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Technical Efficiency and Production Elasticity of Broiler Producers in Edo State, Nigeria

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ABSTRACT

There is a pressing need to increase broiler output in Nigeria in order to meet the inadequate supply of animal protein. The relatively poor technology used in smallholder farms results in significantly lower feed efficiency, marketing of low weight broilers at the end of fattening period and very high mortality rates. This situation is mainly attributable to failure to exploit economies of scale and modern care systems such as fully automated feeding, which decreases feed waste. An awareness of the implicit relationship between the resources and the product will stimulate the farmers to improve on their existing methods of production. This will help in increasing production and productivity of the farmers at lower cost of production and hence increased profits. This study was designed to analyze the farm level technical efficiency and production elasticity of broiler farmers in the study area. A multi-stage sampling procedure was used in selecting the 140 broiler farmers interviewed in this study, through a combination of purposive, random and snowball sampling techniques. The data that were used in this study were collected from a cross - sectional survey of broiler farmers in the State via the use of a well structured questionnaire. Maximum likelihood estimates of the parameters of the stochastic frontier production functions showed that all the coefficients of the variables of the production function conformed to a priori expectations and were positive, with the exception of medication cost. The estimated coefficient of feed intake was 0.19 and it was significant ($p < 0.01$). The estimated coefficient of stock size was 1.03 and was significant ($p < 0.01$). Results also showed that 82.9 % of the respondents had technical efficiency levels of 0.81 and above. Result of the diagnostic statistics indicated that there were technical inefficiency effects in broiler production in the study area, as confirmed by the large and significant value of the gamma coefficient (0.74). Also, the generalized likelihood ratio was significant ($p < 0.01$). The respondents were operating at increasing returns to scale (stage 1 of the production function) as shown by the summation of the elasticities of the inputs which was greater than one (1.2). It was concluded that some gaps exist at farm level technical efficiencies of broiler farmers in Edo State. Improved technical efficiency of broiler farmers can be achieved in the study area by filling these identified gaps. Also, broiler farmers could benefit from economies of scale linked to increasing returns as a way of enhancing production and ensuring the sustainability of the sector.

Keywords: Diagnostic, Estimate, Frontier, Poultry, Production, Returns, Scale, Smallholder.

INTRODUCTION

In Nigeria, the poultry population is estimated to be 140 million (Ocholi et al., 2006). In the past, poultry farming involved raising chickens in the backyard for daily egg production and family consumption. Effiong and Onyeweaku (2006) however reported that poultry business has changed from subsistence to commercial poultry farming. This agrees with the findings of Hamra (2010), that poultry farming is now a huge business that is split into several operations including hatcheries, broiler farms for meat production and pullet farms for egg production. The poultry industry has emerged as the most dynamic and fastest expanding segment in the animal husbandry sector.

Poultry production has been identified as a means of ensuring sustainable family income. It can be established with minimum capital and as a side project (Sani et al., 2000). Moreover they can fend for themselves on free range without much care. Depending on the farm size, broiler farming can be the main source of family income or can provide subsidiary income to farmers throughout the year. Broilers are marketed at an average age of around 56 days, it is a short term enterprise and therefore a number of batches can be raised within a year (Effiong and Onyeweaku, 2006). Broiler production is carried out in all parts of the country with no known religious, social or cultural inhibitions associated with their consumption. The structure of the poultry industry in Nigeria is represented by approximately 40% of commercial operations and 60% of backyard poultry farmers (Watch, 2006).

The inadequate production of farm crops to meet the needs of man and his livestock (Babatunde, et al. 1990; Esonu et al., 2001) as well as the threat of desert encroachment in many parts of West Africa sub region has destroyed the vegetation and depleted livestock population (Idufueko, 1984; Madubuike, 1992). Thus for sustainable animal protein production (Nwapu, et al. (2000); Ekenyem, (2002) and Esonu et al. (2003), have suggested immediate search for cheap and readily available sources of protein and energy particularly those not competed for between man and livestock.

