IMPACT OF ENVIRONMENTAL FACTORS ON THE PERFORMANCE OF POULTRY BUSINESS ENTERPRISES IN KARU METROPOLITAN AREA, NASARAWA STATE

BY

ESALE, FRANCIS EJIN
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DEPARTMENT OF BUSINESS ADMINISTRATION
FACULTY OF ADMINISTRATION
NASARAWA STATE UNIVERSITY, KEFFI,
NIGERIA

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DECLARATION

I declare that this Project has been written by me and it is a report of my research work. It has not been presented in any previous application for a Post Graduate Diploma in Management (PGDM). All quotations are indicated and sources of information specifically acknowledged by means of references.

....

Francis Ejin Esale Date

NSU/PDM/BAM/0382/17/18

CERTIFICATION

This Project on the 'Impact of environmental factors on the performance of poultry business enterprises in Karu metropolitan area, Nasarawa State' meets the regulations governing the award of Post Graduate Diploma in Management (PGDM) of the School of Postgraduate Studies of Nasarawa State University, Keffi, for its contribution to knowledge and literary presentation.

.....	.....
Dr. Ahmed Ibrahim	**Date**
Chairman, Supervisory Committee	
.....	.....
Prof. B. E. Barde	**Date**
Head of Department	
.....	.....
	Date
External Examiner	
.....	.....
Prof. Jonathan M. Ayuba	**Date**
Dean, School of Postgraduate Studies	

DEDICATION

This research work is dedicated to God Almighty, for His goodness and mercies and protection that saw me through the period of my study and this research; and to my wife Mrs Rosemary Francis, and our children—Godswill, Cletus, Godsgift and Victory, and to all my brothers for their kind and continuous support during the thick and tine of this research.

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LIST OF ACRONYMS AND ABBREVIATIONS

Code	Description of Table	Page First Used
ACGS	Agricultural Credit Guarantee Scheme … … … … … … … … …	1
ANOVA	Analysis of variance … … … … … … … … … … … … … … … …	55
BLUE	Best Linear Unbiased Estimator … … … … … … … … … … …	45
CBF	Clarified butterfat … … … … … … … … … … … … … … … …	1
CUSUM test	Cumulative Sum test … … … … … … … … … … … … … … … …	57
DIV	Diversification … … … … … … … … … … … … … … … … ...	38
DW	Durbin Watson … … … … … … … … … … … … … … … … ...	54
ERP	Enterprise Resource Planning … … … … … … … … … … … …	23
ESALQUEST	Esale's Questionnaire … … … … … … … … … … … … … … …	35
EXP	Sustainability/Expansion … … … … … … … … … … … … … …	38
FCR	feed conversion ratio … … … … … … … … … … … … … … …	14
GOV	Political/Government … … … … … … … … … … … … … … …	38
IFAD	International Fund for Agricultural Development … … … … …	16
INFR	Infrastructure … … … … … … … … … … … … … … … … …	38
KII	Key Informant Interviews … … … … … … … … … … … … …	27
MGT	Management skills … … … … … … … … … … … … … … … …	38
MKT	Marketing Factors … … … … … … … … … … … … … … … …	38
NAPRI	National Agricultural Poultry Research Institute … … … … …	2
NGOs	Non Governmental Organisations … … … … … … … … … … …	19
OLS	Ordinary Least Square … … … … … … … … … … … … … … …	33

PROD	Cost of production … … … … … … … … … … … … … … … …	38
PROF	Profitability … … … … … … … … … … … … … … … … … ...	38
R^2 (R-square)	Coefficient of Determination … … … … … … … … … … …	55
SOPs	Security Standard Operating … … … … … … … … … … …	13
TECH	Technological skills … … … … … … … … … … … … … …	38
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ABSTRACT

The study on impact of environmental factors on the performance of poultry business enterprises is timely, current and relevant, judging from the high expectation for poultry production to improve in output so as to make the product available to consumers in Karu and elsewhere at a reasonable quality and affordable price. The study adopted descriptive research method using the ordinary least square (OLS) regression analysis. From the structured questionnaires, data collected from 198 respondents across 23 enterprises were analysed using Eviews software. Three linear regression models constructed in line with our three hypotheses were all robust, as each had a good fit (with their model coefficients of determination (R^2) respectively as 0.62, 0.56, 0.73; and Prob(F-statistic) each of 0.000 less than 5% significance level. Furthermore, all the regressors were free of autocorrelation, as indicated by the Durbin Watson's (DW's) values of 2.18, 1.89 and 1.87 respective[y in their models. Findings showed that environmental factors significantly impacted positively on performance of poultry enterprises in Karu metropolitan area, as seen from the Wald-test F-value (12.62303) of p-value much less than 5% significance level. Similarly, environmental factors had a positively significant relationship with business sustainability/expansion of poultry enterprises, as the Wald-test F-value (39.44982) had probability-value less than 5% significance level. Finally, environmental factors had a significant impact on business diversification, as Wald-test F-value (410.7164) showed a p-value less than 5% significance level. We therefore conclude that the poultry business in Karu Metropolitan area enjoyed the influence of environmental factors. We thus recommend that for poultry business enterprises to exceed their performance level, they must seriously take care of all the environmental factors—being they internal or external. This will help to control and improve on their level of profitability which in turn will allow for subsequent enterprise sustainability/expansion and diversification.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The poultry industry is a unique and crucial subset of the livestock sub-sector of Agriculture in Nigeria. Poultry business (or poultry farming) refers to the rearing and trading in all birds of economic value to man, include chickens, pigeons, ducks, pheasants, quails, guinea fowls and ostriches, all which belong to the zoological class of avian. Poultry farming practice is over 150 million years old dating back to the original fowls. Apart from provision of meat, poultry is useful to man in various ways including egg, research and medicinal purpose, production of manure for improving soil fertility, feathers from poultry birds also provide human with aesthetic value. In the past 20 years the demand for poultry and poultry products has being on the increase resulting to the involvement of most countries in the production of poultry either for meat or eggs.

The industry thus has the fundamental role in the contribution to food programme for sustenance of life of the growing population. Furthermore, products from the poultry industry are also important for other uses other than for direct consumption, such as the utilization of eggs in the preparation of confectionary and vaccines (Gibson, et al 2017). Thus the poultry industry is an important industry, and has a worthwhile history to study.

Even though the livestock sub-sector received some notable developmental consideration from government, focus was more on dairy farming for production of clarified butterfat (CBF), with neglect of the poultry. For instance, before World War II (between 1933 and 1939), the fresh milk usually collected from the Fulanis in Northern Nigeria, went in for CBF production, which is the reason for establishing various dairy processing plants in Vom, Kaduna and Minna. However, things started to change with the introduction of the Agricultural Credit Guarantee Scheme (ACGS) in 1978 to guarantee loans granted by commercial and merchant banks for agricultural purposes. The lending to the LSS from inception of the scheme was said

to have favoured mostly the modem poultry sector. Loan guarantee statistics showed that between the inception of the scheme in 1978 and 1986, total guaranteed loans amounted to ₦316.86m, from which ₦173.90m (54.9%) went to livestock and out of the livestock loans, ₦149.04m (85.7%) went into poultry industry. Commercial banks were interested in lending for poultry projects, not because such ventures were considered more profitable, but because of the short interval between loan advance and repayment.

To some extent, the scheme appeared to have cared mostly for the large commercial producers. In 1986, borrowers of over ₦50, 000 accounted for only 2.4% of all borrowers but received 60.1% of the total guaranteed loans valued at ₦68.4m, small and medium scale borrowers of under N50, 000 represented 97.6% of total borrowers, but received only 39.9% of total loans. Nevertheless, the introduction of the ACGS was an impetus for expansion of commercial bank credit for livestock production. This was evident during this period in the increase in government attention towards assisting private producers engaged in poultry production for modern commercial purpose. To further develop, encourage and boost poultry production in Nigeria, government in 1985 established the National Agricultural Poultry Research Institute (NAPRI) in Shika, Kaduna state to develop improved strains of poultry for egg laying and meat. Since then, NAPRI has been able to develop a layer breed known as *Shika Brown* that can produce high quality eggs, and is resistant to prevailing poultry diseases; this institute also formulates feeding and management packages to enhance the productivity of poultry.

Statistics have shown that the poultry industry grew tremendously between 1963 and 1970 to become a major supplier of animal protein in Nigeria. This is evident in the fact that farmers' strength grew from 350 in 1963 to about 5,000 farmers in 1970, while the bird population increased from about 0.7 million exotic birds to an estimated 40 million birds within the same period. But this growth was scuttled in the 1980's by the economic recession that escalated production costs that sliced the production of commercial poultry by about 75%, and by the end of 1999, the number of commercial poultry farms in the country was less than one thousand (PAN, 2002). The performance generally has been erratic and unpredictable. The real problem appears to be the non-sustainable nature of intensive poultry production systems

developed in the post-independence period, mainly due to technical, biological, institutional and other problems that are socio-economic in nature. Statistical records indicate that the industry rejuvenated during the period of 1999 with an estimated commercial production of USD 800m by 2013 making it the most industrialized component of the Livestock Sector; and that it presently employs over 14 million people directly or indirectly, there is more work to be done in Nigeria, as much as in other African countries. Evidences of challenges abound in many other parts of the world. Apart from high cost of poultry feed in Nigeria, local/scavenger chicken producers are facing challenges on how to implement bio security measures on scavenging poultry especially in the face of resurging H5N1 Virus and other emerging diseases. According to McArdle (2006), the poultry industry faces the challenge of trade barriers that have been implemented in some countries such as China and India; Russia and India have introduced policies in their respective countries meant to hamper entry of the US poultry products.

In Botswana, village fowl farmers have reported that, before *Newcastle* disease attacks, they were feeding their fowls on green mulberry leaves to induce diarrhea claiming that fowls subjected to this treatment would not contract the disease (Moreki, 1997). In Gambia, one preventive measure ('vaccination') traditionally used against *Newcastle* disease consists of blending the excreta from any wild birds with goat's milk and giving the resulting mixture to village fowl to drink. A similar use of the entrails of fowl that have died of *Newcastle* disease has also been reported. The entrails of the fowl are soaked in goat's milk and the resulting infusion is given orally to the birds. These practices may have some protective effect but cannot be recommended because the entrails are very likely to contain the virulent Newcastle disease virus (Moreki, 1997)

In Uganda, marketing of local poultry is not well defined, chicken are sold to meet unforeseen expenses. The birds usually sold from the village flock are surplus males (cockerels and cocks); pullets and non-productive hens; large sized birds; old hens and sick birds. Growing chickens are sold just before the onset of the high risk *Newcastle* disease (Byarugaba, 2007). There are no studies done to cover the various agro-ecological zones nor do they show

consumer behaviour and market trends. The supply chain management consists of various players, right from production, wholesaling and retail. Local poultry farmers sell to the middlemen who exploit their ignorance of market prices to pay them less; the existing types of markets in Uganda include the Informal Markets, Primary markets, Secondary markets and Urban markets.

Informal Markets—which are within the villages, possibly sell from farmer to farmer or to retailers. Often chickens are bartered for larger animals such as goats. The *Primary markets* are generally formed by several villages within a parish. Traders also purchase chicken from adjacent several primary markets, during the course of a week and truck them to destinations within or outside Uganda. *Secondary markets*—which normally have a larger output than that of primary markets, also lack proper weighing, loading and hygienic facilities. Traders often come with trucks to buy local chicken for immediate transportation to larger centres such as Kampala. *Urban markets* are found in larger towns and cities. Often there are designated areas where mobile chicken stalls are erected. Local governments tax operators of such units. Consumers from such urban markets are hotels, restaurants and some affluent city dwellers.

1.2 Statement of the Problem

The poultry industry plays important roles in the social and economic development of any nation, Nigeria inclusive, as it is a major source of eggs and meat. In particular, the eggs have extended use as they are important in the preparation of confectionary and vaccines (Gibson et al., 2017). So many other opportunities abound in the poultry industry, including employment and income generation to the citizenry. However, the poultry industry is said to be continually characterized by low production levels, and majority of farmers particularly in the rural areas find it difficult to meet up the recommended nutritional requirement especially protein. And a source of income for many families, poultry yield has fallen short and unable to sustain the required performance required of a business entity. This gap is largely associated with several environmental factors that act adversely to the operation of the poultry industry, and so makes it difficult for the farmers to produce and supply sufficient and good quality feeds for the

poultry birds (Oyenuga et al., 1977). Critical research problem here is that inspite of the large volume of studies on agro-allied and livestock businesses in Nigeria, to the best of author's knowledge, there is a dearth of literature on studies relating to environmental factors and poultry business performance particularly in Karu metropolitan area in Nasarawa State.

1.3 Research Questions

The study thus sought to answer the following specific research questions:

1. To what significant extent do business environmental factors impact on the profitability level of poultry business enterprises in Karu metropolitan area of Nasarawa State?
2. What is the significant level of impact of business environmental factors on poultry business expansion in Karu metropolitan area of Nasarawa State.
3. To what significant extent do business environmental factors impact on business diversification of poultry business enterprises in Karu metropolitan area of Nasarawa State.

1.4 Objectives of the Study

The main objective of the study is to evaluate the impact of Environmental factors on the performance of poultry business enterprises in Keffi and Karu metropolis of Nasarawa State, using selected poultry enterprises. Other specific objectives to be achieved in this research included the following:

1. To examine the impact of business environmental factors on the profitability of poultry business enterprises in Karu metropolitan area.
2. To evaluate the impact of business environmental factors on poultry business expansion in Karu metropolitan area.
3. To examine the impact of business environmental factors on business diversification of poultry business enterprises in Karu metropolitan area.

1.5 Statement of Hypotheses

To propose useful answers to the research questions posed above, and to realize the study objectives, the following hypotheses have been formulated in null form, H_0i:

Hypothesis One ($H_0$1):

Business environmental factors do not have significant impact on the profitability level of poultry enterprises in Karu metropolitan area of Nasarawa State.

Hypothesis Two ($H_0$2):

Business environmental factors do not have significant impact on business expansion of poultry enterprises in Karu metropolitan area of Nasarawa State.

Hypothesis Three ($H_0$3):

Business environmental factors do not have significant impact on business diversification of poultry enterprises in Karu metropolitan area of Nasarawa State.

1.6 Significance of the Study

It was earlier stated that the poultry industry is unique and crucial in Nigeria, especially for the fact that it is a major source of eggs and meat that provide protein for the population. Thus the success recorded by the industry implies that the Nigerian populace as well as the international consumers will benefit in protein supply. In other word, the industry's fundamental role in the contribution to food programme for sustenance of life of the world's growing population is fulfilled. Furthermore, the outcome of the study will provide knowledge for the poultry farmers to help gauge those environmental factors that could form a barrier to higher performance. Government would also benefit from the study outcome as they would easily fall back on the research findings and recommendations that would assist in the formulation of policies and strategies on poultry farming improvement. From the academic perspective the study addresses issues currently agitating the minds of academics, and its contribution to the future development in this area of research. Thus the study findings are expected to contribute to the existing literature on poultry enterprise performance and factors affecting their performance.

1.7 Scope and Limitations of the Study

This research work assessed the level of performance of poultry business enterprises (PBEs) in Karu metropolitan area of Nasarawa State. It used the most recent period of ten (10) years—from 2009 to 2018, and investigated how environmental factors affected the performance of poultry business enterprises. The reason behind selection of 10 years period (2009-2018), is for easy identification of farm owners that operated within this period considered current and adequate; secondly, this was to ease analysis in terms of model formulation and control; and thirdly, this period had witnessed some considerable efforts made by governments and the agricultural sector toward improved production of the livestock and poultry industry in Nigeria.

This study was conducted on the effect of environmental factors on the performance of poultry business enterprises, using Karu metropolitan area. Information collection came from many stakeholders, such as leaders of Poultry Association of Nigeria, Nasarawa State, producers of broiler birds and, producers of layers who have been in the business for up to 10 years and adjudged by their peers to be knowledgeable in matters relating to the poultry sector in the state were interviewed. However, the study did not include traders in poultry and poultry products or sales outlets such as supermarkets and fast food shops. Environmental factors that may determine business performance or hamper its success are many and varied, as such this study focused only on a limited number for inclusion in the questionnaire. Furthermore, of the several indices of performances available in literature, this study considered only three proxies, namely profitability, business expansion, and diversification.

1.8 Definition of operational terms and acronyms

Environmental Factors:

Various factors that represent the totality of the surroundings which have a direct or indirect bearing on the functioning of business; they are a set of internal factors, (e.g. management style, which may be controllable), and external factors (such political and legal factors, marketing factors, technical factors etc. which may be uncontrollable in nature) and affect the business decisions of a firm.

Performance:

Performance thus points to the positive change towards organizational effectiveness and efficiency brought about by overall operations by workers in the firm. In this study it is used to refer to the degree of success of the poultry farming projects terms of productivity, business expansion/sustainability and financial returns.

Poultry farming:

It is the art and practice of rearing domestic fowl in particular the exotic commercial birds. In this study, the word includes all stakeholders, such as the actual farmers that produce the poultry products, the marketers, etc.

Poultry inputs:

These are materials and service that are routinely administered to the poultry (reared birds) for growth, sustainability and production

Veterinary service:

Part of extension service which is geared towards improving and maintaining animal health. It involves disease management and parasitic control, as well as talks and advices offered to livestock farmers. It involves field days and organized demonstration for farmers on farming and livestock techniques usually on identified and prepared farms.

CHAPTER TWO
LITERATURE REVIEW

2.1 Conceptual Framework

The poultry industry plays an important role in the development of Nigeria, both socially and economically, as it is a major source of eggs and meat. While these products provide the much needed nutritional value (such as the ample protein) for the growing population, so as to solve malnutrition problem, the eggs particularly are important in the preparation of confectionary and vaccines (Gibson, et al 2017). So many other opportunities abound in the poultry industry, such as employment and income generation to the citizenry.

Poultry business has witnessed great change in Nigeria. It has graduated from subsistence to commercial poultry farming. The primary motive of any business is to maximize profit. The marketing process enables poultry farmers and other people who engage in agricultural marketing to generate income, thereby increasing their welfare. But contrary to this reality, we see that the poultry industry in Nigeria, largely due to several environmental factors that act adversely to the operation of the industry, and make it difficult for the farmers to produce and supply sufficient and good quality feeds to the poultry birds (Oyenuga et al., 1977).

One disturbing revelation is that there is so much inconsistency on poultry project funding (Oboth, 2003), especially on the poor funding status of the small scale poultry farms in South Western Nigeria, which perhaps explains why the majority of these farms operated below fund secure level, due to limited credit facilities to procure necessary items such as high quality and abundant feeds, drugs and vaccines, cages and feeding troughs, hybrid chicks and so on. The low level of credit supply to the poultry farms therefore limits productivity and expansion in the sub-sector. To enhance performance in the small scale commercial poultry farms, therefore, adequate and timely release of funds that will see the farms beyond the fund insecure zone is essential (Akanni, 2007).

The importance of poultry to the national economy cannot be over emphasized, as it has become popular industry for the smallholders that have great contribution to the economy of the country. The profession has assumed greater importance in improving the employment opportunity and animal food production in Nigeria.

In trying to explain the role of marketing, Busch and Huston (1985) propounded the gap theory which is based on the premise that marketing need do not exist until a social economy reached the point where producers of economic goods are not the consumers of the same goods. This situation creates a separation or gap. It is in response to the need to bridge this gap that we have marketing. In a competitive economy, agricultural development cannot occur without improved marketing. This is because agricultural marketing is concerned with all the economic activities involved in the production and distribution of agricultural products (Odii and Obih 2000).

In Nigeria, the huge costs involved in the marketing of broiler products have drastically reduced the margin realizable from the enterprise. Considerable improvements in broiler production have been made by the application of modern techniques. However, there have been significant failures within developing countries to understand the interrelationship between broiler production and broiler marketing, since efficient marketing stimulates production. It can be seen that there are several factors that can either bring about the improvement of the poultry performance or creating barriers to performance. Factors considered in this study are discussed below.

