Determinants of Broilers Production in Per- Urban Areas in Dar es Salaam, Tanzania

Timothy M. Lyanga
Department of Community Economic Development, The Open University of Tanzania
**Corresponding Email: lyangatimothy@yahoo.com*

Abstract
The study analyses the determinants of broilers production in per urban areas in Dar es salaam region, Tanzania using variables costs of production, interest per month, Education of the keeper, Skills of the keeper, Experience in keeping chickens and Family size. For this aim, descriptive statistical and an econometric analysis was conducted in 88 randomly selected broilers keeping farmers in Kitunda ward at Ilala district. The results revealed that cost of inputs had the average total cost of inputs of Tshs 55,170.87per batch. The results of econometric model showed that cost of production, experience of broiler entrepreneur in keeping, training attended to entrepreneur about broiler production, total revenue earned, and education level of broiler entrepreneur was the most important inputs, significantly contributed to the total production of broilers; While, the use of bank loan interest (P= -.088) and family size for farmer (P= -.173) have negative relationship with broilers production. Government of Tanzania should enhance the productivity of the agricultural sector through the subsidies provision of the required inputs, which would minimize the total cost of production and speed up the productivity process of poultry in Tanzania.

Keywords: *Per-Urban Areas, Broilers production, Tanzania*

1.0 Introduction

Broiler meat production is the most common of all the white meat other than poultry, pork, and rabbit that are consumed globally. This is because it is fairly cheap, low in fat, and has limited religious and cultural barriers compared to other meat products. Broiler meat production provides employment and regular income for entrepreneurs through its value chain activities. The popularity of broiler meat production can be attributed to a short production cycle, low production cost and product prices, ready market, and high feed-meat conversion ratio (OECD - FAO, 2020). Tanzania has three major poultry production systems: traditional indigenous, improved family chicken and commercial specialized chicken systems (LMP, 2015; Da Silva *et al*., 2017). The traditional indigenous family subsystem is an extensive scavenging dual-purpose system, with levels of

low egg (50 eggs/ year) and meat, 1.5 kg for mature chicken production and therefore local backyard system, low input – low output and absence of biosecurity. The improved family chicken subsystem, with improved local/ imported tropical breeds is a semi-intensive, semi-scavenging moderately high productivity, i.e. 150 eggs/year; and 1.8 kg live weight at maturity subsystem and therefore a more intermediate production system, medium input – medium output based on the use of dual-purpose breeds with some attention to biosecurity (Sanka *et al*., 2020). Chickens are important sources of animal-sourced food for numerous reasons. First, 86% of the livestock keeping households in the country own chickens (MLDF, 2015). About 80% of the chickens are owned by women who have control over decisions on sales and consumption of chicken meat and eggs (Galie *et al*., 2015; Tavenner *et al*., 2019; Shapa *et al*., 2021). Secondly in other parts of the world especially developing countries, chickens are sold alive and do not necessarily need central slaughterhouses and cold chains. Third, a chicken is a unit fit for rural household consumption compared with ruminants which generate too much meat to be consumed in one meal. Chicken eggs are also appropriate units for daily consumption and can be stored for some days without cooling. Fourthly, managing a chicken enterprise is relatively easy, requiring a small capital investment with promising income generation within a short period of time and hence, attracting more women and youth (Hundie *et al*., 2019; Ngongolo *et al*.,, 2021). White meat including that of chicken is considered a healthier food than red meat, and therefore, the trend of consumption is expected to increase steadily (Weber et al., 2017).

Poultry production in Tanzania includes both commercial (broilers and layers) and conventional systems based on indigenous breeds, as well as improved, dual purpose breeds mainly kept in a free range system. Commercial poultry processing is practiced primarily in urban and outlying areas, the traditional production of poultry is the largest, contributing about 70% of the flock and providing the bulk of poultry meat and eggs consumed in rural areas and 20% in urban areas (Nduthu 2015). Poultry production in rural areas is regarded as a cherished asset to local societies due to its share in poverty alleviation, provision of food, and its role in supporting gender equality (Guèye E., 2000). For a long time, the marginalized and remote rural villages of Africa have been keeping poultry as a source of income and mainly involving women as they decide on most of household expenditures particularly food consumption (Bebe BO *et al*., 2012). Schroeder D *et al*., (2016) establish the demand for broiler production to rise from the current 53.47 million to 137 million by the year 2050 .This anticipated rise in demand for animal products will be

met through improved poultry production and management interventions (Meijer S. *et al*., 2020). The poultry sector contributes about 3 percent of the Gross Domestic Product (GDP) derived from agriculture in Tanzania, equivalent to 1% of the total national GDP (TALIRI, 2015). However, despite the central role that the poultry production plays, its potential is not yet fully explored (Olsen JE *et al*., 2021). It is argued that if this sector is managed effectively and efficiently, its contribution to the national economy could be higher (Bekunda M *et al*., 2016). Further initiatives for improving agricultural practices seem necessary to render the sector more efficient and sustainable in order to respond to the foreseen food demand increases and to cushion the livelihood of the millions rural poor farmers.

Poultry production plays an important role in meeting economical and social obligations for the household and national at large, especially for poor families. In addition to slaughtering for home consumption, chickens are sold to raise money for the purchase of food, medicine, clothes and payment of school fees, bride price, farm implements, shops establishment etc. Chickens are regarded as a special food during festivals, ceremonies, entertaining visitors and as a gift. Economic studies of peri urban poultry keeping have shown that the industry is a viable and promising alternative source of income for households (Salum, et al., 2002).

