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Assessment of Farmers' Perceived Utilization of the Entertainment – Education Format for Sourcing Agricultural Information in Southeastern, Nigeria

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Abstract: Utilization of Entertainment-Education (EE) format was assessed to determine its potential use by farmers for sourcing agricultural information in Southeastern Nigeria. A multi-stage sampling procedure resulted in the selection and interview of 612 farmers. Findings reveal that majority of the farmers were in their active years (70.8%), married (81.3%) and engaged more in crop farming (63.7%). Radio rates as the most easily accessible (93.7%), preferred (81.6%) and used (74.8%) entertainment medium for sourcing agricultural information. However, music (35.6%), folklores (39.4%) and drama (32.9%) were rated as highly relevant by farmers. Farmers' sex (x^2=10.6; p< 0.05) agricultural enterprise (x^2=26.2; p< 0.05) and education (x^2=17.0; p< 0.05) had significant relationship with respect to their perceived relevance of EE media for sourcing agricultural information. It is recommended that media relevance concept be considered in the design and formulation of EE based agricultural programs while all EE media should be exploited for disseminating agricultural news.

Key words: Entertainment- education, Agricultural information, Access, Preference, Use and Relevance

INTRODUCTION

The power of popular entertainment in shaping the perceptions and practices of its viewers and listeners cannot be overemphasized. Both radio and television Entertainment-Education (EE) shows, programs, movies, and music not only command the attention of their audiences, but also reinforce existing positive behaviour, demonstrate new behaviour, and affect audience emotions. This is in agreement with Bandura's Social Learning Theory (1977) as reported in Singhal and Rogers (1999) which presupposes that individuals learn a lot not only in a formal setting but also by observing role models in everyday life including characters in movies and television programs. The theory submits that real life model and television models do not differ in how people learn from them. According to this theory, observational learning occurs when a viewer acquires new knowledge about certain rules of behaviour from a model through the cognitive sub-processes of attention, retention, production and motivation. It is the position of the proponent of this theory that individual replicates these sub-processes unconsciously as she or he is exposed to media messages via drama, movies, radio and television programs as well as music.

Development oriented entertainment programs over the years have maximally explored the opportunities inherent in the potentials of EE media and especially leaning on the position of this theory to promote pro-social dispositions as exemplified in massive enrolment in adult literacy classes in *Ven Comigo* (Mexican telenovela in

1975) and poster-letter-manifesto by 184 villagers in an Indian village following radio broadcast of *Tinka –Tinka Sukh* that promoted equal status for women while denouncing inhuman treatment of women in Indian village of *Lutsaan* (Singhal and Rogers; 1999*)*. The far reaching effects of EE is equally well documented in public acceptance in Asia, Latin America and in recent times in Africa especially in East and Southern Africa where it has been specifically deployed to address many pro-social and development issues.

In whatever forms, popular entertainment provides an ideal outlet for sharing development information and positively affecting behaviour. In most cases when used, EE format is interested in providing information that covers a variety of topics. For instance, the Centre for Disease Control (CDC)(2005) in Atlanta, engaged the Hollywood, Health and Society (HH&S) to develop a research agenda for EE that addressed many pro-social issues in American society including violence against women, suicide, lead poisoning, hospital infection, bioterrorism, youth health issues, HIV and AIDS and much more. Knowing that 88 percent of people in America learn about health issues from television, CDC was convinced that prime time and daytime television programs, movies, talk shows are great outlets for its health messages.

In spite of these begging opportunities and potentials of EE, much of these have not been exploited in agricultural information dissemination as it were. Also, whereas its use for information dissemination has been investigated from media practitioners' perspectives (Olajide, 2002), the opinions of the end users (farmers) have not been sought in any study. This justifies the import of this current attempt at investigating farmers' perceived utilization of the format for sourcing agricultural information.

Purpose and Objectives

In order to ascertain the perception of the target audiences than perceived for them by media practitioners in the previous study that attempt is made here to investigate EE format utilization from the farmers' perspectives. Therefore, the following objectives guided the study as a follow – up to the recommendation in Yahaya and Olajide (2003) and Olajide (2002)

- Identify the personal and social characteristics of farmers in southeast, Nigeria.
- Investigate farmers' access, perceived use, preferences and relevance of EE media in obtaining agricultural information.

MATERIALS AND METHODS

Study Area and population

The study was conducted in southeastern part of Nigeria. The area as presently constituted has five states namely Abia, Anambra, Ebonyi, Enugu and Imo states. It is a predominantly Igbo speaking and houses one of the major ethnic nationals in Nigeria. The 2006 Census of Nigeria reported a total population of 16,395,555 for the five eastern states. The target population for the study consisted of all registered farmers in the states identified above. The choice of the area was justified by the agrarian population found in urban, semi-urban and rural settlements in this region and the obvious contribution of the region to agriculture in Nigeria.

Sampling Procedure and sample size

A multi- stage and random sampling procedures were applied in selection of sample for

this study. In the first stage of the sampling procedure, 60% of the states that constitute southeastern Nigeria were randomly selected. This process yielded selection of Abia, Enugu and Imo states. Thereafter, two extension zones each from 3 zonal extension districts in each of the states were again randomly picked. This resulted in six zones that have a total of 72 extension blocks. In the third stage, 25% of the total extension blocks (18 blocks) were randomly selected. In the fourth stage, all extension cells in the 18 blocks were populated and this gave 90 extension cells

In the final stage, 10% of farmers registered with the extension agents in each extension cells were randomly selected and a total of 612 farmers were selected and interviewed between 28th May and 31st July, 2010 using the Agricultural Development Project (ADP) platform in each of these states. Farmers whose name fell within third quartile in the register were picked for randomness

Measurement of variables

Farmers were asked series of demographic questions, questions about their access to and perceived use, relevance and preference of EE media if adopted for agricultural information dissemination as currently being used for health and other development concerns. These variables were measured as follows:

Accessibility: Farmers were asked to assess how accessible are the EE media (radio, television, music, drama and folklores) that have used EE format or general entertainment programs in sourcing agricultural and other development information(e.g. health). This was determined on a 3- point scale of highly accessible, lowly accessible and not accessible and was scored 2, 1 and 0 respectively.

Perceived use, preference and relevance: Farmers were requested to assess perceived use, preference and relevance of EE media if adopted for disseminating agricultural news and information in their region. Perceived use was assessed on a 3-point scale of frequent use, moderate use and no use. Perceived preference was measured as high preference, low preference and no preference. Frequent use and high preference were scored 2, while moderate use and low preference were scored 1 and 0was recorded for none preference and low use. Relevance was measured on a 4 - point rating scale of high relevance (3), moderate relevance (2), least relevance (1) and no relevance ((0).

RESULTS

Information in table 1 indicates that majority of the respondents (70.8%) were in their active years (age 20-50years) and were married (81.3%). The table further reveals that more than one-third of the respondents (39.9%) were illiterate farmers and only 10.7% of the farmers had attained higher educational qualification status. Majority of the respondents were male (80.7%) with majority being crop farmers (63.7%) while 23.1% and 8.1% were livestock and Fadama/fruit farmers respectively. A greater proportion of the respondents (55.8%) were small farm holders and one- third (33.6%) were still tenants on the farmlands they operate.

Table 1: Personal and social characteristics of the respondents (N=612)

Variables	Frequency
Age	
20-30 years	102(16.6)*
31-40 years	138(22.50
41-50 years	194(31.7)
51-60 years	156(25.4)
> 60 years	22(3.5)

Sex		
Male	270(44.2)	
Female	342(55.8)	
Marital status		
Single	90(14.7)	
Married	498(81.3)	
Divorced	12(1.9)	
Widowed	12(1.9)	
Educational Attainment		
None	242(39.9)	
Elementary school certificate	104(16.9)	
SSCE/TCII	126((20.5)	
OND/NCE	74(12.0)	
HND /B.Sc	66(10.7)	
Agricultural enterprise		
Crop	390(63.7)	
Livestock	142(23.1)	
Forestry/Gardening	22(3.5)	
Fadama	50(8.3)	
Crop/Livestock	8(1.3)	
Agricultural Holdings		
Small	342(55.8)	
Medium	186(30.3)	
Large	84((13.9)	
Land ownership status		
Personal	190(31.0)	
Tenant	206(33.6)	
Family Land	168(27.2)	
Community Land	48(8.0)	

*Figures in parentheses are percentages
Source: Field Survey, 2010

Table 2 shows that radio was rated by 93.7% of the respondents as the most easily accessible EE medium. This was followed by television (39.8%) while indigenous music (73.8 %) and folklore (37.5%) were both considered as not readily accessible. Table 2 further indicates that an appreciable proportion of farmers rated drama and folklore as lowly accessible.

