FACTORS INFLUENCING POULTRY PRODUCTION AMONG POULTRY FARMERS IN ELDORET TOWN, UASIN GISHU COUNTY, KENYA.

BY
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DECLARATION

This research project report is my original work and has not been presented to any other university.

…….. ……..

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L50/77612/2015

This research project report has been presented for examination with my approval as the University supervisor.

…….. ……..

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DEDICATION

This study is dedicated to my loving family members, Dad and mum Mr. and Mrs. Ogolla, my sisters Judy , Molly, Lily and my brothers Felix ,Erick, Jared ,Kevin and Moses.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA: Analyses of variance

ANACOVA: Analysis of covariance

GDP: Gross Domestic Product

LAMU Land area management

MDG: Millennium Development Goals

RoK: Republic of Kenya

SFA Stochastic Frontier Analysis

ABSTRACT

This study was conducted in Eldoret town of Uasin Gishu County, Kenya. The purpose of the study was factors which influencing poultry production among poultry farmers in the town, Uasin Gishu County, Kenya, using Stochastic Frontier Production and Cost Frontier Analysis approach. .The objective of the study were to establish how farm inputs influence poultry production, to determine how socio-economic factors influence poultry production, to determine how technology adaptation influence poultry production and lastly to assess how availability of market influence poultry production. Data for analysis were collected from a sample of 100 poultry farmers derived from a target population of 300 farmers who were registered with Uasin Gishu County Government. Data were collected in the months of April and May 2016.in seven estates within Eldoret town. Multi-stage, purposive, random sampling techniques were applied in selecting the farmers who were included in the sample. The data collected solicited information in the form of farm inputs such as land area under poultry farming, quantity of feeds used, quantity of vaccines administered, quantity of labour used and quantity of energy used and socio-economic factors, which include age of the farmer, level of education, experience in poultry farming, engagement in other income generating activities other than poultry farming and access to credit. The Result shows that a 1% increase in land use would result to 0.2018 percent increase in output, majority (53%), 53 out of 100 of the poultry projects farmers are middle aged adults at (31-40)years, in conclusions the study established that among the socio-economic variables under study, except engagement in other activities ,and access to credit , other variables namely; education, age and farming experience were found having negative significant correlation with poultry production of all the selected estates ,The study therefore recommends that government should lowers the cost of electricity to affordable rate ,control the inflation rate in the country that makes cost of living and other inputs which affect poultry farming to be high.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Globally, the demand for the animal source food of has growing exponentially, particularly in developing countries due to urbanization, income and population growth (FAO, 2002, FAO, 2010). However, despite the growing demand for poultry products, poultry farmers worldwide face numerous problems. In Nigeria and Ghana, for example, poultry farmers have suffered setbacks in poultry production to due to rising costs of farm inputs and some mysterious diseases that have wiped out the farmer's birds. The high costs of inputs and the mysterious diseases have significantly reduced the returns of the poultry farmers businesses (Oyesola & Olujide, 2000: Okoli, 2003, Aihonsu, 1999).

In Uganda, the relative importance of poultry industry, particularly the art of keeping traditional birds cannot be under-rated in terms of the provision of the livelihoods of the low income families in the rural and peri-urban areas (FAO, 2003, FAO, 2008). This is because local poultry meat, especially chicken meat, has increasingly dominated the diets of many Ugandan rich families (FAO, 2008). However, the consumption of chicken in poor rural families has been declining due to increasingly high prices (FAO, 2008). Thus, 80% of the total poultry meat in the markets is consumed by effluent urban and semi-urban dwellers due to their income growth and high purchasing power (Mugga, 2006). However, in low-income rural families' poultry products consumption has declined to approximately 7% only of the country's total consumption of poultry's products (FAO, 2009).

The problems facing poultry farmers in other parts of the world are not unique to them only. In Kenya, the poultry industry has been facing some complex and conflicting problems. These problems include: the ever increasing prices of farm inputs as a result of competition for key raw materials inputs in poultry farming, for example a raw material input such as corn is also demanded by some industries which use corn to produce to ethanol. The competition for poultry inputs has drastically affected the profit margins of the poultry farmers and consequently has altered their expansion programs (Bradnock, 2012).

The inability of the poultry farmers to control diseases related to poultry as a result of the increasing costs of vaccines and management fees of the veterinary doctors, is another problem Kenya poultry farmers have been facing. The third problem relates to the vulnerability of the market due to lack crucial information about the market due to stiff completion within the industry (FAO, 2009b). Fourth, in Kenya most of the poultry farmers lack cooperative unions that can assist them in locating favorable markets and also to bargain for their favorable positions in the market place. As a result, the gap between the producers (farmers) and consumers is usually filled by the middlemen who exploit the farmers (Ketelaars, & Saxena, 2012).

Fifth, legal laws of a country determine how favorable or unfavorable a given farming business is in Kenya. For example in 2014, with the advent of devolved governments, some county governments decided to raise their revenue for their counties by increasing fees on agricultural products, poultry products not spared. The increase in fees has significantly affected poultry farming in Kenya.

Sixth, farmer characteristics such as the age of the farmer, experience in poultry farming, engagement in other activities other than poultry farming, availability of skilled personnel and

extension services also determine the success of poultry farming business (Carlson,, 1997). Again for the success of poultry farming in Kenya, proper infrastructure is an essential element that is required. The existence of poor quality and/or inadequate infrastructure in Kenya has inevitably impacted negatively on the poultry production in Kenya due to the increasing internal transport costs, which reduces levels of value additions, as well as lowering transaction efficiencies in the marketing chains (Oladeebo, 2007).

There have been Government and Non-Governmental programmes/policies in recent years to provide support for the poultry industry in order to increase production and consequently bridge the gap between the increasing demand and the low supply of poultry products, especially chicken. More often than not, the commercial and development banks are urged to provide loans for the farmers to expand their production (FAO, 2008). However, there is no empirical evidence to justify whether or not an increase in the scale of production will be profitable to the farmers since the production cost is known to be high in the country. There is, therefore, the need to conduct a systematic study to assess the factors that affect the technical efficiency and economies of scale of the poultry farming in the country.

In Kenya, the commercial hybrid sector is divided into layer and broilers. This sector constitute 23.8% of the population poultry in the country whereas the remaining poultry comprise the indigenous birds that scavenge around homesteads in the rural areas (Warren, 1992) The poultry population distribution in Kenya by Provinces and by categories of birds is shown in Table 1.1 below.

Table 1.1 Poultry Population in Kenya by Province and Categories.

	Layers '000'	Broilers '000'	Indigenous '000'	Others '000'	TOTAL '000'
Rift valley	283.4	1137.1	5776.4	167.8	7364.6
Coast	79.4	248.0	2153.5	133.6	2614.5
Western	23.6	116.5	5217.6	159.7	2817.4
Nyanza	48.2	203.6	5944.8	46.8	6243.3
Central	440.9	1079.2	1787.0	35.6	3342.7
Eastern	112.6	163.9	3628.8	21.3	21.3
North Eastern	0.3	0.2	165. 0	0. 0	166.5
Nairobi	957.8	188.1	141.4	10.0	1297.3
TOTAL	3136.5	1946.2	22114.3	574.9	27771.8

Source: Republic of Kenya, Ministry of Agriculture, 2012.

1.2 Statement of the Problem

In recent times, the poultry industry in Kenya has been experiencing a steep decline in output. The decline has been attributed to soaring cost of production driven out some farmers out of business and prospective investors becoming increasingly unwilling to invest in the industry (USID, 2006). The situation does not only threaten existence and survival of the poultry sub-sector of the agricultural industry, but also calls for a conjunctive effort to save the industry from total collapse. By the year 2009, domestic poultry meat production was only able to meet 54

percent of the domestic poultry products demand, implying that the deficit was to be met by importation from abroad.

There is consensus among researchers and industry experts that one of the principal barriers to promoting productivity in poultry farming due to lack of knowledge towards the factors affecting production.

In Kenya, poultry farming operate under various conditions and constrains, which affect production and productivity of the sector. Such constraints include inadequate funds, high cost of inputs, inadequate managerial skills and lack of access to markets. These factors impact negatively in poultry production, yet the demand for poultry products is increasing whereas supply cannot sustain the growing demand. In, Eldoret town, for example, there is an increasing demand for the poultry products yet production has been declining over the years.

Studies that have been conducted in Kenya and from other African countries suggest that technical efficiency or inefficiency levels of poultry farms are determined by farm and farmer (socioeconomic and demographic) factors (Oji & Chukwuma,2007,Udo & Etim,2009 Ng‟eno ,Lagat, Korir,Kipsat., (2011) . These characteristics include land area under poultry farming, quantity of feeds used, quantity of labour, quantity of vaccine used and quantity of energy used in the production process. In addition the socio-economic characteristics encompasses age of the farmer, level of education, experience in poultry farming, engagement in other income generating activities other than poultry farming and access to credit.

Besides the farm/farmer characteristics, average cost of production could be reduced through an increase in the scale of production (indication of positive scale economies). Lower average costs represent an improvement in productive efficiency and can feed through to consumers as lower prices in the event of market competition. However, not all increases in output or scale of production lead to reductions in average production cost. There are instances where an increase in the scale of production leads to a rise in an average cost per unit. In some cases, an increase in production scale does not have any impact on the average production cost per unit. All these conditions occur, when there are so many inefficiencies within the farm resulting in rising average costs. This study, therefore, addressed the following central research question: *what are the factors that influence poultry production among the poultry farms in Eldoret town, Kenya?*

1.3 Objectives of the study

The specific objectives of the study were to:

1 To establish how farm inputs influence poultry production.

2 To determine how socio-economic factors influence poultry production.

3 To determine how technology adaptation influence poultry production.

4 To assess how availability of market influence poultry production.

1.4 Research questions

The study was sought to the answers to the following questions.

1 How do farm inputs influence the poultry production?

2 How do socio-economic factors influence poultry production?

3 To what extent does technology adaptation influence poultry production?

4 To what extent does access to market influence poultry production?

1.5 Significance of the Study

Poultry farming is a very important sub-sector of the Agriculture industry in Kenya. This is because it helps in solving the problem of food insecurity, provides employment opportunities directly or indirectly to the people involved in the sub-sector. However, the main concern of any production activity has been described as that of achieving maximum possible efficiency in the transformation of inputs into outputs. In agriculture, measurement of technical efficiency is an important step in a process that might lead to optimum resource use, which has important implications for both policy formulation and farm management. Efficiency measures can have important implications for issues related to economic survival, the technological adoption and innovations and the overall input use in the poultry sub-sector of agriculture. Efficiency measures provide important insights to managers when making operational decisions and to policy makers in the debate on regulatory issues. Furthermore, for individual poultry farms, gains in efficiency are of great substance in periods of financial stress since efficient farms are more likely to generate higher incomes and thus, stand a better chance of surviving and prospering. Efficiency measures help in determining whether there is under-utilization or over-utilization of factor inputs in a farm.

Moreover, measurement of the extent and determinants of technical efficiency indicates which aspects of poultry farms' characteristics can be addressed in order to improve efficiency in a farm. It also introduces a new dimension to farmers and policy makers on how to increase poultry production by determining the extent to which it is possible to raise the technical efficiency of the farms with the existing resources base and the available technology in order to meet the increasing demand of poultry products such as chicken in Kenya. An improvement in the understanding of the levels of technical efficiency and its relationship with a host of farm level factors can greatly aid policy makers in developing efficiency c y enhancing measures as well as in judging the efficacy of present and past reforms.

