and 60%, the DRC with a base value of 0.02 changed to 0.02, 0.01 and 0.01 respectively. The implication of DRCs with coefficients of less than one ( $< 1$ ) is that an average broiler chicken marketer efficiently use scarce resources. The result of DRC clearly established the effectiveness of current government policies of total ban on importation of broiler chicken with marketing node found to be socially profitable indicating possibility of foreign earning.

The result indicates that an average broiler chicken marketer with base Private Profit (PP) of ₦2,042,471.90 was negatively affected by 20%, 40% and 60% increase in exchange rate which led to ~~₦1,687,456.20~~, ₦1,332,440.40 and ₦977,424.64 reduction in PP respectively. On the other hand, an average broiler chicken marketer with base Private Profit (PP) of ₦2,042,471.90 was positively affected by 20%, 40% and 60% decrease in exchange rate which increased to ₦2,397,487.70, ₦2,752,503.50 and ₦3,107,519.30 respectively. The result implied that an increase in exchange rate reduced the private profits of an average broiler chicken marketer while the private profits increased as the exchange rates were reduced by 20%, 40% and 60% respectively. The Private Cost Ratios (PCRs) for both increase and decrease in exchange policies remained less than one ( $< 1$ ) an indication that broiler chicken marketing node would remain competitive. Nominal

Protection Coefficient (NPCs) remained constant, the Effective Protection Coefficient (EPC) decreased from 0.91 to 0.90, 0.89 and 0.87 when exchange rate of input increase by 20%, 40% and 60% respectively. On the other hands, Effective Protection Coefficient (EPC) increased marginally from 0.91 to 0.92 and remain constant when exchange rate of input decrease by 20%, 40% and 60% respectively.

**Table 5.22: Effects of Change in Exchange Rate on Broiler Chicken Marketers**

Indicators	Base value	20%	40%	60%	-20%	-40%	-60%
PP (₦)	2,042,471.9	1,687,456.2	1,332,440.4	977,424.64	2,397,487.7	2,752,503.5	3,107,519.3
PCR	0.02	0.02	0.04	0.06	0.01	0.01	0.00
EPC	0.91	0.90	0.89	0.87	0.91	0.92	0.92
PC	0.91	0.91	0.90	0.89	0.92	0.92	0.92
SP (₦)	2,233,817.9	1,856,638.9	1,479,459.8	1,102,280.8	2,610,996.9	2,988,176.0	3,365,355.0
DRC	0.02	0.03	0.05	0.07	0.02	0.01	0.01
SCB	0.46	0.55	0.64	0.73	0.37	0.27	0.18
SRP	-0.05	-0.04	-0.04	-0.03	-0.05	-0.06	-0.06

## **5.7 Constraints to Participation and Intensity of Participation in the Broiler Chicken Value Chain**

Constraints identified by actors as limiting their participation and or intensity of participation in the broiler chicken value chain are presented in Table 5.23. The result indicates that majority (55.1%) of broiler chicken producers identified inadequate electricity supply as a major constraint while fewer broiler chicken processors and marketers with 43.3% and 48.6% respectively, identified electricity supply as a major constraint. This result is in line with the expectation that lack of electricity will have greater impact on the production node where it is required as a major input in raising day old chicks to market size. In addition, broiler chicken farms are generally located in the rural or semi-urban areas while majority of broiler chicken processors and marketers carry out their income generating activities in local markets and urban areas with relatively increased access to electricity (FAO, 2017).

The result of analysis shows that 50%, 43.3% and 53% of broiler chicken producers, processors and marketers respectively identified poor transportation system as major constraints affecting income generating activities of the broiler chicken value chain. The result is in line with the a priori expectation that producers and marketers need good transportation for both input and output movement. The result indicates that poor transportation system affected the broiler chicken marketing node more than broiler chicken production and processing nodes with the broiler chicken processing node being the least affected by poor transportation system in the broiler chicken value chain. This implies that good transportation system is essential for sustainable broiler chicken business in southwestern Nigeria.

The result of the analysis indicates that 49%, 32% and 41% of broiler chicken producers, processors and marketers respectively identified theft or pilfering as a constraints affecting income generating activities of the broiler chicken value chain. The result indicate that theft/pilfering is more rampant with a 49% reported by broiler chicken producers, followed by the marketers (41%) while the broiler chicken processing node was least affected by pilfering in the broiler chicken value chain.

The result indicates that 52.3%, 26.7% and 50.8% of broiler chicken producers, processors and marketers respectively lacked storage facilities in broiler chicken value chain. This result implied that lack of storage facilities severely affected broiler chicken producers and marketers more than the processors. This result is in line with a priori expectation that broiler chicken producers and marketers must have facility to keep live or frozen chicken.

The result indicates that majority of broiler chicken producers (59%) identified land inaccessibility as a constraint affecting income generating activities of broiler chicken value chain. The result however indicates that 13.1% of broiler chicken marketers identified land inaccessibility as a constraint affecting income generating activities of the marketing node while 15% of broiler chicken processors identified land inaccessibility as a constraint affecting income generating activities of the processing node of the broiler chicken value chain.