Table 2: Accessibility to entertainment-education media

Variables	Highly Accessible	Lowly Accessible	Not Accessible
EE on Radio	574(93.7)*	38(6.3)	0(0.0)
EE on Television	244(39.8)	240(39.2)	128(21.0)
Indigenous Music	44(7.3)	116(18.9)	452(73.8)
Folklore	66(10.9)	316(51.6)	230(37.5)
Drama	110(17.9)	430(70.6)	72(11.5)

*Figures in parentheses are percentages
Source: Field Survey, 2010

Findings presented in Table 3 reveal that the trend in accessibility of EE media persists as farmers rated radio (81.6%) and television (30.9%) as the most preferred media to obtain agricultural information. However, other EE media like music (8.6%), folklore (12.7%) and drama (17.7%) were lowly preferred for sourcing agricultural information.

Table 3: Perceived preference for the use of EE media for sourcing agricultural information

Variables	Highly Preferred	Lowly Preferred	Not Preferred
EE on Radio	498(81.6)*	90(14.8)	24(3.6)
EE on Television	192(30.9)	170(28.3)	250(40.8)
Indigenous Music	52(8.6)	304(49.6)	256(41.9)
Folklore	78(12.7)	264(43.1)	270(44.2)
Drama	108(17.7)	278(45.3)	226(37.0)

*Figures in parentheses are percentages
Source: Field Survey, 2010

Data available in Table 4 contrast sharply with information on tables 2 and 3, though radio continues to enjoy high rating in respect to perceived use as about three-quarter (74.8%) of the respondents perceived radio as the probable medium to be frequently used if EE is incorporated in agricultural information dissemination agenda in Nigeria. One significant revelation of the perceived use of EE media for sourcing agricultural information is the emergence of indigenous music as probable second most desired EE medium by 61.5% if EE format is adopted.

Table 4: Perceived use of EE media for sourcing agricultural information

Variables	Frequently Used	Moderately Used	Not at all
EE on Radio	458(74.8)*	124(20.2)	30(5.0)
EE on Television	132(21.5)	166(27.2)	314(51.3)
Indigenous Music	376(61.5)	208(34.0)	28(4.5)
Folklore	46(7.5)	388(63.3)	178(29.2)
Drama	240(39.2)	318(51.9)	54(8.9)

*Figures in parentheses are percentages
Source: Field Survey, 2010

The emerging picture on Table 5 relates to perceived relevance of agricultural information from EE media depicts partly what obtains on perceived preference and use. While radio (71.7%) maintains its status as leading EE medium in the study area, traditional media like indigenous music, folklore and drama enjoyed appreciable ratings by 35.6%, 39.4% and 32.9% respectively as highly relevant media.

Table 5: Perceived relevance of EE media for sourcing agricultural information

Variables	Highly Relevant	Moderately Relevant	Least Relevant	Not Relevant
EE on Radio	438(71.7)	110(17.9)	26(4.3)	38(6.1)
EE on Television	160(26.1)	80(13.1)	108(17.7)	264(43.1)
Indigenous Music	218(35.6)	142(24.3)	152 (24.7)	94(5.4)
Folklore	242(39.4)	196(32.0)	138(22.5)	36(6.1)
Drama	202(32.9)	190(31.1)	156(25.4)	64(10.6)

*Figures in parentheses are percentages
Source: Field Survey, 2010

Tables 6 and 7 present the result of inferential statistics. The degree of association between respondents' characteristics and perceived preference for EE media (table 6) reveals that there is a strong association between farmers' education (X^2 =18.0, p<0.05), sex (X^2= 13.0, p < 0.05) and agricultural enterprise (X^2= 24.1; p < 0.05) and perceived preference for EE media. Data in table 7 indicates that all identified farmers' personal characteristics sex (x^2=10.6; p< 0.05), education (x^2=17.0; p< 0.05), agricultural enterprise (x^2=26.2; p< 0.05) were significantly related to farmers' perceived relevance of EE media to source agricultural information. This implies that all EE media available can serve relevant purposes in information needs fulfilment and for various farmers of diverse social characteristics.

Table 6: Chi-square analysis of respondents' characteristics and perceived preferences for EE media

Variables	X^2	CC	Df
Education	18.0*	0.45	8
Agricultural Enterprise	24.1*	0.34	10
Agricultural Holdings	6.0NS	0.16	4
Sex	13.0*	0.20	2

* Significant   p < 0.05
 NS = Not significant P> 0.05
 CC: Contingency Co-efficient
 df = degree of freedom

Table 7: Farmers' characteristics and perceived relevance of EE media

Variables	X^2	CC	Df
Education	17.0	0.43	8
Agricultural Enterprise	26.2	0.28	10
Agricultural Holding	11.5	0.21	4
Sex	10.6	0.18	2

 * Significant   p < 0.05
 NS = Not significant P> 0.05
 CC: Contingency Co-efficient

5

df = degree of freedom

Discussions

The trend observed in farmers' age and marriage is common to previous findings which revealed that farmers' population constitute very active people and family ties being very strong despite rural-urban migration that has threatened agricultural sector in Nigeria (Yahaya, 2002). The literate proportion of the respondents can be considered significant given the fact that the concept of literate farmers is a recent phenomenon in Nigeria due to staggering unemployment figures for the country which has forced quite significant proportion of the population that would have been employed in other sectors of the economy engage in one form of agricultural enterprise or the other. Farmers in this region of Nigeria cultivate mostly food crops like yam, cassava, maize and cocoyam. These crops are mostly found in large quantities both in cultivation and consumption as staple food in most parts of Nigeria. The tenant farmers phenomenon in this region confirms the densely populated terrain of the region. Southeastern Nigeria occupies the least expanse of land compared to neighbouring south-south and can least be compared with the northern region of the country in terms of land mass. Therefore, free land holding is not widespread as obtained in other segments of the country. What obtains in respect of small farm holding is a common feature of Nigeria's agriculture where subsistence farming and land inheritance at family level still predominate.

The rating radio enjoys in this study is in line with previous efforts that reveal that radio is the most potent source of information dissemination to farmers and farmers' companion (Yahaya, 1995 and 2002). Both radio and television stations abound in the study area with various EE programs, hence, the relative high rating of both media by respondents. Another plausible explanation for the popularity enjoyed by both radio and television with respect to accessibility and preference could be due to the use of these media in the last two decades in Nigeria by international agencies. The British Department for International Development (DFID), United States Agency for International Development (USAID), John Hopkins University's Centre for Communication Program (JHU/CCP) and United Nations Children Education Fund (UNICEF) disseminate health, democracy and good governance, children's and women's rights and environmental development news and information on radio and television using entertainment strategies such as drama. This is as observed in various drama series in Nigeria such as "*One thing at a time", "Asubata Gari', "Rainbow City" and "Kusaurara"*. These efforts to a large extent have reached both rural and urban settlements and targeted many audiences including artisans, farmers, traders and elites in most part of Nigeria in general in the last twenty years. As observed earlier, profound rating of radio is probably because it is the most used medium in most rural settings in Nigeria in general. This can be explained with the comparative advantage it has over other media due to low cost of maintenance and portability. In the overall, both radio and television can then be judged as the most readily accessible, therefore, most preferable media. The perception on drama and folklores might be due to occasional use (annual and special occasions) of

drama by Agricultural Development Programs of most states in Nigeria.