Moreover, the result of the economies of scale determination is a very useful decision making tool when considering an expansion in a farm's scale of production. The result is crucial not only for the poultry farmers but also for those who intend to invest in the poultry industry since it enables them to ascertain whether or not an increase in the present scale of production could translate into reduction in an average cost of production and eventually increase farmers' profit. That is, it enables the other stakeholders (private investors, government) to find out whether a possible increase in the present scale of broiler production in the study area and in Kenya as a whole would not disadvantage the farmers in terms cost/profit. Therefore, an empirical study to determine the cost efficiency levels of the broiler farms and the presence of economics of scale among the farms are the necessary first step in our national effort to reduce broiler production cost and boost local production

The purpose of this study is to investigate the factors that affect poultry production in Eldoret town of Uasin Gishu County, Kenya. The significance of this study is that if it is established that

there are some negative factors that hinder the growth of poultry farming in Eldoret town, then some policy issues that can be applied to promote and sustain the growth of the sub-sector should be formulated and applied. Secondly, a study of this kind will form a base for other researchers to give a critique of the research findings or to make an improvement on it.

1.6 Limitations of the study

First, the findings of the study were limited to the responses that were obtained from the farmers who were interviewed. The quality of responses was depended on the integrity, faithfulness and consistency of the respondents and the research assistants. This is likely to affect the quality of the output. Another limitation expected out of this research is that some farmers may not respond to the questions asked or may not return the questions mailed to them in a case where they may not be accessed**.**

1.7 Delimitations of the study

The study confined itself to the factors which affect productivity in poultry farming projects in seven estates of Eldoret town, Uasin Gishu County, Kenya. The time span for the study was limited to three months April to June 2016. The study was limit its findings to responses from poultry farming projects in Eldoret Town and therefore any other extraneous variables beyond the researchers control such as respondents' dishonesty, and unfaithfulness was not controlled by researcher. Lastly, this study was limited to responses attained from 100 farmers who were interviewed**.**

1.8 Assumptions of the study

The study was base on the following assumptions:

That the respondents were provided sincere, honest and reliable feedbacks to the information that were been sought.

That the duration of three months, that is, from April, 2016 to June 2016 was enough to conduct the research and present the findings.

That the findings of this study would benefit poultry farmers and other stakeholders.

1.9 Definitions of Significant terms

Poultry production-is an innovative and high technology sector producing mainly chicken meat and eggs.

Poultry farmers: in this study, this will refer to persons who engage in poultry farming.

Farm inputs: Are factors that lead to observed results such as capital, labour, raw materials and entrepreneurship

Socio-economic factors: These are defined as those aspects attributed to man and his environment such as farmers age, education level, farm size, and engagement in other income generating activities other than poultry farming, access to credit, and number of years of poultry farming experience.

Poultry Market: This the outlet through which the farmer sells or buys the poultry products particularly eggs and meat.

Technology: Refers to collection of techniques, skills, methods and processes used in the production of goods or services.

1.10 Organization of the study

The study is organized into five chapters. Chapter one consist of the introduction of the study and covers the background information of the study, statement of the problem, objectives of the study, research questions, purpose and significance of the study, limitation of the study, delimitations of the study, basic assumptions underlying the study, definition of key operational terms and organization of the study. Chapter two covers the literature on past studies on poultry farming that had been conducted by other scholars. It starts by reviewing the concept of poultry farming by examining the farm farmer factors. The chapter proceeds to analyze the technological factors and the poultry farm market in relation to productivity in poultry farming. Chapter three discusses the research design to be adopted in the course of the study, the target population, the study size determination and the sampling process and procedure, the data collection methods and the instruments to be used, how the validity and reliability of the research instruments will be tested, and the data analysis methods to employed. Chapter four discusses the expected results and how such results are expected to be useful to the stakeholders of poultry farming; lastly chapter five discusses the summary of the findings, conclusion, recommendation, and further suggestions.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature on the past researches that had been con ducted by various scholars on poultry farming. It starts by discussing the concept of poultry farming and the proceeds to how farm inputs, socio-economic, technological and availability of poultry product markets influence productivity of poultry farming. The chapter also discusses the theoretical and conceptual framework which was adopted in the study. The chapter ends by summarizing the main issues raised in the chapter and identification of the missing gap.

2.3 Concept of poultry production

Poultry production as an aspect of livestock production is important to the economic and social development and biological needs of the people of any nation because it assists in alleviating food security, creates employment opportunities for the people who are engaged and creates incomes to the people who are engaged in the projects. It is a process that involves rearing of chicks from day one to the time they mature by using some farm inputs, capital, labour and entrepreneurial talent (Oladeebo & Ambe-Lamidi 2007). However, the rearing of poultry is faced with some challenges (Ojo, 2003) as discussed below.

2.4 Farm inputs and poultry production

Ngoupayou (2007) points out that the cost of inputs determines the size of the poultry business that a poultry farmer is are able to set up. When the cost is high, many farming businessmen will either opt to reduce the size of the business or close the business altogether which will result to

decreased output. For the poultry business, inputs especially feeds constitute up to 70% of the total costs of production in many African countries. This is because in Africa, the high cost of feeds, especially grains for intensive poultry production is not within the reach of many farmers. This has acted as a deterrent to many potential poultry farmers, especially those who cannot access credit facilities from banks to engage actively in poultry farming. This has led to under-utilization of the available resources such farm lands as farmers can only stock small number of bird that they can be able to manage and sustain.

In America and Europe, the poultry industry has been facing some complex and conflicting problems. These problems include the increase in the prices of feeds as a result of competition for key raw materials such as corn with other industries such as those manufacturing corn based ethanol. This has drastically affected the profit margins of many firms and consequently has altered their expansion programs (Balty, 1995). In Brazil which is among the highest exporter of poultry products in the world, the costs of inputs has become the biggest challenge facing the poultry industry as the demand for grains poultry farming and the production of ethanol is such more than what the country is able to produce. This makes the cost of feeds so high and account for more than 70% of the total poultry costs. The increase in the cost of inputs s has been the cause in the slow growth and the sustainability of the poultry sub-sector of the agricultural industry (Sohel, 2011).

Sonaiya & Swan, (2004). Pointed out that the cost of feed is high and small scale poultry farmer could not afford it then it will affect the number of birds they can keep. Lack of feed for the mother hen and the chicks was the main reason for not confining poultry birds, chick confinement has been known to reduce losses from predators; however, it comes at a cost to the farmer in terms of increased feed . Mwachukwa & Onyenwauku (2009) who argued that:

‘fragmentation of land holding had an important bearing on technical efficiency on agricultural production, because land fragmentation did not give rise to economy of large-scale production’. However, Bravo-Ureta, Boris & Pinheiro (1997), & Wadud & White (2003) argued that there is no relationship between land area and agricultural production and productivity. In view of the contrasting results for and against land area and its relationship with productivity, the link between technical efficiency and farm size has been the subject of much discussion in the literature (Berry & Cline, 1979).

Wozniak (1984) found that farm size a proxy to labour constraint faced in poultry production .Education augments one’s ability to receive decode to making innovative decisions. Akanni, (2007) point out those Government policies however, promoted crop over livestock production. This has led to a decline in livestock production over the years in the country. This is largely associated with lack or limited finance (credit facilities) for the procurement of basic poultry equipment and materials. Feed ingredients are also expensive. This makes it difficult for the farmers to produce and supply sufficient and good quality feeds to the poultry birds.

Kwadzo (2013) also points out that Ghana also faced a serious problem with its poultry farming in the year 2009 because the continuous in the prices of poultry feeds which went up to 20% as a result of the maize produced in that year not being enough for both human and animal consumption causing the country to import more maize to meet the domestic demand

Mokowe, Keboneilwe & Kokoka (2011) notes that in Zambia, the year 2009 was a very hard one for the farmers as the feeds costs went up by 100% as a result of the economic melt-down bringing the poultry framing down by 40% and the farmers income went down by 30%. The

problem of the poultry farming was aggravated by the fact that a few grain monopolies dictated the grain prices. The situation was made worse by the devaluation of the currency combined with very poor government policies (Ngongoni, 2006)

2.5 Social -economic characteristics and poultry production

Different authors have identified a number of factors influencing productivity in poultry production, especially in developing country's agriculture. Al -Hassan (2008) points out that, inefficiency in production can result from socio-economic, demographic or environmental factors. However, some of the environmental/exogenous factors such as weather, government policies among others are outside the scope or the control of the farmers, and hence their impacts cannot be considered as the causes of the farmers' inefficiency. In view of this, Ali & Byerlee (1991) note that farm specific efficiency can be influenced by farmers' characteristics (socioeconomic factors) which impact on the managerial skills of the farmer. Such socio-economic characteristics include: the age of the farmer, his/her level of education, number of years of farming experience, access to credit and extension services, contacts and networks, farm size, gender, and engagement in other income generating activities other than farming activities.

Coelli & Battese (1996) identified age and schooling (level of education) as factors influencing efficiency. The result of their study indicated that the younger farmers were found to be more efficient than their older counterparts. The situation was made worse by the devaluation of the currency combined with very poor government policy. Nhemachama & Hassan (2007) who also found out that farming experience enhanced a farmer's knowledge and information and high skills in farming techniques and management, which improve the technical efficiency of the

farmer. Farming experience also enables a farmer to adapt to climatic change, new agricultural practices and ability to spread risk.

Kaur ,Sakhon, & Kingra,. (2010) conducted their study on technical efficiency of wheat production in Punjab state, India. They used stochastic frontier production to estimate the technical efficiency of wheat production and they found that the mean technical efficiency of wheat production as 87 per cent, 94 per cent, 86 per cent and 87 per cent in semi-hilly, central, south-western and Punjab state as a whole, respectively. The result of their model showed that the technical efficiencies are positively and significantly related to age, education and experience of a farmer and percentage area under the crop.

Bravo –Ureta, Boris & Pinheiro (1997) found that age and the level of education were significant and positively related to productivity of the farmer. Younger and more educated farmers attained high levels of TE, AE and EE than their older and less educated counterparts. However Ongundari & Ojo (2007) conducted a study on Economic Efficiency of Small Scale Food Crop Production in Nigeria using the stochastic frontier approach. The study revealed that farm size was one of the contributing factors of the economic inefficiency of the farmers. Small-sized farms exhibited high levels of technical inefficiency due to diseconomies of scale they experienced. The mean total cost of production was Naira 48,712.95 per hectare with a standard deviation of 43,358.81 Naira. The large variability in the standard deviation implied that the farmers included in the sample operated at different levels of farm sizes, which tended to affect their cost levels.

According to Oji & Chukwuma (2007) carried a study on technical efficiency of small scale poultry egg production in Imo State of Nigeria and found out that farm size has a significant

positive effect on efficiency. They noted that farmers who were not operating at full capacity and would increase output by increasing the number of birds reared. The two researchers also noted that extension contacts and the farmers' level of education do have positive impacts on the farmer's efficiency. Furthermore, a farmer's access to credit also increases his efficiency's ability. They noted that farmers who had access to credit were found to be more efficient than those who did not access credit. This could be due to the fact that those who accessed credit were able to increase their level of production and benefit from cost advantage that are associated with economies of large scale production.