2.1.1 Political Factors

These are closely related to government and its policy decisions and implementation related to agriculture, livestock and particularly poultry. Inconsistent Government Policies are of great disadvantage to poultry business. The onus is on Government to ensure a conducive and enabling environment for business to operate. This is usually lacking, as in the provision of infrastructures, and financial support. Generally, policies relating to business issues have been unpredictable, contradictory, inconsistent and from time to time conflicting (Adebayo, 2013),

and are thus not favourable to the poultry business, as proper and sustainable operation plans cannot be attainable. Associated with political factors is the problem of unlawful taxes (business development tax, business registration tax, business premise tax, sanitation fees, signboard fees, stickers etc) most often than not by state and local government agencies (tax force on this or that). As a result of this, poultry businesses carry out their operations under high cost and unfavourable business environment. Again, constant political turmoil in the country greatly limits foreign investors and possible donors to agro-allied businesses that would provide assistance to poultry farmers in the country. Generally, political and social movements strongly affect the level of entrepreneurial activity in Nigeria.

2.1.2 Cost of Poultry Production

Costs associated with poultry production are many, and include cost of Credit, Cost of diseases, Cost of farm inputs, Labour cost, etc. Poultry production also has both variable and fixed costs. Variable costs change with the number of birds produced and are not incurred when the producer is not growing birds. All inputs costs such as feeds, day old chicks, drugs and biological, electricity, water among others. Fixed costs in poultry production remain the same whether birds are produced or not. Depreciation costs on houses and equipment and interest are some of the fixed costs that the farmers cannot avoid. Input costs keep increasing by the year compared to slower increase on price of products such as eggs (Kang'ethe and Muturi, 2013), and certainly reduce the profit margin. To finance these costs, poultry entrepreneur are obliged to seek financial services such as credit facilities from banks.

Feed cost factors are many and they include high cost, low quality feeds and availability of feeds supplied by millers which have negative impact on productivity. Poultry are the most sensitive to poor quality feeds among the domestic animals and results are low production of meat and eggs due to nutritional deficiencies, and susceptibility to diseases. This lowers the return from the poultry farming business significantly, discouraging business entrepreneurs and impact on availability of protein products. To attract more poultry farming entrepreneurs and retain the current ones, net return must be significant. One aim of any business is to reduce

cost and risks in order to maximize profitability. Vertical integration has been suggested to reduce or eliminate the transaction costs uncured when separate companies own two separate stages of production (Bamino, Momoh and Philip, 2009). For the costs of production to be adequately met, there has to be a proper funding mechanism of the enterprises .The cost of inputs has affected business financing with many banks being not willing to finance poultry business startups and expansion due to limited cash flow as results of diminishing profit margin which consequently affects the rate of poultry products supply (Kang'ethe *et al*, 2013).

Modern poultry enterprise require additional financing apart from farmers own investment fund. The enterprises require application of modern technology in the management of the poultry business. The poultry enterprise is resource driven and requires the farmer to be in control of housing, environmental control, nutritional and health needs of the birds for optimal productivity. Access to credit can help livestock farmers boost production and employ better methods of livestock farming. Access to financial services is an obstacle that many farmers have to overcome to be able to engage in commercial livestock production. High risks connected to drought, diseases and inability of small scale farmers to provide collateral for their loans have resulted in farmer getting the lowest level of credit compared to other entrepreneurs. Several studies have shown that for investment, small holder farmers in sub-Saharan Africa depend on savings from their low incomes which limits opportunities for expansion.

Lack of collateral or credit history makes most farmers to be bypassed by commercial or National development banks and formal micro credit institutions. This push farmers to rely on own savings, income of friends and relatives, remittances and informal money lenders. The share of commercial banks loans to agriculture has been very low compared to manufacturing, trade, and other services sectors hampering expansion and technology adoption and thus low productivity.

Diseases pose one of the greatest risks in poultry enterprises and every producer is supposed to remain abreast in disease control. Poultry diseases can be categorized in many different ways

and among them is according to causative agents. In this classification, diseases can be classified according to causative agents such as viral, bacterial, parasitic, fungal, nutritional, physical such traumatic, thermal and chemical. The sources of infections in poultry originate from different sources such as humans (neighbors, workers, extension and veterinarians), contaminated equipments, from poultry (recovered poultry, poultry from shows and markets, backyard poultry), rodents, house hold pets, wild birds and insects, feeds and water, dust and air among others. One major method of poultry disease management is Biosecurity which is defined as measures taken to prevent microbial, parasites, insects, rodents and wild birds from entering or surviving or infecting or endangering of health of the poultry building. Bio security is aimed at exclusion, eradication and effective management of risks posed by pests and diseases to the economy, environment and human health (Siekkinen, Heikkila, Tammiranta and Rosengren, 2012)

The major costs of disease control arise from preventive medication such as compulsory vaccination against different diseases, traffic/personnel control such as pest control, building fences, gates to prevent introduction of disease causing agents, hygiene of poultry farms through disinfection of poultry houses, regular cleaning of equipments and houses, training of poultry famers and staff on diseases management and finally but not the least by treating the sick birds. A well planned disease control plan should be adopted by poultry entrepreneurs through clearly defined objectives, risk assessment, establishing Bio Security Standard Operating Procedures (SOPs) and monitoring the effectiveness of the Bio security plan (auditing).

Many studies concur that Bio security is the most economical and effective method of disease prevention and control. Bio security has a direct relationship with profitability of poultry farms and firms with poor Bio security measures have always reported drop in egg production, slow growth rate, poor hatchability, poor feed conversion ratio (FCR) and increased rates of condemnations (Yonatan, 2011). The total costs of Bio security per bird are dependent on the

number of birds and the higher the number of birds the lower the cost of preventive medication, pest control, operational hygiene among others (Siekkinen *et al.*, 2012).

2.1.3 Infrastructural Factors

Infrastructure is a key investment in any business, and poultry business is no exception. Among the infrastructure, roads are considered of first interest because transportation has significant, positive and substantial impact on economic growth (Llanto (2012) and poverty since it improves the connectivity of segregated and remote areas. Inoni and Omotor (2009) showed that road infrastructure promotes intersect or linkages between the Agricultural and non-farm sector that enhances income diversification strategies among entrepreneurs. Shortage of land and population pressure has been identified as an obstacle to increased agricultural output. Coupled with changing climate conditions, lack of improved farming technology, the structure of land tenure and lack of proper land ownership, all pose a challenge on output optimization. Natural resources management and application of technology is highly affected by land tenure system and property right. Secured property right has several advantages such as giving sufficient incentives to the farmers to increase their efficiencies in terms of productivity, making farmers emotionally attached to the land work on and use inputs efficiently thus providing incentives for investment in land, durable structures such as poultry houses and sustainable development. Secure land ownership has socioeconomic advantages and increased incentive to invest, better access to investment or substitute shock all increase productivity, productive development. Thus, security in property ownership determines farmers' profit margin and land use decision. Insecure land tenure or lack of land ownership also restricts the farmers access to credit that are required for improved land exploitation (Shimelles, Zahidul and Parviainen, 2009).

Efficient supply of energy is critical for successful commercialization of poultry farming. Agricultural production consumes energy on various levels of value chain. The energy cost affects cost of production which is important to farmers net returns and profitability. In poultry production, the extent in which the energy related expenses affect farmers is directly related to

efficiency of birds to convert feeds to products such as eggs and meat. Higher cost of energy also affects consumer food prices, processing and value addition, distribution, and marketing. Today the largest economic cost in poultry production is feeds but fuel and electricity costs are smaller compared to feeds but their share of total cost is predicted to increase in the future. In order to optimize energy consumption and find potential savings, the energy consumption and its allocation inside the production system must be known. Due to climate change and rising energy prices, energy saving has become increasingly important. Energy consumption of individual farms is affected by climate, season, building type, devices, bird batches, practices and management skills (Rajaniemi and Ahokas, 2012).

Lack of linkage to power supply, irregular power supply affects producers, processors and marketers simultaneously. For instance, poultry farmers need electricity to heat up brooding environment for his chicks, light supply at night to increase feed consumption and weight gain in his birds, the feed miller who needs electricity to run his mill and even the marketer who requires electricity to blast freeze or deep freeze the poultry products before supplying to the market. Commercialization of poultry sector is therefore put in jeopardy by such vicious cycle of inefficiency (Ugnu, 2009).

Efficient agricultural marketing is achievable through efficient transport system. Poultry entrepreneurs require roads to access markets, to receive inputs such as bulky feeds among others. Farmers who totally depend on transport services are disadvantaged when they are inefficient, of poor quality, infrequent or expensive. One cause of low farm gate prices for products is expensive transport system. Similarly, impassable roads or slower inefficient transport services coupled with poor storage facilities have negative impacts on farmers. If the margin between what the farmers receives from the sale of their produce and what the urban consumer pays for his produce is high then the effective demand transferred to the farmer will be considerably be reduced. Agriculture marketing is greatly and strongly influenced by the nature of transport services. Transport costs are higher in rough roads than on good quality bitumen roads and this will be reflected in freight tariffs and passenger fares (Gina, 2013).

2.1.4 Marketing Factors and Poultry Farming

The ultimate goal of any entrepreneur is to make profit through sale of goods or services. The main products from commercial poultry production are eggs and meat. Owuor and Bebe (2009) indicated that linkages between farmers and urban agribusinesses should be established in order to minimize farm gate and urban livestock prices differentials. Value addition should be encouraged and enhanced in order to promote market oriented smallholder agriculture in developing countries.

Value added products help increase productivity and returns from investments. The International Fund for Agricultural Development (IFAD) reported that small scale livestock producers are accounting for 85% global food producers and are the main investors. Lack of capacity to invest in modernizing their farms so as to improve quality (through value addition) and quantity to enable respond and adapt to market demand, lack of reliable partnership with other value chain stakeholders to gain access to market on sustainable basis such as through contract farming and poor bargaining power in dealing with market intermediaries so as to get fair prices for their products are some of challenges faced by small scale producers. Small holders should value add their products, organize themselves into producers and farmers organizations to provide economic services at reduced costs through economy of scale, to increase bargaining power and to present small holders interests within value chains. Wainaina, Okello, and Nzuma (2012) demonstrated that contracted poultry farmers earned more net revenue per bird compared to independent farmers and recommended participation in contract farming to improve benefits of small holder poultry farmers. Contractual arrangements can provide farmers with access to production services, credit, knowledge of new technology and the pricing arrangements can reduce risk and uncertainty. Murthy and Madhuri (2013) confirmed that contract farming can be an effective to in mitigating risks faced by farmers while marketing poultry products to the final consumer.

Farayola, Adeyemo, Nwachukwu and Yusuf (2013) showed that value addition acted as an aid to marketing strategies for poultry products such as eggs and poultry meat. Value added meat

products fetch more profits. Meat products s sales need to be improved in order to avoid losses arising from perishability of meat since most businesses lack storage facilities which make them prone to losses related to perishability during low demand. Processing poultry meat to added value products contribute to sustained demand and efficient marketing of meat to earn reasonable returns from meat animals by farmers. Organized development of processed meat sector is important to realize full benefits from meat animals and contribute for sustained meat production. Value addition produce variety of products, increase demand and marketability and meat lifestyle requirements such as low fat requirements, to preserve, transport and distribute to lager populations, to facilitate export of meat products to promote entrepreneur venture and employment growth of processed meat sector will ensure a regular off take of their produce at reasonable prices and provides a variety to consumers. In poultry sector prices fall due to excess supply. Poultry could be processed and stored to be realized into market at an appropriate time and farmers return could be protected to sustain his operations.

Processing and availability of new products consumption particularly poultry has increased many folds in the world. Processing include partitioning ,deboning, size reduction, seasoning, tenderization tumbling, retorting, battering, breading, variety of cooking methods used to produce variety of value added products. Packaging, storage flavor, colour change, labeling requirements are important factors in the success of processed meat products (Ngore, Mshenga, Owuor and Mutai, 2011). This was also supported by Gwin, Lauren, Thiboumery, and Stillman (2013) who demonstrated that investing in value addition of local meat and poultry processing has a correlation with success.

Farayola *et al* (2013) noted that the single most critical needs for development of poultry production is the right type of organization (social homogenous group in a manner of self help groups of 10 to 20 poultry farmers), that will be able to address issues of provision of timely and regular quality inputs, collection and marketing off eggs and chicken on definite regular interval, daily, bi-weekly or weekly as is practiced in dairy sector and value additions as aid to marketing strategies for the products. One of the most important changes that can be achieved

by small scale poultry producers is to organize themselves effectively into producers associations and to acquire skills to effectively market their products through profitable market links thus achieving greater share of the final products price. Such organizations might also lead to improvements in the supply of inputs such as vaccines, day old chicks at better prices both of which are of concern as well as receive training in improved rearing technology. Powerful associations may also be able to hire specialist advisor or provide incentives for the development of private practitioners such as veterinarians and animal production specialists.

Farmers are more likely to implement new practices and stick with them, able to see direct benefits such as increased productivity, better means of processing and storing and better knowledge of market and pricing (economic benefit). Producers are engaged in evaluating improved practices and sharing of their lessons and success with farmers groups proving to be an effective way of scaling up technology adoption. Farmers associations can be strengthened and consolidated to institutional capacity to give them greater say in agricultural policies and programmes, and to facilitate the integration of small farmers in value chains. Marketing groups are able to have greater control of their economic lives, get higher prices as middle man is cut out, diversify their skills by gaining marketing and business experience as well as increased networking and learning opportunities with other farmers (IFAD, 2009)

The principle behind *contract farming* is the shifting of risk from the producers to processor or marketer since it provides future market for goods being produced. The issue of production and price risk sharing is the main reason behind incentives for producers to enter contract farming. Contract farming is an agreement between farmers and processing and or marketing firms for the production and supply of agricultural products under forward agreements frequently at predetermined prices. In contract farming much of price risk is reduced since mostly the price is predetermined rather than unpredictable market prices. The arrangements often involve the purchaser in providing a degree of support through delivery of inputs, collection of products, provision of extension services and information to guide farmers meet market demand, guarantee of prices before the start of production, provision of inputs on credit

among others. In return the producer commits himself to provide specific commodity on quantities and qualities standards determined by the purchaser. The company on the other hand agrees to support the farmer's production and to purchase the commodity (see Minot, 2011; Murthy and Madhuri, 2013). There are several models of contact farming which include centralized, multipartite, intermediary and informal models. In centralized, a centralized processor and or buyer procure products from small scale farmers and provide services like pre-financing of inputs, extension and transportation of produce from farms to processing units. Multipartite is characterized by two or more organizations, state, private agribusiness firms or NGOs, etc work together to coordinate and manage the co-operation between producers and buyers. On the other hand, intermediary model resemble centralized model but they act as an outsourced intermediary on the behalf of another major firm. Intermediaries organize everything on behalf of the final buyer starting with inputs supply, extension services, paying farmers and final products transport among others. The informal arrangement model involves casual oral agreement between contracting parties and regularly repeated marketing transactions with absence of written contracts or equally binding and specifying documents (Wainaina *et al*, 2012).

2.1.5 Technological Factors of poultry farming

Utilization of technology and skills is a prerequisite for developing countries. Technology and skills are applied in all aspects of poultry production all the way from managing day old chicks to marketing of poultry farm products such as poultry meat and eggs. Several studies have shown that utilization of skills and technology is directly related to increased productivity, higher incomes and profitability of poultry enterprises (Ezeibe, Orkarji and Abudai, 2014). It has also been demonstrated that training of poultry farmers is a significant correlate of productivity, income level and food security and strongly recommended that farmers should be regularly trained by extension agents (Ibitoye and Onimisi, 2013). The researchers also recommended incentive-driven government organized seminars, conferences and workshops

for poultry farmers to participate. Training role in improving management skills of poultry entrepreneurs is considered as an important task in public extension services. This enables poultry farming entrepreneurs to take better and informative decisions to acquire skills in analyzing their decisions, evaluating of marketing, identifying of the trade opportunities and scheduling quality and quantities of products towards the satisfaction of target market in intensive trade market. Technical skills such as poultry density, water management system, feeding management system, feed formulation, insurance and risk management, poultry farm activities, farm management skills and more important, biosecurity and biosafety measures can only be acquired through training which can be either short term or long term training (Mohammad, Mohammad, Saburi and Fathul, 2011)

Weak management of production factors and economic inefficiency of production enterprises is one of the agricultural problems. Incorrect using of knowledge is related to low level of information and technical skills of entrepreneurs. Paying attention to farm management and recognition of its restricting factors and providing suitable executive ways will be a good way to change in production of agricultural products and ideal use of production factors. Poultry farms operators need management skills to take correct decisions. These skills enable them to manage their enterprises effectively facing with the changes in agribusiness environment and remain in the high competition of trade environment. Training influences all aspects of production and rained producers are able to market their products in better ways as some trainings target marketing skills. Ideal and effective communication is required by managers to enable them communicate with other managers, gain ability to transfer the experiences and knowledge to new people working in poultry production enterprises, ability to consider others opinions and perspectives in management, ability to create good and positive relationship with buyers and sellers as consumer oriented enterprise. Enhanced communication skill of the extension agents and farmers are accompanied by increased output. Benefits of training poultry producers are of large scope and these include increase in flock size, increase in eggs and meat production per bird, higher number of eggs per capita per year, improved hatchability

of eggs, decreased mortalities per flock, improved disease management practices, improved animal manure management. This has impact on per capita egg availability, per capita egg consumption, increased income, food security and heath and productive nation (Abida, Khan, Rhasid and Aurangzeb, 2013).

Udoh (2010) demonstrated that the poultry production is highly dependent on knowledge and adoption of improved technology and for sustainability and growth as well as a technical input it must be availed. Adoption of new technology leads to increased production, more profits, and this also attracts more farmers to adopt the technology. For technology to be adopted it has to go through awareness, assessment, acceptance ,learning and usage stages .Higher productivity has led to higher incomes for producers making agricultural enterprises worthwhile economic endeavors. This has the potential of attracting more unemployed people especially the youth into farming enterprises leading to higher incomes, improved food security and sustainable economic development.

The use of new poultry farming technology determines how the increase in poultry enterprise output impacts on poverty levels and environmental degradation. Returns from new technology development and adoption could be far reaching .There are several factors affecting technology adoption such as assets, Income levels, availability of institutions, vulnerability, awareness (such as through training) labor and innovativeness of by small scale poultry producers. Technology that require few assets have lower risk premium and are less expensive and have a higher chance of being adopted by small holder producers. In sub Saharan Africa, the use of technology can narrow the gap between what the farmers get and what is feasible with technology. Adoption affects the rate of increase in output and determines how the increase in output impacts on poverty levels and environmental degradation. For farmers to benefit from technological advances, they have to perceive them to be appropriate and proceed to implement them on farms. Increased agricultural productivity, technology adoption rates and household's foods security and nutrition can be achieved through improved production practices, expansion of financial markets, increased capital and

equipment ownership by rural household and development of research and extension linkage. Improved technology development and adoption has a positive impact on output and house hold food intake. Improved food intake can lead to improve functioning of the human body, healthy and normal life with increased work output; in turn there is improvement in productivity, self sufficiency, poverty alleviation and food security (Muzari, Gatsi and Muvhunzi, 2012).

Information communication technology (ICT) can be used broadly in improvement of various aspects along the value chain of poultry production, research and education to improve efficiency, predictability and reduce wastage and redundancy. Information communication technology consists of technologies that are used to handle information and improve communication. These include hardware ,software, media for collection, storage, processing , transmission and presentation of information (in any format such as voice, data, text and image), computers, the internet, CD-ROMs, email, telephone, radio, Television, Video, digital camera among many others (Kwadwo and Mokonnen, 2012). ICT is believed to bring about economic development by creating an enabling environment by improving communication, increasing participation, dissemination of information and sharing knowledge and skills and it enables attainment of high level of satisfaction in social and economic benefits. Fast and efficient dissemination of suitable technological information from research station to the poultry farmers in the field and reporting of producers' feedback to the research system is one of the critical inputs in transfer of poultry production technology (Meena and Singh, 2013).

Knowledge and information have become the major drivers of social and economic transformation in the world. Agriculture education and extension can play a critical role in transformation process to transfer technology, support learning, and assist poultry producers in problem solving and enable them to become more actively embedded in the production knowledge and information. Market information, transport information, information on storage facilitation, livestock disease management all have an impact on level of farmers' income, improved livelihood and food security. Connectivity to the internet and mobile phones is

increasingly bringing market information, financial and other important services to remote and widespread areas, and is helping to change people's lives in many ways (Sanusi, petuibikunle and Mshelia, 2009).

USAID (2010) reported a case of Suguna poultry farm in India which uses Oracle's enterprise Resource Planning (ERP) software data system where its filed agents can put data via web sites on its contractor growers operations. The farm is able to track and consolidate information on prices paid, mortality rates, feed delivered and chicken delivered. The use of ICT has enabled the farm to efficiently manage its work.