Production cost for broilers is highly correlated with the scale of farm production, feed conversion rate, chick cost, feeding period, number of birds, market live weight, management pattern and enterprise type. Economies of scale arise mainly from effective and efficient management, high quality health care that reduces mortality rate, provision of high quality feed that enhances growth and result in large final live weight at marketing and also integration of various production stages with sufficient capacities. The relatively poor technology used in small scale farms results in significantly lower feed efficiency, marketing of low weight broilers at the end of fattening period and very high mortality rates. The poor technology used on small scale farms is due mainly to failure to exploit economies of scale and modern care systems such as fully automated feeding, which decreases feed waste. Higher production costs on smallholder farms have been accentuated by rising input prices and marketing problems due to inadequate marketing infrastructure such as slaughter houses and selling lots of broilers at above their economic marketing weights or beyond optimum marketing age. Consequently, marketing the broilers take more time which prolongs the fattening period. There is therefore, the problem of finding adequate means of increasing technical efficiency among broiler farmers. The study seeks to determine whether and to what extent resources are efficiently utilized by broiler farmers in the study area as well as the respective elasticities of production associated with the raising of broilers. The objective of this study was thus to determine the technical efficiency and production elasticity of broiler production in Edo State, Nigeria.

METHODOLOGY

The Study Area

The study was conducted in Edo State, Nigeria. The State lies within the geographical co-ordinates of Longitudes 05o 04' and 06o 43' East of the Greenwich Meridian and Latitudes 05o 44' and 07o 34' North of the Equator. The State is characterized by a tropical climate that ranges from humid to sub humid at different times of the year. There are two distinct seasons – rainy and dry seasons and an average temperature ranging from a minimum of 24°C to a maximum of 33°C. The three distinct vegetations identified in the State are Mangrove, Fresh Swamp and Savannah. The major occupations of Edo people outside the public sector employment are trading, farming (including livestock production), fishing, metal and wood work, carving and other related artisanal endeavours.

Sampling techniques

A multi stage sampling procedure was employed in selecting respondents for this study.

Stage I: The three Agro-Ecological Zones of the State (Edo South, Central and North) as delineated by Edo State Agricultural Development Programme (ADP), were purposively selected in order to have a State wide coverage.

Stage II: Three Local Government Areas (LGAs) were randomly selected from each of the three Agro – Ecological zones in the State, making a total of nine LGAs. The selected LGAs included: Ikpoba Okha, Oredo and Ovia North East from Edo South; Esan South East, Esan Central and Igueben from Edo Central and Etsako East, Owan East and Owan West from Edo North.

Stage III: Snowball sampling technique was used to select 70 respondents from each zone in order to have equal representation of the zones. A total of 210 respondents were sampled out of which 140 presented useful data for analysis, giving a response rate of 67%. The data from the remaining 70 respondents could not be used, due to obvious inconsistencies and perceived exaggerations in the information provided. The highest response rate was obtained from Edo South (86%) while Edo North had the lowest response rate of 46%.

Method of data collection

The data that were used in this study were collected from a cross - sectional survey of broiler farmers in the State using a well structured questionnaire. Data were collected on the socioeconomic characteristics of the farmers, matured weight of broilers, farm size, number of batches reared annually, amount and cost of labour, feed and medication used, other variable costs, price of matured broilers and constraints faced by the broiler farmers.

Method of data analysis

The Stochastic Frontier Production Function (SFPF) was used in analyzing the data obtained from the questionnaire.

Frontier model: The linearized Cobb - Douglas form of the Stochastic Production Frontier is explicitly expressed as;

$$\ln Y = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + (V_i - U_i) \quad \ldots (1)$$

Where; Y = output of broiler (Kg); ln = natural logarithm; X_1 = quantity of feed (Kg); X_2 = labour (Man – days); X_3 = cost of medication (naira); X_4 = total number of birds (Broiler stock size); β_0 to β_4 = unknown parameters to be estimated; i = ith farmer; V_i = random error term, which captures the random variation in output, which are due to the factors that are not within the influence of the producer (It is assumed to be independent of U_i, identical and normally distributed with zero mean and constant variance $(0, \sigma^2)$); U_i = non – negative random error term representing the deviations from the frontier production function, which is attributed to controllable factors (technical inefficiency) (It is independent of V_i, half normal and identically distributed with zero mean and constant variance $(0, \sigma^2)$).

The technical efficiency of an individual farmer will be defined in terms of the ratio of the observed output to the corresponding frontier output given the available technology. That is

$$TE = Y_i / Y_i^* \quad \ldots (2)$$

Where Y_i = observed output of the ith farmer; Y_i^* = frontier output of the ith farmer

$$TE = \beta0 + \beta1nX1i + \beta2lnX2i + \beta3lnX3i + \beta4lnX4i + \beta5lnX5i + (Vi - Ui) \ldots (3)$$

$$\beta0 + \beta1lnX1i + \beta2lnX2i + \beta3lnX3i + \beta4lnX4i + \beta5lnX5i + Vi$$

So that, $0 \leq TE \leq 1$

Where 1 indicates a fully efficient farm.