Similarly, a study by Udoh & Etim (2009) determined the farm level efficiency of broiler production in Uyo, Akwa Ibom State, Nigeria and concluded that higher experience and level of education reduce inefficiency. This confirmed the results by other researchers that experience and level of education increase the efficiency of the farmers. Also, the effect of age on inefficiency was positive confirming that the older farmers were inefficient as reported by other researchers

According to Adetayo & Itebu (2013) pointed out that ages ranges from 21 to 40 years indicates that majority of the respondents were within the economically active age category and this is in line with Yinusa (1999) who observed that this age bracket contains the innovative, motivated and adaptable individuals.

Ng'eno (2011) also pointed out that the level of education and experience has significant and positive effect on efficiency of poultry farmers. Farmers with more years of experience and education were found to be more dynamic and therefore were more willing to adopt new

technology practices, thus leading to low inefficiencies as Compared to their counter-parts who were less educated.

2.6 Technology adaptation and poultry production

Technology adaptation remains one of the greatest problems facing the poultry businessmen across Africa (Portsmouth, 2003) where many farmers have inadequate technological knowledge on how to improve the productivity of their poultry production. The many African farmers also lack basic trainings on nutrition, knowledge of key poultry disease prevention which is prevalent in their respective countries. The farmers also face the lack poultry resistant breeds. Threat of disease outbreaks results to poultry farmers to avoid framing businesses which they consider to be risky. It is because many poultry farmers are averse to risk and prefer to invest their monies in safe ventures. An outbreak of a disease lowers the final output due to deaths and low production (Portsmouth, 2003).

Rahman, (2003). Education level influences farmers' access to information as well as their ability to understand technical aspects of innovations which largely affects production decisions. According to Goswami , Ghosh & Mazundar .(2010), annual income, land holding, extension contact, innovative proneness, risk orientation and economic motivation of fish farmers had positive significant relationship with their scientific fish culture practices. The study by Rousan (2007) showed that attitude towards change, educational level, farm income, farmers exposure, income level are the important socio-economic factors influencing adoption of farm innovations. Farmers' changes of technology use are usually influenced by need based and location specific technical training programmes and demonstrations followed by group discussion and field visits.

Men usually use technologies for rice, fruit and fish production, and women use technology for pig, chicken production (Truong Thi Ngoc Chi & Ryuichi Yamada, 2002). Factors that trigger adoption of new technologies comprise of young and educated male farmers, higher income level, risk orientation and decision making ability of farmers. Factors limited adoption of technology included conservative old men, illiterate, weak belief on ensure high yield of new technology etc.

Indrajith Upul Mendis & Jumnongruk U. (2005) reported that education, land, land tenure, income, credit, sources of information, extension activities, extension officer visits and membership of farmer organizations were found to be the important factors affecting adoption of recommended crop management practices in paddy cultivation in Kalutara district, Sri La Teklewold ,Dadi, & Dana. (2006), pointed that farmers' decision on the extent of adoption of exotic poultry breed was positively influenced by age of household head. They observed that farmers who were above 39 years were most likely to have lower adoption rates, because older people fear the risk of poultry diseases and other unexpected events in exotic breed of poultry whilst young farmers tend to be more flexible in their decisions to adopt new ideas and technologies more rapidly.

Therefore, diseases outbreak is one of the biggest challenges affecting the poultry farming in Africa. The fact that most of the serious poultry diseases are air-borne and can affect a number of flocks makes this challenge an issue which requires close monitoring. This problem is compounded by the fact that, in many African countries are yet to develop policies in relation to the insurance to livestock, especially poultry. For example, Kenyan, poultry farmers have in the

past lost thousands of birds as a result of the outbreak of highly infectious diseases such as new castle and gumboro (Kariuki, 2010).

Ferguson (1999) points out that new castle is a common infectious disease, which affects poultry and can be prevented through vaccination. The disease has been reported to cause very high mortality rates in poultry. For example, 50% mortality rate in Togo and Sudan, 70% in Nigeria, 80% in Cameroon, 90% in Kenya and Zaire and 100% in Morocco (Ferguson, 1998). This because many interventions that have been set up in western countries , which include introduction of new technologies, improved breeds, new equipment and modern management practices have not been fully implemented in most African countries (Ryan,1978). The developing countries also lack key personnel, especially the veterinary doctors and extension officers who can respond to cases of disease outbreaks in the farms as well as to train the poultry farmers on the best practices as far as poultry farming is concerned (Beg, Baqui & Hossain, 2011).

In Africa, many livestock diseases are usually based on control rather than on elimination and therefore such diseases keep on recurring. For example, a recent research in Kenya indicated that many poultry farmers spend a big portion of their income in treating endemic diseases (Ferguson, 1999). In Zimbabwe, disease outbreaks have remained to be one of the major setbacks to poultry production. This is because many small-scale farmers cannot afford to buy the necessary vaccines and drugs required for the upkeep of poultry. The problem has been getting worse as the government of the African do not have enough funds. Also the veterinarians have mobility problems when there are disease outbreaks due to poor roads. As a result, the poultry sub-sector of the agricultural industry has been under-performing in the last twenty years (Farrell, 2008).

2.7 Availability of Market and poultry production

Galeboem, Isaac & Mmattio (2009) notes that availability of markets and market information encourages farmers to produce goods that are demanded and hence their confidence that there exists a ready market. A market that is deficient in information and exhibits inconsistency is likely to be attractive to the investors. Like any other business, poultry farmers also prefer to invest in poultry farming where there is adequate information exist.

Makhura ,& Delgado. (2001) found that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold. Thus, the variable transport costs per unit of distance increases with the potential marketable load size. For farmers in very remote rural areas, geographic isolation through distance creates a wedge between farm gate and market prices. This leads to a shift from production of profitable but highly perishable commodities such as fruits and vegetables to relatively storable low-value cereals (Stifel & Minten, 2008)

McArdle (2006) also points out that poultry farmer also wish to invest in markets which are not faced with unfair and un-regulated competition and also in an environment of free trade barriers that have been implemented in other countries. For example, Kolare (2012) points out that in Botswana poultry marketing is highly disorganized. Despite the fact that the buying price of the major poultry input product, corn, is mainly determined by the poultry farmers where they pay low prices, the Botswana poultry industry has not experienced growth over time. This is because word of mouth is the most relied upon method of marketing of the 60% the poultry products. And buyers are the ones who dictate the price to pay for such products.

Mugga (2009) points out that there are serious disparities in the supply of poultry products in different parts of Uganda due to poor marketing strategies. It is common to find out that some areas have over- supply of poultry products while other areas are experiencing deficiencies. This due to the imperfection of the market as a result of the Ugandan government not focused in establishing a system that can ensure a smooth flow of products from the source to the end-user, thus guaranteeing smooth utilization and higher profit margins for the poultry farming business. .

In Kenya, points out Kariuki (2010), the poultry industry also suffers from poor organization and marketing due to little effort on the side of the Kenya government focus on the provision of information in order to facilitate the smooth flow of the poultry products from farmers to the consumers. Another problem that is experienced by poultry farmers in Kenya is the issue of low prices of poultry products in Uganda. This has caused poultry product buyers to illegally cross the border to Uganda to buy cheaper poultry products and then come and resell in Kenya, thus earn better returns. This has affected poultry farming in Kenya due to lack of market.

2.8 Theoretical framework

A production function expresses the relationship between an organization‘s inputs and its outputs. It indicates, in either mathematical or graphical form, what outputs can be obtained from various amounts and combinations of factor inputs. In particular it shows the maximum possible amount of output that can be produced per unit of time with all combinations of factor inputs, given the current factor endowments and the state of available technology. Unique production functions can be constructed for every production technology (James, 2002). Alternatively, a production function can be defined as the specification of the minimum input requirements

needed to produce designated quantities of output, given available technology. This is just a reformulation of the definition above (James, 2002). The relationship is non-monetary, that is, it only relates physical inputs to physical outputs such that prices and costs are not considered. The production function as an equation in its most general mathematical form can be expressed as:

$Q= f(X_1, X_2, X_3... X_n)$

Where:

Q= quantity of output

X_i= factor inputs (such as land size under poultry farming, labour, vaccines used, energy utilized, capital, any raw materials used, technology applied and management practices)

There are several ways of specifying a technology production function, this function. One is as Cobb-Douglas production function

(Multiplicative)

$Q= aX_1^b X_{2 +---+} x_n^c$

Where a, b and c are parameters that are determined empirically.

A production function is through a transcendental production function form (Halter, Carter & Hocking, 1957): in this way a production form can be expressed as

$Q= aX_1^b X_2^c e\, dX_1+fX_{2+ \ldots\ldots\ldots +} fX_n$

Where, e is the natural logarithmic base, b and c are partial coefficients of X_1 and X_2, respectively; d and f are trans-parameters measuring the variability of b and c in response to

changes in production scale and input substitution (complementarily). If d and f are zero, then the equation becomes a Cobb-Douglas production function. For non-zero trans-parameters the Cobb-Douglas special case is rejected because, in this case, the equation is non-linear and characterized by variable marginal products short-run input elasticity and the marginal rate of technical substitution and so equation (2.3) can still be estimated by a conventional regression method because its natural logarithmic version is linear in the parameters as indicated below (James, 2002).

$$\text{Ln } Q=\ln a+ b \ln X_1+c \ln X_2+dx_1+fX_2 + \ldots + fX_n \quad \text{---------- (2.4)}$$

The most defense transcendental production function from Cobb-Douglas is Transcendental which shows up three stages of production. In this way marginal product (MP) and production elasticity equations are presented as follows:

$$Mp = [b/X_1+d]\, Q_i$$

$$Ep = b+ dX_i$$

2.9 Conceptual Framework

In the study the conceptual framework which will be adopted is that farmers perception on factors influencing in the production will be considered as independent variables and the output in poultry production will be taken as the dependent variable as shown in figure (2.1) below.