Studies have shown that there are several factors affecting use of ICT in Sub-Sahara Africa and some of them are level of income, level of production experience, literacy and educational attainment, sociocultural status and gender with men being on the higher side of ICT usage despite having come from same background with men. High costs of available technology, inadequate infrastructure, low ICT skills, poor and expensive connectivity, inappropriate ICT policies, Language barrier, low bandwidth, inadequate credit facilities and systems are some of the limitations (Henri-ukoha, Chikezie, Osuji and Ukoha, 2013).

2.1.6 Poultry Management Practices

The way management performs in the poultry industry tells much about their success. The ability of management to promptly identify problems and proffering correct solutions give the company the best possible chance of survival and growth. The fact that management involves planning, coordination, organization and control of both human and natural resources in an organization to attain its set aims and objectives means things are done appropriately and efficiently through people. Improper planning, and operators' incompetence means inefficiency, wastage and under-utilization of resources available to the organization. Most operators neglect planning function and venture into business on impulse without adequate feasibility study on the project or business, and in most cases these entrepreneurs do not always have skills and experience in areas such as book keeping, financial reporting, marketing, customer relations and financial management.

2.1.7 Concept of Business Performance

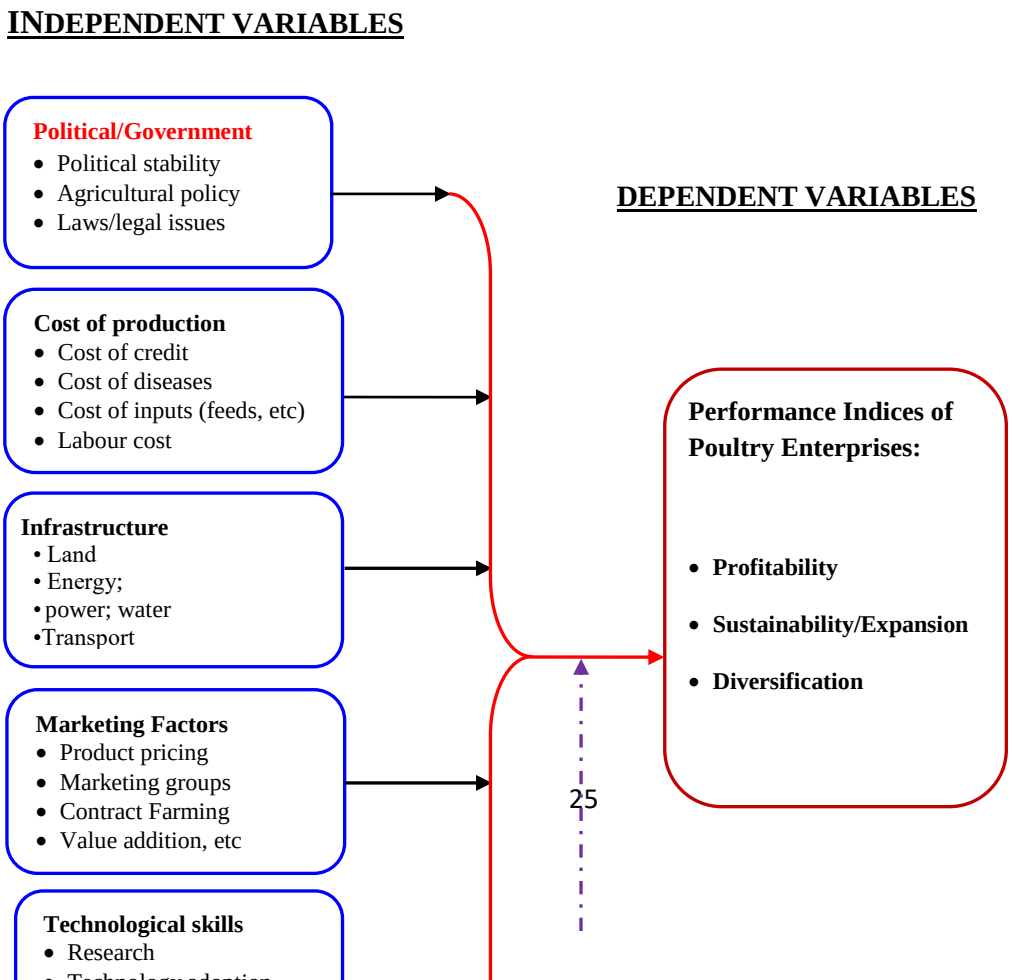
The concept of performance is used to determine the success of a business entity whether small, medium or big. Firm performance refers to the firm's success in the market, which may have different outcomes. Firm performance is a focal phenomenon in business studies. However, it is also a complex and multidimensional phenomenon. Performance can be characterized as the firm's ability to create acceptable outcomes and actions; it is the act of performing; or doing something successfully; using knowledge as distinguished from merely possessing it. Business performance measurement on the other hand is concerned with measuring this performance relative to some benchmark, be it a competitor's performance or a present target. Small and medium business performance can be measured in term of size, employment, turnover, capital base and profitability.

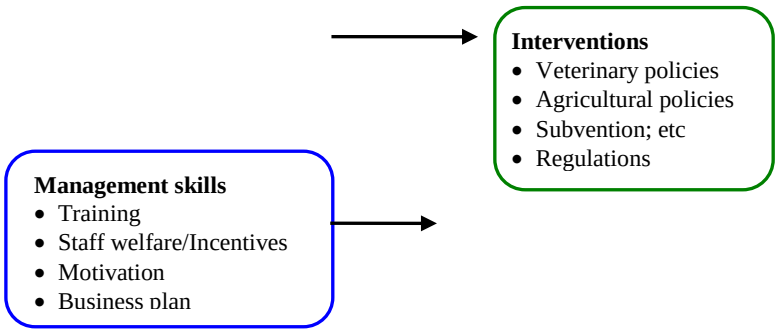
2.1.8 Business and its Environment

The firm interacts with its environment. There are in fact different levels of environment, each encompassing several components. Thus, the environment of the firm consists of several environments. Environment as a general term refers here to all those arenas the firm is operating in and is attached to. Moreover, environments and their components affect firm performance in many ways, directly or indirectly. Hence, the firm operates in many environments simultaneously collaborating with other actors in the market and at the same time competing for scarce resources with others. For instance, from the firm's point of view, one of the most critical markets is the customer market, where the firm sells the products which have gone through the process of combining the production factors. On the other side of the supply chain, in the supplier market, the firm buys factors of production. In the financial market, the firm acquires necessary financing for the business. Several environmental dimensions have been presented in the literature for describing the qualities of organizational environments. For instance, there is a distinction between dimensions such as munificence, dynamism, and complexity. Munificence refers to the environmental capacity as the extent to which the environment can support sustained growth. In general, a munificent environment is

regarded as more favourable for business success than a scarce environment. Dynamism is related to the turbulence, i.e. the dimension of stability vs. instability. It has been found that small firms that face an environment with increasing dynamism tend to grow faster than others Environmental complexity indicates that there are several different segments of the market with varied characteristics and needs that are being served by the firm. Thus, the firm sees a heterogeneous environment as complex. Environments can be hostile or they can termed benign. Hostile environments are characterized by precarious industry settings, intense competition, harsh, overwhelming business climates, and the relative lack of exploitable opportunities. On the other hand, benign environments provide a safe setting for business operations due to their overall level of munificence and richness in investment and marketing opportunities. Perhaps the most elaborate typology of environmental dimensions is the one presented by Jurkovich (1974) made an elaborate typology of environmental dimensions, with an identification of 64 types of environments based upon whether the dimensions are complex/non-complex, routine/non-routine, organized/unorganized, direct/indirect, low-change/high-change, or stable/unstable.

Figure 1.1 Conceptual framework of Environmental Constructs





Source: ***Researcher's Concept of Environmental Constructs***

Furthermore, Anderson and Miller (2003) employed the commonly used environmental dimensions of uncertainty, dynamism, homogeneity, munificence, and complexity. Paradoxically, environment is a threat to the firm, but also an opportunity in providing resources the firm needs.

2.2 Empirical review

A number of studies have examined issues relating to poultry business performance in the rim of the environmental factors within which the industry operates. Gibson, et al (2017) carried out a study on the impact of access to credit on poultry farmer's performance in Ikenne local government area of Ogun state, Nigeria. The authors used a sample of 160 poultry farmers randomly selected from the study area, and used structured questionnaires to collect data. The data were analyzed using descriptive statistics and linear regression. The regression results show the factors of 'education', 'farming experience', 'extension services', and 'belonging to association' significantly contributed to access to credit by the poultry farmers. The study recommends that farm level policies aimed at intensifying extension services among the farmers should help farmers allocate their resources more efficiently, among other things.

Essien and Umoh (2016) explored the impacts of power and market relations with respect to small farmers' responses on how risk and rewards are shared in the poultry supply chain of Akwa Ibom State, Nigeria. They used qualitative data collection techniques and participants

observation to obtain information. Key Informant Interviews (KII) were conducted with key players in the poultry supply chain in the state. These include inputs (drugs or vaccines, feeds, doc, etc) suppliers, poultry farmers (broilers and layers), processors and retail shop operators. Their findings are that poor market and power relations with input suppliers and chicken buyers have subjected poultry farmers to 'price takers' and 'money recyclers'; a reason for the weak poultry sector in need of capacity to tackle economic, social and environmental imperatives. The study positions Nigeria with its abundant untapped resources and expanding population as the largest market for poultry and its products in the region. The study revealed that the state policy intervention with proper tools and collaborative efforts can balance power and market relations across the supply chain and crucially for the marginalized small farmers in order to strengthen the sector and align it with global sensibility. It also recommends government and public sector attention to the powerless poultry farmers to enhance their position to move out of poverty and poor relations to get strong supply chain, knowing that the supply chain is as strong as its weakest link. That government having a multiple regulatory, integrative and facilitatory role in the animal food sector should take food supply more seriously.

Bukunmi and Yusuf (2015) undertook a study aimed at analysing the socio-economic factors influencing poultry egg production among farmers in Ondo state. The main objective of the study was to determine the factors that influenced poultry egg production. The study was carried out in five (5) Local Government Areas (LGA) of Ondo State. Purposive sampling was used to select the LGA while random sampling was used to select 60 poultry farms from the LGA. Data were collected through structured interview schedule. Multiple regression was used to analyse the data collected for the study. The study revealed that number of layers (X_8), level of education (X_2) and years of experience (X_3) and access to credit facilities (X_5) significantly influenced poultry egg production. The study thus recommended that poultry egg farmers should be linked to financial institutions in order to have access to credit through extension

agents so as to improve on their poultry farms. Also adult literacy classes for farmers with low education should be organized by the LGA as this will help the farmers to understand better the innovation introduced to them as regards poultry egg production.

Ng'ang'a (2014) studied the factors influencing implementation of poultry farming enterprises for economic empowerment of Local Communities in Mombasa County, Kenya, with a focus on commercial poultry farmers and livestock officers. The target population of study comprised of 588 poultry farmers and 41 livestock officers. The study focused more on commercial poultry farmers who keep chicken for either eggs (layers) or meat Broilers .The researcher selected a sample of 70 farmers and 10 livestock officers, and data collected through a well-tested viable and reliable questionnaire; also other forms of data collection such as the interviews were dispensed to respondents, and analysis made through a descriptive survey method, and hypothesis testing. Results showed that showed that technological skills, marketing factors, production costs and land& infrastructure influence implementation of poultry farming enterprises for economic empowerment of local communities in Mombasa County, Kenya. Ng'ang'a recommended that, poultry farming entrepreneurs should be empowered technologically and linked with research institutes in order to improve their productivity, thorough analysis of poultry value chain to encourage value addition and enhance access to market, utilization of locally available raw materials to manufacture poultry feeds, formation of poultry farmers organizations in order to access market and inputs at suitable prices and creation of enabling environment which may include availability of credit facilities, improvement of land ownership improvement of infrastructures and affordable energy to favor small and medium entrepreneurs.

Alabi, Aghimien, Osasogie and Otasowie (2014) carried out a study on environmental hazards associated with poultry production among poultry farmers in Edo State. They used a randomly selected sample of 366 respondent-poultry owners, poultry farm workers and poultry farm

neighbours were randomly selected. They analysed collected data using multiple regression and chi-square tests, with results revealing that poultry farming has hazardous effect on the surrounding environment; and that the age of the complainant had negative and significant relationship with frequency of environmental hazard complaint; also that the relationship between distance of poultry farms and living houses on hazard complaint was also negative and significant. The study concludes that the environmental hazard posed by the establishment of poultry farming is high in Edo due to the fact commercial poultry houses are located too close to residential houses. The huge waste generated by the poultry farms in Edo State can also be converted to inorganic manure using modern recycling facilities.

Obasi and Okafor (2011) studied the performance of broiler marketing in Umuahia zone of Abia State of Nigeria, with the objective of examining the performance of broiler marketing in terms of the marketing cost and returns, marketing margin and marketing efficiency, and identifying factors affecting the income of broiler marketers. The study employed purposive sampling covering two categories of broiler marketers—those in the production and marketing of broilers, and those who market broilers only. They used a total of 90 respondents with 45 from each category, from which data were collected and the performance of broiler marketing analysed using net return, marketing margin and economic efficiency models. Results showed that the business was profitable and efficient and so recommended that conducive environment should be provided by government to encourage reasonable investment in the poultry industry in order to address the meat demand of the citizenry.

2.3 Theoretical Framework

2.3.1 The Systems Theory

This theory postulates that an organization is a system that needs to work harmoniously not only within itself but that it is a system within a collection of other systems and, therefore, needs to work also in congruence with the other systems around it. What happens in the larger

system (the environment) is capable of affecting the organization either positively or negatively. The system theory has its origin in Biology with the work of Bertalanffy (1968) with his 'General Systems Theory'.

The General Systems theory aims at looking at the entire world as a composite of co-existing, interacting and interrelating elements. This is not to undermine or downplay the value of studying units, subsystems or even systems within a larger context (a reductionist approach) as is done in specialization, but to place all disciplines within proper perspective of the whole. As captured by Laszlo and Kripper (1997), the General systems approach encourages the development of a global, more unitary consciousness, teamwork, collaboration, learning for life and exposure to the universal storehouse of accumulated knowledge and wisdom. A system can either be controlled (cybernetic) or uncontrolled. A controlled system sensed information (Detector), applies rules to take decision on what is sensed (Selector), and makes some transaction or communication between the system (Effector). According to Kuhn (1974), the aim of decision (communication and transaction) between systems is to achieve equilibrium. A system can either be a closed system in which case interactions occur only between elements within the system and not with any system outside it, or an open system where interactions occur both within the system and outside it. Closed systems tend towards negative entropy with the likelihood of decaying due to the absence of exchanges with outside systems.

2.3.2 Agricultural Marketing Approaches

The agricultural marketing study involves three main approaches. These approaches are the functional, institutional, and the commodity approaches.

Functional Marketing Approach

This approach investigates marketing in terms of the various activities that are performed to exchange product from the producer to the consumer. These activities are called functions

(Cramers and Jensen, 1982). And this approach helps to compare cost and benefits of different functions. The common functions include are: a) exchange (buying and selling), b) physical (processing, storage, and transportation), and c) facilitating (Standardization, financing, risk bearing, and market information). Most of these functions are performed in the marketing of nearly all commodities.

Institutional approach

Institutional approach examines the activities of business organizations or people in marketing. The institutional approach focuses on the study of the various institutions, middlemen and other agencies which perform the marketing activities. These organizations or market actors are those who perform the operations necessary to transfer goods from the producer to consumer, because of the benefit of specialization and scale that exist in marketing as well as production (Cramers and Jensen, 1982).

Commodity approach

This activity encompasses the above two approaches in the marketing of one or more commodities. This approach focuses on what is being done to the product after its transfer from its original production place to the consumer (Kohls and Uhl, 1985). It helps to pinpoint the specific marketing problems of each commodity as well to develop the market for the specific commodity. The approach follows the commodity along the path between producer and consumer and is concerned with describing what is done and how the commodity could be handled more efficiently. This approach will be used in this study as the investigation integrates the above two approaches to study the poultry marketing chain. This paper uses the commodity approach that integrates the application of the functional and institutional approach to examine the poultry marketing system in the study area.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

For collecting and analyzing the information needed for a study, a research design must be instituted as it provides a *framework* for such an assignment. Here we adopted the descriptive research design using the Ordinary Least Square (OLS) method of regression on data collected through structured close-ended questionnaires constructed on a 5-point Likert Scale format from respondents engaged in poultry farming and business. Sources and types of data collected generally for the study came from both the primary and the secondary sources. The secondary information was sourced through related literature collections, some published and some unpublished. Thus, existing secondary sources such as Books, Journals, Magazines, Periodicals and Newspapers became very handy. In the case of primary data, the researcher employed the use of Questionnaire distributed to a selected sample of poultry farmers and poultry business enterprises.

3.2 Population, Sample and Sampling Techniques

The study population for this work consists of the entire poultry farmers or enterprises in the Karu metropolitan area of Nasarawa State. Using the multistage method, we first sampled by convenience one hundred and twenty number business enterprises engaged in poultry farming. Then, from these enterprises, using judgmental sampling, the researcher selected 23 from this number—ensuring that each selected business had staff strength of thirty or more; the total staff strength came to be 1180.

3.2.1 Sampling Techniques

In order to obtain our research sample, there are two general sampling approaches used in social science research, like this research. With *probability sampling*, all elements (e.g. persons, households) in the population have some opportunity of being in the sample, and the mathematical probability that any one of them will be selected can be included calculated. But in *nonprobability sampling*, population elements are selected on the basis of their availability (e.g. because they volunteered) or because of the researcher's personal judgment that they are representative. The consequence is that an unknown portion of the population is excluded (e.g. those who did not volunteer). One of the most common types of nonprobability sample is called a *convenience* sample – not because such samples are necessarily easy to recruit, but because the researcher uses whatever individuals are available rather than selecting from the entire population. Thus, with N representing the 1180 workers, we applied the Taro Yamane formula reproduced by Umaru (2013, p.170), to obtain the minimum number of workers (i.e. minimum sample size (s) for our survey and interview; the formula is:

$$\mathbf{s} = \frac{\mathbf{N}}{\mathbf{3 + N(\alpha)^2}} \quad \text{..... (eq. 3.1)}$$

where s = the desired minimum size of respondents;

N = total number of workers = 1180

α = margin of error = 5% (or 0.05).

Hence, $s = \frac{1180}{3 + 1180(0.05)^2} = \frac{1180}{3 + 2.95}$

≈ 198 (minimum number of respondents to place questionnaires)

Since this is the minimum, the researcher decided to issue far more than this number as many rspondents may be reluctant and sometimes careless in giving attention to Questionnaires. We infact doubled this figure so as to take care of the worst situation (so as to obtain fair responses). Thus we used the convenience method to distribute 300 questionnaires and responses collected as seen on Table 3.1. Over some periods of time, we had to make ourselves available to have personal contacts with some of these poultry farmers to encourage

them and explain how to fill or complete the questionnaires.

Table 3.1 Field Management of ESALQUEST in Karu Metropolis

SN	Respondents Enterprise	Questionnaire Management		
		No. Issued	No. Returned	% Returned
1	Augar & Sons	10	4	40
2	Agro-501	10	8	80
3	CCSS Integrated Farms	15	12	80
4	Chubior Farm	15	9	60
5	Edge Farms	15	9	60
6	Emmy Tax Farm	15	8	53
7	Emmy Tax Farm	15	11	73
8	Every Day Chicken	10	7	70
9	Flict Farm	15	12	80
10	Hakeem Farm	15	10	67
11	Ifeanyi Michael-Chrismin	10	8	80
12	Jambella 4 Nig ltd	15	9	60
13	Kentos Agro Services	15	7	47
14	Lorem Farms	10	7	70
15	Manphong Interated Farms	15	10	67
16	Namu Farm	15	9	53
17	Ovante Farm	10	6	60
18	Paddis Farm	10	6	60
19	Paul Nwankwa	10	6	60
20	Rayuwa Farms	15	12	80
21	Real Time Farm	10	7	70
22	Reyan Farm	15	11	73
23	Zabula Farms	15	12	80
	Total	300	200	66

Source: ***Researcher's Field work, 2019***

3.3 Method of Data Collection

Our instrument for data collection is the Questionnaire named ESALQUEST meaning "Esale Questionnaire" designed to have two major parts, namely: Part A contains personal and demographic information of respondents; Part B contains questions for testing our stated hypotheses. The overall indicators in ESALQUEST instrument of the study used the 5-point Likert scale for the purpose of scoring responses (ranging from the *worst* scenario of "1" to the *best* scenario of "5"); that is: 1 = Strongly Disagree (SD); 2 = Disagree (D); 3 = Undecided (UD); 4 = Agree (A); and 5 = Strongly Agree (SA). We therefore used the convenience method to randomly select our required sample of poultry enterprises and questionnaires were distributed with responses collected as presented in the table below (see Table 3.1).