The estimates for all the parameters of the stochastic frontier production function and the inefficiency model were simultaneously obtained using the programme FRONTIER version 4.1 c (Coelli, 1996).

The technical inefficiency effects Ui is defined by

$$Ui = 0 + 1Z1i + 2Z2i + 3Z3i + 4Z4i + 5Z5i + 6\,Z6i + 7\,Z7i + 8\,Z8i \ldots (4)$$

Where Z1 = age of farmers (years); Z2 = gender of farmers (Female = 1, Male = 0); Z3 = Household size; Z4 = Level of education (years of formal schooling); Z5 = Years of experience Z6 = Nature of farming (seasonal = 0, all year round = 1); Z7 = Age at which birds are sold (weeks); Z8 = Age2

These are included in the model to indicate their possible influence on the technical efficiencies of the farmers. Other parameters estimated were sigma squared (ð2) which indicates the goodness of fit of the model used and is expressed as:

$$2 = 2v + 2\,u \ldots (5)$$

Where: 2 = overall variance of the model ; 2v = variance of error term due to noise; 2 u = variance of error term due to technical inefficiency effects

Also, γ (gamma) was estimated. It measures the total variation of broiler output from the frontier output which can be attributed to technical inefficiency (Battese and Corra, 1977). It is expressed as:

$$\gamma = 2\,u / 2 \ldots (6)$$

$0 \leq \gamma \leq 1$

If $\gamma = 0$, it implies that all deviations from the frontier are due entirely to noise. If $\gamma = 1$, it implies that all deviations are due to technical inefficiency effects.

The coefficients of elasticity of production were estimated with respect to the inputs used in production. It shows the percentage change in the value of output resulting from a given percentage change in the given input. Elasticity coefficients were used to determine the effect of increased utilization of feed, labour, chicks, chemicals and fixed inputs to the total output. (Alabi and Haruna, 2005; Etuk, et al., 2007; Emokaro and Ekunwe, 2009). The returns to scale which is the relationship between the scale on which a firm operates and the level of its cost was derived by the summation of the elasticities of the production. Returns to scale are used to show the proportionate increase in output resulting from a given proportionate increase in inputs. The returns to scale are increasing, constant or decreasing if the sum of the estimated elasticities is greater, equal to or less than one respectively.

RESULTS AND DISCUSSION

Socioeconomic characteristics of respondents

Results showed that majority (58.0%) of the respondents were males indicating that more males participated in broiler production in the study area, although females were also actively involved (42.0%). This indicated that broiler farming cannot be strictly described as a gender based business in the study area. About 96.0% of the respondents was married indicating that broiler farming was not popular among the unmarried people. With respect to education, 99.0% of the farmers was educated, ranging from primary to tertiary education with the majority (44.0%) having secondary education. This is in contrast with the report by Emokaro and Erhabor (2005) in which 31% of respondent were educated up to secondary school level. Educated farmers would be highly receptive to new innovations which could enhance production and productivity.

Majority (61.0%) of the respondents had household sizes ranging between 1 – 6. Also, majority (56.0%) utilized family labour. This could be as a result of their scale of operation which was small, with an average of 666 birds/farmer. Omotosho and Ladele (1988), classified poultry farms into small scale (having less than 1,000 birds), medium scale (having between 1,000 and 5,000 birds) and large scale (having more than 5,000 birds) respectively.

Results also indicated that 56.0% of the farmers reared broilers on seasonal basis. This could be attributable to the fact that the demand for broilers is seasonal. About 61.0% of the respondents indicated that broiler production was their primary choice of business and about 34.0% indicated that it was a means of augmenting income. The respondents' age ranged from 22 – 62 years with the majority (47.0%) falling in the range of 41 – 50 years. The respondents could be classified as middle aged as 78% of them were less 51 years old. With respect to farming experience, about 51.0% of the respondents had experience of less than six years. Only about 4.0% had acquired experience above 15 years. This implies that majority of the respondents were green horns in the business. This is in line with the findings of Taru, et al., (2010) that broiler producers are not adequately experienced, as their average years of experience in broiler production was found to be 3 years. The relatively low number of experienced farmers suggests that broiler farming is not an enduring occupation amongst the respondents. Perhaps, farmers abandon the occupation along the line owing to risks and uncertainties in the business. Majority of the respondents (46.0%) reared two batches of broilers annually. This may have been as a result of the observation that most of the respondents were seasonal farmers who reared birds only during Christian festive seasons of Easter and Christmas because of the seasonality in demand for the product. About73.0% of the respondents sold their birds between the ages of 8 – 12 weeks because of the high demand during these festive periods.