The result of analysis indicates that 75.6%, 45.0% and 38.8% of broiler chicken producers, processors and marketers respectively identified credit inaccessibility as a constraint limiting income generating activities of the broiler chicken value chain in southwestern Nigeria. The result is in line with a priori expectation that broiler chicken producers will require more of credit facility for the construction of pen, purchased of equipment, feeds, labour for daily activities such as clearing of droppings than broiler chicken processors and marketers. In addition, processors and marketers could control their cost with outsourcing of transportation and effective management of their funding requirements by controlling the number live broiler chicken they stocked and handle.

The result indicates that 46.6%, 11.7% and 18.0% of broiler chicken producers, processors and marketers respectively identified inadequate man power as one of the constraints limiting income generating activities of value chain actors. This result implied that there exist higher shortage of human resources in production node of broiler chicken value chain. This is in line with the a priori expectation that more workers are need for farm operations such as feeding, clearing and cleaning activities among others. The result is also in line with a priori expectation that broiler chicken processors and marketers will need fewer workers in terms of human resources for processing and marketing activities



while producers will need more workers. The current situation, however, could reduce production output, lead to scarcity and increase in price per kg of broiler chicken meat except technology in form of automation of production is introduced, subsidized and accepted by farmers.

The result indicates that 36.9%, 6.7% and 7.7% of broiler chicken producers, processors and marketers respectively identified lack of training as a constraint limiting income generating activities of the broiler chicken value chain in the study area. This result implied that 63.9%, 93.3% and 92.3% of broiler chicken producers, processors and marketers respectively had basic knowledge and training about broiler chicken value chain operations and activities that will enhance profitability.

The result indicates that all (100%) broiler chicken producers, processors and marketers identified influx of smuggled broiler chicken as a constraints limiting participation and income generating activities within the broiler chicken value chain in southwestern Nigeria. This result implied that influx of smuggled broiler chicken still persist (against the current policy of total ban on importation of broiler chicken meat) and remained a threat to competitiveness of the broiler chicken value chain in southwestern Nigeria.

**Table 5.23: Identified Constraints by Key Actors of Broiler Chicken Value Chain**

<b>Constraints</b>	<b>Producer</b>		<b>Processor</b>		<b>Marketer</b>		<b>Pooled</b>	
	<b>Freq.</b>	<b>%</b>	<b>Freq.</b>	<b>%</b>	<b>Freq.</b>	<b>%</b>	<b>Freq.</b>	<b>%</b>
Inadequate electricity supply	97	55.1	26	43.3	89	48.6	212	50.6
Bad transportation system	88	50.0	26	43.3	97	53.0	211	50.4
Theft/Pilfering	86	48.9	19	31.7	75	41.0	180	43.0
Lack of storage facility	92	52.3	16	26.7	93	50.8	201	48.0
Land inaccessibility	103	58.5	9	15.0	24	13.1	136	32.5
Credit inaccessibility	133	75.6	27	45.0	71	38.8	231	55.1
In adequate man power	82	46.6	7	11.7	33	18.0	122	29.1
Lack of training	65	36.9	4	6.7	14	7.7	83	19.8
Competition with imported broiler	176	100.0	60	100.0	183	100.0	421	100.0

## CHAPTER SIX

### SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

#### 6.1 Summary of Findings

This study describes socioeconomic profile of broiler chicken value chain actors; identified significant participation and intensity of participation decision factors in each of the three nodes of broiler chicken value chain; analysed the competitiveness and the effect of policies on competitiveness and the comparative advantage of the three nodes of broiler chicken value chain; analysed the effects of price distortion on competitiveness of broiler chicken value chain and finally identified constraints to effectiveness and efficiency of broiler chicken value chain in south west Nigeria.

A three-stage sampling procedure was used with Ogun and Oyo States selected based on prevalence of poultry production in Southwestern Nigeria. Using structured questionnaire, four hundred and nineteen broiler chicken value chain actors (broiler chicken producers-176, processors-60 and marketers-183) were randomly selected. The socioeconomic characteristics of the three key actors observed were age, household size, number of income earners, sex, marital Status, level of education, association membership and years of experience. Other variables studied were credit access and tax among others (for measuring participation and intensity of participation decision factors), inputs, outputs and their prices. Indicators of competitiveness used and measured were Private Profitability (PP) (Privately Profitable when  $PP > 1$ ), Private Cost Ratio (privately profitable and cost efficient when  $PCR < 1$ ) and Effective Protection Coefficient (privately efficient use of resources when  $EPC > 1$ ) for government policy.

Data were analysed using descriptive statistics, policy analysis matrix and double hurdle model at  $\alpha_{0.05}$ .

### **6.1.1 Mapping of the Broiler Chicken Value Chain**

- The actors and the main nodes of broiler chicken value chain identified were broiler chicken producers, processors and marketers who were actively involved in income generating activities within the production, processing and marketing nodes of the broiler chicken value chain.
- Identified activities and functions in broiler chicken value chain were input purchase such as day old chicks, drugs and feed among others; farm management; transportation; processing and marketing.
- All broiler chicken produced, processed and marketed in the study area were one hundred percent (100%) for local markets.
- There was no report of export-related income generating activity in any of the three nodes of broiler chicken in southwestern Nigeria at the time of field survey.