Worldwide, music has been acknowledged as one of the ancient entertainment tradition and its popularity makes it a potentially powerful medium to disseminate educational-development messages to target audiences though very little of these potentials have been used for pro- social purposes up to date (Brown and Singhal; 1999 as cited in Singhal and Rogers (1999). This explains respondents' stands on this medium as second most preferred medium. According to Sujan (1993) in Singhal and Rogers (1999), there are several advantages to using folk music to educate rural audience, it is popular, can provide immediate feedback, it is inexpensive and comes from perceived credible source. This finding corroborates and underscores the relevance of music based on earlier musical experiment in Nigeria where two of Nigeria's leading singers – King Sunny Ade and Onyeka Owenu in their album *Wait for Me* and *Choices* in the early 1990s taught couples how to talk more freely about sex and family planning and persuaded couples to use contraceptives. According to Singhal and Rogers (1999) the two songs became big hits and recorded high degree of success as music video of the two songs were broadcast on national television network and taught both rural and urban audiences about contraception and responsible sexual behaviour. The perceived frequent use of music by respondents can be linked to previous experience, though; music is seldom used for development and pro-social issues in Nigeria. Therefore, this finding will help development planners both in Nigeria and in other parts of the world with similar context of resource availability, culture and other social

milieu to utilize music in their development concerns.

Perceived relevance by respondents reinforces the popularity enjoyed by the three media (music, folklores and drama) in relation to perceived use. These media were rated though at lesser level as lowly preferred in the preference rating; the three media were however perceived as highly relevant. Television that was rated second most accessible and preferred medium recorded a dwindling fortune for use and relevance may be due to the economic realities of the farmers who though may afford to buy one but hindered by competing demand for resources by other pressing needs. This can be due to relatively low socioeconomic status of most farmers in rural Nigeria. Much as they would have preferred to use television as EE medium for sourcing agricultural information, perhaps, their low economic status could explain why they perceived traditional media (folklore, music and drama) as more relevant for their set up. Therefore, the concept of relevance poses a lot of challenge for EE practitioners, agricultural development agencies and communication experts who should consider this crucial concept in the design and formulation of EE based agricultural programs.

The result on table 6 implies that a proposed EE program for agricultural information dissemination should take into consideration farmers' education, sex and agricultural enterprise. For instance, information needs of a male literate crop farmer may be different from information needs of a female non literate Fadama farmer. This means that agricultural information from EE media should consider farmers' level of education, be gender sensitive and agricultural enterprise specific

to appeal to diverse audiences of agricultural development news and information.

The result on farmers' characteristics and perceived relevance implies that all EE media available can serve relevant purposes in information needs fulfilment and for various farmers of diverse social characteristics. Therefore, the concept of relevance poses a lot of challenge for EE practitioners, agricultural development agencies and communication experts who should consider this crucial concept in the design and formulation of EE based agricultural programs. Singhal and Brown (1996) while addressing problems and challenges of entertainment communication articulated and emphasized creation of an appropriate EE mix as one of the several challenges facing EE format utilization. Appropriateness can be interpreted in this context to mean relevance, hence, the need to seriously consider and address this challenge.

CONCLUSIONS & RECOMMENDATIONS

In summary, EE on radio cuts across all variables (accessibility, use, preference and relevance) by farmers' assessment of the EE media for sourcing agricultural information. However, there is a high probability to use traditional media (especially indigenous music) for sourcing agricultural information if available. This assumption does not necessarily undermine the strengths and potentials of conventional media (radio and television) given the fact that it appeals to mass audiences simultaneously.

In addition, going by specific study variable, radio is the most accessible and mostly used EE media because its preference and relevant status among other EE media to farmers in Nigeria. Indigenous music and other traditional sources of

EE (folklore and drama) will also serve useful purposes given the perceived preference expressed for these media use. It is therefore recommended that:

(i) Emphasis should be placed on radio EE programs for disseminating agricultural development information to farmers in developing countries that lack access to other sophisticated media like internet and other forms of information communication technologies that are currently limited.

(ii) Occasional, annual and nominal use of indigenous music and drama should be regularized to fall in line with the thinking of farmers who though preferred the media but have limited access.

(iii) The concept of relevance should be important consideration for EE practitioners, agricultural development agencies and communication experts in the design and formulation of EE based agricultural programs.

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Assessment of Training Needs of Cassava Processors for Increased Productivity in Ogbomoso Agricultural Zone of Oyo State

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Abstract: Cassava is a crop that has multi function but in Nigeria its potential has not been fully harnessed. This study assessed the training needs of cassava processors in Ogbomoso Agricultural Zone of Oyo State. Multi stage sampling was used to select one hundred and twenty (120) processors from four communities in the study area. Data was collected with interview schedule and analyzed using descriptive statistics and binomial regression. The study revealed that the literacy level of most of the processors was very low as 56.7% had no formal education. Few (11.7%) of the processors had access to extension agent in the area. More than half of the processors (57.5%) received hygiene information for cassava processing from sanitary inspectors. Areas of training highly needed by the processors include: value-added products processing (96.7%), link to buying agent and market(95.8%), procedure credit acquisition (92.5%), equipment purchasing process(78.3%), skill for operating processing machines(75.0%) , and maintenance(61.7%). Major products commonly processed in the area were gari (100.0%), cassava flour (Lafun) (100.0%) and starch (97.5%). Processors need training for processing cassava into tapioca, chips and pellet. Binomial logit regression showed that there was a significant relationship between age of the respondent and training need (t=2.039, P<0.05).It is recommended that, extension packages for cassava processing should incorporate improved technologies of cassava value-added products like chips, pellet, starch and snacks for increased productivity in the cassava sub-sector.

Key words: Training needs, Processors, Cassava

INTRODUCTION

Training involves acquiring information and developing abilities or attitudes, which will result in greater competence in the performance of a work (Farinde and Ajayi, 2005). Training is mostly directed at improving the ability of individual to do their vocation more effectively and efficiently. Cassava, *manihot esculenta* crantz is an annual woody shrub with an edible root, which grows in tropical and sub tropical areas of the world. It is an important food crop both for urban and rural consumers in West Africa. It has been estimated that cassava provides calorie requirement for about 200 million people in Africa. Cassava has the ability to grow on marginal land where cereals and other crops do not grow well. It can tolerate drought and can grow in low nutrient soil while it helps to increase food supply (Nweke et al, 2002).

Cassava is part of the traditional rural diet in many parts of sub–Saharan Africa particularly West and Central Africa (Nweke et al, 2002). As civil wars, natural disaster, and continue population growth have increased pressure on local food system, the crop is assuming greater importance as a supplementary staple food security and famine reserve crops in many parts of East and Southern Africa (Nweke, 2004). Cassava has a high income generating potential and can enable resource poor

small holder producer to improve livelihood once they adopt and use appropriate production, processing and marketing opportunities (Ezedinma, 2007).

Despite the fact that Nigeria is the world leading cassava producer (Phillip et al, 2004), the living standard and income generation by cassava producing farmer still remain low because of glut experienced in the subsector which can be linked to the fact that, in Nigeria large proportion of cassava product is derived from traditional processing equipment which limits the effective utilization of the crop (Odebode 1997). Some of common Nigerian cassava products include Abacha, flour, fufu, gari starch and Tapioca (Philip et al 2005). These products are mainly consumed in the country, while a small percentage of them are exported to Nigeria natives abroad.

Also, cassava roots are processed at household and cottage level in rural areas of the major cassava producing states particularly in the Southern and North central parts of the country. Cassava roots must be processed into various forms in order to increase the shelf life because they cannot be stored for too long as they rot within 3 – 4 days of harvest, to reduce bulk, and improve product quality. These will lead to reduced marketing costs, and make cassava competitive with food grains in the market place and hence expand the cassava market. This in turn will facilitate cassava production expansion.