In Tanzania, poultry farming plays an important role in both urban and rural settings in terms of food security, source of income and in meeting other social obligations such as dowry and rituals (Data Driven Insights, 2018). The national flock comprises of 83 million birds; of which 38.7 million (47%) are indigenous breeds, 33.4 million (40%) broilers and 11.1 million (13%) layers (URT, 2020). According to the large scale, commercial producer survey conducted by the NBS in 2016, the total number of chickens reared on large-scale farms was 277 thousand, 179 thousand of which are broilers. This represents 19% of stated broiler production and less than 1% of total chicken production. Chicken production contributes about 1.8% of the Gross Domestic Product (MMA and Transcend Enterprises Limited, 2018). In 2018, the estimated monetary value of meat and eggs was TZS 874 billion and 364 billion respectively (URT, 2022). In the 2021/2022 financial year hatcheries in Tanzania produced 70,323,00-day-old chicks (DOC) comprising of 60,463,872 broiler, 1,999,128 layers and 7,860,000 dual-purpose chicks. There are 26 hatcheries, and the parent stock farms have a capacity of 1,200,000 parent stock. In the financial year 2021/2022 Tanzania produced and recorded (formal market) 80,601.3 MT of poultry meat (MLF,

2022). On the other hand commercial poultry production is mostly practiced in urban and peri-urban areas and productivity levels are relatively higher.

Chawker et al., (2021) demonstrated the poultry production, marketing, and consumption at the smallholder level remain low due to the limited genetic potential of indigenous breeds, inadequate husbandry practices, higher disease prevalence, bird mortality, inadequate inputs access and delivery system and other marketing-related constraints. Approaches to address various constraints need to adopt integrated research and development efforts. This may include developing innovations that enhance the production and productivity of existing breeds; building the capacity various value chain actors; establishing a public-private partnership for effective input delivery and output marketing; and improving the overall performance and competitiveness of the value chain. Research and development efforts to improve the production and productivity of existing breeds may involve improving the genetic potential of existing breeds, introducing locally adapted and farmer-preferred improved breeds and developing innovative and context-specific management practices that enhance the competitiveness and efficiency of different production systems.

The peri-urban environment in Tanzania, as in other developing countries, occurs at the interface between peri-urban, rural and urban areas. A rapidly increasing population and dwindling agricultural lands characterize these areas. The poultry industry in Tanzania is divided into traditional and commercial production systems. The traditional system contributes to over 70% of the flock, supplying most of the poultry meat and eggs consumed in rural and about 20% consumed in urban areas. The main indigenous breed subtypes include; *Kuchi, Kishingo, Sukuma, Kinyafuzi and Kiduchu*. Both commercial and traditional systems are constrained by diseases, poor quality feeds, inadequate technical support services, low genetic potential of the local breed and weak farmer organizations. In addition, there is inadequate regulatory framework in hatcheries and breeding farms (FAOSTAT, 2022a).

Boilers chicken production in Tanzania estimated that there are 24 million broilers and 6 million layers in Tanzania (Meijer-Willems, et al., 2018) whereas others estimate that Tanzania has an estimated chicken population of 32 million commercially bred birds 24 million broilers and eight million layers. Furthermore, the exotic chicken has a huge potential for further commercialization in Tanzania throughout the poultry value chain of the broiler and layer industries in Tanzania.

Based on the literature, in this paper the main objective was to analyses the determinants of broiler production in peri urban area in Dar es Salaam of the broiler entrepreneurs in Ilala Municipal. Furthermore, broiler keeping has been expanding and grown highly in Ilala district by small-scale farmers and has a great potential for improving welfare in household. Therefore, the analysis of this study was to figure out those productions input costs in the number of chicken produced in one production year in this study was constituted by the following variables; Cost, Experience, Interest, Education, Skills, Family size and Personal income (Total revenue) in the Ilala district.

2.0 Literature Review

The benchmark economic model of broiler production has been, the Scott (2023) elaborates how porters five force model shapes every industry and also it helps to identify weaknesses and strengths in industries. It can also be used to identify industry's structure so that corporate strategy can be developed. Industrial competitive environment can be analyzed using five force model and is also used as a guideline. It helps to identify the number of the competitors and their power, the new entrance, suppliers' power, buyers' power and competition that affects the profitability the company makes (Isabelle et al., 2020). The five Forces system "went beyond a more superficial emphasis on the relative pace of market growth" in assessing the industry's attractiveness (Grundy, 2006). The additional benefit according to (Grundy 2006) is that the managers rely on the external environment rather than on the standard "SWOT" analysis. The Five Forces Model aims not only to determine the benefit and disadvantages of the market, but also to identify the ' economic foundation 'and thus the causes of competitiveness (Porter, 2008).

From yet a different perspective focus, (Porter, 2008) argues that the five competitive forces indicate whether or not a sector is sufficiently attractive and make it easier for investors to forecast positive and negative market shifts before they become evident. He further suggests that this deeper thought about competition is a more successful or better Strategy that dominates investment analysis today, rather than financial forecasts and trend extrapolation. Although the author of this theory argues that these five factors are the central or main determinants of companies' competitive success or failure, other scholars argue in favor of this new product development being able to provide a business with strategic strengths in the face of competition. This can be done by providing value from the introduction of new product technologies, new product pricing, new product positioning, branding of new products and marketing of new ones.

Porter (1980, 1985, 2008) stated that some of the basic business decisions are simply the essence of the markets reached by the enterprise and how the enterprise will operate in the chosen markets. Economic tactics concentrate on how a company can achieve its most attractive market position (Pearson, 1999). A corporation's income is essentially the difference between its revenue and its expenditures. Hence the willingness of the organization to pursue the right strategic path for the fifth powers offers high profitability.