### **6.1.2 Profile of the Key Actors of Broiler Chicken Value Chain**

- Majority of broiler chicken value chain actors in the study area were young adult with the mean age of the actors being  $38.00 \pm 7.63$  years,  $37.62 \pm 8.10$  years and  $38.65 \pm 8.21$  years for producers, processors and marketers respectively.
- Broiler chicken value chain production and marketing nodes were more gender specific in the study with majority (79.5%) of producers being male while majority (68.3%) of the marketers were female.
- The level of education in the broiler chicken value chain is high with majority of producers (70.5%) and marketers (56.8%) with a minimum of tertiary level of education while 48.3% of processors have a minimum of tertiary level of education

### **6.1.3 Key Actors Participation Decision Factors of Broiler Chicken Value Chain**

- In the first hurdle of the double hurdle model analysis, the result indicates that marital status, payment of tax and price were the significant producers' decision factors for participation in broiler chicken value chain production node; the result of the first hurdle of DHM also indicates that member of association, payment of tax and access to credit were the significant processors' decision factors for

participation in broiler chicken value chain processing node and the result of the first hurdle of DHM further indicates that gender and access to credit are statistically significant marketers` decision factors for participation in broiler chicken value chain marketing node

#### **6.1.4 Key Intensity of Participation Decision Factors of Broiler Chicken Value Chain**

- The outcome of the second hurdle in the Double Hurdle Model analysis indicates that gender, years of education, household size, farming experience and price were statistically significant intensity of participation decision factors of an average producer in broiler chicken value chain production node.
- The result further indicates that the number of income earners and member of association were the significant intensity of participation decision factors of an average processor in broiler chicken value chain processing node.
- The result of the second hurdle also indicates that gender, marital status, age and years of education were statistically significant intensity of participation decision factors of an average marketer in broiler chicken value chain marketing node.

#### **6.1.5 Measures of Competitiveness of Broiler Chicken Value Chain**

- The results of PAM indicates that the marketing node was the most privately profitable of the three nodes of the broiler chicken value chain in southwestern Nigeria.
- An average marketer and processor has a private profitability of ₦2,042,471.95 and ₦1,985,199.82 respectively, while an average producer has the least private profitability of ₦590,361.35.
- The result indicates that marketing node has the lowest Private Cost Ratio (PCR) of 0.54. The result further indicates that processing node has the Private Cost Ratio (PCR) of 0.61 while the production node has the highest Private Cost Ratio (PCR) of 0.69.
- The PCRs for all three nodes implied that all nodes of broiler chicken value chain in southwestern Nigeria were privately profitable

- The result indicates that marketing node has the highest Private-Benefit Cost Ratio (PBCR) of 2.15, the processing node followed with a PBCR of 2.21 while the production node has the lowest PBCR of 1.75. The result of PBCRs for all the three nodes confirmed the competitiveness of the broiler chicken value chain in southwestern Nigeria.

#### **6.1.6 Measure of Comparative Advantage of Broiler Chicken Value Chain**

- The PAM results revealed that the broiler chicken processing node was the most Socially Profitable (SP) out of the three key broiler chicken value chain nodes with a social profitability of ₦2,666,268.46 followed by broiler chicken marketing node with a social profitability of ₦2,233,817.90 while the least with comparative advantage was the production node with a social profitability of ₦95,188.28.
- The result of Domestic Resource Cost (DRC) indicates that the marketing node has the lowest DRC of 0.02 followed by processing node with DRC of 0.08 while the production node has the highest DRC of 0.65.
- The DRC of less than one (<1) for all nodes implied that all broiler chicken value chain nodes are socially profitable; confirming comparative advantage of the three nodes in southwestern Nigeria.

#### **6.1.7 Sensitivity Analysis at Each Node of Broiler Chicken Value Chain**

- An increase in the base domestic price of input of an average producer (pool) with based Nominal Protection Coefficients (NPCs) PC of 1.37), under the current government policy and technology by 20%, 40% and 60% decreased by 26.56%, 36.17% and 56.66% the level of competitiveness of broiler chicken production.
- Private Cost Ratio (PCR) of an average broiler chicken producer with a base value of 0.38 increased and tended towards one (1) with 0.50, 0.64 and 0.83 when an input-cost price shock policy of an increase by 20%, 40% and 60% respectively was implemented.
- Private Cost Ratio (PCRs) of an average small scale broiler chicken producer with a base value of 0.45 tends towards 1 with 0.61, 0.82 and 1.12 when an input-cost price shock policy of an increase by 20%, 40% and 60% respectively was implemented

- Private Cost Ratio with a base value of 0.12 for an average medium scale producer moved towards 1 with 0.16, 0.20 and 0.24 when 20%, 40% and 60% respectively input-cost price shock policy was introduced. Though Private Cost Ratios (PCRs) remains  $< 1$ , an indication that medium scale broiler chicken production node remained competitive.
- An increase in the world price of inputs of the broiler chicken production node by 20%, 40% and 60% changed the DRC from 0.65 to 1.67, 13.87 and 1.74
- An increase in the world price of input by 20%, 40% and 60% changed the DRC of small scale producers from 0.80 to 1.21, 1.91 and 3.41 respectively making small scale production node not to be profitable at social price.
- An increase in world price of input by 20%, 40% and 60% reduced efficiency and comparative advantage of an average medium scale broiler chicken producer in the broiler chicken value chain by 14.34%, 28.69% and 43.03% respectively
- An increase in the price of input of marketer by 20%, 40% and 60% in the world market worsen the Effective Protection Coefficient (EPC) from the base value of 0.91 to 1.08, 1.34 and 1.75 respectively.
- Decrease in world price of input of marketer by 20%, 40% and 60% led to lower EPC of 0.78, 0.69 and 0.61 respectively
- With increase in the exchange rate by 20%, 40% and 60%, DRC coefficient of broiler chicken producers increased from 0.65 to 1.67, 13.87 and (1.74) respectively.
- An average broiler chicken marketer with base Private Profit (PP) of ₦2,042,471.90 was negatively affected by 20%, 40% and 60% increase in exchange rate which reduced the Private Profit to ₦1,687,456.20, ₦1,332,440.40 and ₦977,424.64 respectively.
- Effective Protection Coefficient (EPC) decreased from 0.91 to 0.90, 0.89 and 0.87 when exchange rate of input increase by 20%, 40% and 60% respectively.