It also facilitates transportation and marketing, reduce cyanide content and improve palatability because it is bulky with about 60 – 70% moisture content. Processing tends to increase the palatability, usability, and digestibility. The processing techniques and procedures differ within countries and localities. They also differ within a country according to food culture, environmental factors such as water availability and fuel wood, the cassava variety and types of processing equipment and technologies available. Among the processing methods often used are: Peeling, Grating, Slicing, Pounding, Pressing Cooking , (boiling, steaming, roasting, and frying/ caking,), Washing Drying (sun drying, oven drying etc), Grinding (milling) into flour, Flaking, Canning, Fermentation (aerobic or anaerobic) or Ensiling , Soaking and Pulping of the tubers, among others (Aletor and Fasuyi, 1997 and Odebode, 2008). The processor in many developing countries including Nigeria lack appropriate technological and scientific knowledge application in processing of cassava to internationally acceptable product which eventually limit agricultural and economic progress. This reveals necessity of training needs. Furthermore, Akinrele, (1977) stated that to invest massively in the development of the production phase of food without extending to the complementary post harvest phase is like acquiring an expensive automobile without caring about the terrain on which it will run. An urgent attention is therefore needed to keep pace with the rapid rate of food demand that is attendant upon rapid population growth and help to improve the gloomy food situation and its consequence, continuous training and research in food production and modern technological equipment need to be incorporated or introduced to processing (Odebode, 1997). Introduction of modern equipment needs adequate training for appropriate handling and better usage of some of the equipment in order to improve the productivity of processors. In view of

these, the study assessed areas of training needed by Cassava processors for increased productivity in Ogbomoso Agricultural Zone of Oyo State.

Specifically the study was designed to address the following objectives:

The objectives of the study

i. Examine the Socioeconomic and enterprise characteristics of the cassava processors in Ogbomoso Agricultural zone of Oyo State.

ii. Identify the cassava products that processors are aware of

iii. Determine accessibility of equipment to processors

iv. Identify the areas of training needed by cassava processors for increased productivity.

Hypothesis

There is no significant relationship between the selected personal characteristics and their cassava processing training needs.

METHODOLOGY

The study area was Ogbomoso Agricultural zone. The major occupation is farming which is dominated by the cultivation of cassava, yam and maize. The population of the study were cassava processors in Ogbomoso agricultural zone of Oyo State. Primary data were collected from selected cassava processors and Interview schedule was used to elicit information from the respondents.

Multi stage sampling was employed in selecting cassava processors in the area of study. Ogbomoso Agricultural zone consist five (5) local governments namely Ogbomoso South, Ogbomoso North, Oriire, Ogo Oluwa and Surulere Local

Government Areas. Two local governments were randomly selected. The local governments were Oriire and Ogbomoso South.

These two local governments are also among the major cassava processing areas in Ogbomoso. Several cassava processing centres and a lot of farmland used for cultivating cassava are also located within and around the area. Two communities were selected randomly from each local government to have four communities namely Iluju, Arada Tewure and Kajola for this study. Cluster sampling technique was used to select 30 processors from each community because there is usually a high concentration of cassava processors in these places which added up to 120 for the study. The dependent variable of the study was training need of cassava processors. This was measured by listing areas of need of cassava processors on a 3-point rating scale of highly needed which attracted a score of 2, fairly needed which attracted a score of 1 and not needed which attracted a score of 0. The total score for each item on the training need scale was calculated by multiplying the number of processors who mention a particular item on the scale by the weight of that rating scale, and by totalling these weights.

Data collected for the study was summarized using frequencies, percentages and bi-nomial regression was used to test the hypothesis.

RESULT DISCUSSION

Socioeconomic characteristic

The result from Table 1 shows that most of the processors had their age between 30 and 40 years. This show that majority of the processors were in their middle age and this has a good implication on their productivity, as they are able to put in the high labour required in cassava

processing. This is in line with Odebode (2008) and Ogunleye *et al* (2008) who found that majority of cassava processors are in their active years. The age of the processors is an important factor influencing level of output, especially in traditional processing of cassava, which is characterized by high labour requirement. Table 1 further show that 93.3% of the processors were females in the study area. The study reveals that cassava processing is mainly dominated by females. This is in line with Nweke et al.,(2002) who observe that women specialize in cassava processing.

Also shown on Table 1 is the level of education of cassava processors in the study area. More than half (56.7%) had no formal education, only 16.7% had adult education while 13.3 % had primary school certificate. Therefore, the literacy level of cassava processors was very low and might contribute to low productivity. Table 1 further show that majority of the respondents (65.8%) were Christians while 34.2% were Muslim. About 78.3% of the cassava processors were married and only 15.0 % were singles, 2.5 % were separated while the remaining 4.2% were widowed. This indicates that cassava processing is mainly a kind of family work and also common among the married because of readily available family labour, which can also be used in processing. Table 1 also shows the distribution of cassava processors in the study area according to their primary occupation. Furthermore, the result on Table 1 shows that majority (83.3%) of the respondents were involved in cassava processing as their primary occupation, 5.8% had farming as their primary occupation and 8.3% were into cassava and yam processing as their primary occupation while 3.3% were students and 1.7 % were mechanic.

Table 1:Distribution of Socioeconomic Characteristic of Cassava Processors

Characteristics	Frequency	Percentage
Age in years		
Less than 30	10	8.3
30 – 40	50	41.7
41- 50	48	40
51- 60	12	10
Total	120	**100.0**
Sex		
Male	8	6.7
Female	112	93.3
Total	**120**	**100.0**
Religion		
Christianity	79	65.8
Islam	41	34.2
Total	**120**	**100.0**
Marital status		
Single	18	15.0
Married	94	78.3
Widowed	5	4.2
Separated	3	2.5
Total	**120**	**100.0**
Level of education		
No formal education	68	56.7
Adult education	20	16.7
Primary school	16	13.3
Secondary school	9	7.5
NCE	5	4.1
OND	2	1.7
Total	**120**	**100.0**
Primary Occupation		
Cassava Processing	106	83.3
Trading	1	0.8
Farming	7	5.8
Mechanic	2	1.7
Student	4	3.3
Total	**120**	**100.0**

Enterprise characteristics of cassava processors

The results presented in Table 2 shows distribution of respondents according to the measurement used for selling product. Majority (70.0%) of respondent sell their product in "congo", bags and bowls, 10.0% of the respondents sell their product in bags, while 0.8% sold in kilograms. This implies that majority of respondents sell their product to diverse market outlets like wholesalers and retailers. It shows that the respondents sell their product through

wholesaler and retailer with 54.2%, 35.8% and 10% respectively. Thus, majority of the respondents sell their product through wholesaler and retailer for effective marketing process. This confirms earlier findings on unit of measurement. Table 2 further reveals the resources needed by the respondents; it is deduced from the study that capital is the only highly needed resources by most (97.5%) of the respondent. Land (1.7%) is not an important resource needed. This is in line with Adegeye, (1999) that access to land is not generally a problem in Nigeria as more hectares of land are under fallow than under cultivation. Also, labour (0.8%) is not an important resource needed; this could be that labour required is supplied by family since majority are married.

More than half of the respondents (57.5%) received hygiene information for cassava processing from sanitary inspectors and 11.7% received information on cassava processing from extension workers but 30.8% did not receive any cassava processing information. This implies that sanitary inspectors were the major source of training for the processors on hygienic condition.

Table 2: Distribution of Respondents According to Enterprise Characteristics of Cassava Processors

Measure of product sale	Frequency	Percentage
Congo, bags and bowl	84	70.0
Congo and bowl	23	19.2
Bags	12	10.0
Kilograms	1	0.8
Total	**120**	**100.0**
Channel		
Wholesaler and retailer	65	54.2
Wholesaler	43	35.2
Retailer	12	10.0
Total	**120**	**100.0**
Resources Needed		
Capital	117	97.5
Land	2	1.7
Labour	1	0.8
Total	**120**	**100.0**
Source of training		
Extension agent	14	11.7
Sanitary Inspector	69	57.5
None at all	37	30.8
Total	**120**	**100.0**

Accessibility to cassava processing machine

Table 3 shows the distribution of respondents according to accessibility to equipment. It reveals that all the processors (100.0%) had access to cassava grater which according to (Nweke et al., 2002) is the improved technologies introduced to produce right particle size of grated mash and at the same time handle large quantities of peeled cassava tuber. Majority (95.8%) of respondent had access to diesel engine for different product processing. An overwhelming proportion of the respondents (96.7%) had access to cassava press to extract the poisonous liquor by subjecting fermented mash to dewatering process. Most of the processors (97.5%) had access to gari fryer, which shows the prominence of traditional technology which can handle limited proportion of sieved particle of dewatered cassava mash at a time. Table 3 further reveals that most of the processors did not have access and therefore do not use improved equipment like sieving machine, peeling machine, sealing machine, drum dryer, dewatering machine and petrol engine. This might be due to inaccessibility of the equipment, cost of purchasing and complexity of use of some improved equipment.