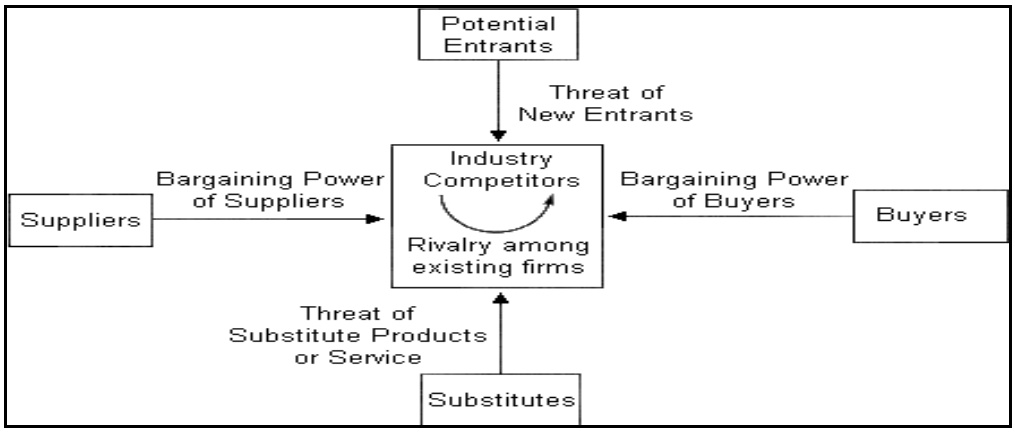

Figure 1: Michael Porter's "Five Forces" Model (2008) - Summary and interpretation of live chicken product

Wilson *et al*. (2022) grouped constraints faced by smallholder poultry farmers into three major categories – financial, technical and institutional constraints. Financial constraints were related to farm size, while technical constraints were related to farmers' knowledge of chicken production and management concerns such as veterinary measures, feed access and availability, and management practices. Other technical factors included knowledge and awareness of farmers on record keeping, entrepreneurship and marketing skills, and gender roles in different managerial aspects at the household level (Wilson *et al*., 2022). Institutional constraints included public support services and physical infrastructure (i.e., roads, water supply, energy availability and communication technology), market infrastructure, finance availability and credit facilities (Mapiye *et al*., 2008). The major constraints identified by Wilson *et al*. (2022) were chicken diseases, poor availability of day-old chicks, theft and limited access to quality feed and/or feed ingredients. Other challenges included; limited knowledge of managerial practices, market availability, predators, limited access to vaccines and medications, lack of capital, and limited extension services and personnel to offer advice'

Emokaro *et al*, (2014) studied the production and marketing estimated technical efficiency of broiler producers in Nigeria using the stochastic frontier approach. The study revealed technical efficiency of 81%, and sources of inefficiency were farmer's age, gender, nature of farming and age squared of the broiler, while factors such as house hold size, education level, experience in farming and age at which the broilers were sold were not influencing inefficiency of the farm. Otieno *et al*. (2012) used the technique to assess the technical efficiency of cattle production in Kenya. Wikedzi (2013) used the technique to analyse technical efficiency of dairy cattle in Tanga City, while, (Mlote *et al*.2013) estimated the technical efficiency of small scale cattle fattening using stochastic production function.

Baliyan, (2017) used cross-sectional data from 60 broiler farmers, to study "Socio- Economic Factors as Determinants of Farm Management Skills among Broiler Farmers in Botswana". The analysis of variance (ANOVA) as analytical technique was used to determine the influence of socio-economic factors and post hot analysis was also used to determine the influence in each level of the variable to the farm management skills. The findings revealed that all socio-economic variables have significant influence on farmer management skills. This also was used by (Ogalo, 2016) to study "Factors Influence Poultry Production in Eldoreti Town Kenya". This technique was also adopted in this study to analyze the influence of socio-economic factors to the profitability among small-scale farmers in a study area.

Omondi (2018) carried a study in the Kisumu and Thika cities of Kenya the gross- margin was used as analytical tool to find out economic feasibility of 160 small-scale poultry producers. The findings showed that urban poultry production is profitable and important for food security. (Gad., *et al* 2015) also were used gross-margin analysis to identify factor affect the performance of small and media of poultry production in Karuri Kenya. (Rodica, 2012) used Goss-margin as analytical tool in analysis of poultry production. This study also adopted gross-margin analysis to determine profitability of poultry farming in a selected area.

Jackson, W. (2020), conducted a study on Economic analysis of small-scale poultry production in Dodoma region: a case of CHAWAKUBODO cooperative society. Cross-sectional design was used with sample size of 200 of small-scale producers who were members of CHAWAKUBODO. Descriptive Gross- margin and Pearson`s correlation analysis were used for

data analysis. The study found that most of the farmers (66.92%) were women with average age of 46.45 who spent 6.83 years in poultry farming and they have primary education level (57.14%). The study discussed the factors such as; costs of feed and outbreak of diseases were the major constraints facing poultry production information on markets, transport problems, technological barriers. The study discovered that many smallholder farmers were poultry production is profitable among small-scale farmers. Hence, there is the need to support these sectors especially by the government toward the growth of the poultry sector notably through financial institutions, external services such as veterinary services, control of quality of drags and vaccination services. It shows that majority of emerging producers lack knowledge on financial and marketing skills and it was found that producers were not able to meet the quality standards set by fresh produce markets and food processors.

The main objective of the present study was to analyses the determinants of broiler production in peri urban area in Dar Es Salaam in Ilala Municipal. The study employing the stochastic production frontier approach and to determine the number of chicken produced in one production year in constituted by the following variables; Cost, Experience, Interest, Education, Skills, Family size in order to develop policy parameters to improve the existing situation.

3.0 Methodology

The Study Area

The study was conducted in Dar Es Salaam region at Kitunda ward at Ilala Municipality Tanzania. The choice of the region had been attributed by many factors; first the regions have significant number of chicken keepers which are located in the peri urban geographical area at Kitunda ward. Kitunda is an administrative ward in the Ilala municipality of the Dar es Salaam Region of Tanzania. According to the (National Census,2022), the Kitunda ward has a total population of number of households of 11,470. Secondly, the researcher is based in peri urban area and participated on social and economic development through chicken keeping in the research area. (Figure 1).