## **6.2 Conclusion**

- Findings in this study indicates that socioeconomic and demographic characteristics of head of farming household were key decision factors and significantly contribute to participation as well as extent of participation in broiler chicken value chain in south west Nigeria.
- Broiler chicken production, processing and marketing were privately profitable. The Private Profitability and Private Cost Ratios of the three nodes confirmed that broiler chicken value chain was competitive; an indication that Nigeria can compete with other countries thereby saving foreign earnings on importation livestock.
- Broiler chicken production, processing and marketing were socially profitable. The SP, DRC and SCB ratios of the three nodes confirmed that broiler chicken value chain has comparative advantage; an indication that Nigeria can compete with other countries by exporting her broiler chicken for foreign earnings.
- The current government policy of total ban on importation of broiler chicken was found to be effective as indicates by the result of Nominal Protection Coefficients (NPCs), Effective Protection Coefficients (EPCs) and Profitability Coefficients (PCs).
- All nodes of broiler chicken value chain were found to be protected by the current policy of total ban on importation of live broiler chicken.
- Marketers were the most competitive while the producers were the most policy protected actors of the broiler chicken value chain in southwestern Nigeria.
- Broiler chicken value chain was found to be highly sensitive to policy shocks. Any input-price shock above 60% increase would lead to loss at private price for an average actor in the production, processing and marketing nodes of the broiler chicken value chain in southwestern Nigeria.

## **6.3 Policy Recommendations**

Based on the findings of the study, the following recommendations are made:

1. All significant socioeconomic variables identified in this study should be considered during the process of developing either or both domestic and



international agricultural policies for broiler chicken value chain. This will lead to an increase in participation and high intensity of participation of broiler chicken value chain actors.

2. Participation and intensity of participation decision factors should be considered by policy makers for a robust and inclusive policy for broiler chicken value chain in southwestern Nigeria.
3. Poultry group membership and other farmers' association need to be identified for support by government so that becoming a member will of association that supports broiler business needs to be strengthened among the actors most especially within the production nodes of broiler chicken value chain.
4. Private-led broiler market development training that is fully backed by government, with focus on broiler chicken value chain actors that have no formal education, on managerial skills, basic farm record and account keeping, current innovative technologies needed for improved competitiveness of broiler chicken value chain and on risk associated with poultry farming is recommended. The training could be carried out in collaboration with selected agricultural-focused training institutions and Poultry Association of Nigeria with support from corporate organization for the achievement of regular training and education of key actors and their staff. This will help develop key actors' resilience, business agility and market expansion for a broiler chicken value chain that is competitive with comparative advantage.
5. Government should not revert but sustain the current trade policy of total embargo on importation of broiler chicken into Nigeria.
6. Stricter land border control is needed and recommended to reduce to minimum, if not eliminate smuggling and to sustain the current level of competitiveness and comparative advantages of the broiler chicken value chain in southwestern Nigeria.
7. Effort should be made to sustain current incentives being enjoyed by broiler chicken value chain key actors most especially chicken producers. It is important to create enabling environment for local broiler chicken processors and marketers so as to be able to support local producers for export of broiler

chicken to neighbouring countries of West Africa rather than importing low quality chicken meat into the country.

#### **6.4 Contributions to Knowledge**

Contributions to knowledge arising from the study are as follows:

1. Trade policy of total import restriction on poultry or total ban on importation of broiler chicken is targeted at expansion of local broilers value chain in Nigeria. However, studies on the effects of the policy on the competitiveness of broiler chicken value chain in southwestern Nigeria are rare. This study fills this gap and investigated the competitiveness of key actors in broiler chicken value chain in Southwestern Nigeria.
2. The total ban on importation as a government policy was introduced to also increase participation and protect local actors for competitiveness of the broiler chicken value chain . This study measured and found to be privately and socially profitable all the three nodes of broiler chicken value chain in Southwestern Nigeria.
3. Studies that measure participation decision factors of broiler Chicken value chain actors are rare. This study identified significant participation and intensity of participation decision factors of broiler chicken value chain in southwestern Nigeria. This study identified and measured participation decision factors (such as transportation, selling price, and inadequate water) and intensity of participation decision factors (such as years of experience, association membership, credit access and tax). Participation increasing, reducing and intensity decision factors were determined for broiler chicken actors in Southwestern Nigeria.
4. The study revealed that marketers were the most competitive while producers were the most policy protected actors of broiler chicken value chain in Southwestern Nigeria
5. The study concludes that competitiveness of the locally produced broiler chicken will be negatively impacted with any trade policy of an increase in the cost of tradable feed-inputs.