Production function estimates

The Maximum Likelihood Estimates of the parameters of the SFPFs (Table 1), showed that all the coefficients of the variables of the production function, except for cost of medication conformed to a priori expectations and were positive. The estimated coefficient for feed intake was 0.19 and it was significant ($p < 0.01$), indicating that an increase in feed intake by the birds will increase their output. The estimated coefficient of stock size was 1.03 and it was significant ($p < 0.01$), indicating that an increase in stock size will lead to an increase in the output of broilers. Subahash, et al. (1999) and Ajibefun (2000), demonstrated that increases in feed intake and stock size will bring about a corresponding increase in output. According to Iheanacho et al. (2000), an increase in stock size means that more inputs will be used and consequently more output is expected under good management. Since stock size had the highest coefficient, it means that more increase can be experienced in the output of broilers, by increasing the number

Table 1: Result of the Maximum Likelihood Estimates of the Cobb – Douglas Frontier Production Function

Variable	Parameters	Std error	t- values
Constant	1.12	0.18	6.24*
Feed	0.19	0.07	2.84*
Labour	0.05	0.16	0.32
Medication cost	-0.04	-0.03	-1.24
Stock size	1.03	0.04	27.98*

* Significant at 1% level.

This further agrees with the findings of Oladeebo and Ambe – Lamidi (2007), that variables of total number of birds stocked and feed intake by the birds were positively signed and significant in broiler production. Also, Effiong (2005); Etim (2009); Ike (2011); Ezeh, et al. (2012) and Areerat – Todsade, et al. (2012), demonstrated that feed intake and stock size were significant determinants of output in broiler production.

The coefficient of labour use was also positive meaning that as labour use increased, more output accrued to the farmers. This can however be possible up to a certain limit, due to the law of diminishing returns. Iheanacho, et al. (2000), observed that this kind of relationship is expected where the available labour is efficiently managed along with other resources in order to avoid diminishing returns to labour. Emenyonu, et al. (2006), reported that the coefficient of labour was positive but an insignificant determinant of the output of broilers. The coefficient of medication cost was, negative indicating that expenditure on medication reduces the output of broilers. This could be as a result of the observation that farmers spent a lot on medication, sometimes beyond optimal level to prevent outbreak of diseases in their farms. However, its coefficient was not significant at either 1% or 5% level. This is in line with the findings of Oladeebo and Ambe – Lamidi (2007). The estimated production function equation is:

$$Ln\ Y = 1.12 + 0.19X1 + 0.05X2 - 0.04X3 + 1.03X4 \ldots (7)$$

Elasticities of production and return to scale

Production elasticities indicate the percentage change in output relative to a percentage change in input if other factors are held constant. From the nature of the Cobb – Douglas SPF, the sum of the coefficients which are also known to be the estimated parameters of variables is the elasticity of production of the variables. Result presented in Table 2 showed the partial elasticities of production with respect to the explanatory variables and it indicated the relative importance of the factors used in broiler production. From the findings, the elasticity of feed intake was 0.19 meaning that a 100% change in feed intake will bring about a 19.0% change in output of broilers if other factors are held constant. This result compares favourably with the findings of Etuk et al., 2007 who reported elasticity coefficient of 0.76 for feed intake in the study of Broiler production in Cross River State.

Labour had an elasticity of 0.01 meaning that for a 100% change in labour input, output of broilers would change by 1%. Medication cost had an elasticity of -0.04, meaning that a 100% change in medication cost would bring about 4.0% reduction in output of broiler production in the study area. The elasticity of farm size was 1.04 indicating that a 100 % change in stock size would bring about a 104% change in the output of broilers.