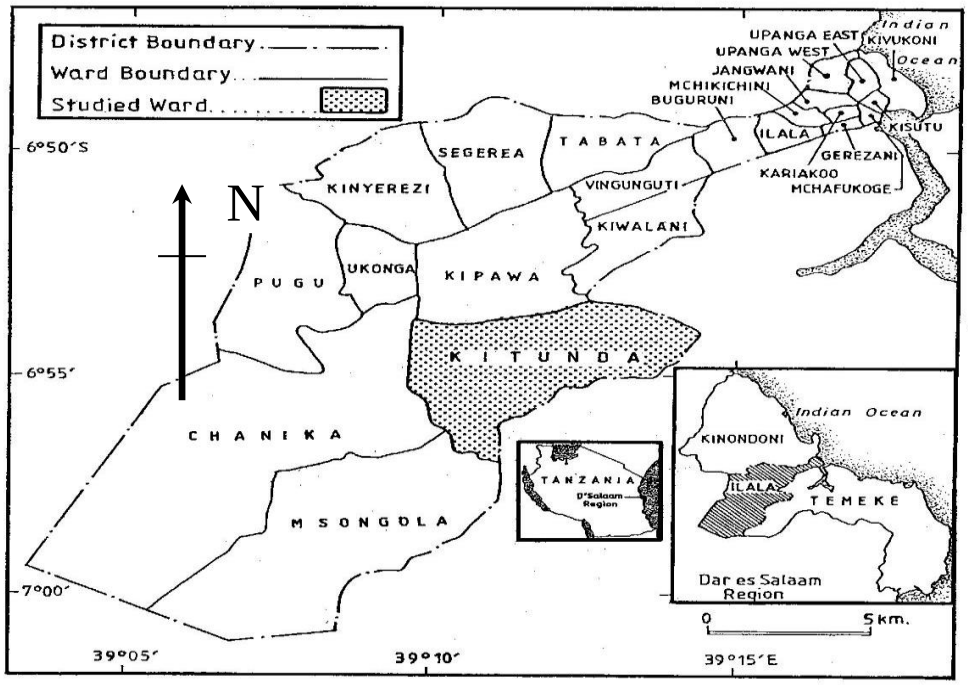

Figure 2: Map of Dar Es Salaam region, Ilala Municipal showing Kitunda ward.
Source: CARTOGRAPHIC UNIT, (2023) – University of Dar Es Salaam (UDSM)

Selection of Study Area and Data Collection

Data used in this study were obtained from 100 broiler entrepreneurs in Kitunda ward from Ilala district, Dar es Salaam region. A survey approach was used to collect quantitative information on different inputs used for the production of broilers as well as output and socio-economic structure of farms. For sampling, the simple random sampling method was used Tabachnick *et al*, 2007) suggest a sample size of $N > 50 + 8m$ for multivariate data analysis (where N is the sample size, number of broiler producers in unknown target population (Ilala district, Dar es Salaam region) and m is the number of independent variables.

$N > 50 + 8m$

$N=50+(8*6)$

$N=50+48$

N=98 *…… minimum sample size required for unknown population*

Population of the Study

According to (Kothari, 2007), the term population means an entire group of individuals, events or objects that have common observable characteristics. It refers to all elements that meet certain criteria for inclusion in a given

universe. The study used case study based approach and targeted population was smallholder's farmers on broiler production. The household in Dar es salaam in Ilala district is 5,967 for the Population and Housing (Census, 2022).

Analytical Framework of Broilers Production

In this study, the determinants influencing the broilers production was carried out by taking the costs of various inputs into consideration. The descriptive statistical and econometric methods were used to analyze the primary data collected from smallholder household heads using structured questionnaire. Descriptive methods such as; measures of averages and percentages; and statistical methods such as one-way ANOVA tests and two-sample t-test was used to describe and analyze the determinants of broilers production per batch of the broiler production of the sample households. Multivariate linear regression analysis was used to analyses the level of determinants of the broilers production to the farmers. SPSS software package was used to run the probit regression and multivariate linear regression models, and to analyze the quantitative data. Quantitative data were entered in IBM SPSS Statistics Version 26 for all necessary arithmetic conducted for estimation of costs.

The stochastic frontier model was originally pioneered by Aigner, *et al*., (1977) who proposed a composed error term. Building on that, Van den Broeck *et al*., (1977) independently improved the production function by specifying an error term consisting of two components. The improvement of that model is a decomposition of the error term and generation of a stochastic frontier model (Aigner, et al., 1977, Meeusen and van den Broeck, 1977, Battese and Corra, 1977). Their result is that the error term is assumed to have two additive components; one component captures pure random factors and the other one accounts inefficiency error that is inability to maximize or work on stochastic frontier.

The primary production model previously was specified as follows:

$y = f(x_i ß) exp \varepsilon_i$ … … … … … … … … … … … … … … … … … … . … … …..(1)

provement which is the decomposition of error term leads to the following model:

$y = f(x_i ß) e^{vi - ui}$ …… … … . . … … … … … … … … … … … … … … ……. (2)

Applying to this study as an example, Y_i is the poultry output, $f(.)$ define the Cobb Douglas production function, x_i is a set of inputs, ß is a vector of parameters to be estimated and $v\_i - u\_i$ denotes the error term: vi is assumed to be independently and identically distributed as $N(0, \sigma\_v\hat{}2)$ and

represents external factors to the farmer; u_i is the second random component which accounts for technical inefficiency effects and it is stochastic as well as assumed to have a particular distribution specification, that is, half-normal distribution, truncated normal distribution or exponential distribution (Hatirli *et al*., 2006).