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**APPENDIX 1**  
**QUESTIONNAIRE FOR BROILER CHICKEN PRODUCERS**  
**COMPETITIVENESS OF BROILER CHICKEN VALUE CHAIN IN**  
**SOUTHWESTERN NIGERIA**

**DEPARTMENT OF AGRICULTURAL ECONOMICS UNIVERSITY OF**  
**IBADAN, NIGERIA**

Dear respondent, this is a research questionnaire which is aimed at collecting data on Broiler Chicken Value Chain Analysis. Please, fill it appropriately, as data collected will be used for the purpose of the study.

**Questionnaire code** \_\_\_\_\_ **Name of interviewer:** \_\_\_\_\_

**SECTION A. DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS**

The questions are addressed to BROILER processors as respondents.

1	Local Govt. Area:	
2	Community:	
3	Gender: _____	Male = 0; female =1
4	Marital status:	Single =1, Married = 2, Divorced = 3, Widowed = 4, Married but single, Others = 6
5	Age: _____(years)	Age in completed years
6	Religion: _____	Christianity =1, Islam = 2, Traditionalist =3, Others, please specify _____
7	Level of Education: _____	No formal = 0, Koranic = 1, Adult literacy training = 2 Primary = 3, Secondary = 4, Tertiary =5.
8	Years of Education: _____	Number of years spent in receiving education in completed years
9	Do you have any formal training in broiler production?	Yes = 1, No = 0

10	Household size:_____	Number of persons living under the same room and sharing common cooking arrangements
11	Income Earners (Number in the household)_____	Number of adult household members in paid or self-employments
12	Do you produce broilers?	Yes = 1, No = 0
13	How long have you been in poultry farming: Broiler _____, others _____	Number of years of experience in broiler production and/or other birds
14	Do you currently produce broilers? If yes how many do you have in stock? ____	Yes = 1, No = 0
15	How many broilers can you normally produce at once _____;	Farmer' s stocking capacity
16	How many did you produce in the last season _____;	Farmer' s exact stock in the previous season
17	How many production cycles did you do last year? _____	
18	What is your farm distance from the nearest market (km) _____	
19	How many times were you visited by extension agents in your last production season _____	
20	Did you access loan in your last production? If yes, how much? _____	Yes = 1, No = 0
21	What is/are your source(s) of loan	Formal = 1, informal = 2, Both = 3

## 22 Membership of Social Groups

Groups	Member (Yes/No)	Position held	Name of Group	Membership size	Benefit to business
Farmers' Coop					
Savings/ Credit Thrift					
Religious					
Town Union					
Poultry Farmers` Association					
Others					

### B. INFORMATION ON INPUTS

(i) Flock size (last production cycle)

No. of birds	N	Age of bird at stocking	Cost per bird (₦)	Total cost (₦)
No. of birds (stock of bird)				
Mortality				

### Variable Inputs (Last Production Cycle)

Items	Quantity	Price per unit (₦)	Total cost (₦)	
Feed				
Drug				
Vaccines				
Water				
Electricity				
Heat source				
Litter material				
Disinfectants				
Insecticides				



Petrol/diesel				
Transportation				
Others				

**Fixed Inputs**

Items	Quantity	Duration of use or cycles of production	Salvage value	Cost/unit	Total cost (₦)
Cages					
Pens					
Drinkers					
Feeders					
Lantern					
Wheelbarrow					
Building/rents					
Generator					
Stoves					
Charcoal pots					
Jerry cans					
Shovels					
Buckets					
Rakes					
Bowls					
Tanks					
Borehole					
Well					
Others					

**(iv) Labour Used**

**Hired Labour (Last Production Cycle)**

	ADULT MALE (M)			ADULT FEMALE (F)			CHILDREN (M&F)		
	No of persons	Mode of payment	Cost (₱)	No of persons	Mode of payment	Cost (₱)	No of persons	Mode of payment	Cost (₱)
Farm workers									
Animal /Vet services									
Others									

**Family Labour (Last Production Cycle)**

	ADULT MALE (M)			ADULT FEMALE (F)			CHILDREN (M &F)		
	No of persons	Mode of payment	Cost (₱)	No of persons	Mode of payment	Cost (₱)	No of persons	Mode of payment	Cost (₱)
Farm workers									
Animal health/Vet services									
Others									

Are there peak and low periods in processing of broiler? ( ) Yes ( ) No

- a. When is the peak period \_\_\_\_\_ to \_\_\_\_\_
- b. When is the low period \_\_\_\_\_ to \_\_\_\_\_
- c. other, specify \_\_\_\_\_

What breed do you produce? Local = ;1 Exotic = 2; Both = 3

**C. Information on Output**

Who are your buyers?

Buyers	Percentage purchased
Individuals only	
Retailers only	
Corporate body	
Individuals and Retailers only	
Others, specify	

Revenue from sales of broiler (last production)

Number of birds sold (N)	
Price per bird (₦)	

Revenue from sales of byproducts of broiler production (last production)

Item	Quantity	Price (₦)	

**D. GOVERNMENT POLICY**

Have you paid tax/levy at any local/state/Federal government? ( ) yes, ( ) No

If yes, please provide the following information

Level <sup>a</sup>	Items <sup>b</sup>			
		No. of time	Rate	Amount

a: 1- Federal, 2- State, 3- LGA, 4- Community, 5- Association, 6- Others (specify) \_\_\_\_\_

b: 1- Facilities, 2- Income/profit, 3- Transaction, 4- Water use, 5- Others (specify) \_\_\_\_\_