Independent variable

Factors influencing

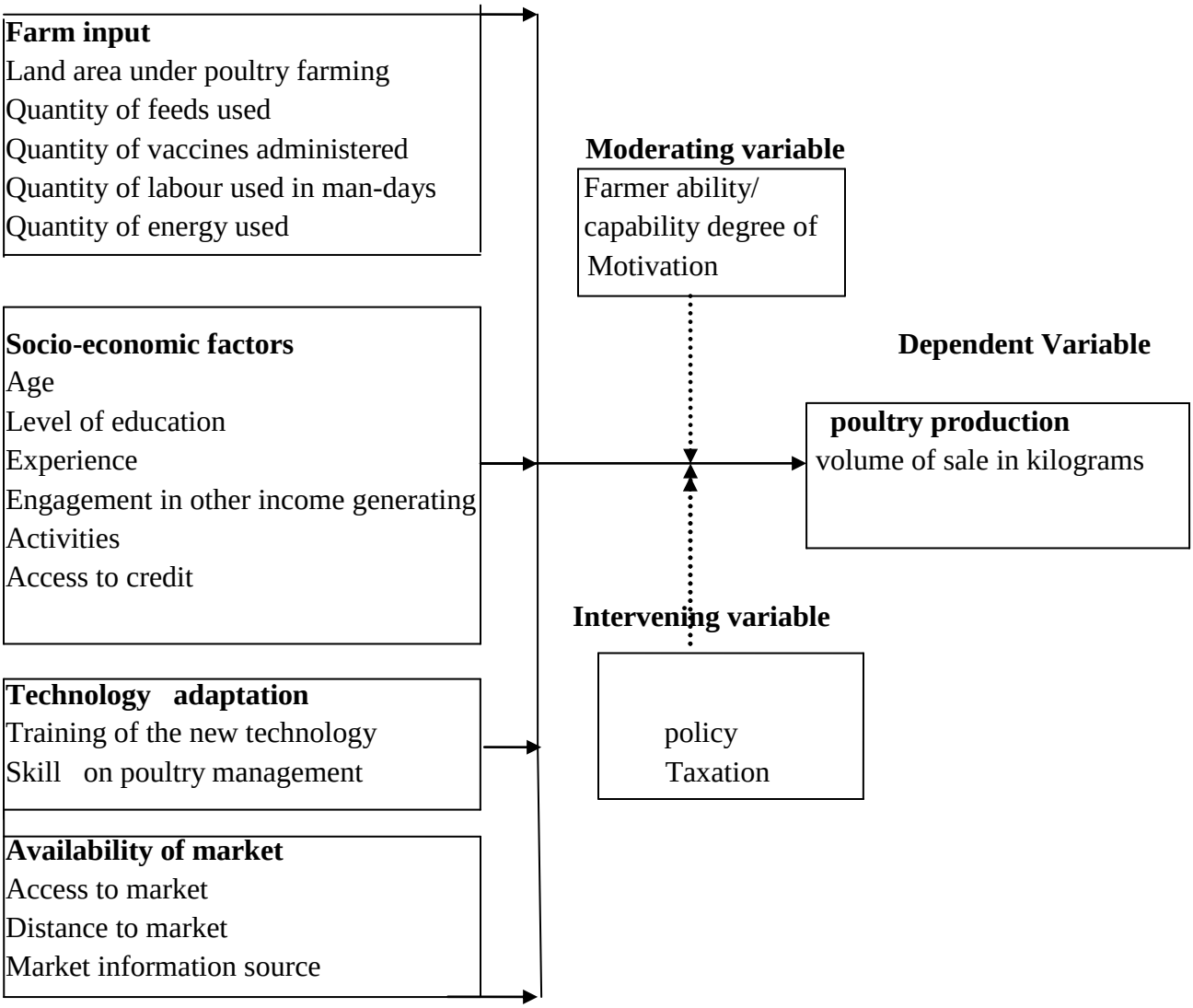

Figure 2.1: Conceptual framework. *Source: researcher source*

Extensive research has been done on the concept of poultry production; however, little research has been done on factors influencing poultry production. The past researches have dwelt on poultry production in general but have not specifically broken the poultry production into factors

influencing poultry production in poultry farming in terms of farm (farm inputs) and farmer factors (socio-economic) factors.

2.11 Knowledge gap

Literature reviewed for this study revealed that limited researches have been done on the factors that influence poultry production in Kenya while using both farm and farmer factors. This research intends to incorporate both the farm and farmer factors in poultry farming, a gap that had not been filled by other past studies. The reason for incorporating in this study both the farmer and farm factors in this study is that the productivity level on any firm depends on the two major factors.

Table 2.1 Knowledge gap

Variable	Indicates	Author	The year	Title	Finding	Knowledge
Disease and pet attack	Number of birds	Adetayo. and Itebu .A	2013	Challenges of small poultry farms layers production ibladan Oyo state Nigeria	majority were young	management
Number of birds raised	Size of the farm	Adebayo, o.o and Adeola,R. G	2005	Socio-economic factors affecting poultry farmers in Eligbo Local Government of Osun state	Majority were women	management
Land **Feed used** **Distance to market**	Size Amount used Distance in kilometer	Atieno. M.Ogolla	2016	Factors influencing poultry production among poultry farmers in Eldoret town ,Uasin Gishu	Majority were young adult	production

Table 2.1 Knowledge gap: Source*: researcher source*

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the research design, the target population, the sample size, the sampling process, the data collection methods and instruments, the validity and reliability of the data and methods which be used for data analysis are discussed, Ethical consideration and operationalization variable

3.2 Research Design

. The study adopted a descriptive design approach. This is because the objective was to obtain some insights into the factors that determine poultry farming in the study areas of the estates within Eldoret town. Secondly, the design was preferred because it was regarded as a systematic Third, the design contributed to a deeper insight and better understanding of the research problem, and accurate and fair interpretation of results. Lastly, the design was flexible enough and therefore allowed the respondents to raise issues with the researcher in relation to some questions and matters, which were not clear in the questionnaire or during the interview process.

3.3 Target Population

Since the aim of the study was to analyze the factors that influence poultry farming in Eldoret town. Data required for the analysis were obtained from poultry farmers who are were registered with the County Government of Uasin Gishu and were included in the survey. Approximately, 300 poultry farmers are registered with the County government of Uasin Gishu. A preliminary

survey conducted revealed that of the three hundred farmers who were registered with the Uasin Gishu County government, 75 were from Annex/Sugunanga, 60 from Langas, 54 from Huruma, 36 from Kimumu, 30 from Kapsaret, 27 from Kapsoya and 18 from Elgon View estates respectively as shown in Table 3.1.

Table 3. 1: Number of poultry farmers from the various estates of Eldoret town

Estates	Annex/Sugunanga	Langas	Huruma	Kimumu	Kapsaret	Kapsoya	ElgonView
Number of Farmers	75	60	54	36	30	27	18

Source: Field Survey data 2016

It was from this population that a random sample was drawn as outlined in sub-section 3.4.1 below.

3.4 Sample size and sampling procedure

3.4.1 Sample size

The population of poultry farmers who were registered with the Uasin Gishu government was 300 out of this number I took 100 as my sample size .This is because Kothari (2006) says that, sample size of 10-30 percent is reasonable .

The proportion of the number of poultry farmers who were surveyed from each estate was determined proportionately according to the number of farmers who were registered with Uasin

Gishu County government, From Annex/Sugunanga the proportion of the farmers who were surveyed was determined as 75/300 x 100, which culminated to 25, For Langas 60/300x100, for Huruma 54/300x100, for Kimumu 36/300x100 ,for Kapsaret 30/300x100 ,for Kapsoya 27/300x100, for Elgon View 18/300x100 were surveyed .

3.4.2 Sampling Procedure

The number of the farmers that was surveyed from each estate was proportionate to the number of poultry farmers in that estate in relation to the total population of the registered farmers as outlined below.

Tab le 3.2 Target population

Number of Poultry farmer's	Estates	Proportion of farmers out of 300	Number of farmers to be surveyed
75	Annex & Sugunanga	0.25	25
60	Langas	0.20	20
54	Huruma	0.18	18
36	Kimumu	0.12	12
30	Kapsaret	0.10	10
27	Kapsoya	0.09	09
18	Elgon View	0.06	0.6
300	**TOTAL**	1.00	100

Source: Researcher's source

From the register of listed from each estate a simple random sampling process where the first person was to be picked for the survey. This was followed by every third consecutive farmer

after the preceding farmer who was picked last. This process was repeated until the number of farmers to be surveyed was reached.

3.5 Research instruments

3.5.1 Piloting of the instruments

Before embarking on actual research, questionnaires was constructed and a pilot study was conducted in one of the nearest estate, Out span, next to where the researcher stays to enable the researcher to test the validity and the reliability of the research instruments was to be used in the data collection exercise. Another reason for the pilot test is that it was enable me as a researcher to familiarize myself with what kind of feedback to get from those who were respondents and to make any necessary adjustments to the research instruments where certain matters were not clear to the respondents

3. 5.2 Validity of the instruments

To test the validity of the research instruments, a test-retest method was applied. The purpose of the test-retest method was to ascertain the reliability, quality, accuracy and consistency of the answers that was obtained from the respondents. For example, in establishing the age of the respondent, he or she can be asked to state her/his age.

3.5.3 Reliability of the instruments

To test the reliability, validity, accuracy and consistency of the information, the same respondent is asked sometimes later to state when he or she was born and then co-relate the date of birth with the age which was stated earlier. .Qualitative validity of the research instruments was to ensured by processing the collected data into manageable proportions through editing ,coding and tabulation methods .Data collected was checked while still in the field to ensure that all questions are answered .Contradictory information was removed if found infective. Coding of answers to each item on the questionnaire was classified into meaningful categories and tabulations were used to obtain frequencies and percentages of each item.

Reliability of the research instruments is a measure of the degree to which an instrument yields consistent data after repeated results. To determine and improve the validity and reliability of the questionnaires, pilot study was carried out first in one of the estates, Outspan, as was mentioned earlier. This was done as a prerequisite for the preparation of the final research instruments.

3.6 Data collection procedures

Data required for the study was collected from both secondary and primary data. Secondary consist of information in relation to poultry farming obtained from journals, books, magazines, ministry of agriculture of Kenya publications, statistical abstracts, and economic surveys and from any other already documented information. Primary data, that is data that was collected from the source was solicited by means of research instruments questionnaires, Before embarking on actual research, questionnaires was constructed and a pilot study was conducted in one of the nearest estate, Outspan, next to where the researcher stays to enable the researcher to test the validity and the reliability of the research instruments was to be used in the data collection exercise. Another reason for the pilot test is that it was enable me as a researcher to familiarize myself with what kind of feedback to get from those who were respondents and to

make any necessary adjustments to the research instruments where certain matters were not clear to the respondents

3.7 Data analysis procedure

The data collected was analyzed qualitatively and quantitatively. The qualitative analysis take the form of calculation of percentages, means, range, standard deviations, analysis of variance and covariance (ANOVA and ANACOVA), and presentation in the form of table . Quantitative analysis take the form of multiple regression analyses to test the relationship between the independent variable (the output in terms of volume of sales in kilograms produced) and the independent variables, inputs used (quantity of feeds, labour hours expended, quantity of vaccines administered, quantity of energy used in terms of kilowatts) The relationship between output of the poultry farm and socio-economic characteristics was established by running regression analyses. The parameter estimates was reveal the extent of the relation of the dependent variable and the independent variables, inputs and the socio-economic characteristics.

3.7.1 Model specification for analyzing factors and poultry production in the study area

In analyzing the technical efficiency of the poultry farmers included in the sample, the assumption made was that, each poultry farm sought to reduce rate of output subject to a stochastic production frontier constraint. Each farm was permitted to be technically inefficient by allowing it to operate beneath its stochastic production frontier. Farm specific technical inefficiencies were derived using a stochastic production frontier (Battese and Coelli, 1995). An implicit assumption of a production function is that, all firms do produce in a technically efficient manner and the representative (average) firm defines the frontier. Variations from the frontier are assumed to be randomly distributed, and are likely to be associated with un-measured

production factors. In the estimation of the production frontier, it is also assumed that, the boundary of the production function is defined by "best practice' firms (Magreta, 2011). The maximum potential output for a given set of input is indicated by a set of points, which lie along a ray from the origin. Some white noise, is accommodated since the estimation procedures are stochastic.

However, the additional one-sided error represents any other reason for firms to be away from the boundary. Therefore, observations within the frontier are deemed "inefficient' and so from an estimated production frontier, it is possible to measure the relative efficiency of certain groups or a set of practices from the relationship between observed production and some ideal or potential production (Green, 2000).