The determinants were used in the production of broilers were specified in order to calculate the total production in the study. The inputs may be in the form of Y_c = Number of chicken produced (output), C_p = Cost of production, I= interest per month, E= Education of the keeper, S = Skills of the keeper, E_p= Experience in keeping chickens and F_s = Family size. In specifying a fit function relation, the Cobb Douglass production function was selected. The Cobb Douglass function has been used by several authors to investigate the relationship between various inputs and output of agricultural crops (Singh et al., 2004; Hatirli et al., 2006; Rafiee et al., 2010); it is a power function can be expressed in a mathematical form as follows (Singh et al., 2004):

The maximum likelihood estimation of equation Eq. (2) provides estimators for β and variance parameters, $\sigma^2 = \sigma^2{}_v + \sigma^2{}_u$
The subtraction of v_i on both side of eq. (2) result to:
$\bar{y_i} = y_i - v_i = f(x_i ß) e_i{}^u$ … … … … … … … … … … … … ..... (3)
Where, $\bar{y}\_i$ is the observed output of the $i\wedge th$ farm. Note that the $\bar{y}\_i = y\_i$ for an efficient farmer. For a given level of output$\bar{y}_i$, the efficiency input vector for the $i\wedge th$ farm $x\_i\wedge t$ is derived by simultaneously solving Eq. (2) and the input ratios$x_i/x_i = k_(i)$ $(i > 1)$,
where k_1 is the ratio of observed inputs.
On the assumption that the production function in Eq. (2) is self-dual, the dual cost frontier can be derived algebraically and written in a general form as follows:
$ci = h(wi, \bar{y_i}\,; \alpha)$ … … … … . … … … … … … … … … … … … … … … (4)
Where, c_i is the minimum cost of the $i\wedge th$ farm associated with output $\bar{y}\_i$, w_i is a vector of input prices for the $i\wedge th$ farm and α is a vector of parameters. The economically efficient input vector for the $i\wedge th$ farm $x\_i\wedge e$ is derived by applying shepherd's lemma and then substituting the farm's input prices and output level into the resulting system of input demand equations.

$$\frac{\partial ci}{\partial wki} = xke(wi\bar{y}i_i\psi)\ k = 1,2, \ldots\ m = input \ldots \ldots . \ldots \ldots . . \ldots \ldots \ldots \ldots (5)$$

Where, ψ is a vector of input parameters. The observed, economically efficient costs of production of the $i\wedge th$ farm are equal to $w'\_i\ x\_i$, $\bar{w}\_i\ x\_i\wedge t\ and\ \bar{w}\_i\ x\_i\wedge e$ respectively.

In this functional form the parameters to be estimated, α_i, represent the elasticity of output with respect to each input *i* which implies the percent change in output augmentation from a 1% increase in the i^{th} input cost.

Model Specification

The total production of broilers is affected by average value of inputs. Data was analyzed with Cobb-Douglas function to observe the effects of different determinants of production of broilers yield. Following equation was formed for input affecting the production of broilers in Ilala district as under assuming that total production is a function of input, for economical analysing the impact of each input on production of broilers yield. This study regards the economics analysis production of broilers as inputs in a given area of study. Given that these measurements were made on each observation, a bivariate probit model was adopted. Using a probit regression model the dependent variables will take values: l if individual input went for pricing and 0 if the individuals input did not go for pricing. This model assumes that the error is normally distributed. A probit regression model is adopted to show whether there will be positive, negative or no association between broiler production and the independent variables. Based on the theoretical framework, factors that determine uptake of broiler production in Tanzania was explored using binary probit regression model that lies on an interval of between 0 and 1.
This relationship is being expressed as:
1 if the event takes place (an individual uses inputs costs for production)

$$Y_i = \begin{cases} 1 \\ \\ \\ 0 \text{ otherwise} \end{cases}$$

Equation (1) expressing the econometric model for stochastic production function is specified as:

$$y^*_i = x_i \text{ '}\beta + \varepsilon_i \quad \ldots\ldots (6)$$

Where: y^*_i is variable showing the broiler production,
x_i '= is a vector of variables related to the individual inputs
β = is a vector of parameters and
εi = is error term

$Y = 1$ *if* $y^*_i > 0$ *i.e* $(x_i \text{ '}\beta + \varepsilon_i) > 0$ and

$Y = 1$ *if* $y^*_i < 0$ *i.e* $(x_i\ '\beta + \varepsilon_i) < 0$

The values 0 and 1 are used in order to allow the definition of probability of occurrence of an event as a mathematical expectation of the variable Y.
This study aims to establish the relationship between the independent variables and the outcome variables for differences models, the Eq. (4) for the evaluation of farm specific determinants of smallholder broiler producer's, the following translog stochastic frontier production function with decomposed error term was estimated, can be expanded in the following form;

$$\ln Y_i = \alpha_0 + \alpha_1 \ln C_1 + \alpha_2 \ln I_2 + \alpha_3 \ln E_3 + \alpha_4 \ln S_4 + \alpha_5 \ln Ep_5 + \alpha_6 \ln Fs_6 + \mu_i \quad \cdots (7)$$

Where; Y_c = Number of chicken produced (output),
C_1 = Cost of production,
I_2= interest per month,
E_3= Education of the keeper,
S_4 = Skills of the keeper,
Ep_5= Experience in keeping chickens and
Fs_6 = Family size.

Description of explanatory variables used for models specification

Cost of production	=	(χ_1)	Total cash in Tshs
Continuous	+		
Interest per month	=	(χ_2)	Cash in Tshs
Continuous	+		
Education	=	(χ_3)	1 if access, otherwise 0
Dummy	-		
Skills	=	(χ_4)	1 if access, otherwise 0
Dummy	-		
Experience	=	(χ_5)	1 if access, otherwise 0
Dummy	-		
Family size	=	(χ_6)	1 if access, otherwise 0
Dummy	-		
Output of chicken	=	(Y_c)	Number of chicken
Continuous	+		

Basic information on the inputs and output were entered into Excel's spreadsheet and simulated using SPSS 23.0 software programs.

4.0 Results and Discussion

Descriptive Statistics of Broilers Production

In this study determinants influencing the broiler production was carried out by taking the costs of various inputs into consideration. The results obtained from economic analysis are presented in Table 1, the average costs and sum of inputs per batch of the broiler production was considered. Accordingly average total cost value per farmer in batch were calculated as input costs had average of Tshs. 55,170.87, highest average and maximum cost per batch is Tshs 280,000.00 for cost of family size in broiler keeping while minimum cost is the training attended is Tshs 0.00 per batch, this reveal that the farmer deal with broiler production had attended free cost of training for chicken keeping. The average total costs of broiler production are positive and significant relationship between expenses on the feed, medicine/vaccine and rental charge from number of chicken sold in one year production (total output) indicates that if more feeds, medicine and vaccines are given to the family poultry, there was more than proportionate increase in the output of family poultry. It is, therefore, logical to assess the costs affecting broilers production and associated activities of off-farm participation of farm operation in the study areas. The results implying that the application of costs of inputs in the broilers production is considered a value added goods and products. The results clearly demonstrate the substantial benefits of more efficient input use in the production of broilers that improvement in resource use efficiency can contribute remarkably to increase revenue at the farm level.