40. Do you enjoy subsidy from any source in any form? ( ) Yes, ( ) No

41. If yes in the above question 40, in what form and how much do you receive in a year?

Level <sup>a</sup>	Items <sup>b</sup>			
		No. of time	Rate	Amount

a: 1- Federal, 2- State, 3- LGA, 4- Community, 5- Association, 6- Others (specify) \_\_\_\_\_

b: 1- Equipments, 2- Income/profit, 3- Transaction, 4- Fertilizer purchase, 5- Others (specify) \_\_\_\_\_

42. From the list below, select constraints and challenges affecting your broiler production:

Constraints	Select	Rank
Availability of Water		
Electric Supply		
Transportation		
Facilities/Storage		
Availability of day old chicks		
High cost of veterinary services		
Access to Credit		
High costs of agro machinery		
Knowledge & information gap		
Inadequate marketing channels		
Disease outbreak		
Maintaining biosecurity		
Others 1		
2		

List three major diseases of economic importance to broiler production on your farm

**APPENDIX II**  
**QUESTIONNAIRE FOR BROILER CHICKEN PROCESSORS**  
**COMPETITIVENESS OF BROILER CHICKEN VALUE CHAIN IN**  
**SOUTHWESTERN NIGERIA**

**DEPARTMENT OF AGRICULTURAL ECONOMICS UNIVERSITY OF**  
**IBADAN, NIGERIA.**

Dear respondent, this is a research questionnaire which is aimed at collecting data on Broiler Chicken Value Chain Analysis. Please, fill it appropriately, as data collected will be used for the purpose of the study.

Questionnaire code \_\_\_\_\_ Name of interviewer: \_\_\_\_\_

**SECTION A. DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS**

The questions are addressed to BROILER processors as respondents.

1	Local Govt. Area:	
2	Village/Town:	
3	Gender: _____	Male=1, female=2
4	Marital status:	Single =1, Married =2, Divorced=3, Widowed=4
5	Age: _____(years)	
6	Religion: _____	Christianity =1, Islam = 2, Traditionalist =3,
7	Level of Education: _____	No formal=0, Koranic=1, Adult literacy training = 2 Primary=3, Secondary =4, Tertiary=5.
8	Level of Education in year: _____	
9	Have you received any formal training in Poultry processing/management	Yes = 1, No = 2
10	Number of Household: _____	

11	Income Earners (Number)_____	
12	How long have you been in the practicing of processing of broiler _____	
13	How many broilers can you process at once?	Small-scale <500 medium - scale 501-1000 large-scale >1000
14	How many broilers can you process in 3 months ?	Small-scale <500 medium - scale 501-1000 large-scale >1000

### 15 Membership of Social Groups

Groups	Member (Yes/No)	Position held	Name of Group	Membership size	Benefit to business
Cooperative					
Savings and credit group					
Religious group					
Town union					
Poultry Farmers` Association					
Others					

### SECTION C. INPUTS USED IN PROCESSING

16. Do you have processing facilities? Yes ( ), No ( )

17. What are the processing facilities?

S/N	Processing Facilities
1	
2	

3	
4	
5	

18. Do you own or acquire the place where you are operating your business activities?

Type	Acquisition (₱)	Building( (₱)	Lease/Rent( (₱)	Lifespan (Years)	Maintenance (₱)
Self-owned					
Lease/on Rent					
Inherited					

**SECTION B. PROCESSING/SYSTEM/ TECHNOLOGY**

19. Provide the quantity and cost of broiler processing

<b>2014</b>		
Average quantity/batch	Unit cost (Naira)	Cost per month

20. Are there peak and low periods in processing of broiler? ( ) Yes ( ) No

a. When is the peak period \_\_\_\_\_ to \_\_\_\_\_

b. When is the low period \_\_\_\_\_ to \_\_\_\_\_

c. other, specify \_\_\_\_\_

21. a) Which breed do you process? 1. Local 2 Exotic. 3 Both

Indicate.....

b) How many Bird/Week \_\_\_\_\_ Average Kg/Bird \_\_\_\_\_

c)

22. What processing methods do you use?

Method	Processing Method <sup>a</sup>	Location <sup>b</sup>	Collaboration (1-Yes, 0- No)
Frozen			
Frying			
Application of preservative			
Smoking			
Others <sup>i</sup>			

23. Do you keep live bird for processing? Yes/No \_\_\_\_\_

24. What is the average you spent on construction of a Pen? \_\_\_\_\_ (Naira)

25. State the average number of broiler you keep in a Pen \_\_\_\_\_



26. What is the source of power to your pen/processing facilities?

S/N	TYPES <sup>a</sup>	COST PER CYCLE	COST PER MONTH
1			
2			
3			
4			

*a:Charcoal-1, Firewood-2, Petrol-3, Diesel-4, Electric supply-5, Gas-6, Solar-7*

27. What is your average electricity bill per month ₦\_\_\_\_\_?

28. Do you have a generator of your own? Yes ( ) No ( ). If yes, below table should be completed:

Year of Purchased	Cost (₦)	Lifespan (Years)	Maintenance per month (₦)	
			Repair	Fuel

29. During the year, do you access any credit facility? Yes ( ), No ( )

30. If yes, below table is to be completed:

Source	Amount	Interest/year	Year collected	To be paid back in
Saving/Personal				
Individuals/ Families				
Associations/Cooperatives				
Commercial Banks				
Money Lenders (Local)				
Government				