The estimated elasticities of feed intake and labour use were in the stage of economic relevance in the production function. Their elasticities were less than unity indicating that output of broiler production is inelastic with respect to the above factors. As a result, a change in the use of these variables would lead to a less than proportionate change in the output of broilers. The elasticity of the coefficient of stock size was positive. It indicates that the use of this variable was in stage one of the production function. The elasticity was greater than unity indicating that the output of broiler production is elastic with respect to stock size. As a result, a change in the use of this variable would lead to a more than proportionate change in output of broiler. The estimated elasticity of medication cost is negative. The elasticity was negative and less than unity indicating that the output of broiler is inelastic with respect to the above factor. As a result, a decrease in the use of this variable would lead to a less than proportionate increase in the output of broilers. In summary, the variables specified in the model (with the exception of stock size) had inelastic effect on output.

The summation of the elasticities of the inputs which serve as a measure of total resource productivity was greater than one (1.2) suggesting that the respondents were operating at increasing returns to scale. In other words, they were producing in stage 1 of the production function. This is an indication that broiler farmers could benefit from economies of scale linked to increasing returns in order to enhance production. At this irrational stage (stage 1), production could be increased by using more of the factors with positive elasticities especially stock size, which was observed to be the most important factor in broiler production in the study area. This agrees with the result of Alabi and Aruna (2005), who reported return to scale of 12.29 in their study of family poultry production in the Niger – Delta region of Nigeria. They concluded that the farmers were in stage 1 (inefficient stage) of the production process. It was recommended that more variable inputs be utilized in broiler production so as to enhance efficiency.

Table 2: Estimated Elasticities and Return to Scale in Broiler Production

Variable	Elasticity
Feed	0.19
Labour	0.01
Medication cost	-0.04
Stock size	1.04

Return to Scale (R.T.S.) = summation of elasticities = 1.2

Inefficiency sources model analysis

Result of the diagnostic statistics presented in Table 3 indicated that there were technical inefficiency effects in broiler production in the study area. This is confirmed by the large and significant value of the gamma coefficient. The gamma value of 0.74 indicated that 74.0 % of the variations in the output of broiler production by the respondents was attributable to technical inefficiency effects alone, while only about 26.0% was due to random effects. Also, the generalized likelihood ratio is significant at 1% level suggesting the presence of one sided error component. This means that inefficiency factors were significant in the stochastic frontier model.

The coefficients of farmers' age, gender, nature of farming and age (squared) of the birds were positive and less than unity. This implies that these factors led to an increase in technical inefficiency. Age (squared) was significant. The coefficients of household size, education level, years of experience and age at which the birds were sold were negative and less than unity. This indicated that these factors led to a decrease in technical inefficiency. They were however not significant apart from the age at which the birds were sold.

Household size positively influenced efficiency. This is expected as broiler production is not labour intensive and results from the survey indicated that majority (56.0%) of the respondents utilized family labour. However, Yusuf and Malomo, (2007); Okike, (2010); Mohammed, et al. (2011); Areerat – Todsade, et al. (2012) demonstrated that the estimated coefficient for family size was positively related to technical inefficiency as it was reported that in a situation where the family size is large and only a small proportion of the farm labour is derived from it, the inefficiency effects are expected to be greater. The nature of farming positively influenced efficiency as majority of the farmers reared broilers on seasonal basis. They did this within a short period of time and they had target weight and size. Age at which the birds were sold contributed to efficiency and was significant at ($p < 0.05$) as most of the farmers did not exceed three months in selling their birds, while age (squared) contributed significantly ($p < 0.01$) to inefficiency. The coefficient of age (squared) was greater than zero, indicating that inefficiency fell initially with age of the birds and later increased as the birds aged.

Table 3: Estimated coefficients in the inefficiency sources m odel of the stochastic frontier production function

Variable	Coefficient	Std error	t – ratio
Constant	0.92	0.27	3.45
Age	0.02	0.22	0.09
Gender	0.02	0.04	0.48
Household size	-0.18	-0.23	-0.77
Years of formal Education	-0.04	-0.04	-1.09
Years of experience	-0.05	-0.05	-1.04
Nature of farming	0.02	0.04	0.57
Age at which birds are sold	-0.10	-0.04	-2.71*
Age square	0.03	0.02	1.98**
Diagnostic statistics			
δ^2	0.01		3.26*
Y	0.74		5.41*
Log likelihood function	129.67		
[illegible]	37.4		

* Significant at 1 % level
** Significant at 5 % level

Years of formal education had a positive influence on technical efficiency of the farmers. Studies have shown that farmers with formal education have greater ability to adopt new technologies and innovations. This is expected to have a positive influence on their efficiency level. This agrees with the findings of Oluwatosin, and Akeem, (2011), that farmer's level of technical inefficiency declines with more years of formal education. Years of experience contributed to inefficiency. Studies show that farming experience could have a positive or negative effect on efficiency. It is evident that majority of the farmers (51.0 %) had years of experience below six years indicating that majority of the farmers were inexperienced. Ike and Inoni (2006), demonstrated that farmers with more experience tended to be more technically efficient.