Table 1: Inputs Cost in Broilers Production to Farmers

Costs for the inputs in TSHS per batch in broiler keeping at Ilala district					
Variable	**Sample**	**Min**	**Max**	**Mean**	**Stan. Dev**
Cost of Training attended	100	0.000	50,000.00	5,66.67	314.02
Cost Loan borrowed in year	100	4,000.00	24,000.00	16,324.12	920.62
Cost of chicken sold in one production year	100	1,000.00	11,000.00	7,359.34	471.27
Cost of spent on keeping	100	30,000.00	120,000.00	55,000.00	3220.22
Cost of Family size in broiler keeping	100	30,000.00	280,000.00	142,000.00	8400.11
Average total cost in year	100	**12,800.00**	**97,000.00**	**55,170.87**	

Econometric Model Analysis of Input Costs

The results of exponential production function models Table 2 estimate showed seven parameters used to analyse the determinants of broiler production, Cobb-Douglas type of model was considered appropriate. The results of economic model estimation of broiler production are show in Table 2. For the data used in this study presence of autocorrelation in the residuals from the regression analysis was tested using the Durbin–Watson statistical test (Hatirli et al., 2006; Rafiee *et al*.,2010). The test result revealed that Durbin–Watson value was as 1.75 that indicating, there was no autocorrelation at the 5% significance level in the estimated model. Meanwhile, the R^2 of about 0.88, this implies that the 88.0% of the total variation in dependent variable (endogenous variable) is being explained by the explanatory variables. As shown in Table 2, R is the correlation coefficient indicating the relationship between the study variables. Thus, it revealed a strong and positive relationship as evidenced by 1.75 Durbin-Watson. The coefficient of determination (or R squared) was 0.88 indicating a variation of 88.0% in broiler production performance due to changes in the independent variables. However, 22.0% were not explained by this study's independent variables. Similarly, the F-value of 30.814 being significant wasalso an indication that the model has a good fit to justify the factors influencing the broiler chicken keeping operations in the study area.

The estimated regression coefficients for the model (Eq. (4) are presented in the standardized coefficients of Table 2. The results revealed that, C_p = Cost of production, I= interest per month, E= Education of the keeper, S = Skills of the keeper, E_p= Experience in keeping chickens and F_s = Family size were the most important inputs, significantly contributed to total production; While, the use of bank interest, keeping experience, training attended and family size were indicating that coefficient for broilers production had negative sign indicating that the relationship has negative influence. The value of coefficient of bank interest borrowed in year for broilers keeping was - 0.088. The coefficient was significant at one per cent. The coefficient indicated that by one per cent increase in bank interest borrowed in year of broilers farm beyond expected costs, the yield of broiler keeping decrease by 8.8% Tshs per acre. The coefficient for family size in household results presented in Table 2 showed that there was a negative impact of the family size in broilers production. A beta coefficient of -0.173 was observed confirming that family size is statistically insignificantly. The coefficient showed family size costs has decreased the yield of broilers production by 17.2%. Therefore, yield loss due to dependent family was one of the major problem of production of poultry. Also, all of the statistically

significant inputs showed the positive relationships with output. Moreover, broiler entrepreneurs in broilers production such as average total cost of production, experience of broiler entrepreneur in keeping, training attended to entrepreneur about broiler production, total revenue earned, and education level of broiler entrepreneur are influencing the broiler production in Kitunda ward.

Table 2: Analysis of Econometric model estimation of input costs for broilers production

Coefficients[a]						
$\ln Y_i = \alpha_0 + \alpha_1 \ln x_1 + \alpha_2 \ln x_2 + \alpha_3 \ln x_3 + \alpha_4 \ln x_4 + \alpha_5 \ln x_5 + \alpha_6 \ln x_6 + \alpha_7 \ln x_7 + \mu_i$						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	- 8.976	30.209		1.332	.275
	Total cost in year	.000	.000	.464	1.906	.153
	Bank Interest borrowed in year	.000	.000	-.088	-1.832	.164
	Keeping-Experience	-1.405	3.553	.011	-.395	.719
	Training attended	-32.455	15.316	.274	-2.119	.124
	TR from chicken per year	.000	.000	.002	5.633	.001
	Family size in household	-22.493	10.854	-.173	-2.072	.130
	Education level of farmer	20.498	13.030	.092	1.573	.214
Durbin-Watson		1.75				
R^2		0.88				
F-value		30.814**				

a. Dependent Variable: Average number of chicken sold in one production year
b. Significant at $P = 0.05$

5.0 Conclusions and Policy Implications

The main objective of this study was to analyse the determinants of broiler production in peri urban area in Dar Es Salaam of the broiler entrepreneurs in Ilala Municipal, Tanzania. In this study, the descriptive statistical analysis of determinants of broilers production in Ilala district of Tanzania was carried out. Analysis of econometric model between determinants and the total production of broilers was developed using the Cobb-Douglass production function. For this purpose, total interest borrowed, total revenue earned, family size of broiler entrepreneur and education level as social economical determinants, which have been addressed in relation to access broilers production in Kitunda ward entrepreneurs. In terms of total interest borrowed, it is indicated that broiler entrepreneurs were not adopt

system of acquire loan from financial institution to increase change production. The said scenario may be explained and concluded that, additional sources of funds are therefore not required for the poultry operators due to lack knowledge of loan to sustainable solidify their financial base with assured them on possess increased output level. Moreover, the results of econometric model development revealed that, C_p = Cost of production, E= Education of the keeper, S = Skills of the keeper and E_p= Experience in keeping chickens were the important costs significantly contributed to total production of broilers and showed the positive relationships with output. While, inputs showed negative sign it also indicated that additional units of these inputs were contributing negatively to production, i.e. less production with more input.