31. Number of workers/labour engaged or employed:

	Skilled Labour			Unskilled Labour		
	≤18 years	Male >18 years	≤18 years	Male >18 years	≤18 years	Male >18 years
Number						
Hours/ Day						
Pay/person/month						
Pay/person/week						
Pay/ person/day						
Others						

#### SECTION D. SALES AND MARKETING

32. State the forms and the prices you sell your products after processing:

Forms of sale <sup>a</sup>	Response (yes=1, No=0)	Price (₱)
Smoked		
Dressed		
Dressed and Frozen		
Others specify:		

33. Please indicate the average quantity you handle or process in a month?

Types	Period of High Demand (Peak)			Period of High Demand (Lowest)		
	Quantity (Kg)	Cost/Kg (₱)	Selling Price (₱)	Quantity (Kg)	Unit cost(₱)	Unit price(₱)
Smoked						
Dressed						
Dressed/Frozen						
Others specify:						

34. Who are your major suppliers?

Material Supplied	Suppliers	Quantity	Unit price
Live Chicken	1		
	2		
	3		
	4		
Dressed Chicken	1		
	2		
	3		
	4		
Ingredients	1		
	2		
	3		
	4		
Others; specify	1		
	2		

35. Who are your buyers?

Buyers	Products: Live (1), Dressed chicken(2) offal (3)	Location of buyers
Individuals only		
Retailers only		
Corporate body		

Individuals only + Retailers only		
Other; specify		

36. Along with your broiler processing activities, list other business you are involve in:

SN	Business	Location Same location (1) Other specify (2)	Is the income less than revenue from Processing (1-Yes, 0-No)
1			Amount: _____
2			
3			
4			

Business Process: 1. Salary Job/Government or Private; 2. Farming Activities; 3. Other, specify

### SECTION E. GOVERNMENT POLICY

37. Have you paid tax/levy at any local/state/Federal government? ( ) yes, ( ) No

38. If yes, complete below:

Level <sup>a</sup>	Items <sup>b</sup>	2015		
		No. of time	Rate	Amount
Federal Government				
State Government				
Local Government				

Other				
-------	--	--	--	--

a: 1- Federal, 2- State, 3- LGA, 4- Community, 5- Association, 6- Others (specify)

b: 1- Facilities, 2- Income/profit, 3- Transaction, 4- Water use, 5- Others (specify)

39. Do you enjoy subsidy from any source in any form? ( ) Yes, ( ) No

40. If yes in the above question 40, in what form and how much do you receive in a year?

Level <sup>a</sup>	Items <sup>b</sup>	2015		
Federal Government		No. of time	Rate	Amount
State Government				
Local Government				

a: 1- Federal, 2- State, 3- LGA, 4- Community, 5- Association, 6- Others (specify)

b: 1- Equipment, 2- Income/profit, 3- Transaction, 4- Fertilizer purchase, 5- Others (specify)

41. From the list below, select constraints/challenges affecting your broiler processing:

Constraints	Select	Rank
Water: Availability		
Electric Supply		
Transport		
Facilities/Storage		
Availability of chicks		
Training/Knowledge Gap		
Access to Credit		
Information gap		

Influx of imported Poultry Products		
Inadequate marketing channels		
Disease outbreak		
Other specify		

**Thanks for your assistance**

**APPENDIX III**

**QUESTIONNAIRE FOR BROILER CHICKEN MARKETERS**

**COMPETITIVENESS OF BROILER CHICKEN VALUE CHAIN IN**

**SOUTHWESTERN NIGERIA**

**DEPARTMENT OF AGRICULTURAL ECONOMICS UNIVERSITY OF**

**IBADAN, NIGERIA.**

Dear respondent, this is a research questionnaire which is aimed at collecting data on Broiler Chicken Value Chain Analysis. Please, fill it appropriately, as data collected will be used for the purpose of the study.

Questionnaire code \_\_\_\_\_ Name of interviewer: \_\_\_\_\_

**A. Demographic and socioeconomic characteristics**

The questions are addressed to broiler marketers as respondents.

1.	Name of Community	
2.	Local Govt. Area:	
3.	Gender: _____	Male=1, female=2
4.	Marital status	Married=1, single=2, Divorced=3, Widowed=4
5.	Age: _____(years)	
6.	Religion -----	Christianity=1, Muslim= 2, Traditionalist =3, Others =4
7.	Type of Education: _____	No formal=0, Koranic=1, Adult literacy training = 2 Primary=3, Secondary =4, Tertiary=5.
8.	Years of education	
9.	Household size____	
10.	No of income earned in the household?	
11.	What breed of broiler do you sell? _____	local=1,exotics=2, others specify

12.	How long have you been into broiler retailing/ marketing ? -----	
13.	What is your level of activity as a marketer?	Wholesale ( ) Retail ( ) Both ( )

14. Social Assets: Membership in social groups

Groups	Member (Yes/No)	Position held	Name of Group	Membership size	Indicate the activities
Cooperative					
Informal work exchange group					
Savings and credit group					
Religious group					
Town union					
Social groups					
Poultry Farmers Group/Association					
Others					

**B. Marketing Activities**

15. Are there peak and low periods in broiler marketing? ----- (Yes/No).  
 When is the peak period ----- to ----- (month)  
 When is the low period ----- to ----- (month)