3.3.1 Validity and Reliability of the Research Instrument

ESALQUEST validity was tested through taking into account questions that totally avoided duplication; in addition the questionnaire was reviewed by academic and technical specialists to ensure its effectiveness and reliability. The researcher conducted a *pilot study* to identify the degree of clarity and understanding of the questionnaire paragraphs from the respondent viewpoint, and also to determine possible problems with the design and instrument used in this study.

To undertake this **pilot work**, we asked a group of experts (from the academic and some poultry farming technical specialists) by using 20 number questionnaires to comment on the representativeness and suitability of our questions in the instrument, ESALQUEST. This was to allow for suggestions on the structure of the questionnaire, as well as to establish *content* validity and enable us to make necessary amendments prior to pilot testing with a group as similar as possible to the final population in our sample. Again, after making adjustments the researcher asked the same participants to fill the modified questionnaire again. In all circumstances, educating respondents to understand the instrument was one of our major priorities to avoid having any problems understanding or answering questions correctly. These responses helped provide us with an idea of the reliability and suitability of the questions,

because the following were revealed: the length of time each questionnaire would be completed; the clarity of instructions; unclear or ambiguous questions; opinion about any major topic omissions, and other comments.

The **instrument's validity** was tested from values obtained by running the Pearson Product Moment Correlation from the Eviews10.0 statistical software. An instrument has acceptable validity if the correlation value of each indicator to total correlation (r) is more than 0.30; that is r-value > 0.30 (Cooper and Emory, 2002).

Table 3.2 Validity and Reliability of the Research Instrument

Environmental factors	**Corrected item-correlation, r**	**Cronbach's α (test1)**	**Remarks**	**Corrected item-correlation, r**	**Cronbach's α (test2)**	**Remarks**
Political and government factors	0.226	0.599	Invalid/ Unreliable	0.439	0.676	Valid/ Reliable
Production Cost	0.276	0.521	Invalid/ Unreliable	0.532	0.761	Valid/ Reliable
Infrastructure	0.298	0.639	Invalid/ Reliable	0.617	0.868	Valid/ Reliable
Marketing factors	0.211	0.574	Invalid / Unreliable	0.494	0.902	Valid/ Reliable
Technological factors	0.307	0.703	Valid/ Reliable	0.612	0.747	Valid/ Reliable
Management factors	0.246	0.455	Invalid/ Unreliable	0.722	0.881	Valid/ Reliable
Profitability	0.336	0.596	Valid / Unreliable	0.644	0.732	Valid/ Reliable
Sustainability/ Expansion	0.298	0.677	Invalid/ Reliable	0.714	0.798	Valid/ Reliable
Diversification	0.401	0.607	Valid/ Reliable	0.652	0.869	Valid/ Reliable
Overall (mean) effectiveness	**0.289**	**0.597**	Invalid/ Unreliable	**0.603**	**0.804**	Valid/ Reliable

Source: ***Extraction from Pearson-moment Correlation (Eviews Output), 2019.***

Reliability of constructs was tested with Cronbach's *Alpha (α)* values as recommended by Lee Cronbach (1951). According to Hair, Yoseph, Rolph, Anderson and Black (2006), α for each variable should *not* be less than 0.6 for the statements in the instrument to be deemed reliable, even though Ritter (2010) recommends a more stringent reliability value of 0.70 (minimum) for professionals. Thus, the value obtained is reasonably high suggesting acceptable internal consistency among the items.

Therefore based on the above test results, a ***second pilot test*** was conducted after all the adjustments to the ESALQUEST were made. The results turned out good. As can be seen in **Table 3.2**, the value of Correlation (r) and Cronbach's alpha (α) were well above the critical values, thereby making our main study instrument (the ESALQUEST) used in this study valid and reliable, as reflected in our overall or enterprises total effectiveness.

3.4 Technique for Data Analysis

From our earlier discuss in Chapter Two, we have adopted the following criteria that have formed our research constructs for the purpose of our Model Specification and data analysis. They include: Political/Government = GOV; Cost of production = PROD; Infrastructure = INFR; Marketing Factors = MKT; Technological skills = TECH; Management skills = MGT; Profitability = PROFIT; Sustainability/Expansion = EXP; and Diversification = DIV.

From our stated hypotheses, the following functions are clear:

Profitability = f(Business environmental factors) = f(GOV, PROD, INFR, MKT, MGT, TECH)

That is, PROF = f(GOV, PROD, INFR, MKT, MGT, TECH);

And mathematically, the multiple regression model for Profitability is written as:

Model One

$$PROF_i = \beta_0 + \beta_1 GOV_i + \beta_2 PROD_i + \beta_3 INFR_i + \beta_4 MKT_i + \beta_5 MGT_i + \beta_6 TECH_i + \mathcal{E}_i \ldots. \text{(eq. 3.2)}$$

Similarly,

Model Two

$EXP_i = \beta_0 + \beta_1 GOV_i + \beta_2 PROD_i + \beta_3 INFR_i + \beta_4 MKT_i + \beta_5 MGT_i + \beta_6 TECH_i + \mathcal{E}_i$ …. (eq. 3.3)

And,

Model Three

$DIV_i = \beta_0 + \beta_1 GOV_i + \beta_2 PROD_i + \beta_3 INFR_i + \beta_4 MKT_i + \beta_5 MGT_i + \beta_6 TECH_i + \mathcal{E}_i$ …. (eq.3.4)

Where

$\boldsymbol{\beta_0}$ = "Y-intercept" or constant of each dependent variable ($PROF_i$, EXP_i, or DIV_i).

$\boldsymbol{\beta_i}$ = Coefficients of independent variables, where i = 0, 1, 2, …6.

$\mathcal{E}_i$ = Error term of estimated joint coefficient for each model.

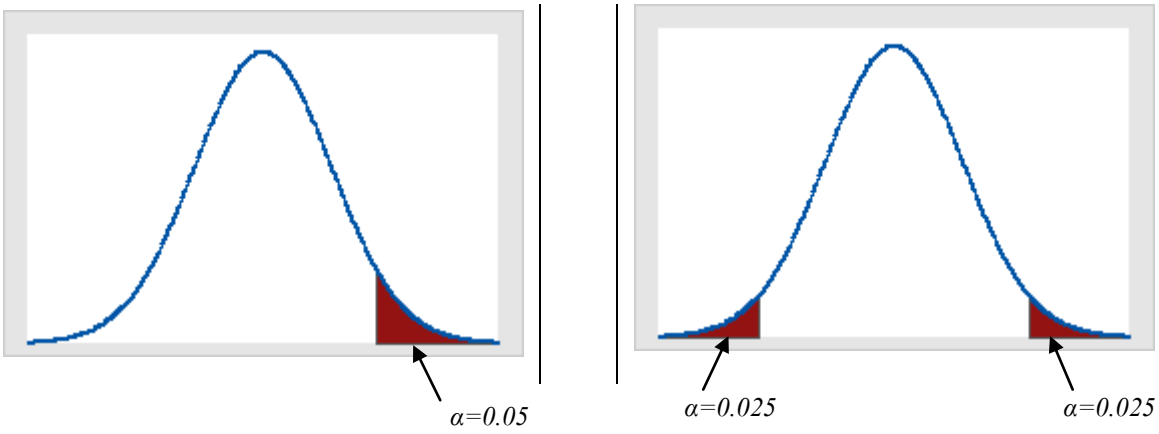
3.4.1 Hypotheses Testing and Decision Rule

Hypotheses testing were made within a confidence interval of 95%. **Decision Rule** is that for a *p*-value less than or equal to critical value of 0.05, null hypothesis would be rejected. The linear relation exists when the *p*-value or significance level was less than or equal to the critical value. We note here the following: a statistic is said to be statistically significant if the value of the test statistic lies in the critical region. A test statistic is a standardized value that is calculated from sample data during a hypothesis test. Test statistic is used to determine whether to reject the null hypothesis or not. The test statistic compares your data with what is expected under the null hypothesis. The test statistic is used to calculate the *p*-value. When the data show strong evidence against the assumptions in the null hypothesis, the magnitude of the test statistic becomes large and the test's *p*-value can become small enough to reject the null hypothesis. In this case the null hypothesis is rejected. On the other hand, if the value of the test statistic lies in the acceptance region, then a test is said to be statistically insignificant. In this situation, the null hypothesis is not rejected. If for example, we calculate the *t*-test and is significant, we simply reject the null hypothesis. For instance, the test statistic for a z-test is the *z*-value. By performing a two-tailed z-test with an alpha α of 0.05, and obtaining a *z*-value of 2.5, it means this *z*-value corresponds to a *p*-value of 0.0124 (from *z*-distribution table).

Because this *p*-value is less than α, you declare statistical significance and reject the null hypothesis.

In hypothesis testing, a critical value is a point on the test distribution that is compared to the test statistic to determine whether to reject the null hypothesis. If the absolute value of our test statistic is greater than the critical value, we can declare statistical significance and reject the null hypothesis. Critical values correspond to alpha (α), so their values become fixed when we choose the test's α.

Figure 3.1 Critical values on the standard normal distribution for α = 0.05



(a) **One-tail Critical Distribution** *(b)* **Two-tail Critical Distribution**

Source: ***Researcher's Design, 2019***

Figure 3.2 (a) shows that results of a one-tailed z-test are significant if the test statistic is equal to or greater than 1.64, the critical value in this case. The shaded area (α) is 5% of the area under the curve. Figure 3.2 (b) shows the results of a two-tailed z-test are significant if the absolute value of the test statistic is equal to or greater than 1.96, the critical value in this case. The two shaded areas sum to 5% of the area (α) under the curve. For our test analysis however, we will adopt the t-test. Testing the regression coefficients using t-tests not only gives researchers some insight into the fit of the regression model, but it also helps in assessing the strength of individual predictor variables in estimating the dependent variable (Hair et al., 1995; Black, 2001).

3.5 Justification of Method

This research work adopted the multiple regression analysis (bivariate) for the evaluation of the study hypotheses. The Ordinary Least Square (OLS) method or the classical linear regression model is the econometric technique adopted to study the impact of environmental factors on the performance of poultry business enterprises in Karu metropolitan areas of Nasarawa State. The preference of the use of OLS estimation method was because the computational procedure is simple compared to other analytical techniques. Furthermore, OLS estimator has smaller variance than any other linear unbiased estimator; OLS is known to be the Best Linear Unbiased Estimator (BLUE) because its outputs are linear and normally distributed, efficient, consistent and symmetrically unbiased (Koutsoyannis, 1979).

CHAPTER FOUR
DATA PRESENTATION AND ANALYSIS

4.1 Data Presentation

4.1.1 Data Summary

Data obtained from collected data were summarized into segments covering the independent variables, namely: Political/Government (GOV), Cost of production (PROD), Infrastructure (INFR), Marketing Factors (MKT), Technological skills (TECH) and Management skills (MGT). Data were also collected for the three dependent variables, namely: Profitability (PROF), Sustainability/Expansion (EXPN) and Diversification (DIV). This set of data is summarized in percentages in the table in the Appendix.

4.2 Data Analysis and Results

4.2.1 Pre-Estimation Diagnostics Tests

Two pre-estimation tests were carried out, namely basic descriptive statistics (and test of normality) and a measure of Coefficient of Correlation. The first of these tests, the descriptive statistics, is shown below:

4.2.2 Descriptive Statistics and Normality Test

The normality statistics for our research variables, viz: Political/Government (GOV), Cost of production (PROD), Infrastructure (INFR), Marketing Factors (MKT), Technological skills (TECH), Management skills (MGT), Profitability (PROF), Sustainability/Expansion (EXPN) and Diversification (DIV) are as shown in Table 4.1 below. The mean for GOV, PROD, INFR, MKT, TECH, MGT, PROF, EXPN and DIV are all different. This indicates that the variables exhibit significant variation in terms of magnitude, suggesting that estimation of the variables in levels will not introduce some bias in the results. The implicit null hypothesis is that the series are NOT normally distributed; but the Jarque-Bera statistic for all the variables is significant with their individual *p*-values being less than the critical value of 0.05; hence we

reject the null hypothesis and conclude that the series are normally distributed (or have a normal distribution).

Table 4.1 Summary of Basic Descriptive & Normality Statistics

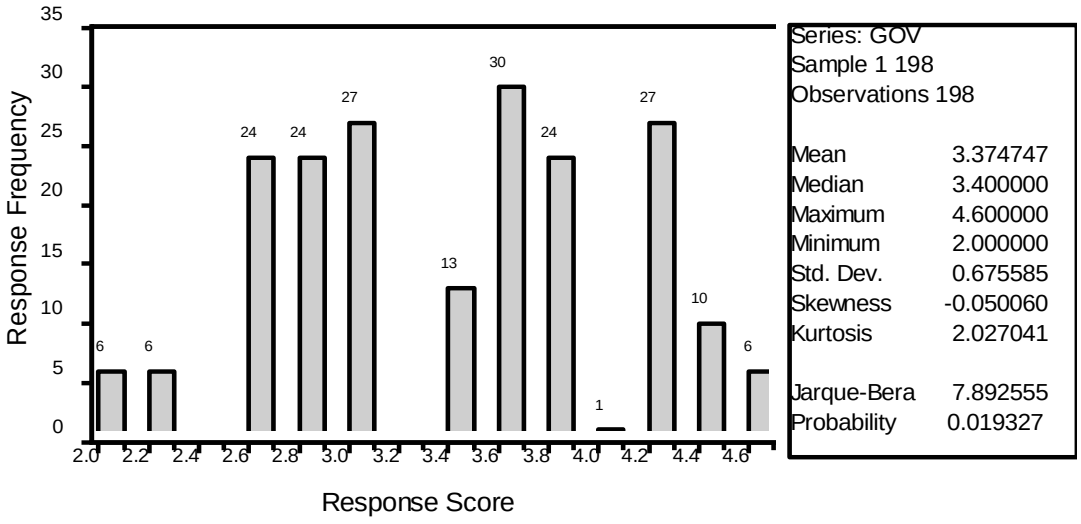
	GOV	PROD	INFR	MGT	MKT	TECH	PROF	EXPN	DIV
Mean	3.374747	3.876768	3.648485	3.881818	3.821212	3.710101	3.463636	3.788889	3.748485
Median	3.400000	4.000000	3.800000	4.000000	3.800000	3.800000	3.800000	3.800000	3.800000
Maximum	4.600000	4.600000	4.600000	4.400000	4.400000	4.600000	4.400000	4.854000	4.400000
Minimum	2.000000	2.800000	2.400000	3.000000	2.600000	2.000000	1.200000	2.200000	2.600000
Std. Dev.	0.675585	0.409736	0.616584	0.416381	0.386254	0.559005	0.864759	0.756211	0.410488
Skewness	-0.050060	-0.383104	-0.399555	-0.671385	-0.913505	-0.882315	-0.753769	-0.383315	-0.816015
Kurtosis	2.027041	2.533234	1.950431	2.578899	3.551495	3.905537	2.380324	2.322668	3.386690
Jarque-Bera	7.892555	6.640801	14.35643	16.33795	30.04742	32.45481	21.91753	8.633611	23.20765
Probability	0.019327	0.036138	0.000763	0.000283	0.000000	0.000000	0.000017	0.013342	0.000009
Sum	668.2000	767.6000	722.4000	768.6000	756.6000	734.6000	685.8000	750.2000	742.2000
Sum Sq. Dev.	89.91374	33.07313	74.89455	34.15455	29.39091	61.55980	147.3182	112.6556	33.19455
Observations	198	198	198	198	198	198	198	198	198

Source: ***Author's Computation from EViews, 2019***

The basic descriptive statistics of 198 sampled data collected for the study were obtained by the EViews statistical software with results displayed as seen on Table 4.1. Also individual variable data were plotted as graphs of Bar Charts/Histogram and Statistics, from which easy analyses could be made.

The Variable GOV

Figure 4.1 GOV Histogram and Statistics



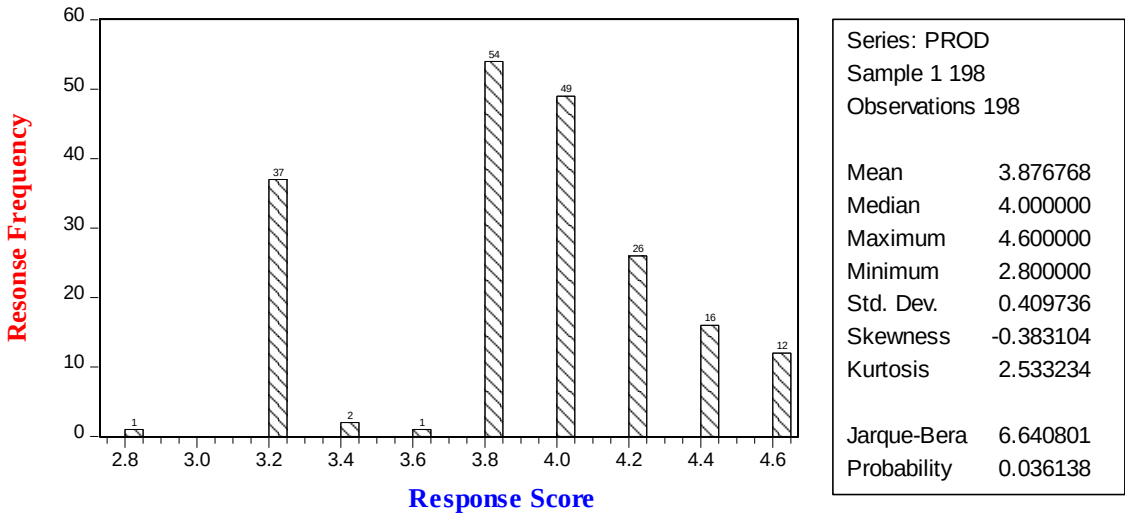
Source: ***Response Data on Political/Government (GOV) Factor; EViews Plot, 2019***

The mean (or average) value of responses on GOV of data collected from the field was 3.38 with a standard deviation of 0.68%, implying that the data deviated from both sides of mean by 0.68. This suggests that the data for the GOV was not widely dispersed in the sample size under analysis, because the standard deviation was less than the mean value of 3.38. The coefficient of skewness of -0.05 suggests that the data was slightly negatively skewed; and so the data distribution has not complied with the symmetrical distribution assumption. The probability value of Jaque-Bera of 7.89 implies that the Gaussian distribution assumption of normal data had been met. This indicates that the data followed the normal curve, because the null hypothesis that the data is not normally distributed is rejected at 5% level of significance.

The Variable PROD

The mean of **responses** on PROD variable was 3.88 with a standard deviation of 0.41, implying that the data deviated from both sides of mean by a value of 0.41. This suggests that the data for the PROD was not widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.88. The coefficient of skewness of -0.38 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption.

Figure 4.2 PROD Histogram and Statistics



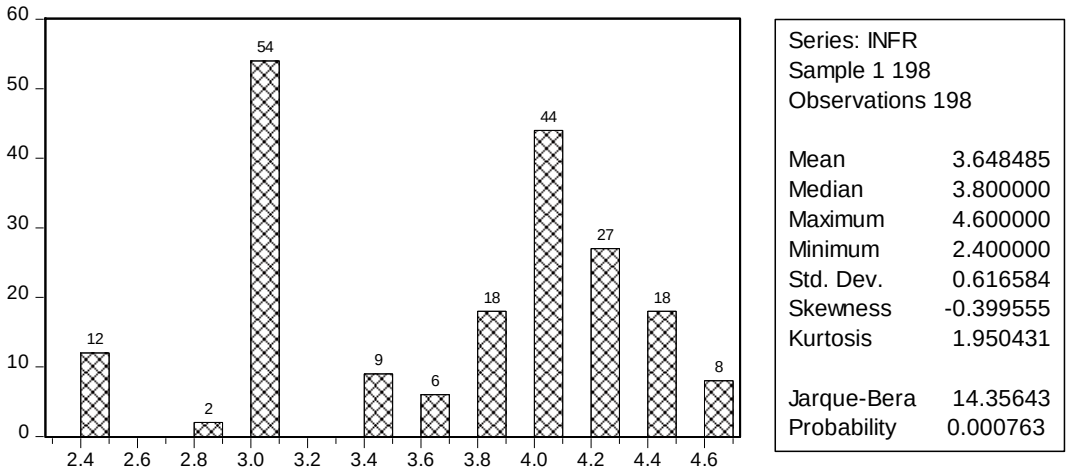
Source: *Response Data on Production Cost (PROD) Factor; EViews Plot, 2019*

The probability value of Jaque-Bera of 6.64 for the variable PROD implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

The Variable INFR

The mean of **responses** on INFR variable was 3.64 with a standard deviation of 0.62, implying that the data deviated from both sides of mean by a value of 0.62. This suggests that the data for the INFR was not widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.64. The coefficient of skewness of -0.39 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption.