A suitable production function, can therefore be presented as

$Y_i = f(x_i; \beta) \exp(v_i) TE_i$ ……. (4.1)

Where Y_i is the quantity of agricultural output of the i^{th}firm (1, 2, 3…..N), $x_,$ applied to crop i, β is a vector of parameter, and $(x_i; \beta)$ is a suitable production function, v_i is a random error associated with random events such as measurement errors in production. Such errors are assumed to be independently and identically (*ii*) distributed as N $(0,\sigma^2)$ random variable and TE_i is technical efficiency of the i^{th} farmer. The possible production Y_i is bounded by the stochastic quantity $f(x_i; \beta) \exp(v_i)$. From this, technical efficiency can be defined as the ratio of the observed poultry output to the maximum feasible poultry output in an environment characterized by defined random shocks. Thus, mathematically, technical efficiency can be expressed as

$$TE_i = \frac{Y_i}{\text{- -}} \quad (4.2)$$

$$f(x_i; \beta) \exp(v_i)$$

Estimation of the stochastic production frontier requires a particular functional form of a production function be imposed. There are various forms of production functions, with the most commonly used being Cobb-Douglas. Many factors do influence poultry production. Such factors include land area under poultry farming, labour used, poultry feed, vaccines and energy used. The variables mentioned above, which were included in the model were considered as a *priori* explanatory variables, responsible for influencing poultry production output..

The individual effect of these inputs and factors, were explained to a certain degree by multiple regression analysis. The Cobb-Douglas production function model was selected for the analysis as it is generally considered superior on theoretical and econometric grounds for determining the effects of the variable inputs (Constantin, 2009). The function also allows for regression under Ordinary Least Squares (OLS) in logarithm, yields coefficients that represent production elasticity where the sum of the production elasticities indicate whether the production process as a whole yields increasing, constant or decreasing returns to scale, taking into account that all the all inputs are related to production and are independent of one another.

Data were converted to per hectare basis to facilitate the analysis. Seven variables were selected and hypothesized to explain the poultry production as those variables were more relevant. The selected Cobb-Douglas production function in its stochastic form was specified as:

$$Y_i = aX_{1i}^{b1}+X_{2i}^{b2}+X_{3i}^{b3}+X_{4i}^{b4}+X_{5i}^{b5}+X_{6i}^{b6}+X_{7i}^{b7}e^{ui} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4.3)$$

In analyzing the factors influence poultry production among poultry farmers of Eldoret town; I adopted Kaur, Sakhon, and Kingra. (2010) model that was used to analyze the Technical Efficiency of Wheat Production of the Semi-hilly, Central and Western regions of Punjab, Pakistan. The model was used to estimate the individual technical efficiency of the wheat farmers of the regions stated above. The model was specified as

$$\ln Y_i = \alpha_0 + \sum_{k=1}^{7} \alpha_k \ln X_{ki} + \sum_{j=1} d_j D_{ji} + v_i - u_i$$

$$u_i = \delta_0 + \sum^{7}_{m=1} \delta_m Z_m \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4.4)$$

Where,

Y_i = wheat output of the i^{th} farmer

X_{ki} = use of the k-th input by the i_{th} farmer

D_{ij} =The j^{th} region of i^{th} farmer

Vi =The random-error assumed to be identically and independently distributed

N $(0, \sigma^2)$

u_i= Farm-specific inefficiency effect assumed to follow a truncated (at zero) normal

Distribution N (u_i, σ^2_u),

Zm = Factors affecting technical inefficiencies, and α_s and δ_s are the regression

Coefficients estimated.

To study the effects of the socio-economic factors on inefficiency, the model was analyzed in a single-step rather than the two step procedures because it generates estimates which are not biased compared to the ones generated by the two-step method (Wilson & Hadley, 1998; Battese & Coelli, 1995, Chu-Chia Lin & Yu-Chiang Ma, 2006). The specific variables, which were included in the model as specified by equation (4.4) were:

Y_i = Yield of poultry in kilogrmmes

X_1 = Land area under poultry farming

X_2 = Labour in man-days

X_3 = Quantity of poultry feed in kilograms administered

X_4 = Quantity of vaccines in litres administered

X_5 = Quantity of energy used measured in watts

Causes Inefficiency Factors

Z_1 = Age of the farmer

Z_2 = Level of education

Z_3 = Number of years of poultry farming experience

Z_4 = Engagement in other income generating activities other than poultry farming

Z_5 = Accessed financial credit.

Z_6 = Adaptation of Technology on Poultry Farming

Z_7 = Access to market

Ln = Natural logarithm

The above mentioned specific variables have been used in the analysis of farm productivity in other studies by Adebayo (2007), Akani (2007), Oladebo (2007) and Suniya & Sween (2004) Following Sonaiya & Swan (2004), the technical efficiency estimation of a farm, is given by the

mean of the conditional distribution of inefficiency term u_i given ε. Thus, the technical efficiency estimation was defined by

$$E(u_i / \varepsilon_i) = \frac{\sigma_u - \sigma_v}{\sigma} \left[\frac{f(\varepsilon_j \lambda / \sigma}{1-F(\varepsilon_i \lambda / \sigma} - \frac{\varepsilon_i \lambda}{\sigma} \right] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4.5.)$$

In equation (4.5**),** $\lambda = \sigma_u / \sigma_v$ and $\sigma^2 = \sigma^2_v + \sigma^{-2} u$ and F and f represent the standard normal density and cumulative distribution functions evaluated at $\varepsilon_j \lambda / \sigma$ and the farm-specific technical efficiency defined in terms of observed output (Y_i) to the corresponding frontier output (Y_i*) using available technology. The result derived from equation (4**.5)** yields,

$$TE_i = \frac{Y_i}{Y_i^*} = \frac{E(Y_i / u_i, X_i)}{E(Y_i u_i - 0, X_i)} = E(\exp(-u_i) / \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots \quad (4.6)$$

Or

$$TE_i = Y_i / Y_i^* = f(X, \beta) \exp v_i - u_i / f(X_i, \beta) \exp v_i = \exp(-u_i) \quad \ldots\ldots\ldots\ldots\ldots \quad (4.7)$$

Where,

Yi = the observed output

Y_i*= the frontier output

Thus, TE ranged between zero and one, that is, $0 \leq TE \geq 1$.

The data used in the analysis were derived from the raw data for obtained from the farmers interviewed from the seven estates of Eldoret town contained in appendix 3.1. Equation (4.4) was analyzed using a computer programme frontier 4.1 by Coelli (1996). The results are presented as table 4.1 and discussed in sub-section 4.2 of this study.

3.7.2 Model specification for the socio-economic analysis

To analyze the sources of factors that influence inefficiencies in poultry farming, it was necessary to investigate the relationship between farm/farmer characteristics with respect to the productivity of the poultry farmers for policy formulation purposes. Bravo-Ureta (1993,) states that, in order to understand the association between economic efficiency of farm and socio-economic characteristics a 'second step' estimation process is necessary. The second step estimation process involves analyzing the socio-economic factors and their effects on productivity. The socio-economic factors that were included in the analysis of the inefficiency model were: (a) age of the poultry farmer (b) his/her level of education (c) number of years of poultry farming experience (d) the poultry farmer's engagement in other income generating activities other than poultry farming (e) access to credit (f) adaptation of technology and (g) access to market. To analyze the effects of the socio-economic factors mentioned above, the model (4.19) below was applied

$$U_i = \delta_0 + \delta_1 Z_{1i} + \delta_2 Z_{2i} + \delta_3 Z_{3i} + \delta_4 Z_{4i} + \delta_5 Z_{5i} + \delta_6 Z_6 + \delta_7 Z_7 \quad \ldots\ldots\ldots\ldots \quad (4.19)$$

Where**:** Z_1 = represents the age of the poultry farmer

Z_2 = represents the level of education

Z_3 = represents the number of years of poultry farming experience

Z_4= engagement of the poultry farmer in other income generating activities other than poultry farming

Z_5 = Access to credit

Z_6 = adaptation to technology

Z_7 = Access to market

The δ_{is} were the scalar parameters to be estimated.

The engagement of the poultry farmer in other income generating activities was dummied as 1, and not engaging in other income generating activities was dummied as 0. The above socio-economic activities were included in the model to determine their possible influence on the poultry production efficiencies of the poultry farmers.

The data used in the analysis of the socio-economic factors are from appendix 3.1. The results of the analysis of equation (4.19) are presented as table 4.3 and discussed in sub-section 4.2 of this study.

3.8 Ethical considerations

During the study, the researcher will maintain high professional ethics of conduct and will ensure that the respondent's privacy and confidentiality will be safeguarded. The respondents will be informed of the objectives and significance of the study through copy of the letter of authority from the government and more specifically the Ministry of Agriculture. Effort will be

taken to ascertain that no plagiarism will occur during the research study as the intellectual property rights of other authors will be upheld.

3.9 Operational of Variables

Variable	Measurement category	Scale of measurement		Statistical
Farm input	Occasionally	Ratio	Multiple	Regression
Independent variable	Always	Ratio	Multiple	Regression
Land area	Occasionally	Ratio	Multiple	Regression
Feed area	Always	Ratio	Multiple	Regression
Vaccines administered	Always	Ratio	Multiple	Regression
Labour used	Always	Ratio	Multiple	Regression
Energy used	Occasionally	Ratio	Multiple	Regression
Socio-economic	Occasionally	Ratio	Multiple	Regression
Age	Occasionally	Ratio	Multiple	Regression
Level of education	Occasionally	Ratio	Multiple	Regression
Experience	Occasionally	Ratio	Multiple	Regression
Engagement in other activities	Occasionally	Ratio	Multiple	Regression
	Occasionally	Ratio	Multiple	Regression
Access to credit	Occasionally	Ratio	Multiple	Regression
Gender	Occasionally	Ratio	Multiple	Regression
Technology	Occasionally	Ratio	Multiple	Regression
Training	Occasionally	Ratio	Multiple	Regression
Skills	Occasionally	Ratio	Multiple	Regression
Availability of market	Occasionally	Ratio	Multiple	Regression
Market information	Occasionally	Ratio	Multiple	Regression
Distance to market	Occasionally	Ratio	Multiple	Regression

Table 3.2 Source: Author

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the results of the analysis of factors that influence poultry farming in Eldoret town. In sub-section 4.2 the results of farm characteristics, which Influence the productivity and production of poultry farming in the study area are presented and discussed. The results of the socio-economic factors analysis are presented and discussed in sub-section 4.5 of this chapter. Conclusion and recommendations arrived at as a result of the findings of the study are presented in sub-sections 4.4, 4.5, 4.6, and 4.7 respectively.

4.2 Response rate

The researcher administered hundred (100) questionnaires to randomly selected farmers in seven estates within Eldoret town Uasin Gishu county , namely Annex/Sugunanga ,Langas, Huruma, Kimumu, Kapsaret ,Kapsoya ,Elgon View , 100 of which were returned dully filled, representing a response rate of100%.

4.3 Demographic analysis

4.3.1 Age of the respondents

The ages of respondents would show the energy level and the importance attached to the project. The respondents indicated their ages as shown in the table below.