CONCLUSION

It can thus be concluded that some gaps exist in the farm level technical efficiencies of broiler farmers in Edo State. Resources were inefficiently utilized by broiler farmers in this study. Improved efficiency can be achieved technically by making input use more efficient through increased stock size and reduced cost of medication in broiler production. The study therefore recommends that broiler farmers be assisted in accessing credit facilities (especially soft loans) by relevant stakeholders. This would enable them to increase stock size, output and profit since there is some potential for increasing returns from broiler production in the study area.

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Applied Tropical Agriculture

Use of Some Indigenous Forestry Knowledge in Managing Forest Resources in Selected Local Government Areas, Benue State, Nigeria

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ABSTRACT

This study investigated the indigenous forestry knowledge systems that are for improved forest resources management efforts in Benue State, Nigeria. Data for this study were collected with structured questionnaire administered on randomly selected 300 households from 10 out of the 23 Local Government Areas (LGAs) of the State. Two respondents (male and female) were interviewed in each of the 150 households that were selected. Data were analyzed using descriptive statistics and Analysis of Variance (ANOVA). Tree identification methods, systems for determining flowering periods, and indicators of fruiting in forest trees constituted the indigenous knowledge systems of forest conservation in the area. For tree identification, respondents used leaf texture, trunk, flowers, fruits/seeds, leaf size, leaf colour, bark and tree size. Except for leaf size, there were no significant differences (p>0.05) across the ethnic groups. Identification of flowering periods was done using season, observation, presence of birds, bees, flowers, leaf sprouts among others with only bird indicators showing significant differences (p<0.05) among the ethnic groups. Indigenous indicators of fruiting included odour and presence of insects (bees, butterflies), birds, bats and snakes with no significant differences (p>0.05) in all the variables among the ethnic groups. The indigenous forestry knowledge systems should be integrated with the scientific approaches to produce a synergy that will encourage, stimulate, facilitate and promote effective forest management and indigenous people's participation.

Keywords: Indigenous knowledge, Forest Resources Management, Benue State, Participation, Integration, Tree identification.

INTRODUCTION

Human existence relied on the forest for food, shelter, clothing, health, entertainment as well as industry and commerce. Man also depends on the forest for cultural, spiritual, environmental and aesthetic needs. His activities are therefore intricately connected to the conservation of the forest; hence the imperatives of indigenous knowledge-based conservation systems in forest conservation and sustainable development (Orlove and Brush 1996, Bisong and Essien, 2010). IUCN (2010) reported that many indigenous people who are living in forest areas have traditional links to their lands and are users and managers of these forest land resources. Byarugaba (2008) maintained that local people, through experience have acquired knowledge of the extent of variation in the traits usually displayed by individual trees. They can therefore use such knowledge to develop and adopt methods that can conserve and sustain these resources and the general ecosystem in perpetuity. Indigenous knowledge-based conservation system is therefore seen as a complementary knowledge that is set to weld or harmonize the potentials of conservation in sustainable development.

According to the Rio Declaration on Environment and Development (1992), long term economic progress is ensured if it is linked with the protection of the environment and that indigenous people and their communities have vital roles to play in environmental management and development Indigenous knowledge is an important natural resource that can facilitate development in a cost-effective, participatory and sustainable way (Rao and Ramana, 2007). It is the basic component of any country's knowledge system, which encompasses the skills, experiences and insights that people apply to improve their livelihood. To ignore people's knowledge is almost to ensure failure in development; thus such knowledge must be gathered and documented in a coherent and systematic fashion for use in development decisions (Rao and Ramana, 2007). Also, the conservation and development of protected areas have always met with difficulty as a result of non-inclusion of the knowledge base and resource management capabilities of indigenous peoples as regards the functional workings of the ecosystems (Bisong and Essien, 2010).

Improving forest conservation needs not be the sole preserve of the scientific or indigenous knowledge system; integrating both knowledge systems is very important as rural dwellers often