Table 3: Distribution of respondent according their accessibility to processing equipment

Equipment	Accessible	Not accessible
Mechanised grater	120 (100)	0 (0.0)
Sieving machine	0 (0.0)	120 (100)
Hydraulic jack press	116 (96.7)	4 (3.3)
Gari fryer	117 (97.5)	4 (3.3)
Diesel engine	115 (95.8)	5 (4.2)
Petrol engine	5 (4.2)	115 (95.8)
Dewatering machine	0 (0.0)	120 (100)
Milling machine	118 (98.3)	2 (1.7)
Sealing machine	0 (0.0)	120 (100)
Peeling machine	0 (0.0)	120 (100)
Drum dryer	0 (0.0)	120 (100)

Source: field survey 2009
Figures in parentheses are percentages

Product Awareness of Respondents

The table 4 reveals that all the respondents (100.0%) were aware that cassava can be processed to gari, cassava flour (lafun) and Fufu. This corroborates Philip et al (2004) that in South West zone of Nigeria, Gari, Lafun and fufu /Akpu are important cassava products. Also majority (97.5% and 75.8%) were aware that cassava can be processed to starch and cassava flour for baking but, very few (5.8% and 8.3%) were aware that cassava can be processed into tapioca and chips for livestock feed. None of the respondents was aware that cassava can be processed into pellets. This corroborates earlier studies conducted by Dorosh (1988) that the use of cassava as animal feed account for only about 2% cassava utilization in Africa although, cassava peels are widely used in most tropical areas for feeding pigs, cattle, sheep and poultry.

Table 4: Distribution of respondent according to product awareness

Product	Aware	Not Aware
Gari	120 (100)	0(0.0)
Tapioca	7(5.8)	113(94.2)
Starch	117 (97.5)	3(2.5)
Chips for Livestock	10 (8.3)	110(91.7)
Cassava pellets	0 (0.0)	120(100)
Cassava flour for baking	91(75.8)	29(24.2)
Cassava flour (Lafun)	120(100)	0(0.0)
Cassava dough (Fufu)	120(100)	0(0.0)

Source: field survey 2009.

Figures in parentheses are percentages

Training needs of cassava processor

Table 5 show the training need of cassava processors. This table reveals that value added product processing (96.7%), link to buying agent and market (95.8%) credit acquisition (92.5%), equipment purchasing process (78.3%), skill for operating processing machine (75%) equipment maintenance (65%) were areas in which respondents highly need training. However, ranking the training needed shows that training on value-added product (236 points) was first and therefore paramount area of training needs of the processors. Other areas of training needs include buying agent and market (235points), equipment purchasing processing (230 points), skill for operating processing machine (214points).This result also validates the finding on table 4 that the processors are not aware of new uses of cassava for pellets, tapioca, chips and other products. Therefore training targeted toward processors in the area should put into consideration this area of need in order of priority.

Table 5: Distribution of Respondent according to Training needed

Training needed	Highly needed	Fairly needed	Not needed	Score
Skill for operating processing machines	90 (75.0)	27 (22.5)	3 (2.5)	207
Selection of varieties suitable for product processing	67 (55.8)	45 (37.5)	0 (0.0)	179
Procedure for credit acquisition	111 (92.5)	8 (6.7)	0 (0.0)	230
Link to buying agent and market	115 (95.8)	5 (4.2)	0 (0.0)	235
Equipment purchasing process	94 (78.3)	26 (21.7)	0 (0.0)	214
Value-added products processing	116 (96.7)	4 (3.3)	0 (0.0)	236
Equipment maintenance skill	78 (65.0)	32 (26.7)	10 (8.3)	188
Packaging	74 (61.7)	32 (26.7)	14 (11.7)	180

Source: Field survey 2009.   Figures in parentheses are percentages

Relationship between personal characteristics and training needs of cassava processors

Table 6 shows the result of binomial regression of the relationship between selected personal characteristics and cassava processing training needs. The table reveal that age of the respondent has a significant relationship with training need (t = 2.039, p< 0.05). This implies that as the processors get older more training is required in the areas of need identified so as to keep pace with development and technological advancement.

Table 6: Binominal Regression Result

Variable	Coefficient	t	*P*
Constant	0.568	0.205	0.8375
Age	0.704	2.039	0.041[*]
Sex	-1.600	-1.410	0.159
Marital status	0.238	0.749	0.454
Religion	0.120	0.274	0.784
Educational status	0.210	0.320	0.749
Primary occupation	-0.771	-0.948	0.343
Secondary occupation	-0.172	-0.172	0.864

[*]Significant at 5%   Source field survey, 2009

From the study it emanates that, majority of the processors were female and the respondents were in their middle age. The processors need to be trained on processing of value added products such as tapioca, chips for livestock and cassava pellets. Cassava processors are also in dire need for link to buying agent and market for their products while procedure for credit acquisition is also very important to the processors. It is also inferred from the study that, as the processors get older more training is required in the areas of need identified so as to keep pace with development and technological advancement.

Recommendations

Based on findings of this study, the following recommendations were made.

1. Processors need to be introduced to source (fabricator) of equipment especially the modern ones.

2. Extension packages for cassava processing should incorporate technologies for value-added   cassava products.

3. There is need for mass literacy campaign for the processors since most of them are not educated and do not have access to extension services that will enable proper understanding and usage of some of improved equipment.

4. The government should provide loan and credit to processors in order to acquire modern equipment.

5. The extension agent should be adequately funded and trained, so as to provide essentials information required to processors.

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Challenges of Risk Management among Smallholder Farmers in Ebonyi State, Nigeria: Implications for National Food Security

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Abstract: The challenges posed by risk factors in agricultural production have been an issue of general concern among various stake holders in the agro-industry. This concern is attributable to the negative impacts of risk on agricultural productivity as well as on food security at various levels. This study was conceptualized to assess risks and its management practices among smallholder farmers in Ebonyi State as well as the implications for food security in Nigeria. The methodology involved the sampling of 240 smallholder farmers who supplied the primary data used in the study. Result showed the sources of risk encountered by the farmers as inadequate finance (100%), pest attacks (97%), input acquisition problems (93%) and crop and animal diseases (90%) among others. Furthermore, 100%, 83%, 79%, 75% and 71% of the farmers identified flexibility in farm operations, use of fertilizer, membership of self-help organizations, adoption of improved crop varieties and speculative produce storage respectively as some of the major strategies utilized in managing risks in their agricultural production. Then the constraints militating against the effective management of risks among the respondents included among others; lack of access to improved farming technologies (95%), high cost of improved technologies (93%), lack of access to weather information (91%) and lack of finance (82%). Finally some implications for national food security were drawn from the overall result of the study. It was suggested among other things that interest free credit should be made available to the small scale farmers to enable them to access improved risk management technologies. This will help them to contribute more meaningfully to national food security through enhanced productivity.

Keywords: Challenges, risk management, smallholder farmers, Ebonyi State, food security

INTRODUCTION

One of the greatest challenges facing the human race has been how to generate adequate food to meet the food security needs of the ever-increasing population. According to FAO (2010) an estimated 925 million people, about 14% of the worlds population are food insecure with 239 million or 26% of these found in the Sub-saharan Africa. In Nigeria particularly, about 6% of the citizens are undernourished especially in the rural areas where poverty incidence seem to be relatively higher than in the urban centres (Aigbokhan 2008). In a bid to address the ever-worsening global food security challenges, a number of actions have been initiated at various levels of governance. For example, the United Nations (UN) had set a target under its Millennium Development Goals (MDGs) to halve between 1990-2015, the number of people going hungry globally, by the year 2015 (FAO,2010).

At the national level, the government at various times have formulated policies and

initiated programmes aimed at addressing the food needs of the country. Some of the programmes are; Operation Feed the Nation (OFN), The Green Revolution (GR), National Special Programme on Food Security (NSPFS) and the Presidential Initiatives on Rice and Cassava Production (Omotor, 2009), to mention but a few. These efforts notwithstanding, a wide gap still exist between the country's domestic food needs and available stock. For example, as at 2009, Nigeria alone accounted for about 25% of total rice imports in Africa (Adejumo-Ayibiowu, 2010). This implies that there is a gap between domestic demand and supply of this commodity and as such portrays a situation of some level of food insecurity.