The beta coefficients of the model showed that Bank Interest borrowed in year negative that indicate the highest variable cost item in the broiler enterprise in the study area. The determinants of influencing broiler production were also analysed, and the result showed that the training of the farmers influenced the production level. Therefore, it can be concluded that most of the broiler farmers in the study area were operating on a small scale. The level of profitability of the broiler enterprise can be increased through better use of resources available, given technology, and addressing the constraints to the enterprise. The high cost of inputs was the highest constraint in the study area, followed by the inadequate market and inadequate funds. Based on the conclusion, it can therefore be recommended that the funds should be made available to the farmer by providing micro-credits to the farmers because inadequate funding was the highest constraint identified by the farmers. Improvement in feed and feeding systems should be the other area of intervention. Provision of proper trainings to chicken producers on how to formulate supplementary rations to live chicken, using locally available feeds ingredients, could be important.

References

Aigner, D.J., Lovell, C.A.K., and Schmidt, P. (1977), Formulation and estimation of stochastic
frontier production function models, *Journal of Econometrics*, 5(1), 16-29.

Battese, G.E., andCorra, G.S. (1977), Estimation of a production frontier model: With application to pastoral zone of Eastern Australia, *Australian Journal of Agriculture Economics*- 6(1). 33-39.

Brentrup F, Lammel J, Plassmann K, Schroeder D. Sustainability of intensification of smallholder maize production in Tanzania. In:

Climate change and multi-dimensional sustainability in African agriculture. Berlin: Springer; 2016. p. 127–48.

Da Silva M., Desta S and Stapleton J. (2017) Development of the chicken sector in the Tanzanian

Data Driven Insights (2018). Structure and profitability of poultry value chains in Tanzania. First draft, 20 November 2018. [https://cgspace.cgiar.org/

CL, Rosegrant MW, Meijer S. Livestock to (2020): the revolution continues. In: Paper presented at the annual meetings of the Interna- tional Agricultural Trade Research Consortium (IATRC), Auckland, New Zealand; 2001.

Emokaro and Emokpae (2014): Technical Efficiency and Production Elasticity od Broiler Producers in Edo State, Nigeria, *Applied Tropical Agriculture*, 19(1), 59-69.

FAOSTAT,(2018). Production of Broiler Seeds in Tanzania. www.faostat.org. visited on 12/10/2020.

Gad, M. F., Otieno, O. B., & Wahome, N. A. (2015). Factors affecting the performance of small and medium scale poultry farming enterprises in Karuri

, Kenya. *Research Journal of Finance and Accounting*, 6(19), 119–130.

Govereh, J., Jayne, T. S., & Nyoro, J. (1999) Smallholder Commercialization, Interlinked Markets and Food Crop Productivity: CrossCountry Evidence in Eastern and Southern Africa.

Govereh, J., & Jayne, T. S. (2003). Cash cropping and food crop productivity: synergies or trade-offs? *Agricultural Economics*, 28, 39–50.

Grundy, S.M., Cleeman, J.I., Daniels, S.R., et al. (2006). Diagnosis and management of the metabolic syndrome: an American Heart Association/National Heart, Lung, and Blood Institute scientific statement. Circulation, 112, 2735-2752.

Guèye E. Gender aspects in family poultry management systems in developing countries. World's Poult Sci J. 2005;61(01):39–46.

Hammad, B., Javed, M.S., Asghar, A. and Zahira, B. (2002). Production and marketing constraints limiting broiler production in Punnjab. Retrieved on 12 December 2019 www://www.ijab.org.

Hatirli, S. A., Ozkan, B. and Fert, C. (2006). Energy inputs and crop yield relationship in greenhouse tomato production, *Renewable Energy*, 31, 427-438.

Isabelle, D., Horak, K., McKinnon, S., & Palumbo, C. (2020). Is Porter's Five Forces Framework Still Relevant? A Study of the Capital/Labour

Intensity Continuum via Mining and IT Industries. *Technology Innovation Management R*eview, 10, 28-41.

Jackson, W. (2020). Economic analysis of small-scale poultry production in Dodoma region: A case of Chawakubodo Cooperative society (Master dissertation) http://hdl.handle.net/20.500.12661/2825

Kajimbwa, M.; Kondowe, A.; Mhanga, S. Edible Oil Seeds Value Chain Development Programme 2007–2015.Results report 2010. Available online: http://www.snv.org/public/cms/sites/default/files/explore/download/edible_oils_tanzania_result_report_final.pdf (accessed on 3 October 2020).

Kabatange M A and Katule A M 1990, Rural poultry production systems in Tanzania. In: Proceedings of an International Workshop on Rural Poultry in Africa 13-16 November. Sonaiya E B, (Editor) Conference Centre, Obafeni Awolowo University Ile-Ife Nigeria 171-176.

Kitalyi, A. J. 1998.Village chicken production systems in rural Africa:household and food security and gender issues, FAO Animal Production and Health Paper 142, Rome, Italy. http://fao.org/docrep/003/w898e/w8989e00.htm. Acessed: 22/08/2021.

Mapiye, C., M. Mwale, J. Mupangwa, et al. 2008. A research review of village production constraints and opportunities in Zimbabwe. *Asian-Australasian Journal of Animal Sciences* 21:1680-1688.

Meijer-Willems D. (2018). Regionalisation in poultry development in Eastern Africa. Wageningen Livestock Research. Netherlands Africa Business Council, 7(1), 21-30.

Meijer-Willems, D., Masaki, M., Vernooij, A., (2018) Regionalization in Poultry Development in Eastern Africa, 6(1), 33-39.