Figure 4.3 INFR Histogram and Statistics



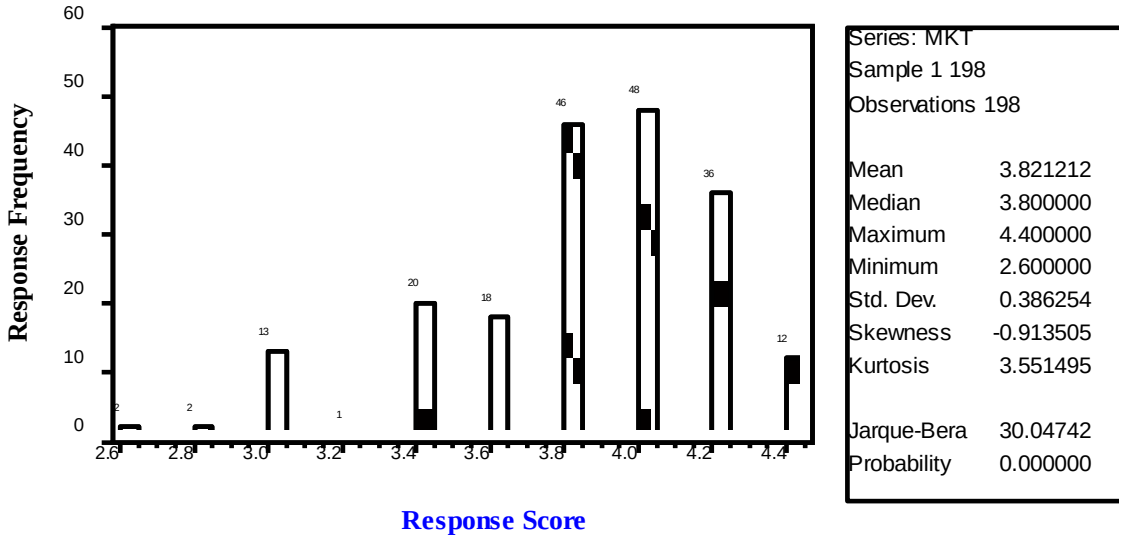
Source: *Response Data on Infrastructure(INFR) Factor; EViews Plot, 2019*

The *p*-value (0.00076) for Jaque-Bera (14.36) for the variable INFR implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

The Variable MKT

The mean of **responses** on MKT variable was 3.82 with a standard deviation of 0.38, implying that the data deviated from both sides of mean by a value of 0.38. This suggests that the data for the MKT was not widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.82. The coefficient of skewness of -0.91 suggests that the data was highly negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption.

Figure 4.4 MKT Histogram and Statistics



Source: *Response Data on Marketing (MKT) Factor; EViews Plot, 2019*

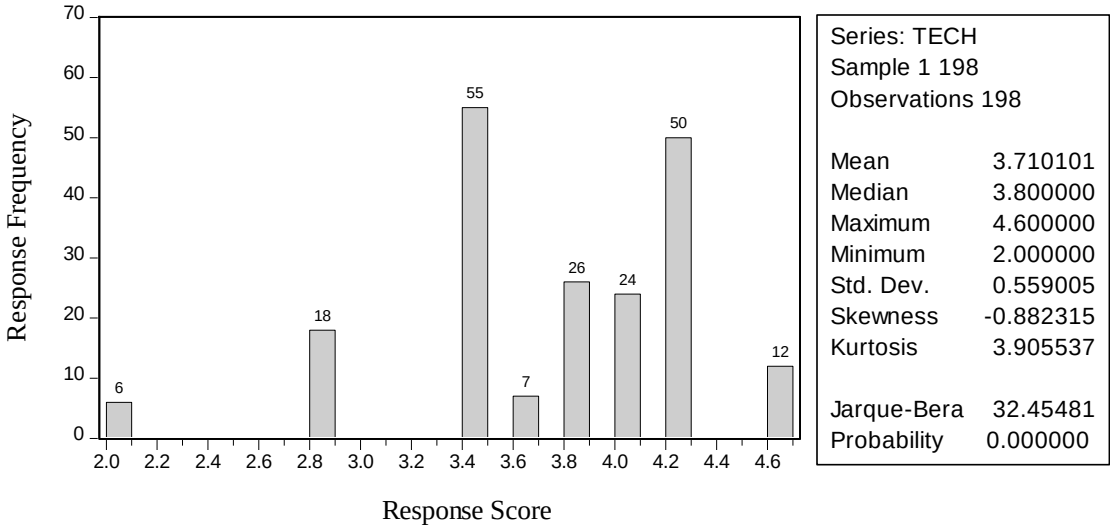
The probability value of Jaque-Bera of 30.05 for the variable MKT implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

The Variable TECH

From the statistics shown, TECH had minimum and maximum **responses** values of 2.00 and 4.60 respectively; while the average value stood at 3.71 with a standard deviation of 0.56, implying that the data deviated from both sides of mean by a value of 0.56. This suggests that the data for the TECH was not widely dispersed in the sample size under analysis, because the

standard deviation is less than the mean value of 3.71. The coefficient of skewness of -0.88 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption.

Figure 4.5 TECH Histogram and Statistics



Source: *Response Data on Technological (TECH) Factor; EViews Plot, 2019*

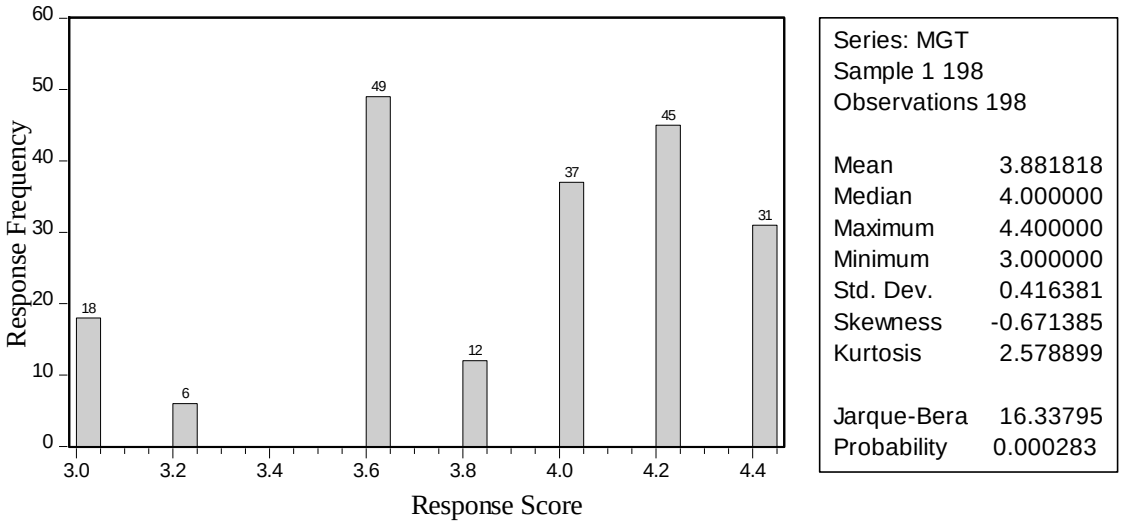
The probability value of Jaque-Bera of 32.45 for the variable TECH implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

The Variable MGT

From the statistics shown, MGT had minimum and maximum **responses** values of 3.00 and 4.40 respectively; while the average value stood at 3.88 with a standard deviation of 0.41, implying that the data deviated from both sides of mean by a value of 0.41. This suggests that the data for the MGT like that of PROD was not widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.88. The coefficient of skewness of -0.67 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption. The probability value of Jaque-Bera of 16.34 for the variable MGT implies that the Gaussian distribution

assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

Figure 4.6 MGT Histogram and Statistics

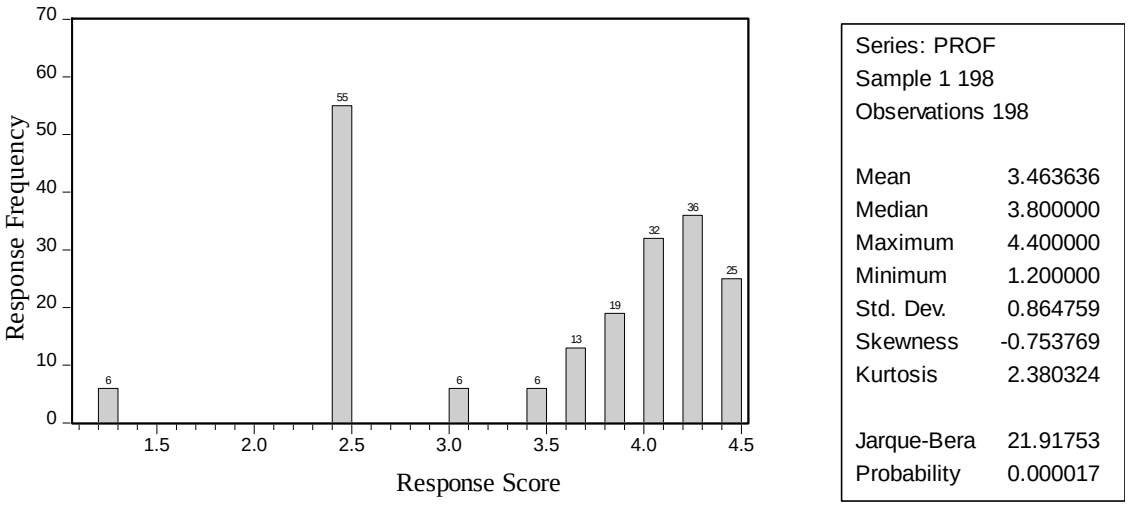


Source: *Response Data on Management Skill (MGT) Factor; EViews Plot, 2019*

The Variable PROF

From the statistics shown, PROF had minimum and maximum **responses** values of 1.20 and 4.40 respectively; while the average value stood at 3.46 with a standard deviation of 0.86, implying that the data deviated from both sides of mean by a value of 0.86.

Figure 4.7 PROF Histogram and Statistics



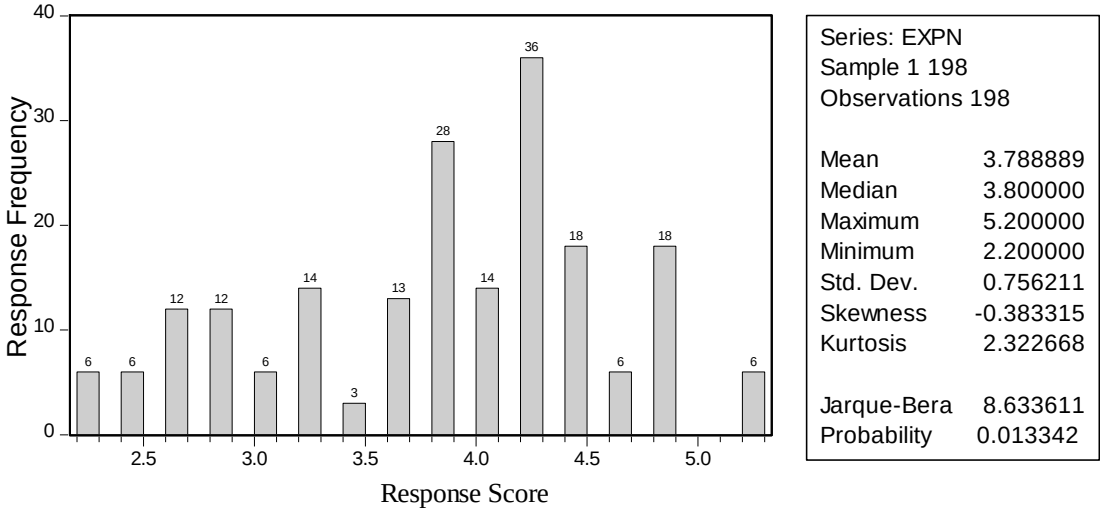
Source: *Response Data on Profitability (PROF) Factor; EViews Plot, 2019*

This suggests that the data for the PROF was not too widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.46. The coefficient of skewness of -0.75 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption. The probability value of Jaque-Bera of 21.91 for the variable PROF implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

The Variable EXPN

From the statistics shown, EXPN had minimum and maximum **responses** values of 2.20 and 5.00 respectively; while the average value stood at 3.79 with a standard deviation of 0.75, implying that the data deviated from both sides of mean by a value of 0.75.

Figure 4.8 EXPN Histogram and Statistics



Source: *Response Data on Sustainability/Expansion (EXPN) Factor; EViews Plot, 2019*

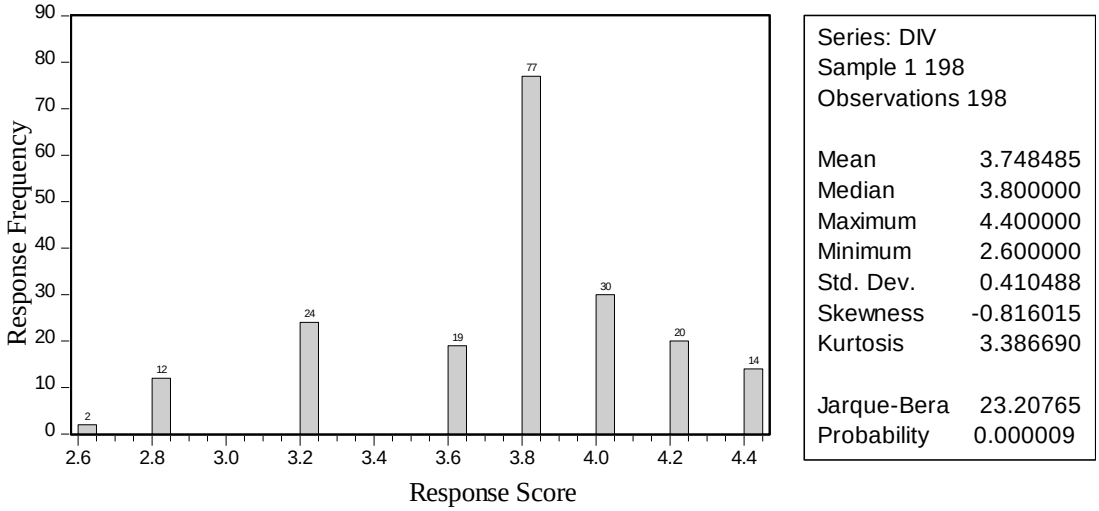
This suggests that the data for the EXPN was not widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.79. The coefficient of skewness of -0.38 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption. The probability

value of Jaque-Bera of 8.63 for the variable EXPN implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

The Variable DIV

From the statistics shown, DIV had minimum and maximum **responses** values of 2.60 and 4.40 respectively; while the average value stood at 3.75 with a standard deviation of 0.41, implying that the data deviated from both sides of mean by a value of 0.41.

Figure 4.9 DIV Histogram and Statistics



Source: *Response Data on Sustainability/Expansion (EXPN) Factor; EViews Plot, 2019*

This suggests that the data for the DIV was not widely dispersed in the sample size under analysis, because the standard deviation is less than the mean value of 3.75 The coefficient of skewness of -0.82 suggests that the data was negatively skewed, meaning that the data distribution has not complied with the symmetrical distribution assumption. The probability value of Jaque-Bera of 23.21 for the variable DIV implies that the Gaussian distribution assumption of normal data had been met. Therefore, the null hypothesis that the data is not normally distributed is rejected at 5% level of significance. This indicates that the data followed the normal curve.

4.2.3 Coefficient of Correlation

The Coefficient of Correlation was measured, by use of the Pearson product moment correlation coefficient (r) because it measures the relationships existing between two or more variables. It further shows a precise quantitative measurement of the degree of correlation between dependent and independent variables. As a rule of thumb, the usefulness of correlation is further to assess the level, nature, and significance of the relationships among the variables, as well as to test the existence of multi-collinearity among the variables.

Table 4.2 Correlation Matrix of Variables

	GOV	PROD	INFR	MGT	MKT	TECH
GOV	1	0.295310	0.730703	0.280948	0.156907	0.260632
PROD	0.295310	1	0.689239	-0.317876	0.772269	-0.346474
INFR	0.730703	0.689239	1	0.058022	0.477360	-0.005552
MGT	0.280948	-0.317876	0.058022	1	-0.305007	0.653742
MKT	0.156907	0.772269	0.477360	-0.305007	1	-0.287344
TECH	0.260632	-0.346474	-0.005552	0.653742	-0.287344	1

Source: ***Author's Computation, EViews Output, 2019.***

From Table 4.2, it can be seen that the entries on the main diagonal (those running from the upper left-hand corner to the lower right-hand corner) give the correlation of one variable with itself, which is always 1 by definition, and the entries off the main diagonal are the pair-wise correlations among the variables. Using the first row of this table, this gives the correlation of GOV with the other variables. For example, 0.295310 is the correlation between GOV and PROD, 0.730703 is the correlation between GOV and INFR, and so on.

Evidently, it can be seen that the strongest relationship among the variables is found to exist between PROD and MKT where the correlation coefficient gave a value of 0.772. This is followed closely by 0.731 (between INFR and GOV). It shows that INFR has strong and positive correlation with GOV variable of the research. But, very weak and negative correlation was found to exist between TECH and PROD, with a coefficient of -0.346. This

means that PROD had a very weak and negative relationship with TECH variable of the research. Similarly, PROD had a very weak and negative relationship with MGT (of coefficient -0.318) of our research variables.

4.2.4 Multicollinearity Test

To examine multicollinearity among the study variables, Variance Inflation Factor (VIF) test was conducted, using the centred VIF. According to Hair, Black, Babin, Anderson and Tatham (2006), the common cut off threshold for centred VIF is a tolerance value of less than 0.10, which corresponds to a VIF value of less than10. Therefore, the VIF results obtained (Table 4.3) signify that multicollinearity does not exist among independent variables since VIF values are less than 10, and hence does not pose any problem to the current study.

Table 4.3 Multicollinearity Result
Variance Inflation Factors
Date: 06/28/19 Time: 15:08
Sample: 1 198
Included observations: 198

Variable	Coefficient Variance	Uncentered VIF	**Centered VIF**
C	0.789313	346.9880	NA
GOV	0.013910	72.41971	**2.776865**
INFR	0.027956	168.2390	**4.648553**
MGT	0.025341	169.7842	**1.921618**
MKT	0.038785	251.4900	**2.530891**
PROD	0.061964	413.9459	**4.550028**
TECH	0.013939	86.25474	**1.905211**

Source: ***Author's Computation, EViews Output, 2019.***

4.2.5 Model Evaluation and Test of Hypotheses

Our model evaluation was based on the fact that the *F*-statistic reported in the regression output is from a test of the hypothesis that *all* of the slope coefficients (excluding the constant, or intercept) in a regression are zero. This follows that the null hypothesis is specified as H_0: $\beta_i = 0$ while its corresponding alternate hypothesis is specified as H_1: $\beta_i \neq 0$.

The *p*-value given just below the *F*-statistic, denoted as *Prob(F-statistic),* is the marginal significance level of the *F*-test. Where the *p*-value is less than our 5% significance level that

we are testing, we had to reject the null hypothesis that all of the regression coefficients are equal to zero. For the example above, the *p*-value is essentially zero, so we reject the null hypothesis that all of the regression coefficients are zero. Essentially, the *F*-test is a joint test so that even if all the *t*-statistics are insignificant, the *F*-statistic can be highly significant. Additionally, EViews also reports a robust Wald test statistic and *p*-value for the hypothesis that all non-intercept coefficients are equal to zero.

Hypotheses Testing: Our three study hypotheses were tested using **Wald test (F-statistic) and *p*-value**, within 5% significance level. The Wald test computes a test statistic based on unrestricted regression and tests for joint significance of the coefficients. It measures how close the unrestricted estimates come to satisfying the restrictions under the null hypothesis. If the restrictions are in fact true, then the unrestricted estimates should come close to satisfying the restrictions. We performed a joint significance test, where the null hypotheses ($H_0: \beta_i = 0$) off no significance was tested against the alternative hypothesis ($H_1: \beta_i \neq 0$).