16. What marketing method(s) do you use?

SN	Business Process <sup>a</sup>	Location <sup>b</sup>	Collaboration with other stakeholders (1-Yes, 0-No)	If yes, specify
1				
2				
3				

*a : 1-Hawker, 2-Neighborhood store, 3-Central Market store, 4-international market point, 6-Supermarket, 6-Others (specify)*

*b: 1-within locality, 2-other part of the state, 3-other part of country, 4-Others (specify)*

17. In what form did you sell your broiler?

Forms of purchase	Quantity sold			Price (₦)		
	Kg	No/ broilers	Local measure (₦)	Per Kg	Per broiler	Per Local measure
Live						
Dressed						
Dressed& Frozen						
Others specify:						

18. Do you owned or acquire the place where you are operating your business activities?

Type	Acquisition (₦)	Building( (₦)	Lease/Rent( (₦)	Lifespan (Years)	Maintenance (₦)
Self-owned					
Lease/on Rent					
Inherited					

19. Own personal means of transportation? Yes ( ), No ( )

20. If yes, in what form?

Forms	Year of Purchased	Cost (₦)	Useful Lifespan (Years)	Cost of Maintenance per month (₦)		
				Repairs	Fuel	Others
By head						
Pick-up Van						
Car						
Motor-bike						
Bicycle						

21. Indicate the source and what you use and cost of getting your produce

Source	Distance (km or Mile)	Method and cost of transportation per bag.					
		By head (₦)	Pick-up Van (₦)	Lorry (₦)	Motor bike (₦)	Bicycle (₦)	other
From pen/farm to farm gate							
From farm to local market							
From farm to urban market							

22. Do you have electricity connected to your shops/facilities? Yes ( ) No ( )

23. If yes, what is your average electricity bill per month? ₦ .....

24. How many days in a week do you open or operate? -----

25. How many hours in a day do you work? \_\_\_\_\_

26. During the year, do you access any credit facility? Yes ( ), No ( )

27. If yes, below table is to be completed:

Source	Amount	Interest/year	Year collected	To be paid back in
Saving/Personal				
Individuals/ Families				
Associations/Cooperatives				
Commercial Banks				
Money Lenders (Local)				
Government				

28. Do you store or preserve your products? Yes ( ) No ( )

29. Complete Table 29 if Yes:

Method	Quantity / Volume			Period of storage ( days/ months/ years)	Cost ( ₦: K)		
	Kg	Live	Other measures		Kg	Live	Other measure
Frozen							
Frying							
Application of preservative							
Smoking							
Others							

30. Number of workers/labour engaged or employed: \_\_\_\_\_

	Skilled Labour			Unskilled Labour		
	≤18 years	Male >18 years	Female >18 years	≤18 years	Male >18 years	Female >18 years
Number						
Hours/ Day						
Pay/person/month						
Pay/person/week						
Pay/ person/day						
Others						

### SALES AND MARKETING

31. What were the total values of broiler products you sold for the years 2012 to 2014?

Products	2012			2013			2014		
	No	Avg. Weight	Price (N/kg)	No	Avg. Weight	Price (N/kg)	No	Avg. Weight	Price (N/kg)
Live									
Dressed									
Dressed& Frozen									
Others specify:									

32. Who are your suppliers?

S/N	Name	Nature of supply i.e <i>live, dressed, frozen</i>	Quantity	Cost/unit
1				
2				

<b>3</b>				
<b>4</b>				
<b>5</b>				

33. Who are your buyers?

S/N	Name	What did they purchase? i.e <i>live, dressed, frozen</i>	Quantity	Cost/unit
<b>1</b>				
<b>2</b>				
<b>3</b>				
<b>4</b>				
<b>5</b>				

34. Along with your marketing activities, which other business processes are included within your company's / business's operations?

S/N	Business Process	Location	Collaboration (1-Yes, 0-No)
1			
2			
3			
4			

**GOVERNMENT POLICY**

35. Have you paid tax/levy at any local/state/Federal government? ( ) Yes, ( ) No

36. If yes in question 39, please provide the following information

Level <sup>a</sup>	Items <sup>b</sup>	2012			2013			2014		
		No. Of time	Rate	Amount	No. Of time	Rate	Amount	No. Of time	Rate	Amount

*a: 1-Federal, 2-State, 3-LGA, 4-Community, 5-Association, 6- Others (specify)*

*b: 1-Facilities, 2-Income/Profit, 3-Transaction, 6-Others (specify)*

37. Do you enjoy subsidy from any source in any form? ( ) Yes, ( ) No

38. If yes in question 41, at what level and how much do you receive in a year?

Level <sup>a</sup>	Items <sup>b</sup>	2012			2013			2014		
		No. Of time	Rate	Amount	No. Of time	Rate	Amount	No. Of time	Rate	Amount

*a: 1-Federal, 2-State, 3-LGA, 4-Community, 5-Association, 6- Others (specify)*

*b: 1-Credit, 2-Trainning, 3-fertilizer , 4-Technical Assistance 5-Others (specify)*

39. From the list below, select constraints and challenges affecting your sales/marketing:

Constraints	Select	Rank
Water: Availability		
Electric supply		
Transportation		
Theft/Pilfering		
Facilities/Storage		
Access to Land		
Access to Credit		
Man-power		
Training/Knowledge Gap		
Others (specify):		
Others		

**Thanks for your assistance.**