Generally, the problem of food insecurity has often been attributed to a number of factors within the system some of which are man-made while others evolve naturally. Today, one of the factors mostly implicated for the current food insecurity woes of the world include extreme weather-induced conditions such as droughts and floods (Adejuwon 2006). This is as a result of climate change and climate variability which has been identified as long-term and cumulative consequences of a number of human activities such as deforestation and the release of ozone layer-depleting gasses through industrial processes (IPCC, 2010). Based on this, research has revealed myriads of impacts on the agro-ecology and agro-economy (Till, *et al.* 2010; Mendelsohn *et al.* 2000; Boko *et al.* 2007) which also translates to negative impacts on global and national food securities.

Apart from climate change-related factors, there are also other Socioeconomic, socio-cultural, political, institutional and ecological variables that hamper efforts at attaining maximum food security at global, national and household levels. Manyong *et al* (2005) observed that constant changes in policies and unsustainable implementation of government programmes has been a major problem in the Nigerian agricultural sector. Also, the problems associated with land use and land tenure systems have been identified as one of the factors militating against agricultural production in the country (Lawal *et al.* 2010). Furthermore, inefficient marketing systems as well as lack of incentives such as micro-credit for agricultural production are all part of constraints to ensuring that people have adequate food at all times.

Generally, any factor that tends to limit the capability of a system to maximize its intended objectives could be said to constitute a risk in the system. According to Hyman (1997) risk in business terms, is a measure of the extent of variation between an expected outcome and the actual outcome of a given management decision. As such the factors enumerated above could be technically classified as risk factors that are militating against the achievement of food security as a result of their negative impacts on agricultural business productivity. Risks have been classified with reference to agricultural production under six traditional sub-groups which include; production risks, marketing risks, financial risks, institutional risks, obsolescence risks and human risks (Emery *et al.*1987).

According to Upton (1997) effects of agricultural risks are quite substantial in African agriculture where unreliable rains as well as pests and diseases outbreaks cause wide variations in crop and livestock yields. Ingrid (2002) particularly mentioned soil erosion occasioned by

desertification as a potential source of risk to about 1 billion people in the world. In terms of risk management, available risk management strategies have been classified under; loss control, loss financing and internal risk reduction methods (Harrington and Niehaus, 1999). Some of the specific strategies for managing agricultural risks include adoption of improved crop varieties, proper timing of farm operations based on reliable weather information and insurance coverage (Okereke, 2004).

In Nigeria in general and Ebonyi State in particular, the agricultural production system is dominated by smallholder farmers (Awoke, 2002; Idachaba, 1993). These farmers operate mainly within the limits of their highly insufficient resources which tend to constrain their capacity to employ most recommended risk management technologies. As such they are often left with only the option of either leaving their farm operations at the mercy of natural risk factors or at least applying somehow ineffective strategies based on indigenous knowledge. This diminishes the ability of these smallholders to optimize food production for both domestic consumption and for income generation thereby affecting the food security prospects of the entire population.

Based on the foregoing, it was thought necessary to explore the current risk management system in smallholder agriculture in Ebonyi State and its implications for achieving food security in Nigeria. The necessity of this study is underpinned by the fact that there seem to be a gap in knowledge existing in the area of this subject matter in relation to the study area. Therefore, this study was conceived to fill this perceived existing gap in knowledge as a contribution to knowledge towards effective policy formulation based on empirically-generated information.

METHODOLOGY

The Study Area

The study focused on Ebonyi State, which is in the southeast zone of Nigeria. The state is made up of 13 local government areas with the capital in Abakaliki. It is located on latitude $6^0$15'N and longitude $8^0$05'E on the globe and it shares boundaries with Cross River, Abia, Enugu and Benue States in the east, south, west and north respectively. Its total land area is 5,530km^2 (Wikipedia, 2012). It also shares boarder with Imo State at Ivo L.G.A. According to NBS (2006) the population of the area is 2,173,501 made up of 1,132,517 males and 1,040,984 females.

Ebonyi State is an agrarian state with the majority of the populace involved in one form of agricultural production or the other mainly at a small scale. The crops produced in the area include: rice, yam, cassava, cocoyam, vegetables and others. Apart from the production of crops, rearing of animals especially the small ruminants (sheep and goat) as well as muturu cattle and fishing are also practiced by the people. The pattern of agricultural production is mainly defined by the influence of the annual weather regime of the area based on two distinct seasons: the dry and the rainy seasons. The dry season starts around November and ends around March while the rainy season starts in April and ends in October with the average annual rainfall at about 134 mm (EBADEP, 2001).

Sampling and Data Collection

Multi-stage sampling was used to select 240 farmers who supplied the primary data needed in the study. At the first stage, 2 local government

areas were purposively selected from the 13 local government areas of the state. These were Ohaozara and Ohaukwu LGAs in the south and north agricultural zones of the state respectively. These were believed to be fair representations of the two distinct climatic regions of the state. Then 4 communities were randomly selected from each of the 2 local government areas giving a total of 8 communities. Furthermore, 2 villages were randomly selected from each of the 8 communities giving a total of 16 villages. Finally, 15 smallholder farmers were randomly selected from each of the 16 villages based on the Ebonyi State Agricultural Development Programme (EBADEP) farmers list. This gave the sample size of 240 respondents used in the study. Then the collection of data was done using questionnaire which was administered as interview schedule in some of the cases based on the literacy levels of the respondents.

Analytical Techniques

The analysis of data obtained from field survey was through the use of tools of descriptive statistics which include mean, frequency distribution and percentage.

RESULTS AND DISCUSSION

Data obtained from field survey were analysed in line with the objectives of the study and the results are presented and discussed in the following sub-sections.

Sources of Risk Encountered in Agricultural Production

Understanding the nature as well as the source of any particular risk could be a useful step towards handling the challenges associated with it. Therefore, the study assessed the major sources of risk encountered in agricultural production in the study area and the results are presented in Table 1.

Table 1: Frequency distribution of farmers according to sources of risk encountered in agricultural production

Source of Risk	Frequency	Percentage (%)
Weather	174	72.5
Pest attacks	232	96.67
Crop and animal diseases	216	90
Lack of adequate finance	240	100
Input acquisition problems	224	93.33
Market inefficiency	150	62.5
Family ill health	204	85
Government laws and policies	50	20.83
Land dispute and litigations	186	77.5
Farm theft	200	83.33
Total	*1876	

Source: Field Survey Data, 2011.
* Multiple Responses Obtained

Ten distinct sources of risk were identified with varying degrees of incidence according to farmers' responses. Specifically, lack of adequate finance had 100% responses showing that all the respondents saw it as a very significant source of risk in farming. Of course this is expected because every other activity in agricultural production is influenced one way or the other by the size and application of fund in the farm. Therefore, there are always lots of problems arising from the unavailability of the required fund for the day to day running of the farm. For example, lack of adequate liquid asset at certain critical periods of growth of crops in the field could cause substantial level of distortion in the production schedule which leads to the risk of yield loss in the long run. Lack of cash for carrying out critical activities such as weeding and fertilizer

application in the farm at the right time can also result in unfavourable outcomes (Okereke, 2004).

Other factors that were acknowledged as substantial sources of risk among the farmers were pests attack (97%), input sourcing problems (93%), crop and animal diseases (90%), family ill health (85%) and farm produce theft (83%). Input sourcing problems here has to do with the availability and access to improved production technologies such as high yielding or disease resistant crop varieties. In respect to family ill health as source of risk, it is understandable that if a household member happens to fall critically ill possibly within the production season, it could adversely affect the farm operations as well as the amount of cash available for investment in the farm.

In addition to the foregoing, the farmers also identified land disputes and litigations, weather-related issues, produce marketing problems and government laws and policies as sources of risk in their agricultural endeavours. These variables had 78%, 73%, 63% and 21% of the farmers' responses respectively. Weather-related issues here is in terms of unpredictable annual rainfall regime which manifests in a variety of problems such as flooding and droughts that expose the farm entrepreneur to risks in farming business. Of course the issues of climate change, its attendant impacts on agricultural production as well as how farmers could adapt have been issues of global concern in recent times (Hassan and Nhemachena, 2008).