4.2.5.1 Model One Evaluation and Test of Hypothesis One

This model was earlier stated in Chapter Three as:

$$PROF_i = \beta_0 + \beta_1 GOV_i + \beta_2 PROD_i + \beta_3 INFR_i + \beta_4 MKT_i + \beta_5 MGT_i + \beta_6 TECH_i + \mathcal{E}_i \quad \text{…. (Eq. 3.2)}$$

The regression output for this Model is presented on Table 4.4. From the model equation we can extract the coefficients of the regressors including the constant as follows:

C	=	β_0	≈ -1.08	MKT	=	β_4	≈ 0.62
GOV	=	β_1	≈ 0.30	MGT	=	β_5	≈ 1.04
PROD	=	β_2	≈ -0.62	TECH	=	β_6	≈ 0.07
INFR	=	β_3	≈ -0.20				

Thus, the model forecast equation for Profitability is given as:

PROF = -1.08+0.30*GOV-0.62*PROD-0.20*INFR+0.62*MKT+1.04*MGT+0.07*TECH… (eq. 4.1)

Table 4.4 Regression Output on PROF versus Environmental Factors

Dependent Variable: PROF
Method: Least Squares
Date: 07/03/19 Time: 01:51
Sample: 1 198
Included observations: 198

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.082368	0.888433	-1.218289	0.2246
GOV	0.294809	0.117941	2.499632	0.0133
INFR	-0.199240	0.167199	-1.191635	0.2349
MGT	1.038018	0.159188	6.520721	0.0000
MKT	0.624391	0.196938	3.170491	0.0018
PROD	-0.618317	0.248926	-2.483946	0.0139
TECH	0.070017	0.118066	0.593032	0.5539

R-squared	0.616048	Mean dependent var	3.463636
Adjusted R-squared	0.597704	S.D. dependent var	0.864759
S.E. of regression	0.671120	Akaike info criterion	2.074975
Sum squared resid	86.02674	Schwarz criterion	2.191227
Log likelihood	-198.4226	Hannan-Quinn criter.	2.122030
F-statistic	22.68028	Durbin-Watson stat	2.185736
Prob(F-statistic)	0.000000		

Source: ***Author's Computation (E-Views Output), 2019***

Now, by examining the overall fit and significance of the **Profitability model**, it can be observed that the model has relevance, as indicated by the *F*-statistic (22.68028) value significant at the 5.0%t level. That is, the F-statistic *p*-value of 0.000 is less than 0.05 probability levels. Again, the R^2 (R-square) value of 0.616048 shows that the model has a good fit. It indicates that about 61.6% of the variation in level of Profitability is explained by the independent variables namely GOV, PROD, INFR, MKT, MGT and TECH, while the remaining 38.4% is captured by the error term. Durbin Watson (DW) indicates that there is no autocorrelation among the variables as captured by DW statistic of 2.18. This shows that the estimates are unbiased and can therefore be relied upon for policy decisions.

(a) Test of Hypothesis One ($H_0$1)

This hypothesis was earlier stated as: *environmental factors do not have significant impact on the profitability level of poultry enterprises in Karu …,* that is $\beta_i = 0$:

To test the hypothesis, we employed the Wald Test output shown on Table 4.5:

Table 4.5 Wald Test Results for PROF v Environmental Factors

Wald Test:
Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	12.62303	(6, 191)	0.0000
Chi-square	75.73819	6	0.0000

Null Hypothesis: C(1)=0, C(2)=0, C(3)=0, C(4)=0, C(5)=0, C(6)=0.

Source: ***Author's Computation (E-Views Output), 2019***

From the **Wald-test** on Table 4.5 the calculated F-value for **profitability** level of poultry enterprises (PROF) is 12.62303 with a probability value of 0.0000. This probability value is lower than 0.05 or 5% level of significance, and thus the *F*-value (12.62303) falls in the **rejection region** and hence, the decision criterion is to reject the null hypothesis ($H_0$1). This means that **profitability** is significantly impacted by the environmental factors. We thus conclude that environmental factors have significant impact on the profitability level of poultry enterprises in Karu metropolitan area of Nasarawa State. This agrees remotely with the work of Muzari et al (2012) that technology development is essential strategy for increasing productivity, achieving food self sufficiency and alleviating poverty and food insecurity among small holders farmers in sub Saharan Africa.

(b) Sensitivity (or Stability) Analysis of Prof Regression

(1) ANOVA (or F-statistic)

The analysis of variance (ANOVA) or F-statistic which is used to examine the overall significance of regression model equally showed (from results on Table 4.4) that the result is significant. This is indicated by the *F*-value (22.68) which is significant at the 5% level, since the *p*-value (0.000) is less than 0.05.

(2) Coefficient of Determination— R^2 (R-square)

The coefficient of determination (R-square), used to measure the goodness of fit of the estimated model, indicates that the model is reasonably fit in prediction. This is because from Table 4.4 the R^2 value is 0.616048**,** meaning that 61.6% change in PROF was due to the independent variables under study while the remaining balance of 38.4% unaccounted

variation was captured by the error term. This means overall the independent variables jointly had fairly strong significant impact on the PROF in the research study.

(3) Serial correlation

Serial LM test: As can be noticed, the regression model is free of serial correlation going by the result of the serial LM test, (using the Breusch-Godfrey (BG) Serial Correlation LM Test as seen on Table 4.6 (below). It can be seen that F-Statistic (10.15444) has a *p*-value = 0001 which is less than 0.05; thus we accept that the regression model is free of serial correlation, meaning there is no serial correlation among the variables used in the model.

Table 4.6 BG Serial Correlation LM Test: PROF Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	10.15444	Prob. F(2,189)	0.0001
Obs*R-squared	19.21160	Prob. Chi-Square(2)	0.0001

Source: ***Author's Computation (E-Views Output), 2019***

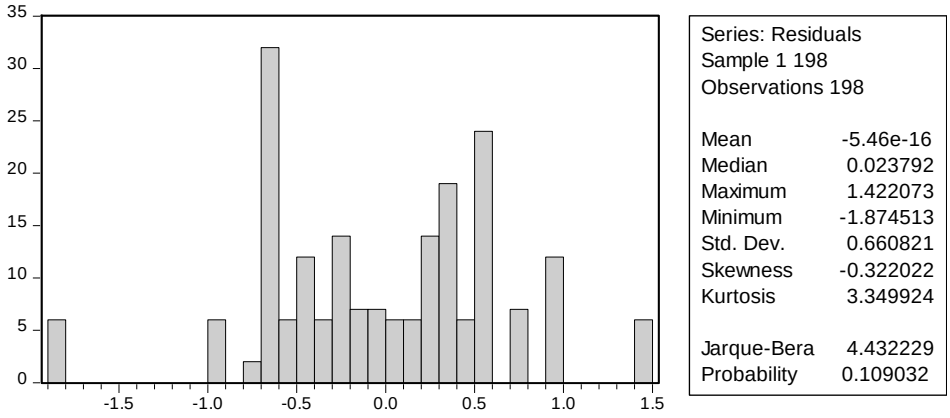
Durbin Watson (DW) statistic also tests for the presence of serial correlation or autocorrelation among the error terms. If there is no autocorrelation, $\rho = 0$ and $DW \approx 2$

Thus the model indicates that the alternative hypothesis (H_1) is accepted, meaning that there is no autocorrelation among the variables as captured by Durbin Watson (DW) statistic of 2.18 (≈2.0) (see Table 4.4). It shows an unbiased estimate and the model is good to be used for policy decisions.

(4) Normality Distribution Test

Normality distribution test is a test for assumption of the error term. The result shows the properties of the residuals. Importantly, the Jarque-Bera statistics is a test which shows whether the residual from our equation violates the normality assumption of the OLS method. As shown in Figure 4.10, the hypothesis of non-normality was rejected since the p-value of the Jarque-Berra statistics (0.109032) is about 10% level of significance. Therefore, the residuals have a normal distribution.

Figure 4.10: Residuals normality Test: PROF model

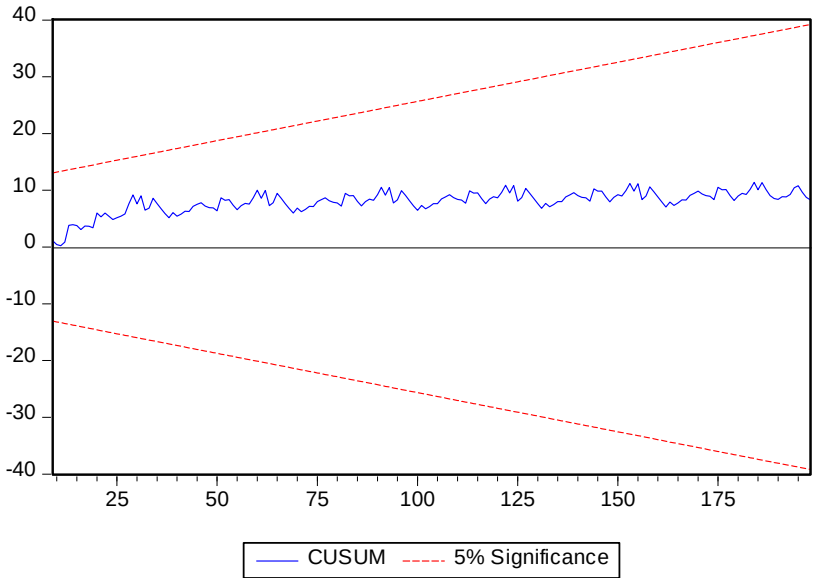


Source: ***Researcher's computation (Eviews Output), 2019.***

(5) Parameter stability Test—CUSUM test

CUSUM test plots the cumulative sum of the recursive residuals together with the 5% critical lines.

Figure 4.2: Testing the Parameter stability: PROF model



Source*: Researcher's computation: Eviews Output, 2019*

As observed from the figure, the CUSUM test result indicates parameter stability as the cumulative sum does not go outside the area between the two critical lines, as shown on Figure 4.2. As observed from the figure, the CUSUM test result indicates parameter stability as the cumulative sum does not go outside the area between the two critical lines.

4.2.5.2 Model Model Two Evaluation and Test of Hypothesis Two

This model was earlier stated in Chapter Three as:

$EXPN_i = \beta_0 + \beta_1 GOV_i + \beta_2 PROD_i + \beta_3 INFR_i + \beta_4 MKT_i + \beta_5 MGT_i + \beta_6 TECH_i + \mathcal{E}_i$ …. (eq. 3.3)

The regression output for the model is presented below (Table 4.7):

Table 4.7 Regression Output on EXPN versus Environmental Factors

Dependent Variable: EXPN
Method: Least Squares
Date: 06/25/19 Time: 14:00
Sample: 1 198
Included observations: 198

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.925065	0.671418	-1.377778	0.1699
GOV	0.013228	0.089132	0.148415	0.8822
PROD	-0.531214	0.188121	-2.823787	0.0052
INFR	0.867754	0.126358	6.867434	0.0000
MGT	0.132401	0.120303	1.100562	0.2725
MKT	0.399696	0.148833	2.685538	0.0079
TECH	0.410080	0.089226	4.595970	0.0000

R-squared	0.563869	Mean dependent var	3.788889
Adjusted R-squared	0.550168	S.D. dependent var	0.756211
S.E. of regression	0.507187	Akaike info criterion	1.514840
Sum squared resid	49.13260	Schwarz criterion	1.631092
Log likelihood	-142.9691	Hannan-Quinn criter.	1.561895
F-statistic	41.15694	Durbin-Watson stat	1.894903
Prob(F-statistic)	0.000000		

Source: Author's Computation (E-Views Output), 2019

From the model equation we summarise the coefficients of the regressors:

C = β_0 ≈ -0.93

GOV = β_1 ≈ 0.01

PROD = β_2 ≈ -0.53

INFR = β_3 ≈ 0.87

MKT = β_4 ≈ 0.40

MGT = β_5 ≈ 0.13

TECH = β_6 ≈ 0.41

Thus, the model forecast for Profitability of the Poultry Enterprises is thus given as:

EXPN= -0.93+0.01*GOV-0.53*PROD+0.87*INFR+0.13*MGT+0.40*MKT+0.41*TECH …(eq.4.2)

Furthermore, by examining the overall fit and significance of the Profitability model, it can be observed that the model does really have relevance, as indicated by the relatively high value of the *F*-statistic (41.15694), significant at the 5.0%t level. That is, the F-statistic *p*-value of 0.001 is less than 0.05 probability levels. Again, the R^2 (R-square) value of 0.563869 shows that the model has a good fit. It indicates that about 56.4% of the variation in level of Profitability is explained by the independent variables namely GOV, PROD, INFR, MKT, MGT and TECH, while the remaining 43.6% is captured by the error term. Durbin Watson (DW) statistics which is also used to test for the presence of autocorrelation indicates that there is no autocorrelation among the variables as captured by DW statistic of 1.89 (≈2.0). This shows that the estimates are unbiased and can therefore be relied upon for policy decisions.

(a) Test of Hypothesis Two ($H_0$2)

Business environmental factors do not have significant impact on ***business expansion*** *of poultry enterprises in Karu …,* that is $\beta_i = 0$ for all coefficients in EXPN model: The test of the hypothesis is carried out using Wald Test and the results shown below (Table 4.8):

Table 4.8 Wald Test Results for EXPN v Environmental Factors

Wald Test:
Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	39.44982	(6, 191)	0.0000
Chi-square	236.6989	6	0.0000

Null Hypothesis: C(1)=0, C(2)=0, C(3)=0, C(4)=0, C(5)=0, C(6)=0

Source: ***Researcher's computation: Eviews Output, 2019.***

From the Table 4.8 the calculated F-value for sustainability/expansion of poultry enterprises (EXPN) is 39.44982 with a *p*-value of 0.0000, (lower than 0.05 significance level); thus the F-value (39.44982) falls in the rejection region—the decision criterion is to reject the null hypothesis ($H_0$2). In other words, C(1)≠0, C(2) ≠0, C(3) ≠0, C(4) ≠0, C(5) ≠0, C(6) ≠0. This

means that sustainability/expansion is significantly impacted by the environmental factors of poultry enterprises in Karu metropolitan area of Nasarawa State. This follows closely with the demonstration by Udoh (2010), who demonstrated that the poultry production is highly dependent on knowledge and adoption of improved technology and for sustainability and growth as well as a technical input it must be availed.

(b) Sensitivity (or Stability) Analysis of EXPN Regression

(1) ANOVA (or F-statistic)

The F-statistic which is used to examine the overall significance of regression model equally showed (from results on Table 4.7) that the result is significant. This is indicated by the *F*-value (41.15694) which is significant at the 5% level, since the *p*-value (0.000) is less than 0.05.

(2) Coefficient of Determination— R^2 (R-square)

The coefficient of determination (R-square), used to measure the goodness of fit of the estimated model, indicates that the model is reasonably fit in prediction. This is because from Table 4.7 the R^2 value is 0.563869, meaning that 56.4% change in PROF was due to the independent variables under study while the remaining balance of 43.6% unaccounted variation was captured by the error term. This means overall the independent variables jointly had fairly strong significant impact on EXPN in the research study.

(3) Serial correlation

Serial LM test: As can be seen, the regression model is free of serial correlation going by the result from the Breusch-Godfrey (BG) Serial Correlation LM Test (on Table 4.9):

Table 4.9 BG Serial Correlation LM Test: EXPN Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	6.131941	Prob. F(2,189)	0.0026
Obs*R-squared	12.06500	Prob. Chi-Square(2)	0.0024

Source: ***Author's Computation (E-Views Output), 2019***

From Table 4.9, the Prob. Chi-square gave 0.0024, which is less than 0.05; thus we reject the null hypothesis that there is serial correlation among the variables used in the model. In other words, that there is NO serial correlation among the variables used in the model.

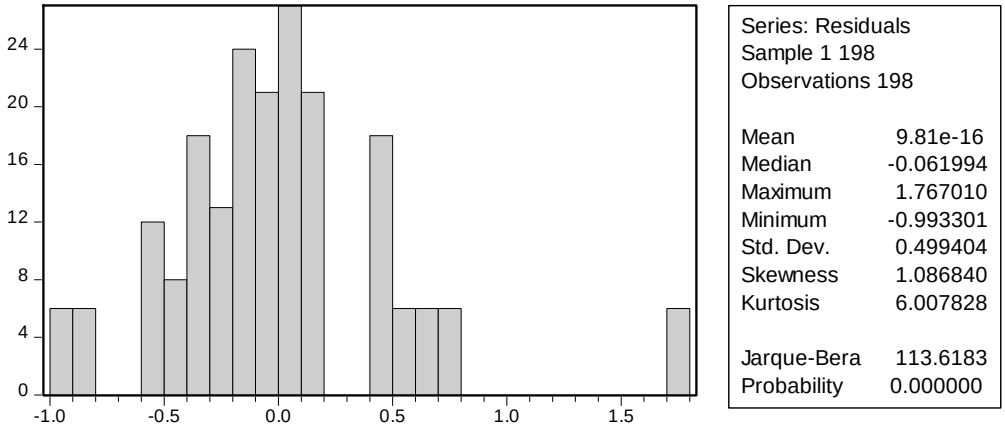
Durbin Watson (DW) statistic also tests for the presence of serial correlation or autocorrelation among the error terms. If there is no autocorrelation, $\rho = 0$ and $DW \approx 2$

Thus the model indicates that the alternative hypothesis (H_1) is accepted, meaning that there is no autocorrelation among the variables as captured by Durbin Watson (DW) statistic of 1.89 (≈2.0) (see Table 4.7). It shows an unbiased estimate and the model is good to be used for policy decisions.

(4) Normality Distribution Test

Normality distribution test is a test for assumption of the error term. The result shows the properties of the residuals. Importantly, the Jarque-Bera statistics is a test which shows whether the residual from our equation violates the normality assumption of the OLS method.

Figure 4.11: Residuals normality Test: EXPN model



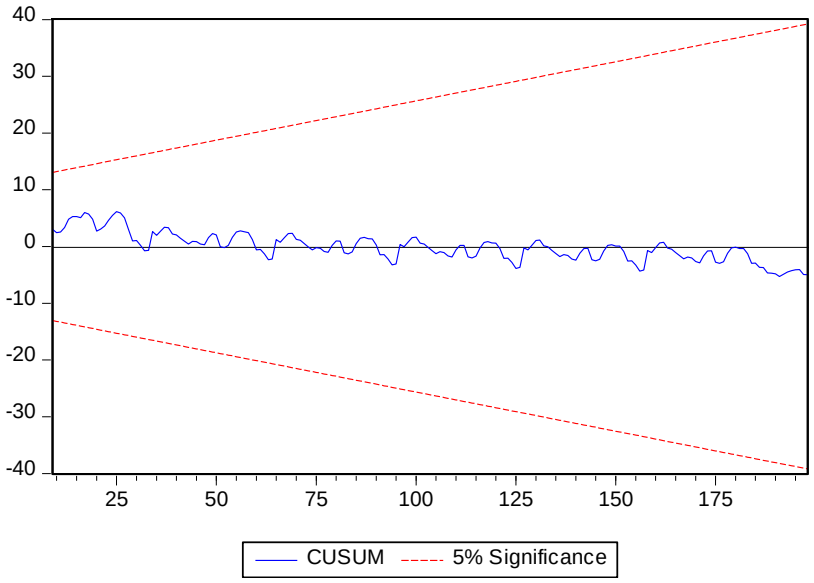
Source: ***Researcher's computation (Eviews Output), 2019.***

As shown in Figure 4.11, the hypothesis of non-normality was rejected since the Jarque-Berra statistics (113.6183) has a *p*-value of 0.0000, which is less than the 0.05 level of significance. Therefore, the residuals have a normal distribution.

(5) Parameter stability Test—CUSUM test

CUSUM test plots the cumulative sum of the recursive residuals together with the 5% critical lines. The test indicates parameter instability if the cumulative sum goes outside the area between the two critical lines, as shown on Figure 4.12.

Figure 4.12: Testing the Parameter stability: EXPN model



Source*: Researcher's computation: Eviews Output, 2019*

As observed from the figure, the CUSUM test result indicates parameter stability as the cumulative sum does not go outside the area between the two critical lines.