LMP (2017) Livestock Master Plan – Brief 7, October 2017

Marwa L, Lukuyu B, Mbaga S, Mutayoba S, Bekunda M. (2016.) Characterization of local chicken production and management systems in Babati, Tanzania, 5(2), 34-39.

Mobtaker, H. G., Akram, A. and Keyhani, A. (2010). Economic modeling and sensitivity analysis of the costs of inputs for alfalfa production In Iran: A case study from Hamedan province, *Ozean Journal of Applied Sciences*, 3, 313-319.

Mlozi, M.R.S. Market Studies on FRLC and the Curriculum Paper presented at the Regional Poultry Workshop held at Hotel Impala Arusha 11th – 12th October 2003.

Mlote, S. N., Mdoe, N. S. Y., Isinika, A. C. and Mtenga, L. A. (2013). Estimating technical efficiency of small scale beef cattle fattening in

the lake zone in Tanzania. *Journal of Development and Agricultural Economics*,5(5),197-207.

Mutayoba S, Katule A, Minga U, Mtambo M, Olsen JE. The effect of supplementation on the performance of free range local chickens in Tanzania. *Livestock Res Rural Dev*. 2012;24(5):93, *34-39.*

Nduthu, P. W. (2015). Social-economic influence on Indigenous Poultry Production
Project in Kenya: A Case of Machakos Indigenous Poultry. International
Journal of Education and Research, 3(1), 141–163. www.ijern.com

Ngongolo et al., 2019, K. Ngongolo, E. Sigala, S. Mtoka. Community poultry project for Conserving the wildlife Species in Magombera forest, Tanzania

Ochieng J, Owuor G, Bebe BO. Determinants of adoption of management interventions in indigenous chicken production in Kenya. *Afr J Agric Resour Econ*. 2012;7(1):39-50.

OECD-FAO. (2020). Agricultural outlook 2020-2029 © OECD/FAO2020. http://www.fao.org/3/ca8861en/Meat.pdf

Omondi, S. O. (2018). Economic analysis of small-scale poultry production in
Kenyan medium-sized cities of Kisumu and Thika. https://ideas.repec.org/p/ags/iaae18/277360.html

Otieno DJ, Hubbard L, Ruto E (2012) Determinants of technical efficiency in beef cattle production in Kenya. International Association of Agricultural Economists (IAAE) Triennial Conference, Brazil 18-24 August 2012, 1-25.

Porter, M. E. 1985 Competitive advantage: creating and sustaining superior performance.
New York: The Free Press.

Porter, M. E. 1990. The competitive advantage of nations. Harvard Business Review: 73-91.

Porter, M.E. 2008. The five competitive forces that shape strategy. Harvard Business Review: 1-18.

Rafiee, S, Mousavi Avval, S. H. and Mohammadi, A. (2010). Modeling and sensitivity analysis of energy inputs for apple production in Iran, Energy, 35, 3301-3306.

Rodica, M. Z. (2012). Profitability of Romanian companies on food trade. https://www.econstor.eu/handle/10419/76810

Rural Livelihood Development Company (2008). Broiler Sector; Market Development Strategy, an intiative by Rural Livelihood Development Company, 6(1), 21-30.

Salum, M.R., Mtambuki, A. and Mulangila, R.C.T. 2002. Designing a vaccination regime to control Newcastle disease in village chickens in the Southern zone of Tanzania. Proceedings of the joint 17th Scientific Conference of the Tanzania Society for Animal Production and the 20th Scientific Conference of the Tanzania Veterinary Association held in Arusha, Tanzania on 3 to 5th December, 2002, 299-305.

Scott, G. (2023, March 31). Porter's 5 Forces Explained and How to Use the Model. Investopedia. https://www.investopedia.com/terms/p/porter.asp

Singh, G., Singh, S. and Singh, J. (2004). Optimization of energy inputs for wheat crop in Punjab, Energy Conversion and Management, 45, 453-465.

Sonaiya E. The context and prospects for development of smallholder rural poultry production in Africa. In: Paper presented at the CTA-Seminar proceedings on smallholder rural poultry production; 1990.

Strasberg, P., Jayne, T., Yamano, T., Nyoro, J.K., Karanja, D.D and Strauss, J. (1999) Effects of Agricultural Commercialization on Food Crop Input Use and Productivity in Kenya, Policy Synthesis for USAID – Africa Bureau Office of Sustainable Development 41, East Lansing MI: Michigan State University.

Tabachnick, B. G. and Fidell, L. S. (2007). Using Multivariate Statistics, 5Th Edition. Boston: Pearson Education Inc.

TALIRI (2015), the role of chicken in the Tanzanian economy and opportunities for development: an overview. First ACGG Tanzania Innovation Platform Meeting; 2015.

Tanzania National Agricultural Policy-2013; URT: Dar es salaam, Tanzania, 2013; Availableonline:http://www.faoilo.org/.../user.../NATIONAL AGRICULTURAL POLICY-2013.pdf (accessed on 25 September 2020).

Tanzania Ministry of Livestock and Fisheries (MLF). Budget Speech - Ministry of Agriculture

2022/23. Dodoma.

Ugulumu, E. S. and Inanga, E. L. (2014). Market access and broiler marketing: Challenges and prospects to small scale farmers in Tanzania.

United Republic of Tanzania, URT (2013) Population and Housing Census: Population Distribution by Administrative Areas. National Bureau of Statistics, Ministry of Finance, Dar es Salaam and Office of Chief Government Statistician, President's Office, Finance, Economy and Development Planning, Zanzibar.

Wilson, W.C., M. Slingerland, S. Oosting, F.P. Baijuka, A. Smits and K.E. Giller. (2022). The diversity of smallholder chicken farming in the

Southern Highlands of Tanzania reveals a range of underlying production constraints. Poultry Science 101:10. 102062.

Wikedzi, I. A. (2013). Economic Analysis of Production Efficiency and Marketing Performance of Dairy Value Chain in Tanga City. Ms. Thesis, at Sokoine University of Agriculture (SUA), Morogoro, Tanzania. 131.