Table 4.1 distribution of the age of the respondent

Ages	Frequency	Percentage
(Below 20) yrs	5	5
(21-30) yrs	17	17
(31-40) yrs	53	53
(41 -50) yrs	15	15
(Over 51) yrs	10	10
Total	100	**100.0**

Source: Field survey data 2016

The results show that majority (53%), 53 out of 100 of the poultry projects farmers are middle aged adults at (31 - 40) years, followed by young adults of (21 - 30) years at 17%, 17 out of 100 who are energetic. Older farmers over 51 years age and young adult at (below 20) years are quite few representing only 10% and 5% respectively. This implies that poultry farming is common among younger farmers unlike those who are above 51 years which represent 10% of the respondents in this study. The ages ranges from 21 to 40 years indicates that majority of the respondents were within the economically active age category and this is in line with Yinusa (1999) who observed that this age bracket contains the innovative, motivated and adaptable individuals

4.3.2 Years of involvement in the project

Experience as in most other areas is critical in poultry production and therefore the study aimed at establishing the years of experience the poultry project farmers have and the results are shown below;

Table 4.2 Years of involvement by the project farmers

Year	Frequency	percentage
Less Than 5 year	65	65
Between (5-7) years	25	25
Over 7years	10	10
Total	**100**	**100**

Source: Field survey data 2016

The table shows that the poultry projects are relatively new in Eldoret town Uasin Gishu county, since the majority of the respondents (65%) 65 out of 100 have been in it for below 5years while only 10% 10 out of 100 have practiced for a longer time of over 7 years. The level of experience of the respondents; 65% of the respondents had less than 5 years' experience while 10% had above 7 years of experience. Little years of experience could be the reason for low poultry production among the poultry farmers in the study area. The knowledge on management, which is a key to profitable poultry production, is gained through years of experience of the poultry farmer (Fetuga 1992).

4.4 Farm inputs and poultry production

In order to understand how certain farm characteristics influence productivity and production in poultry farming in the study area, it was necessary to carry out a technical efficiency analysis of the factors, which were incorporated in the technical efficiency model specified in sub-section 3.7 of this study. Technical efficiency analysis of the poultry farmers who were included in the

survey was based on the Stochastic Production Frontier Analysis (SPFA) approach. In most microeconomics textbooks, producers are treated as successful optimizers, that is, they are engaged in production processes to minimize costs and consequently maximize profits. Conventional econometric techniques build on this paradigm in order to estimate the production/cost/profit function parameters, using regression techniques, where deviations of the actual yields (observed) are compared with optimal (expected) and then the results are modeled as statistical noise (Lewis, 2004).

However, though every producer may attempt to optimize profits, not all of them may succeed in their efforts. Given some inputs and some technology, some farmers produce more output while others produce less because of their differences in the level of inefficiencies. Therefore, econometric estimation techniques allow for the fact that deviations of observed choices from optimal ones are due to two factors: failure to optimize (that is inefficiency) and random shocks. Hence, Stochastic Frontier Analysis (SFA) approach was used to explain the producers' behavior.

To analyze the technical efficiency of the farmers, model 3.7 was applied. The data used in the analysis were derived from the raw data collected from the sampled farmers from Langas, Huruma, Elgon View, Annex/Sugunanga, Kimumu, Kapsaret and Kapsoya estates of Eldoret town. The summary of the results of the analysis is presented in table 4.4 below

Table 4.3 Result of farm inputs and poultry production

Variable	Parameter	coefficient	standard-error	t-ratio
Constant	beta 0	0.31560944	0.13961449	0.22605779
Land area	beta 1	0.20175223	0.50733176	0.39767317
Labour	beta 2	0.37714290	0.48732321	0.77390711
Quantity of feed	beta 3	0.33684285	0.14319775	0.23522914
Quantity of vaccine	beta 4	0.63524239	0.13802183	0.46024775
Energy	beta 5	0.26614183	0.18545416	0.14350815
	Sigma-squared	0.71846281	0.14573092	0.49300643
	Gamma	0.94489612	0.46718206	0.20225437
Mean efficiency =	0.57895194			

Source: Field survey data 2016

The results of the factors influencing poultry production of the sampled poultry farmers ranged between 0.1378 and 0.9170 a range of 0.7792. The statistics revealed that there was more variability in technical efficiency in poultry farming in the study area. The summary statistics of the factors influencing poultry production of the farmers who were included in the survey are presented as table 4.4 below.

Table 4.4 Summary of the results estimates of farm inputs.

Parameters	Maximum	Minimum	Range	Average
Entire Eldoret Town	0.9170	0.1378	0.7792	0.5790

Source: Field survey data 2016

The average (mean) for the poultry farmers of the study area was 0.5790; the maximum was 0.9170 and the minimum 0.1378. The above statistics implied that, if the average farmer in the sample from the study area was to achieve the TE level of its most efficient counterpart, then that

average farmer could release 36.86 percent cost savings (i.e.1-[0.5790/0.9170 x100] = (1 - 0.6341) x100 ≈ 36.86). As for the least technically efficient farmer, a cost savings of 15.03 percent (i.e. 1-0.1378/0.9170 x100). The high mean TE of 89th farmer could be due to more use of farm inputs, such as spacious land area, poultry feed, labour, vaccines, energy and better farm management practices.

The coefficient of land area under poultry production was 0.2018, implying that land area had a positive influence on poultry farming. This is because land fragmentation increases the inefficiency of the poultry farmers of the study area because of fewer benefits of economies of scale. However, large land units results to more benefits of economies of scale and therefore has positive influence on poultry production. The result also indicates that a 1% increase in land use would result to 0.2018 percent increase in output. Alternatively, it can be argued that every unit increase in farm size increases the likelihood of the poultry farmers to increase their poultry production because an increase in farm size is likely to increase the income of the farmer. Since the coefficient of land area was significantly different from zero, it can be implied that land area influences poultry productivity and production.

The above result is in agreement with the findings of Mwachukwa & Onyenwauku (2009) who argued that: 'fragmentation of land holding had an important bearing on technical efficiency on agricultural production, because land fragmentation did not give rise to economy of large-scale production'. However, Bravo-Ureta and Pinheiro (1997), & Wadud & White (2003) argued that there is no relationship between land area and agricultural production and productivity. In view of the contrasting results for and against land area and its relationship with productivity, the link

between technical efficiency and farm size has been the subject of much discussion in the literature (Berry & Cline, 1979).

The mean farm size ranged from 500 square metros for a farmer who had the smallest size to 30,000 square meters for a farmer who had the largest area under poultry farming, a range of 29,500 square metros. The large variability in farm size measured by the range of 29,500 was due to land fragmentation in some areas which affected negatively land that would be put under poultry farming. Thus, it could be implied that the size of land acreage under poultry farming was a contributing factor of the low technical efficiency of the poultry farmers of the study area...

Given the small size and fragmented nature of the poultry farmers' plots, it was uneconomical for the individual small-scale poultry farmers to reap economies of scale which would make them minimize their costs of production. To overcome this problem, it is desirable that the small-scale poultry farmers group themselves in larger land units, which are economically manageable (that is, land area management units -LAMU). The adoption of such proposed LAMU scheme has numerous benefits, which the small-scale sugarcane farmers could enjoy. The benefits are discussed below.

First, through a large land unit, the farmers are likely to enjoy economies of scale in production, which has the effect of lowering average cost per unit. As the average cost per unit lowers to a minimum, the small-scale poultry farmers are likely to reap maximum profits from their poultry production. Second, under the LAMU scheme, the small-scale poultry farmers are likely to

benefit from the closer and continuous monitoring of all their operations. This is likely to result into efficient use of resources and timeliness of operations.

The estimated coefficient for the variable labor was 0.3771. The positive coefficient implied that, an increase in the use of labor by 1% would increase the total production by 0.3771 in the study area, all things being equal. This implies that labour positively influences poultry production in the study area. The above finding was in agreement with the findings of Ogundari & Ojo (2006) in their study of An Examination of Technical, Economic and Allocative Efficiency of Small Farms: The Case of Cassava Farmers of Osun State, Nigeria. Their finding had also positive coefficients for the price of labor, which implied that there was a tendency of disguised unemployment in Osun state Nigeria because of too many people scrambling for the few job opportunities available in the state. This could be the same scenario in the study area.

The derived production elasticity for the quantity of feed was 0.3368. The positive sign of the elasticity of the quantity of poultry feed used indicated that a 1% increase in the use of this variable resulted in an increased yield of poultry products by 0.3368 percent for the farmers of the study area. The result implied that quantity of feed positively influences poultry farming in the study area and that there was scope for increasing production. The above results were consistent with the findings of Battese & Coelli (1993) , Hussein (1999) and Hussein (2004) who also obtained positive signs for the parameters quantity of feed used.

The application of vaccines is a very important aspect of poultry farming because of the role it plays in controlling diseases that can easily wipe all the birds in the farm. The coefficient of the

variable vaccine was 0.6352, implying that a 1% increase in the use of vaccine would result into an increase in poultry production by 0.6352 percent. Thus, the application of vaccines to the birds influenced positively poultry yield in the study area However, the study established that application of vaccines positively influenced poultry production, some vaccines such as Marrex, Newcastle and Fowl-box were found to be harmful to the environment. Although the use of vaccines contributed positively to poultry production, the research findings revealed that some of the poultry diseases had become resistant to some commonly used vaccines thus making the death rate in the farms to be high.

The cost with electricity (β5), which is one of the main operation costs in poultry production (Turco *et al.*, 2002), presented a positive sign .According to the estimated electricity coefficient, for each 1% increase in electricity costs, profit increase in approximately 0.27 % Although electricity costs had a significant impact on farmer's profit, the electricity price in Eldoret town (Ksh 17.00/kWh) is an advantage since it is substantially cheaper than using traditional method (charcoal).

4.5 Socio-economic factors and poultry production

Factors that influence poultry farmers production is not only affected by the physical inputs such as land area, labour, quantity of feed used, quantity of vaccine applied and quantity of energy used, but also by socio-economic, demographic, institutional and non-physical factors. Socio-economic factors, included in this study, which were deemed to affect the technical efficiency of the poultry farmers, were: age, level of education, number of years of poultry farming

experience, engagement in other income generating activities other than poultry farming, access to credit, Model 3.72 was applied in analyzing the socio-economic influences on poultry farming. The results obtained are shown as table 4.5 below.

Table 4.5 Result of the farmers socio-economic factors and poultry production

Variable		coefficient	Std. Error	t-value	p-value
Inefficiency model		Regression			
Age of farmer	δ_1	-0.06751	0.055584	-1.2091	0.000589
Level of education	δ_2	-0.21936	0.0796653	-2.7536	0.00589
Farming experience	δ_3	-0.36922	0.127837	-0.2888	0.77272
Engagement in other activities	δ_4	0.369402	0.136183	2.7145	0.00664
Access to credit	δ_5	0.000024	0.000006	3.2997	0.000097

Source: Field survey data 2016

From table 4.5 above, the parameter for the age variable was -0.06751 at 1% percent significant level. This implied that, age of the farmers was negatively related to the farmers' technical inefficiency in poultry production but positively influenced the efficiency of poultry farmers of the study area. This because as the poultry farmer grows older, he gains more experience in poultry farming, which in turn gives him the ability to combine resource inputs used in poultry production in an optimal manner, given the available technology (Idiong, 2005). One other possible reasons adduced was that, the older the poultry farmer the higher the chances that he had more resources at his disposal, which included capital, family labour, buildings and land. These resources are likely to increase the technical efficiency of the poultry farmer.

The age variable parameters were significantly different from zero at 1% significant level for all the seven estates surveyed and the parameter estimates of age for the farmers in the survey had

uniformly the same negative sign and were statistically significant. This implied that age positively influenced poultry production of the poultry farmers of the study area

The average ages of the farmers surveyed are indicated below as table 4.6.