4.2.5.3 Model Three Evaluation and Test of Hypothesis Ho3

Like models One and Two, this model was also stated in Chapter Three as:

$DIV_i = \beta_0 + \beta_1 GOV_i + \beta_2 PROD_i + \beta_3 INFR_i + \beta_4 MKT_i + \beta_5 MGT_i + \beta_6 TECH_i + \mathcal{E}_i$ …. (eq. 3.4)

The regression output for the model is presented below (Table 4.7), from which we summarise the coefficients of the regressors as follows:

C	=	β_0	≈ 0.56	MKT	=	β_4	≈ -0.20
GOV	=	β_1	≈ -0.11	MGT	=	β_5	≈ 0.08
PROD	=	β_2	≈ 1.14	TECH	=	β_6	≈ -0.01

INFR = β_3 $\approx$ -0.10

Table 4.10 Regression Output on DIV versus Environmental Factors

Dependent Variable: DIV
Method: Least Squares
Date: 07/03/19 Time: 11:45
Sample: 1 198
Included observations: 198

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.564094	0.287932	1.959122	0.0516
GOV	-0.111806	0.038223	-2.925076	0.0039
INFR	-0.101614	0.054187	-1.875229	0.0623
MGT	0.084070	0.051591	1.629555	0.1048
MKT	-0.200856	0.063826	-3.146948	0.0019
PROD	1.139731	0.080674	14.12758	0.0000
TECH	-0.012091	0.038264	-0.315997	0.7523

R-squared	0.727794	Mean dependent var	3.748485
Adjusted R-squared	0.719243	S.D. dependent var	0.410488
S.E. of regression	0.217503	Akaike info criterion	-0.178495
Sum squared resid	9.035743	Schwarz criterion	-0.062243
Log likelihood	24.67098	Hannan-Quinn criter.	-0.131440
F-statistic	85.11256	Durbin-Watson stat	1.869138
Prob(F-statistic)	0.000000		

Source: Author's Computation (E-Views Output), 2019

Thus, the model forecast for diversification of the Poultry Enterprises in Karu metropolitan area is thus given as:

DIV = 0.56-0.11*GOV+1.14*PROD-0.10*INFR+0.08*MGT–0.20*MKT-0.01*TECH … (eq. 4.3)

Furthermore, by examining the overall fit and significance of the Sustainability/ diversification model, it can be observed that the model does really have relevance, as indicated by the *F*-statistic (85.11256) value, which is significant at the 5.0%t level. That is, the F-statistic p-value of 0.001 is less than 0.05 probability levels. Again, the R^2 (R-square) value of 0.727794 shows that the model has a good fit. It indicates that about 72.8% of the variation in level of Sustainability/diversification is explained by the independent variables namely GOV, PROD, INFR, MKT, MGT and TECH, while the remaining 27.2% is captured by the error term. Durbin Watson (DW) statistics which is also used to test for the presence of autocorrelation indicates that there is no autocorrelation among the variables as

captured by DW statistic of 1.87 (≈2.0). This shows that the estimates are unbiased and can therefore be relied upon for policy decisions.

(a) Test of Hypothesis Three ($H_0$3):

This hypothesis was earlier stated as: *Business environmental factors do not have significant impact on* ***business diversification*** *of poultry enterprises in Karu* …, that is $\beta_i = 0$ for all coefficients in DIV model: The test of the hypothesis is carried out using Wald Test and the results shown below (Table 4.8):

Table 4.11 Wald Test Results for DIV v Environmental Factors

Wald Test:
Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	410.7164	(6, 191)	0.0000
Chi-square	2464.299	6	0.0000

Null Hypothesis: C(1)=0, C(2)=0, C(3)=0, C(4)=0, C(5)=0, C(6)=0

Source: ***Researcher's computation: Eviews Output, 2019.***

From the Table 4.8 the calculated F-value for expansion or **diversification** of poultry enterprises (DIV) is 410.7164 with a *p*-value of 0.0000, (lower than 0.05 significance level); thus the F-value (410.7164) falls in the rejection region—the decision criterion is to reject the null hypothesis ($H_0$2). In other words, C(1)≠0, C(2) ≠0, C(3) ≠0, C(4) ≠0, C(5) ≠0, C(6) ≠0. This means that **diversification** is significantly impacted by the environmental factors of poultry enterprises in Karu metropolitan area of Nasarawa State.

(b) Sensitivity (or Stability) Analysis of DIV Regression

(1) ANOVA (or F-statistic)

The F-statistic which is used to examine the overall significance of regression model equally showed (from results on Table 4.10) that the result is significant. This is indicated by the *F*-value (85.11256) which is significant at the 5% level, since the *p*-value (0.000) is less than 0.05.

(2) Coefficient of Determination— R^2 (R-square)

The coefficient of determination (R-square), used to measure the goodness of fit of the estimated model, indicates that the model is reasonably fit in prediction. As can be seen from Table 4.7, the R^2 value is 0.727794, meaning that 72.8% change in PROF was due to the independent variables under study while the remaining balance of 27.2% unaccounted variation was captured by the error term. This means overall the independent variables jointly had fairly strong significant impact on DIV in the research study.

(3) Serial correlation

Serial LM test: As can be seen, the regression model is free of serial correlation going by the result from the Breusch-Godfrey (BG) Serial Correlation LM Test (on Table 4.9 below):

Table 4.12 BG Serial Correlation LM Test: EXPN Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.751685	Prob. F(2,189)	0.4730
Obs*R-squared	1.562530	Prob. Chi-Square(2)	0.4578

Source: ***Author's Computation (E-Views Output), 2019***

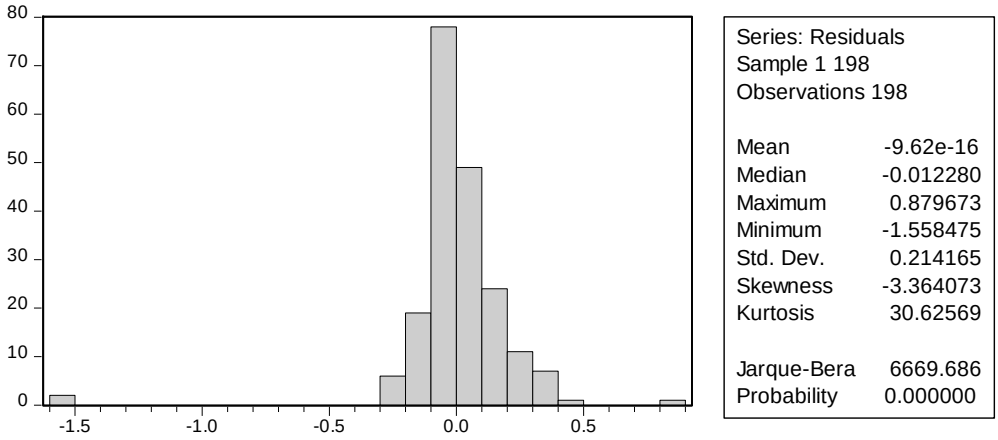
From Table 4.12, the Prob. Chi-square gave 0.4578, which is less than 0.05; thus we accept the null hypothesis that there is no serial correlation among the variables used in the model.

Durbin Watson (DW) statistic also tests for the presence of serial correlation or autocorrelation among the error terms. If there is no autocorrelation, $\rho = 0$ and $DW \approx 2$

Thus the model indicates that the alternative hypothesis (H_1) is accepted, meaning that there is no autocorrelation among the variables as captured by Durbin Watson (DW) statistic of 1.87 (≈2.0) (see Table 4.10). It shows an unbiased estimate and the model is good to be used for policy decisions.

(4) Normality Distribution Test

Figure 4.13: Residuals normality Test: DIV model



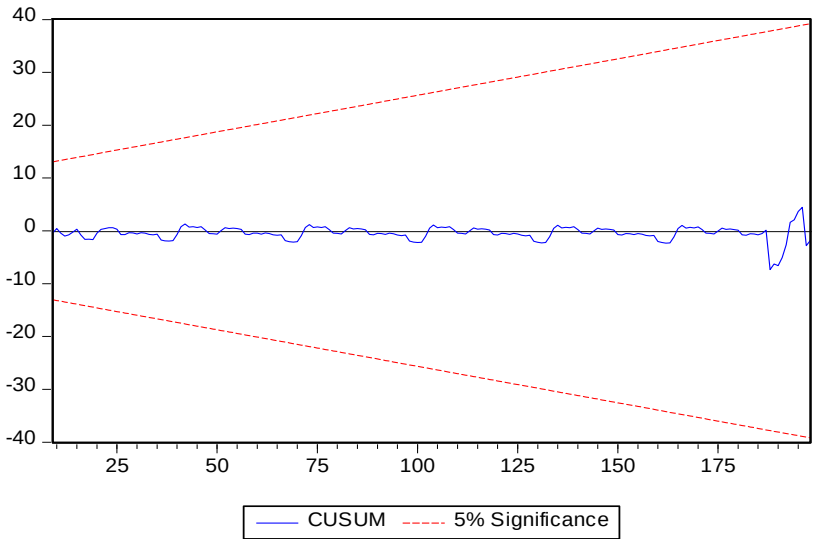
Source: ***Researcher's computation (Eviews Output), 2019.***

From the Normality distribution test shown in Figure 4.13, the hypothesis of non-normality is rejected since the Jarque-Berra statistics (6669.686) has a *p*-value of 0.0000, which is less than the 0.05 level of significance. Therefore, the residuals have a normal distribution.

(5) Parameter stability Test—CUSUM test

CUSUM test plots the cumulative sum of the recursive residuals together with the 5% critical lines. The test indicates parameter instability if the cumulative sum goes outside the area between the two critical lines, as shown on Figure 4.14.

Figure 4.14: Testing the Parameter stability: DIV model



Source*: Researcher's computation: Eviews Output, 2019*

As observed from the figure, the CUSUM test result indicates parameter stability as the cumulative sum does not go outside the area between the two critical lines.

4.3 Discussion of Findings

4.3.1 PROF Model and Test Results of H_o1

The PROF Model was the first model and is an OLS regression model relating the dependent variable of profitability (PROF) and the (independent) environmental variables. The estimated forecast model was obtained as:

PROF= -1.08+0.30*GOV-0.62*PROD-0.20*INFR+0.62*MKT+1.04*MGT+0.07*TECH … (eq. 4.1)

From this forecast model, we notice that if all the variables are held constant at zero, PROF = -1.08, meaning the profitability of the industry is negative. This implies that the enterprises will survive only by eating up its capital. Furthermore, PROD and INFR do not contribute positively to PROF growth as shown by their negative coefficients.

The regression output showed that F-value of 12.62303 fell in the rejection region because the Wald test returned a *p*-value of 0.0000 (which is lower than 0.05 significance level), that is β_i is non-zero for all coefficients in PROF model. Thus, all the environmental factors (independent variables) considered in our study have effect on sustainability/expansion. The coefficient of determination (R^2) of 0.616048 indicates that 61.6% change in PROF was due to the independent variables under study with the remaining 38.4% unaccounted variation captured by the error term. This means the $\boldsymbol{R^2}$ has sufficiently measured the goodness of fit of the estimated model, and thus indicates that the model can reasonably predict poultry enterprise profitability. Moreso, the independent variables jointly had fairly strong significant impact on the profitability of the poultry enterprise in Karu.

To test the null hypothesis ($H_0$1) Wald-test was used which gave F-value (= 12.62303) with a *p*- value of 0.0000, leading to a rejection of the null hypothesis ($H_0$1). This means that environmental factors significantly impact on the profitability level.

The ANOVA test: We tested the overall significance of the regression model using the ANOVA (or F-statistic). The F-value (of 22.68) was returned with a *p*-value = 0.000, which is less than 0.05 critical value, thus establishing that the result is significant.

Also the **Serial correlation** test was conducted using the Breusch-Godfrey (BG) Serial Correlation LM Test that gave F-Statistic of 10.15444 and a *p*-value = 0.0001, which is less than 0.05. This means the regression model is free of serial correlation. Also the DW statistic of 2.18 (≈2.0) indicated absence of correlation or autocorrelation among the error terms, showing an unbiased estimate and that the model is good to be used for policy decisions. To test for assumption of the error term, we ran the Normality distribution test which is a test for assumption of the error term, and hence the properties of the residuals. The Jarque-Berra statistic (of 4.43229) has a 10% level of significance, meaning that the residual from our equation did not violate the normality assumption of the OLS method, and therefore, the residuals have a normal distribution. Finally, the Parameter stability Test or the CUSUM test was conducted; the plot of the cumulative sum of the recursive residuals together with the 5% critical lines showed that the cumulative sum does not go outside the area between the two critical lines, meaning that there is parameter stability.

With all these tests carried out, it is clear that the performance factor of PROFITABILITY can be correctly analysed. The variables of GOV, MKT, MGT and TECH have been identified as most crucial to enhance profitability. Government factor relates to ensuring political stability, good agricultural policy and tackling basic laws and other legal issues that can do some good to the poultry industry. For marketing factors, entrepreneurs are faced with product pricing which should be reasonable; robust marketing groups to stamp out backyard decisions and negating actions from betraying or desperate members, and so on. Further, technological skills

involve many thing an organization must do, such as research and development, technology adoption and the use of ICT to improve in their operations. Finally, acquiring requisite management skills means adequate staff training, provision of staff welfare and motivation, etc.

4.3.2 EXPN Model and Test Results of H_o2

Like the PROF model, the EXPN model is an OLS regression model that related Sustainability/Expansion (EXPN) variable and the (independent) environmental variables. The estimated forecast model was obtained as:

EXPN = -0.93+0.01*GOV-0.53*PROD+0.87*INFR+0.13*MGT+0.40*MKT+0.41*TECH … (eq. 4.2)

From this eq. 4.2, we notice that if all the variables are held constant at zero, EXPN = -0.93, meaning the expansion of the industry is negative, that is no positive value is added but rather the enterprise worth is shrinking. Furthermore, PROD variable does not contribute positively to the enterprise expansion or sustainability, as shown by its negative coefficient.

The regression output showed that F-value of 41.15694 fell in the rejection region because it had a *p*-value of 0.0000 (which is lower than 0.05 significance level), that is β_i is non-zero for all coefficients in EXPN model This means that all the environmental factors (independent variables) considered in our study have effect on sustainability/expansion.

Also, the coefficient of determination (R^2) of 0.563869 indicates that 56.4% change in PROF was due to the independent variables under study with the remaining 43.6% unaccounted variation captured by the error term. This means the R^2 has sufficiently measured the goodness of fit of the estimated model, and thus indicates that the model can reasonably predict poultry enterprise sustainability/expansion in Karu. Again, the independent variables jointly had fairly strong significant impact on the sustainability/expansion of the poultry enterprise in Karu.

To test the null hypothesis ($H_0$1) Wald-test was used which gave F-value (= 39.44982) with a *p*-value of 0.0000, leading to a rejection of the null hypothesis ($H_0$2). This means that *environmental factors significantly impact on the* Sustainability/Expansion variable.

The ANOVA test: We tested the overall significance of the regression model using the ANOVA (or F-statistic). The F-value (of 41.15694) was returned with a *p*-value = 0.000, which is less than 0.05 critical value, thus establishing that the result is significant.

Also the Serial correlation test was conducted using the Breusch-Godfrey (BG) Serial Correlation LM Test that gave F-Statistic of 6.131941 and a *p*-value = 0.0001, which is less than 0.05. This means the regression model is free of serial correlation. Also the DW statistic of 1.89 (≈2.0) indicated absence of correlation or autocorrelation among the error terms, showing an unbiased estimate and that the model is good to be used for policy decisions. To test for assumption of the error term, we ran the Normality distribution test which is a test for assumption of the error term, and hence the properties of the residuals. The Jarque-Berra statistic (of 113.6183) has a 10% level of significance, meaning that the residual from our equation did not violate the normality assumption of the OLS method, and therefore, the residuals have a normal distribution. Finally, the Parameter stability Test or the CUSUM test was conducted; the plot of the cumulative sum of the recursive residuals together with the 5% critical lines showed that the cumulative sum does not go outside the area between the two critical lines, meaning that there is parameter stability.

The analysis of the effect of environmental factors on sustainability/expansion of poultry business indicate that apart from '*production cost'*, all other variables, namely, GOV, INFR, MKT, MGT and TECH all have crucial positive contribution to sustainability/expansion. Thus in addition to the discussion carried out above, stakeholders come face to face with the aspect of infrastructure, such as adequate provision of such as land, water, energy, power, transport, etc.

4.3.3 DIV Model and Test Results of H_o3 71

Like the previous models, the DIV model is an OLS regression model that related Business diversification (DIV) variable and the (independent) environmental variables. The estimated forecast model was obtained as:

DIV=0.56-0.11*GOV+1.14*PROD-0.10*INFR+0.08*MGT–0.20*MKT-0.01*TECH (eq. 4.3)

From the forecast model, we notice that if all the variables are held constant at zero, DIV = 0.56, meaning the enterprise can still diversify in the absence of the variables. This implies that the enterprises will survive only by eating up capital. However, GOV, INFR, MKT and TECH do not contribute positively to DIV as shown by their negative coefficients.

The regression output showed that F-value of 85.11256 fell in the rejection region because its *p*-value of 0.0000 is lower than 0.05 significance level, that is β_i is non-zero for all coefficients in DIV model. This means that all the environmental factors (independent variables) considered in our study have effect on diversification. Also, the coefficient of determination (R^2) of 0.727794 indicates that 72.8% change in DIV was due to the independent variables under study with the remaining 27.2% unaccounted variation captured by the error term. This means the R^2 has sufficiently measured the goodness of fit of the estimated model, and thus indicates that the model can reasonably predict poultry business diversification in Karu. Again, the independent variables jointly had fairly strong significant impact on the sustainability/expansion of the poultry enterprise in Karu.

To test the null hypothesis ($H_0$1) Wald-test was used which gave F-value (= 410.7164) with a *p*- value of 0.0000, leading to a rejection of the null hypothesis ($H_0$3). This means that *environmental factors significantly impact on* diversification *variable of performance*.

The ANOVA test: We tested the overall significance of the regression model using the ANOVA (or F-statistic). The F-value (of 85.11256) was returned with a *p*-value = 0.000, which is less than 0.05 critical value, thus establishing that the result is significant. Also the Serial correlation test was conducted using the Breusch-Godfrey (BG) Serial Correlation LM Test that gave F-Statistic of 0.751685 and a *p*-value = 0.0001, which is less than 0.05. This means the regression model is free of serial correlation. Also the DW statistic of 1.87 (≈2.0) indicated absence of correlation or autocorrelation among the error terms, showing an unbiased estimate and that the model is good to be used for policy decisions. To test for

assumption of the error term, we ran the Normality distribution test which is a test for assumption of the error term and hence the properties of the residuals. The Jarque-Berra statistic (of 6669.689) has a 10% level of significance, meaning that the residual from our equation did not violate the normality assumption of the OLS method, and therefore, the residuals have a normal distribution. Finally, the Parameter stability Test or the CUSUM test was conducted; the plot of the cumulative sum of the recursive residuals together with the 5% critical lines showed that the cumulative sum does not go outside the area between the two critical lines, meaning that there is parameter stability.

Finally, the environmental factors having crucial positive contribution on the performance variable of diversification of poultry business are strictly two namely, PROD and MGT. This means if the poultry businesses must involve in diversification strategy, they must concentrate on these two variables. PROD representing production cost is a delicate variable that is crucial to the aspect of business diversification. Where production costs are carelessly handled, it can grossly affect profit negatively, and therefore the company cannot expand or diversify. So the Cost of credit or the cost of acquiring capital must be optimal and carefully handled; also the cost of diseases and veterinary treatment as well as the cost of inputs (such as feeds, and other nutritional aspects) must be carefully handled so as to avoid wastages. Furthermore, Poultry entrepreneurs are challenged to acquire requisite skills in management especially in training their workers, or providing staff welfare and motivation, and other leadership styles that can move performance to the next level.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

5.1.1 Study Objectives, Literature and Basic Tests

This chapter represents a summary of the major findings that were presented in chapter four, summary, conclusion and recommendations suggested by the researcher. All the findings are summarized as per the objectives, they show how objectives have been achieved and how objectives agree or disagree with the literature reviewed. The research project, taken within the most recent period of ten (10) years—from 2009 to 2018, was designed to study how environmental factors impact performance of poultry business enterprises in Karu Metropolitan Area of Nasarawa State. The environmental factors considered were six and constituted the independent variables, namely: the *Political/Government, Cost of production, Infrastructure, Marketing Factors, Technological skills,* and *Management skills.* Alongside were the performance factors that make up the dependent variables namely, Profitability, Sustainability/Expansion and Diversification.