Generally, it is obvious from the result that all the traditional classes of risk in agricultural production already documented by Emery *et al.* (1987) also existed within the agro-ecosystem of the study area. Specifically, weather, pests and diseases are sources of production or yield risk; lack of finance is a source of financial risk; problems of input sourcing and marketing problems are sources of marketing risk; family ill health and theft are sources of human risk while land disputes and litigations as well as government laws and policies are sources of institutional risks.

It is important to note here that some of the risks encountered by the farmers as identified above were enterprise-specific. For example, the pests: African Rice Gull Midge (*Orseolia oryzivora*), Rice Shoot Fly (*Antherigona oryzae*) and Rice Bugs (*Leptocorisa spp*) are all associated with rice enterprise while the African Maize Stem Borer (*Busseola fusca*) is a problem in maize production. As such the producers (farmers) of the crops affected by these pests could be isolated by policy makers for intervention purposes.

Risk Management Strategies Utilized by Farmers

The management of various risks encountered in agricultural production requires the application of a number of strategies aimed at either controlling the extent of loss, financing losses or internal risk reduction. The small scale farmers in this study were found to be adopting one measure or the other that fall within either one or more of these three broad categories of risk management methods. The results of the analysis are presented in Table 2 and discussed hereunder.

Table 2: Frequency distribution of respondents according to risk management strategies adopted in agricultural production

Risk Management Strategies	Frequency	Percentage (%)
Adoption of improved varieties	180	75
Irrigation during dry season	60	25
Saving money in bank	100	41.67
Mixed cropping	164	68.33
Mixed farming	140	58.33
Use of fertilizer	200	83.33
Use of insecticides	90	37.5
Adoption of improved farming methods	120	50
Membership of self-help organizations	190	79.17
Use of meteorological information in planning	32	13.33
Agro-forestry	40	16.67
Flexibility in farm operations	240	100
Speculative storage and marketing	170	70.83
Share cropping	36	15
Total	*1762	

Source: Field Survey Data, 2011
* Multiple Responses obtained

According to the result, all the respondents (100%) acknowledged that they tried to be flexible in their annual farming operations as a means of reducing certain losses associated with risk factors such as droughts. Flexibility here refers to the ability of the farmer to alter plans and activities according to prevailing circumstances. This enables the farm entrepreneur to at least reduce or avoid impending farm produce losses that would have resulted if the farmer had been rigid in implementing farm management decisions. In line with this, Nzeadibe *et al*. (2011) observed that one of the ways through which smallholder farmers adapted to climate change in the Niger Delta area of Nigeria was the adjustment of their timing of farm operations such as land preparation in response to prevailing weather conditions.

In addition, 83% and 79% of the respondents adopted the use of fertilizer and membership of self-help organizations such as isusu groups respectively as means of managing risks in farming. Of course the use of fertilizer is seen as a way of improving crop yield in order to reduce loss of farm revenue associated with low crop output. Then belonging to self-help organization such as cooperative societies and isusu groups helps farmers to pool resources for handling risks incidences among themselves. The first method here could be seen as a loss reduction or loss control while the later is a loss financing method (Harrington and Niehaus, 1999).

Other risk management methods adopted by the respondents include; adoption of improved crop varieties (75%), speculative produce storage and marketing (71%), mixed cropping (68%) and mixed farming (58%). It is important to note here that both mixed cropping and mixed farming are actually forms of diversification which helps farmers to avoid "putting all their eggs in one basket". As such if one crop or enterprise happens to be exposed to a risk factor such as disease attack, there may still be the chance of getting some yield from the one that is not affected. For example, if an intercrop arrangement involving cassava, yam and maize, is attacked by cassava mealy bug, only the cassava crop would be endangered while the farmer could still realize some income from yam and maize. At least this will enable him not to go completely out of

production due to absolute lack of fund during the subsequent farming season.

Apart from the above-mentioned methods of risk management, 50% of the farmers adopted improved farming technologies while 42% maintained saving accounts in banks as strategies for managing risks in their farming. Also, 38% of the respondents acknowledged the use of insecticides as a risk reduction method in farming. However, only comparatively small proportions of 25%, 15% and 13% of the respondents used crop irrigation, share cropping and weather information respectively as risk management strategies in their agricultural production. It has been observed that one of the challenges to climate change adaption in the developing nations is the lack of access to functional weather information (Enete and Onyekuru 2011). Such lack of information limits the capability of the farmer to take necessary farm management decisions and actions that will help to reduce or eliminate possible losses associated with futuristic manifestations of risk factors such as flooding.

It is worthy of note here that there were also a number of risk management strategies practiced among the farmers based on indigenous knowledge. They include; smoking of maize over the fire place to control weevils; use of scare crow in rice fields to scare birds away; mixing of stored corn and beans grains with pepper to control weevils and the spraying of field plants such as okra with burnt wood ash to control insect pests. Some of them also consulted native doctors and deities for talisman to ward off thieves from stealing crops in the field.

Constraints to Risk Management in Agricultural Production

A number of factors were found to be militating against the effective management of agricultural risks among the smallholder farmers in the study area. These were analysed and presented in Table 3.

Table 3: Frequency distribution of respondents according to constraints to risk management in agricultural production

Constraints	Frequency	Percentage (%)
Lack of finance	196	81.67
High cost of fertilizer	172	71.67
Lack of collateral for loan	70	29.17
High interest on loan	216	90
Poor marketing facilities	90	37.5
Poor transportation system	80	33.33
High cost of improved technologies	224	93.33
Lack of storage facilities	116	48.33
Inaccessibility of insurance houses	124	51.67
Unpredictable weather regime	120	50
Unfavourable government policies	48	20
High cost of land	108	45
High cost of labour	228	95
Lack of access to improved technologies	152	63.33
Lack of access to meteorological information	218	90.83
Total	*2162	

Source: Field Survey Data, 2011.
* Multiple Responses Obtained

Result showed that majority (95%) of the respondents identified high cost of labour as a key factor constraining the farmers in managing risk. Other constraining factors with comparatively high frequencies were; high cost of improved varieties (93%), lack of access to weather information (91%), high interests on agricultural loan (90%),

lack of adequate finance (82%) and high cost of fertilizer (72%). Most of these factors have also been identified by previous researches as problems associated with smallholder agricultural production (Okereke, 2004; Manyong *et al*. 2005).

Other factors indentified by the farmers as constraints to risk management were; lack of access to improved technologies (63%), lack of access to insurance (52%), unpredictable annual weather regime (50%), lack of storage facilities (48%) and high cost of land acquisition (45%). Furthermore, poor marketing facilities, poor transportation system, lack of collateral for agricultural credit and unfavourable government laws and policies were cited as constraints by 38%, 33%, 29% and 20% of the farmers respectively. Generally, it is obvious from the above-result that the smallholder agricultural production in the area was fraught with Socioeconomic, environmental, institutional and infra-structural problems that tend to limit the farmers' abilities to manage various risks factors affecting their farming endeavours.

Implications of risks and Risk Management for Food Security in Nigeria

Ebonyi State is one of the states in Nigeria often referred to as food baskets of the nation. This is not surprising considering the fact that the state is known for rice production all over the country. It also produces a wide variety of other crops such as cassava, cocoyam, potato and vegetables among others (Wikipedia 2012). As such, it is not an over-statement to say that the state is making significant contributions to the food security status of the nation.

However, the productions of these important agricultural commodities of the state have been mainly in the hands of those usually classified as smallholder farmers (Fawole and Oladele 2007). Based on the findings of this study the smallholder farmers are overwhelmed by a number of risk factors within their production environment. These factors tend to reduce the level of efficiency at which these farmers are able to utilize the limited resources at their disposal to optimize output and maximize profit. As such the extents to which they can contribute to the food security of the state in particular and Nigeria in general are significantly reduced. This situation is further exacerbated by the constraints identified as militating against their capacities to manage agricultural risks efficiently towards enhanced and sustainable food production.