Table 4.6 Age distribution of the poultry farmers of the study area

Age in years	below 20 yrs	21-30	31-40	41-50	51 and above
Number of farmers	5	17	53	15	10
Percentage	5	17	53	15	10

Source: Field Survey 2016

Table 4.6 indicates that most (53%) of the respondents were between the ages 31-40 while 10% were 51 years and above. This implied that poultry farming was common among younger farmers unlike those who are above 50 years which represent 10% of the respondents in this study. The farmers between 21 to 40 years (70%) indicated that majority of the respondents were within the economically active age category and this is in line with Yinusa (1999) findings, who observed that the age bracket of 21-40 years comprises of innovative, motivated and adaptable individuals who are actively engaged in economic productive processes.

Formal education plays an important role in upgrading people's consciousness in understanding the substance of various agricultural inputs required in poultry production. Education also plays a role in enabling the poultry farmer understand the environment where he operates and the factors affecting it. The variable level of education, that is, the number of years of schooling achieved by the poultry farmer, was used as a proxy for managerial input. Increased poultry farming experience coupled with higher level of educational achievement may, lead to higher technical efficiency in poultry production, including efficient use of inputs. This is because education

enhances a poultry farmer's ability to seek, decipher and make good use of information about production inputs.

The results indicate that, the parameter estimates for education was -0.2194, which implied that education was positively related to technical efficiency (but negatively related to technical inefficiency) of the poultry farmers. This is because education empowered the poultry farmers with knowledge to combine farm resources in an optimal way. Secondly, education played an important role in upgrading farmers' skills. The results further indicated that, the average level of schooling was more or less the same for the farmers from the seven estates surveyed at 12 years, with a standard deviation of 4. This finding was in agreement with the findings of Aromolaran-Adetayo,. (2013) but was at variance with the findings of Kalirajan and Shand (1986). On the other hand, Bravo-Ureta and Evenson, (1994); have argued that there is no statistically significant relationship between education and production.

The parameters for poultry farming experience for the Eldoret farmers was -0.036922. This implied that, experience was positively related to a poultry farmer's efficiency (but negatively related to a farmer's technical inefficiency). This is because as the poultry farmer engages more of his time in poultry farming, which gives him ability to combine resources in an optimal manner, given the available technology. The experience of the poultry farmer helps in lowering production inefficiency in the farm... These findings were in congruent with the findings of Nhemachama & Hassan (2007) who also found out that farming experience enhanced a farmer's knowledge and information and high skills in farming techniques and management, which

improve the technical efficiency of the farmer. Farming experience also enables a farmer to adapt to climatic change, new agricultural practices and ability to spread risk.

Table 4.7 below illustrates how poultry farming experience varied among the poultry farmers of the study area.

Table 4.7 Level of experience distribution of the poultry farmers of the study area

Level of experiences in years	Less than 5years	5-7 years	above 7years
Frequency	65	25	10
Percentage	65	25	10

Source: Field Survey (2016)

The average poultry farming experience was 4.4**,** with a standard deviation of 0.9**,** which implied that poultry farming experience varied significantly among the poultry farmers of the study area. Farmers with more experience in poultry farming were more technically efficient in poultry production than those who had few years of farming experience as was revealed by technical efficiency results

From Table 4.5, it can also be adduced that the level of experience of the respondents; 65% of the respondents had less than 5 years' experience while 10% had above 7 years of experience. Little years of experience could be the reason for low production among Poultry farmers. The knowledge on management, which is a key to profitable poultry production, is gained through years of experience of the poultry farmer (Fetuga, 1992).

The result of the regression coefficient for engagement in other income generating activities other than poultry farming was 0.369402. The positive sign indicated that, engagement in other income generating activities other than poultry farming had a positive influence in inefficiency in poultry farming but negative relationship with technical efficiency of the poultry farmers. This was because as the poultry farmer engaged in other income generating activities, he paid less attention to how the resource inputs of the farm were utilized. Secondly, many of the poultry farmers who engaged in other income generating activities other than poultry farming became more of absentee farmers who put little time as a resource to poultry farming activities.

The parameter estimate for access to credit was 0.000024, which implied that access to credit had a positive influence on a farmer's efficiency. This is because access to credit empowers a farmer to purchase the necessary inputs required for the production and increases his/her working capital eventually enabling the farmer to meet the day today obligations of the farm as they arise.

4.6 Technology adoption and poultry production

Technological innovation plays a very important role in agricultural production, poultry production included. If new and innovative agricultural technologies developed for farmers are not transferred in correct (appropriate) manner and adopted accordingly, all the efforts by the researchers who developed such new and innovative technologies would have been in vain. A farmer is a rational decision maker who normally strives for a better standard of living and seeks ways of adopting new and innovative technologies to accomplish this goal (Nell ., 1998). The results of the regression analysis for the adoption of new and innovative technologies by the poultry farmers of the study area are presented in table 4.8 below.

Table 4.8 Multiple regression analysis of technology adaption and poultry production analysis

Variables	parameters	coefficient	stand error	t-value	p-value
Age of farmer	δ_1	-0.06751	0.055584	-1.2091	0.000589
Level of education	δ_2	-0.21936	0.0796653	-2.7536	0.00589
Farming experience	δ_3	-0.36922	0.127837	-0.2888	0.77272

Source: Field survey data 2016

The age of the respondents was not found significant on technology adoption of any of the selected seven poultry farmers under study. The parameter estimate for age was -0.06751 this indicates that adoption of technology of the poultry farming was not determined by the age of the respondents. This is attributed to the fact that most of the respondents under study were in the category of young from 21 to 40 years. This because as the poultry farmer grows older, he gains more experience in poultry farming, which in turn gives him the ability to combine resource inputs used in poultry production in an optimal manner, given the available technology (Idiong, 2005).

The respondents were grouped into five; No formal education, primary level, secondary, Diploma/college, graduate and postgraduate Most of the respondents were secondary, tertiary and illiterate in that order. The coefficient of educational status in the adoption of Poultry farming was negative (-0.21936).This implies that Education level influences farmers' access to information as well as their ability to understand technical aspects of innovations which largely affects production decisions (Rahman, 2003).

The result was at variance with the study of Teklewold , Dadi, & Dana. (2006), they pointed out that farmers' decision on the technology adoption positively influenced by age of household head. They observed that farmers who are above 39 years were most likely to have lower adoption rates, because older people are not fast at adapting new technology while young farmers tend to be more flexible in their decisions to adopt new ideas and technologies more rapidly. On the other hand Ghosh ,Goswami & Mazundar. (2004) showed that education of the respondents was significantly correlated with adoption of improved animal husbandry practices in West Bengal.

The coefficient of farming experience showed a negative (-0.36922) this implied that the adoption of technologies by the farmers. Experience helps an individual to think in a better way and makes a person more mature to take right decision.

4.6.1 Poultry farmers perception of adoption of technology in poultry production

Poultry farmers' perception of adoption of technology in poultry farming influence poultry production increase or decrease is presented in table 4.6 below.

Table 4.9 Farmers' perception of adoption of technology and poultry production

S.N	Perceived Benefits	S A	A	U	D	SD
		Freq %	Freq%	Freq %	Freq. %	Freq %
1.	Technology potential of my product is promising	15	17	15	27	20
2	Searching for new technology for my products is not so difficult	40	20	10	5	15
3	Technology of my products is well planned	20	15	5	27	33
4	I have information on new technology of my Product	50	15	2	17	16
5	Adoption of technology in poultry farming influence production	60	15	10	5	10

Source: Field Survey (2016)

NB: 1 SD = Strong Disagree, 2 D = Disagree, 3 U = Undecided, 4 A= Agree, 5 SA= strongly agree

From Table 4.6 above most (60%) of the respondents strongly agreed that the adoption of technology in poultry farming influence production and helps in increasing profit made from the poultry business. More than half of the respondents perceived that adoption of technology increased production of poultry products (eggs, meat and poultry droppings, which could be used as manure to boost agricultural production). The respondents stated that, having information on new technology of their product improved well-being of the farmer's household. At least (40%) agreed that searching for new technology for their product is not difficult. This because of more farmer interview were between the age bracket of 21-40 who were much familiar with new technology trend required to handle the increase in the poultry business. Among the respondents (27%). strongly disagreed that technology potential of their products is promising to boost their poultry production.

4.7 Availability of market and poultry production.

Table 4.10 Multiple regression analysis of availability of market and poultry production in the study area.

Variables	parameters	coefficient	stand error	t-value	p-value
Access to market information	δ_1	0.45293	0.17774	0.81355	0.25520
Distance to market	δ_2	-0.21936	0.0796653	-2.7536	0.00589

Source: Field survey data 2016

Access to market information, which was consistent expectation that if a poultry farmer has the knowledge of what is required in the market, and then he can easily produce what, is demanded by the customers. This positively influences poultry farming. The significance of the value of 0.45293 is that a one percent increase in market information to poultry farmers increases their poultry farming by 0.453 percent.

The coefficient of the variable longer distance to market was found as -0.21936. The result indicates that the longer the distance to the market the less poultry farmers in increasing their production. Thus, long distant market negatively influenced production of the study area because long distances increased the costs of the poultry farmers and consequences increases in their inefficiencies.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings, conclusions, recommendations and suggestions for further study.

5.2 Summary of findings

5.2.1 Farm inputs and poultry production

The result indicates that a 1% increase in land use would result to 0.2018 percent increase in output. Alternatively, it can be argued that every unit increase in farm size increases the likelihood of the poultry farmers to increase their poultry production because an increase in farm size is likely to increase the income of the farmer. Since the coefficient of land area was significantly different from zero, it can be implied that land area influences poultry productivity and production. The result is in agreement with the findings of Mwachukwa & Onyenwauku (2009) who argued that: 'fragmentation of land holding had an important bearing on technical efficiency on agricultural production, because land fragmentation did not give rise to economy of large-scale production'. However, Bravo-Ureta and Pinheiro (1997), & Wadud & White (2003) argued that there is no relationship between land area and agricultural production and productivity

The estimated coefficient for the variable labor was 0.3771. The positive coefficient implied that, an increase in the use of labor by 1% would increase the total production by 0.3771 in the study area, all things being equal. This implies that labour positively influences poultry production in

the study area. The above finding was in agreement with the findings of Ogundari & Ojo (2006) in their study of An Examination of Technical, Economic and Allocative Efficiency of Small Farms:

5.2.2 Socio-economic factors and poultry production

The results show that majority (53%), 53 out of 100 of the poultry projects farmers are middle aged adults at (31 - 40) years, followed by young adults of (21 - 30) years at 17%, 17 out of 100 who are energetic. Older farmers over 51 years age and young adult at (below 20) years are quite few representing only 10% and 5% respectively. This implies that poultry farming is common among younger farmers unlike those who are above 51 years which represent 10% of the respondents in this study. The ages ranges from 21 to 40 years indicates that majority of the respondents were within the economically active age category and this is in line with Yinusa (1999) who observed that this age bracket contains the innovative, motivated and adaptable individuals

The parameters for poultry farming experience for the Eldoret farmers was -0.036922. This implied that, experience was positively related to a poultry farmer's efficiency (but negatively related to a farmer's technical inefficiency). This is because as the poultry farmer engages more of his time in poultry farming, which gives him ability to combine resources in an optimal manner, given the available technology. The experience of the poultry farmer helps in lowering production inefficiency in the farm... These findings were in congruent with the findings of Nhemachama & Hassan (2007) who also found out that farming experience enhanced a farmer's knowledge and information and high skills in farming techniques and management, which

improve the technical efficiency of the farmer. Farming experience also enables a farmer to adapt to climatic change, new agricultural practices and ability to spread risk.