Literature reviewed has revealed the fact that the poultry industry has many environmental factors that affect its performance. It was upon these factors that three specific objectives were formulated, the first related the environmental factors and profitability of poultry business enterprises in Karu metropolitan area; the second related the environmental factors and poultry business expansion; and the third related the environmental factors and poultry business diversification.

Empirical literatures relating to issues on the work of other authors, as well as relevant theories of poultry entrepreneurship that formed the base upon which this work was founded.

Particularly, three major theories were considered: the Resource-based Entrepreneurship Theory, the Systems theory, and the Agricultural marketing approaches.

The research adopted descriptive research method using the Ordinary Least Square (OLS) method of regression. In line with the research objectives, formulated hypotheses were tested in Chapter four, using 198 primary data collected by use of an instrument named ESALQUEST, which is the questionnaire distributed in the field. Three linear regression models were constructed to reflect the three hypotheses stated in Chapter One, which were tested using the *F-test*. The level of significance for the study was 5%, for a two-tailed test, with a decision rule to accept the null hypothesis if the p-value of the F-statistic was lower than 0.05 (or 5% level of significance), it meant the *F*-value has fallen in the **rejection region** and hence, the decision criterion was to reject the null hypothesis, but contrary to this, we may accept the null hypothesis.

5.1.2 Summary on Model formulation and Data Analysis Method

The three OLS Regression models constructed followed in line with the three formulated hypotheses in Chapter one. A test of the models indicated that they were all robust as each of them had a good fit within the 5% critical value. This is judged from the *F*-test values and the R^2 (R-squared) of the regression. Furthermore, all the independent variables passed the autocorrelation or serial correlation test as confirmed by the Durbin Watson (DW) statistics of about 2.0.

Also carried out were Post Estimation Diagnostic Tests such as Histogram normality test (for normal distribution), on all the research variables with particular analysis on Mean, Std. Dev., Skewness, Kurtosis, Jarque-Bera statistics. The results showed that the Gaussian distribution assumption of normal data had been met, meaning that the data followed the normal curve for each variable. We also carried out the Coefficient of correlation test, and found that all the pair-wise coefficients showed non-existence of multicollinearity among independent variables.

This claim was confirmed by the test of Variance Inflation Factor (VIF) that showed VIF values were all less than the critical value of 10. Furthermore, the evaluation of our three models namely the Profitability model, the Sustainability/Expansion model and the Diversification model all had non-zero coefficients.

Measure of Variable coefficients was done by Wald test for each regression model, and showed that all the coefficients of the respective models were non-zero. Thus each dependent variable (Profitability, Expansion and Diversification) had been impacted by environmental factors (independent variables).

5.1.3 Summary on Sensitivity Analysis

Coefficient of Determination R^2 (R-squared) measures the goodness of fit of an estimated model. Here it indicated that the three models were reasonably fit in prediction, as R^2 has reflected in each regression model as follows: PROF: R^2 = 0.616048; EXPN: R^2 = 0.563869; DIV: R^2 = 0.727794. This means the R^2 had sufficiently measured the goodness of fit for each estimated model, meaning that the models can reasonably predict poultry enterprise profitability, expansion and diversification respectively. Moreso, the independent variables jointly had fairly strong significant impact on the dependent variables of the poultry enterprise in Karu.

The ANOVA or F-test is another sensitivity test that indicates the overall significance of a regression model. For each of our models, the F-statistic values were returned with a *p*-value less than the 5% significant value, thus establishing that the results of each model were significant.

Serial correlation or Serial LM (Lagrange Multipier): the Serial correlation test was conducted using the Breusch-Godfrey (BG) Serial Correlation LM Test showed that the each regression model was free of serial correlation. The DW statistic each indicated a comfortable value of close to 2.0 (critical) meaning there was absence of correlation or autocorrelation among the

error terms for each model, showing an unbiased estimate and that the models were good to be used for policy decisions.

To test for assumption of the error term, we ran the Normality distribution test which is a test for assumption of the error term and hence the properties of the residuals. The Jarque-Berra statistic (of 4.43229) for PROF model was significant at10% level, while the EXPN model and the DIV model had their JB values significant at 5 level, meaning that the residuals from our Regression equations did not violate the normality assumption of the OLS method, and thus had a normal distribution.

Finally, the Parameter stability Test or the CUSUM test was conducted for each model. The plot of the cumulative sum of the recursive residuals together with the 5% critical lines showed that the cumulative sum did not go outside the area between the two critical lines, meaning that there was parameter stability.

5.1.4 Summary of Findings (Tested Hypotheses)

First Finding: Poultry Enterprise Profitability v. Environmental Factors

The tested hypothesis relating Poultry Enterprise Profitability *showed from the* Wald Test that F-value = 12.62303 and *p*-value = 0.0000 which is less than 0.05 (level of significance), and hence fell in the rejection region and thus concluding that environmental factors have significant impact on the profitability level of poultry enterprises in Karu metropolitan area of Nasarawa State, in partial agreement with Muzari et al (2012) that technology development is essential strategy for increasing productivity, achieving food self sufficiency and alleviating poverty and food insecurity among small holders farmers in sub Saharan Africa.

Second Finding: Poultry Business Expansion v. Environmental Factors

The tested hypothesis relating **Poultry Business Expansion** *showed from the* Wald Test that F-value = 39.44982 and *p*-value = 0.0000 which is less than 0.05 (level of significance), and hence the F-value(39.44982) fell in the rejection region and thus we concluded that

environmental factors have significant impact on Poultry Business Expansion in Karu metropolitan area of Nasarawa State. This follows closely with the work of Udoh (2010), who demonstrated that the poultry production is highly dependent on knowledge and adoption of improved technology and for sustainability and growth as well as a technical input it must be availed.

Third Finding: Poultry Business Diversification v. Environmental Factors

The tested hypothesis relating Poultry Business Diversification *showed from the* Wald Test that F-value = 410.7164 and *p*-value = 0.0000 which is less than 0.05 (level of significance), and hence the F-value(410.7164) fell in the rejection region. We therefore concluded that environmental factors have significant impact on Poultry Business Diversification in Karu metropolitan area of Nasarawa State.

5.2 Conclusions

5.2.1 Preliminary Conclusions

This research work investigated how environmental factors affected the performance of poultry business enterprises in Karu metropolitan area of Nasarawa State. The work used the most recent period of ten (10) years—from 2009 to 2018, with data collected from primary sources for the purpose of analysis. The three formulated OLS Regression models passed all the required Pre-estimation and Post-estimation Diagnostics Tests.

The ANOVA (F-statistic) test established that our models had an overall significance; while the coefficients of determination, R^2 (R-squared) indicated that the models were reasonably fit in prediction, since we had: for PROF: R^2 = 0.616048, meaning 61.6% change in Profitability was due to the explanatory variable (i.e. the environmental factors) used in the study, while the balance of 38.4% unaccounted variation was captured by the error term; for EXPN: R^2 = 0.563869, meaning 56.4% change in Expansion in Poultry business was due to the explanatory variable (i.e. the environmental factors) used in the study, while the balance of 43.6% unaccounted variation was captured by the error term;

for DIV: R^2 = 0.727794, meaning 72.8% change in Diversification in Poultry business was due to the explanatory variable (i.e. the environmental factors) used in the study, while the balance of 27.2% unaccounted variation was captured by the error term. Overall thus, the dependent variables namely, Profitability; Expansion in Poultry; and Diversification in Poultry business were all impacted by the environmental factors under study.

Moreover, there was no serial correlation, and no autocorrelation, among the variables used in the models. Thus, our models had an unbiased estimate, and could be comfortably used for policy decisions. Furthermore, our Normality Test (after Jarque-Bera) indicated that the residuals from our regression equations did not violate the normality assumption of the of the OLS method, and thus had a normal distribution. Also the Parameter stability Tests (CUSUM tests) all indicated that the parameters were stable.

5.2.2 Specific Conclusions

The specific or main conclusions from our study reflect on the tests of our three hypotheses (in Chapter Four) that originated from the three specific objectives (highlighted in Chapter One). The conclusions are made hereunder:

#1 Our study revealed that the profitability of the poultry business is significantly impacted by the environmental factors. We thus conclude that environmental factors have significant impact on the profitability level of poultry enterprises in Karu metropolitan area of Nasarawa State. Consequent upon this is that the poultry entrepreneur is vulnerably exposed to these factors that can make or mare his profitability.

#2 On the issue of business sustainability and expansion, we conclude that this is grossly impacted by the environmental factors under study. This is supported by the Wald test where the F-value (39.44982) fell in the rejection region and we had to reject the null hypothesis, and conclude that Business environmental factors do significantly impact business expansion of poultry enterprises. In other words, sustainability/expansion is

significantly impacted by the environmental factors of poultry enterprises in Karu metropolitan area of Nasarawa State.

#3 **Business enterprise diversification**: Overall, our study revealed that business diversification of poultry enterprises is significantly impacted by environmental factors in Karu. This is supported by the Wald test where the F-value (410.7164) fell in the rejection region and we had to reject the null hypothesis, and conclude that Business environmental factors do significantly impact diversification of poultry enterprises in Karu metropolitan area of Nasarawa State.

5.3 Recommendations

From the findings and conclusions of this study, it is clear that the issue of performance must be taken seriously by poultry stakeholders. The various environmental factors considered in this study are at stake. In particular, the following recommendations must be taken:

#1 **Profitability**: The environmental variables of GOV, MKT, MGT and TECH have been identified as most crucial to enhance profitability. Stakeholders must ensure that the 'Government factor' relating to ensuring political stability, good agricultural policy and tackling basic laws and other legal issues are critically handled to improve profitability. This goes same with Marketing factors, where for instance, adequate and reasonable product pricing must be made; also robust marketing groups must be in place to stamp out backyard decisions and negating actions that may come from desperate members, etc. Another factor that can enhance improved profitability is the acquisition of technological skills; this means organizations must be involved in research and development, as well as technology adoption and the use of ICT to improve in their operations. Finally, acquiring requisite management skills is very essential: staff training, staff welfare and motivation, and so on are critical elements for Poultry managers to consider in their strategy to improve overall performance.

#2 **Business sustainability and expansion**: All the environmental factors that affect profitability (i.e. GOV, MKT, MGT and TECH) positively as discussed also affect the performance in terms of sustainability/expansion of poultry business. In addition to these factors, INFR also has a positive contribution. Thus stakeholders must come face to face with the aspect of infrastructure, such as adequate provision of such as land, water, energy, power, transport, etc. that can aid performance.

#3 **Business enterprise diversification**: Knowing that PROD and MGT have crucial positive contribution poultry business diversification, we seriously recommend that poultry entrepreneurs should ensure that production costs are carefully handled so that they do not eat up profit, otherwise the company will not diversify. Therefore, entrepreneurs must ensure the Cost of credit or the cost of acquiring capital is optimal and carefully scrutinised; also the cost of diseases and veterinary treatment as well as the Cost of inputs (such as feeds, and other nutritional aspects) should be carefully handled so as to avoid wastages. Furthermore, Poultry entrepreneurs are must acquire requisite skills in management and have the courage to train their workers, or to provide adequate welfare and motivation to their workers, as well as other leadership styles that can move performance to the next level.

5.4 Limitations of the Study

Obtaining the correct population for this study was not possible because there are so many poultry businesses that were unaccounted for during our survey. Eventhough we tended to be selective by concentrating on those who had been in operation for at least 10 years (2018-2018), many of those that were not already in the register of the Poultry Farmers Association could not be enumerated. This is a limitation for the study and could affect the quality of test results/conclusion. Also, the independent variables chosen for the study were done only on the basis of the researcher's judgment. There are actually many more environmental factors that

affect business performance. Even among those variables that were used, the right thing to do was to sieve them out, say by use of some statistical techniques. All these constitute limitations.

5.5 Suggestion for Further Study

Future research work in this area should have the following focus: firstly, the variables or proxies used should be checked against some global standardized variables so as to improve the quality of conclusion; secondly, a more intense statistical check should be carried out on selecting the most effective variables, perhaps by using principal components isolated by use of factor analysis, or by using say, the Stepwise Least Squares method of regression equation, which this researcher considered cumbersome and too time-consuming for this work. Finally, future study should include descriptive analysis of the personal information of the respondents (see Appendix A1, p. 87). In particular, information on Entrepreneur's Age, Highest formal education attained, Longest Time in poultry business and starting investment capital, can be analysed along with responses on dependent and independent variables.

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APPENDICES

APPENDIX A: ESALQUEST (RESEARCH INSTRUMENT)

Appendix A1: Respondent's Personal Information

Qu. 1 State the Name/Address of your Poultry Farm/Business

……

……

Qu. 2 Which of the following options indicates your age bracket?

A. Less than 25 years ☐ B. Between 25 and 35 yrs ☐

C. Between 35 and 45 yrs ☐ D. 45 and 55 yrs ☐

E. Above 55 years ☐

Qu. 3 What is your highest formal educational attainment?

A. Postgraduate ☐ B. First Degree/HND ☐

C. Diploma/Certificate ☐ D. Secondary School ☐

E. Primary School/Other ☐

Qu. 4 How long have you been operating your **poultry** business?

A. Between 1 and 2 years ☐ B. Between 2 and 4 years ☐

C. Between 4 and 6years ☐ D. Between 6 and 8 years ☐

E. Over 8 years ☐

Qu. 5 Your **starting investment capital falls** under which of the these option ranges?

A. Less than ₦50,000 ☐ B. ₦50,000 to ₦100,000 ☐

C. ₦100,000 to ₦200,000 ☐ D. ₦200,000 to ₦500,000 ☐

E. More than ₦500,000 ☐

APPENDIX B: QUESTIONS RELATING TO HYPOTHESES TESTING

APPENDIX B1: Questions On Political/Government Factors

QUESTION SEGMENT		RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
I	POLITICAL/GOVERNMENT FACTORS						
1	Government policies are inconsistent, unpredictable, contradictory, and conflicting, and thus not favourable to decision-making in poultry farming.						5
2	Poultry business has no conducive/enabling environment as operations are under high cost due to multiple taxation (development tax, registration tax, premise tax, sanitation fees, signboard fees, etc) by state and local government agencies.						5
3	Constant political turmoil and instability in the country limit entrepreneurial activity and discourage expansion in poultry farming						5
4	Agricultural policies of Government in relation to livestock and particularly poultry are unfavourable to the poultry farming sector.						5
5	Government provides incentives from time to time in the areas of organized seminars, conferences and workshops for poultry farmers to participate						5

APPENDIX B2: Questions On Cost of Production Factors

COST OF PRODUCTION (PROD)		RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	Input costs (e.g. feeds, vaccination, labour, etc) keep increasing by the year compared to slower increase on price of products (e.g. eggs, chicken meat, etc) and certainly reduce the profit margin.						5
2	Our company has the capability to process poultry meat to added value products that will contribute to sustained demand so as to realize full benefits from poultry meat.						5
3	Our variable or current costs (such as feeds, labour cost, disease cost, drugs, veterinary treatment, sanitation) are on the increase, without corresponding turnover on product sales, thereby affecting profit margin negatively.						5
4	The quality choice of our input factors (day-old chicks, feeds-type, drugs, veterinary practitioners, etc) does not warrant good quality output, and so affects our product quality adversely.						5
5	Poultry production set-up costs (feasibility, fixed costs, day-old chicks, electricity, etc) are very high and so create a high break-even point that can only be met after long gestation period.						5

APPENDIX B3: Questions On Infrastructure Factors

	INFRASTRUCTURE (INFR)	RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	There is assured transportation and road accessibility to vendors, workers and other stakeholders who come in and out of the farm.						5
2	We have efficient power and supply is regular for at least heating up brooding environment for the chicks, and adequate night light to increase feed consumption for weight gain of birds.						5
3	We have adequate storage facilities and preservative arrangement for our eggs and chicken meat whenever the need arises.						5
4	Our company has efficient transportation arrangement of shipping our products on time to customers as demanded.						5
5	There is provision of farm factory wears, such as special footwears, overalls, and other protective gadgets that help in biosecurity control.						5

APPENDIX B4: Questions On Marketing Factors

MARKETING FACTORS (MKT)		RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	Marketing sales channels for our product distribution have helped to improve our profit margin levels tremendously						5
2	Government agencies encourage us by buying up our products over to prevent inflation and market volatility, thereby stabilizing prices						5
3	We have the marketing capability, skills and strategies to face our competitors in the market to take up required market share for our poultry products						5
4	Workers have an easy method of communication with each other and with management on issues affecting the well-being of the business, including sales.						5
5	Government agents come up to buy up products as an incentive to supporting farmers in controlling wastages to maximize to improve income.						5

APPENDIX B5: Questions On Technical Factors

	TECHNICAL FACTORS (TECH)	RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	mobilization campaigns aimed at sensitising our workers on new technologies and disease control are not considered a priority by our bosses in the farm						5
2	Management earnestly pursues application technology like ICT and skills in all aspects of poultry production all the way from managing day old chicks to marketing of poultry farm products such as poultry meat and eggs.						5
3	There are visible provisions of public research facilities and public extension services for poultry entrepreneurs and farmers who want to improve their processes and product yield.						5
4	Technical equipment, modern machineries, Information communication technology (ICT) as well as new drugs are readily available and affordable even by small-scale poultry farmers.						5
5	We are trained and are able to apply the technical skills of poultry density, water management, feeding management, feed formulation, biosecurity/biosafety measures, etc.						5

APPENDIX B6: Questions On Management Skills

	MANAGEMENT SKILLS (MGT)	RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	Most of our operational lapses are due to poor equipment and poorly qualified technical feed operators and other labourers, and do lower performance of sales growth						5
2	Generally, poultry management lacks professional planning, has poor human and material control that result in deficient coordination of activities.						5
3	Each set of birds has its own monitoring timetable in relation to feeding, medication or vaccination, and staff are well informed to carry out their duties in this line.						5
4	Staff rewards for hardwork and productivity (financially or with products), and staff welfare (such as transport, first aid, launch breaks, etc) are of top priority						5
5	Since poultry enterprise is resource-driven, management has a control grip of farm housing, physical environment, nutritional and health needs of the birds for optimal productivity						5

APPENDIX B7: Questions On Profitability Factors

	PROFITABILITY (PROF)	RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	Over-leveraging relating to indebtedness to our lenders is on the high side leading to low profit that cannot cover the interest payable on the loan, thereby creating low growth.						5
2	Bad resource/financial management such as poor costing and ruthless financial handling affect our sales turnover, and hence sales growth						5
3	Excessive high cost of materials input does not make room for our company to make reasonable profit.						5
4	Bad resource/financial management such as poor costing and ruthless financial handling affect our poultry products sales turnover, and hence our profitability level						5
5	Excessive high cost of materials input (such as feeds, vaccines, drugs, etc) does not make room for our business to make reasonable profit.						5

APPENDIX B8: Questions On Sustainability/Expansion Factors

SUSTAINABILITY/EXPANSION (EXP)		RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	Government offers adequate tax rebates, or tax cuts and sometimes tax exemptions all in a bid to helping the poultry sector to survive, grow and expand.						5
2	Bad resource/financial management such as poor costing and ruthless financial handling affect our sales turnover, and hence sales growth						5
3	We derive huge socioeconomic advantages and increased incentive to invest more in the poultry sector because the process of securing land ownership in Nasarawa State is easy, cheap and straight forward.						5
4	Bank credit facilities to farmers and credit delivery alternatives, e.g. local financing are readily available and so we can sustain and then expand our poultry business						5
5	Our customers' demand is increasing steadily over time, making it necessary to increase our production levels, and employment of more workers to meet our operations.						5

APPENDIX B9: Questions On Diversification Factors

DIVERSIFICATION (DIV)		RESPONSE RATINGS					
		SD	D	U	A	SA	Total per Response
		1	2	3	4	5	
1	I am aware of Government collective incentives to help poultry farmers in the area of subsidy on bird vaccination and quality drug supplies, water, electricity, etc and so we have opportunity to produce our own inputs.						5
2	Our capability, capacity or skills to make desired optimum contribution are limited by our level of professional exposure through say workshops and seminars, and so we have limitation in creative knowledge.						5
3	Management is considering manufacturing of direct consumption products from our eggs and chicken meet.						5
4	There is all likelihood that our company is considering partnership with other investors to boost its financial and managerial positions that will support new product lines in the poultry sector						5
5	Our company has distributors and dealers of our products and also depots in towns outside main office that take care of increasing customers demand						5