The level of experience of the respondents; 65% of the respondents had less than 5 years' experience while 10% had above 7 years of experience. Little years of experience could be the reason for low layer production among the small-scale layer farmers. The knowledge on management, which is a key to profitable poultry production, is gained through years of experience of the poultry farmer (Fetuga 1992).

5.2.3 Technology adaptation and poultry production

The parameter estimate for age was -0.06751 this indicates that adoption of technology of the poultry farming was not determined by the age of the respondents. This is attributed to the fact that most of the respondents under study were in the category of young from 21 to 40 years. This because as the poultry farmer grows older, he gains more experience in poultry farming, which in turn gives him the ability to combine resource inputs used in poultry production in an optimal manner, given the available technology (Idiong, 2005).

Most (60%) of the respondents strongly agreed that the adoption of technology in poultry farming influence production and helps in increasing profit made from the poultry business. More than half of the respondents perceived that adoption of technology increased production of poultry products (eggs, meat and poultry droppings, which could be used as manure to boost

agricultural production). The respondents stated that, having information on new technology of their product improved well-being of the farmer's household.

At least (40%) agreed that searching for new technology for their product is not difficult. This because of more farmer interview were between the age bracket of 21-40 who were much familiar with new technology trend required to handle the increase in the poultry business. Among the respondents (27%). strongly disagreed that technology potential of their products is promising to boost their poultry production.

5.2.4 Availability of market and poultry production

This positively influences poultry farming. The significance of the value of 0.45293 is that a one percent increase in market information to poultry farmers increases their poultry farming by 0.453 percent.

The coefficient of the variable longer distance to market was found as -0.21936. The result indicates that the longer the distance to the market the less poultry farmers in increasing their production. Thus, long distant market negatively influenced production of the study area because long distances increased the costs of the poultry farmers and consequences increases in their inefficiencies.

5.3 Conclusions

The study established that technical efficiency of the poultry farmers of the study area was very low (approximately 57 percent as was revealed by the analysis). The low technical efficiency

could be as a result of factors that influencing poultry production in the study area. Such factors include farm inputs. Land area, quantity and quality of labour supplied, quantity and quality of poultry feed administered, the amount and the appropriateness of vaccine applied to the birds and quantity of energy used positively influenced poultry farming in the study area. In addition, socio-economic factors such as age of the farmer, level of education, experience in poultry farming and access to credit, new and innovative technologies and market also influenced positively poultry farming of the study area. However, engagement in other income generating activities other than poultry farming was found to have a negative influence on poultry farming.

5.4 Recommendations

Given the small size and fragmented nature of the poultry farmers' plots, it was uneconomical for the individual small-scale poultry farmers to reap economies of scale which would make them minimize their costs of production. To overcome this problem, it was recommended that the small-scale poultry farmers group themselves in larger land units, which are economically manageable scheme (that is, land area management units -LAMU). The adoption of such proposed LAMU scheme has numerous benefits, which the small-scale poultry farmers could enjoy. The benefits are discussed below.

First, through a large land unit, the farmers are likely to enjoy economies of scale in production, which has the effect of lowering average cost per unit. As the average cost per unit lowers to a minimum, the small-scale poultry farmers are likely to reap maximum profits from their poultry production.

Second, under the LAMU scheme, the small-scale poultry farmers are likely to benefit from the closer and continuous monitoring of all their operations. This is likely to result into efficient use of resources and timeliness of operations.

The study noted that many poultry farmers were operating at low technical efficiency level as was exhibited by the overall mean technical efficiency of approximately 57 per cent. The low efficiency level could have been attributed to the high costs of inputs such as land, poultry feed, labour, vaccines and energy (cost of electricity or charcoal). The study therefore recommends that, the Kenya government through the ministry of energy lowers the cost of electricity to affordable rate. The government should also try to control the inflation rate in the country that makes cost of living and other inputs which affect poultry farming to be high.

During the survey, it was noted that many poultry farmers did not have access to credit. Therefore, the study recommends that, the government through the central bank should influence the commercial banks to lower their lending rates and put less emphasis on the expensive collaterals they require poultry farmers to deposit with them in order to get access to loans they have applied for. These two proposals, if implemented, are likely to encourage poultry farmers to apply for loans from the financial institutions, which can enable them to improve their poultry farming.

Young, educated, innovative and energetic citizens should be encourage to venture into poultry farming and taking seriously as a business and as alternative way of employment creation instead of banking on formal employment opportunities which are scarce relative to the demand.

In order to improve the adoption of new and innovative technologies by the poultry farmers, it was recommended that the communication of such new and innovative technologies be passed to the farmers at the appropriate time and place. This can be done through extension services, field visits, radio and televisions using some form of language that is understandable by the farmers. Such new and innovative technologies should be appropriate and affordable by the poultry farmers.

5.5 Suggestions for further research

It came out that there are numerous factors that influence poultry production in Eldoret town - Uasin Gishu County. It is therefore suggested that further research be done on other factors such as quality of feeds and chicks. Similar study may also be done in other areas particularly the neighboring sub counties or counties. Research on the prospect of establishing a feed processing plant in the region will go a long way in addressing the high cost of feeds currently born by the young and vulnerable farmer in Eldoret. A similar research on other fields such as dairy production may be undertaken since the climatic condition in Eldoret town suits these projects, coupled with high demand for dairy products such as milk yet again there's a decline in this venture as the farmers gradually replace pasture crops with maize.

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APPENDICES

APPENDIXI

LETTER OF TRANSMITTAL

Maureen Atieno Ogolla
P.O. Box 7386 (30100)
Eldoret
Cell phone: 0723670159
Email: maureenatieno00@yahoo.com,
22thMARCH, 2016

The District Livestock Officer,
Uasin Gish County
P.O. Box

Dear Sir/Madam,
RE: REQUEST FOR RESEARCH DATA COLLECTION

I am a student undertaking Master of Arts (MA) in project planning and management at the University of Nairobi. As part of my assessment, I am required to submit a research project report. Consequently, I have written a proposal for a research on 'factors influencing poultry production among poultry farmers in Eldoret town Uasin, Kenya.
I have, therefore, designed a questionnaire to enable me collect the relevant data and wish to seek your authority to collect the data from the sampled farmers of poultry project.
The information obtained shall be strictly used for academic purposes only and will be availed to you on request.
Your cooperation is highly appreciated Thanks in advance

Maureen Atieno Ogolla

APPENDIX II

RESPONDENTS QUESTIONNAIRE

Dear Respondent,

My name is Maureen Atieno Ogolla, who is currently undertaking a Master of Arts in Project planning at the University of Nairobi. I am conducting a study on the factors that influence poultry production among poultry farmers in Eldoret Town, Uasin Gishu County, Kenya. I am kindly requesting you to spare some time and fill this questionnaire for me as honestly as possible by ticking or filling in the spaces provided. The information provided will be treated strictly as confidential and will only be used for the purpose of this study. The findings of the study and the recommendations arrived at will be of benefit to the poultry farmers of Eldoret town and other poultry farmers in Kenya and the world at large.

Thank you for your cooperation.

Maureen Atieno Ogolla.

This questionnaire is made up of four sections A, B, C and D. Please answer each question by writing on the space provided or tick against a box for the choice provided. The information provided is considered strictly confidential and will only be used for the purpose of this research. Do not write your name anywhere on the questionnaire**.**

A How does farm input influence poultry production?

1 Indicate the type of the poultry do you have

Broilers ☐ Layers ☐ Cockerels ☐ Village /backyard ☐

2 what is your flock size?

Less than 50 ☐ 50-249 ☐ above 250 ☐

3 How many square meters do they occupy? ----------

4 How many workers do you employ to take care of poultry farming per day on the ▼

Average----------

5 Indicate the amount each worker pay per day on the average? Ksh ----------

6 How many kilograms of feeds do you use per day? ----------Kg

7 How much do you pay on the average per kilogram? Ksh ----------

8 Do you administer preventive medicine (vaccines) to your birds? Yes ☐ No ☐

Which of the following vaccines do you administer? Tick as appropriate

Marrex ☐ Quality in liters ☐

Newcastle vaccine ☐ Quality in liters ☐

Newcastle + infections bronchitis ☐ Quality in liters ☐

Fowl box ☐ Quality in liters ☐

9 How much do you spend on the vaccines per litre administered? Ksh ----------

10 Do you keep your poultry warm? Yes ☐ No ☐

If yes how do you keep them warm?

By use of brooding jiko ☐ By use of infrared bulbs ☐

(Tick as appropriate)

How much do you spend on energy in warming the birds per month? Ksh ----------

11 How many poultry did you sell per one cycle of poultry kept? ---------- birds

12 What was the weight of the birds on the average in kilograms? ---------- Kg

13 How much did you charge per kilogram of the poultry sold? Ksh ----------

B How does Socio- economic characteristics influence poultry production?

14 What is your age bracket?

Below 20years ☐ 20-30years ☐ 31-40years ☐ 41-50years ☐ over 50years ☐

15 What is your level of education?

No formal education ☐ primary level ☐ Secondary ☐ Diploma ☐ Graduate ☐

Postgraduate ☐

16 Do you spent your labor hours on other income generating activities other than poultry

Farming? Yes ☐ No ☐

17 For how long have you been a poultry farmer?

Less than 1 year ☐ 1yr ☐ 2yrs ☐ 3yrs ☐ 4yrs ☐ 5yrs ☐ 7yrs ☐ over 7yrs ☐

18 Do you have access to credit to enable you run your poultry? Yes ☐ No ☐

If yes where did you get your financing from?

Bank Loan ☐ Bootstrapping .Chama/merry go round ☐ saving ☐

KEY:1 SA-Strongly Agree,2 A- Agree,3 UD-Undecided,4 D-Disagree,5 SD-Strongly Disagree

Indicate your level of agreement with regard to the following statements.

C How does access to appropriate and affordable technology influence your poultry farming?

19 Technology potential of my products is promising. SA ☐ A ☐ UD ☐ D ☐ SD ☐

20Searching for new technology for my products is not so difficult SA ☐ A ☐ UD ☐ D ☐ SD ☐

21Technology of my products is well planned SA ☐ A ☐ UD ☐ D ☐ SD ☐

22 I have information on new technology of my product. SA ☐ A ☐ UD ☐ D ☐ SD ☐

23Adoption of technology in poultry farming influence production SA☐A ☐ UD☐ D ☐ SD ☐

D To what extent does access to the market influence your poultry production?

24 Market potential of my products is promising. SA☐ A ☐ UD ☐ D ☐ SD ☐

25Searching for new market for my products is not so difficult SA☐A ☐UD D ☐ SD ☐

26Marketing of my products is well planned SA ☐ A ☐ UD ☐ D ☐ SD ☐

27Distribution channel of my product is already in place. SA ☐ A ☐UD ☐D ☐ SD ☐

28 have information on market / consumer on my product SA ☐ A ☐ UD ☐D ☐ SD ☐

29 Availability of market influence poultry production SA ☐ A☐UD ☐D ☐SD ☐

30 What is my market information source/arrangement? Informal ☐ formal ☐

31 What is my distance farm to market 1-3km☐ 4-5 km ☐ 6-7 km ☐ over 7km ☐