It therefore becomes necessary to address the issues raised in this study through programmes and policies that will assist the farmers to be better positioned to contribute meaningfully in finding solutions to the food security challenges of the country. First, the government should appropriate adequate fund for disbursement to farmers as agricultural credit at no interest. Also latest improved technologies for managing agricultural risks should be made affordable and easily accessible to the farmers. In addition, relevant marketing information and reliable weather forecasts should be provided to farmers possibly in their local dialects so as to enable them plan their farm operations with some level of reliability. It is hoped that if these measures are taken, they will go a long way in reducing the negative impacts of risks on farmers' productivity and by implication lead to enhanced food security situation in the country.

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Determinants of Market Participation of Maize Farmers in Rural Osun State of Nigeria

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Abstract: The study investigated the levels of market participation of small-scale maize farmers in Osun State, Nigeria with objective of examining the determinants of their market participation. A multi- stage sampling technique was employed in the selection of the respondents. The first stage is the purposive selection of ten Local Government Areas from the six agricultural zones in the state. The second stage involved random selection of six villages from each Local Government Area (LGA). The third stage was random selection of 24 farmers from each village. Tobit model was used to analyse the factors affecting market participation while Regression model was used to analyse the volume of maize offered to the market for sale. The result of the Tobit model correctly predicted 67% of the observation with a significant chi square of 52.93 and it shows the overall significance of the model. All variables had positive coefficients significantly different from zero except years of education, transaction cost, marital status and household size. This means that a unit increase in the quantity of these variables will increase the proportion of maize offered for sale by the respondents. The result of the regression model also showed that R –Square and adjusted R-Square are respectively 91% and 90% with a significant overall fit. Volume of maize sold by individual respondents was used as the dependent variable. Total maize produced ($p<0.01$), age ($p<0.05$), years of education ($p<0.10$), ownership of cultivating equipment ($p<0.01$), access to non farm income ($p<0.05$), and belonging to farmers' association ($p<0.01$), means of information ($p<0.10$), all had a significant and positive relationship with the volume of sales. This suggests that an increase in any of these variables will lead to an increase in the volume of maize offered for sale while marital status ($p<0.05$), and transportation cost ($p<0.05$), had a negative and significant relationship with the volume of maize sold and this is in line with the *a priori* expectation. The study recommends that effort should be made at establishing more points of sales in farming areas in order to lower transportation costs to promote market participation and youths should be encouraged to participate in agricultural production and consequently market participation so as to inject new blood into the system.

Key Words: Market Participation, Maize Farmers, Marketable surplus, Commercialization, Regression

INTRODUCTION

The bulk of Nigeria's populace is poor scattered in the rural areas as farmers producing the largest portion of the nation's food and exports (Oluwasola *et al* 2008). One would like to ask why this is still so despite several coordinated programmes and policies that has been formulated by the past and present Nigerian Government to reduce the level and incidence of poverty in the country and particularly among farming households. The problem of living below the poverty line attributed to Nigerians' farmers could be traced to many factors: one of which is market related factors as most of the rural markets in Nigeria are still not developed. It is now evident that achieving and sustaining success in

productivity based agricultural growth critically depends not only on achieving agricultural productivity and household food consumption but also increasing better market access and expansion of market opportunities as the livelihoods of most African smallholder farmers are often restrained by poor access to markets and limited entrepreneurial skills for adding value to the products (Haggblade, 2004). The question of how to increase the market participation of smallholder is a major challenge facing many government and non-governmental organizations in developing countries. Holloway and Ehui (2002) opined that the inability to access markets is a major constraint to improving the welfare of smallholders. Enhancing the ability of poor smallholder farmers to reach the markets, and actively engage in them, is one of the most pressing development challenges.

In Sub- Sahara Africa, Asia and South and Central America, small scale agriculture remains the major source of rural employment but, confronted with changes in world trade and falling commodity prices (Junior, 2006). Although, previous studies attributed the low market participation to different challenges, there is seldom any framework for ranking the impediment at village level and as a result, privatization and adaptation of intervention becomes difficult. Consequently, there is duplication of efforts and resource wastage, leading to a rise in food insecurity and widespread poverty (Balint, 2003). Improvements in market participation are necessary to link smallholder farmers to markets in order to increase agricultural production as well as set opportunities for income generation (Pingali, 1997). Enhancing the ability of smallholder and resource- poor farmers to access market

opportunities and diversify their links with markets is one of the most pressing developmental challenges facing both governments and non-governmental organizations (IFAD, 2002). Market orientation enhances consumers' purchasing power for food, while enabling re – allocation of household income by producers to high value non – food agribusiness sectors and off farm enterprises (Davis, 2006). The rationale for enhancing participation in commercial agriculture also stem from the potentials to accelerate attainment of the Millennium Development Goal (MDG) on food security and poverty reduction through utilization of untapped opportunities in commodity value chains (John et al, 2007).

It is well established that majority of the smallholder farmers are located in remote areas with poor road networks and market infrastructure, contributing to the high transaction costs, which has been seen to be one of the key reasons for smallholder farmers' failure to participate in markets (Makhura et al., 2001). In addition, they lack reliable market information as well as information on potential exchange partners. National and international policy initiatives that aim at addressing this constraint have to address issues associated with reduction of transaction costs, which are often the embodiment of access barriers to market participation of smallholder farmers and market risks. Virtually, all Nigerian farmers depend on trading for some household needs and hence seek additional income generating activities. Improvements in market participation is therefore necessary to link smallholder farmers to markets in order to have better market for agricultural products as well as set opportunities for income generation.

Market participation is the integration of subsistence farmers into the inputs and output markets of agricultural products, with the aim of increasing their income level thereby reducing poverty (Holloway and Ehui, 2002). The concept of market orientation, commercialization or participation refers to the percentage of marketed output from total farm production. The research on market participation has been scanty, but the major issues that abound in the literatures are: the study of market participation based on whether farmers make market participation decision and the volumes of sales simultaneously or sequentially; the institutional factors that affects market participation and the effect of government policies on market participation decisions. Goetz 1992, Lapar et al 2003, Heltberg and Tarp (2001) and Holloway et al 2005 studied market participation based on the assumption that market participation and volume choices are made sequentially or simultaneously. That is, farmers initially decide whether or not to participate in the market, and then decide on the volume purchased or sold, conditional on having chosen market participation; farmers make market participation decision simultaneously with the decision as to volume purchased or sold.

Heltberg and Tarp (2001) modelled market participation behaviour as a two step decision process. The first one is for the household to decide whether or not to participate in the market and secondly establish how much to sell. They found out that transaction cost, risk and other factors create barriers or thresholds to participate in crop markets. Goetz (1992) used a Probit model of households' discrete decision to participate in the market (either as buyers or as sellers without distinction) followed by a second stage switching regression model of the continuous extent of market participation decision. Result suggest that options other than relative output price changes are available for stimulating market surpluses in Sub Sahara African. In particular, better information significantly raises the probability of market participation of selling households, while access to coarse grain processing technology significantly raises quantities sold by sellers.

In a similar view, farmers participation levels at various un-organized markets in Nigeria differs, some opt not to participate at all due to various limiting barriers. This is because some farmers have not yet seen the benefits of participating in the organized markets despite the envisaged benefits of market orientation as well as positive tendencies in drivers of commercialization. This has resulted into quite poor return on their investment in terms of money, time, energy and resources. Putting emphasis on this is to consider the activities of the middlemen whose share of the total marketing margin is usually higher compared with the farmer's return which is usually low as a result of the exploitation. This exploitation directly or indirectly leads to loss of interest in farming and subsequently food insecurity in the country (Asemote, 2000). There is therefore need to encourage these poor farmers by integrating them into the markets; integration will only happen when smallholder farmers fully participate in the markets. In the past, studies on marketing in Nigeria have been particularly focused on market prices and margin and also on the organization and conduct of food marketing systems. This study distinguishes itself from the

past studies in Nigeria because it will go beyond the market place to identifying the market constraints the farmers are facing and also to integrate them into the markets so as to enable them to participate more in the markets.

The study therefore examines the determinants of market participation among maize producers in Osun State. The identification of ways to increase market participation by smallholder producers requires identification of variables that influences market access (Randala et al., 2008). Identification of farm level factors that influence or enhance market participation is important as this may offer information for policy alternatives that would promote and enhance better commercial orientation. It may further lead to improved income of rural dwellers. Addressing the determinants of commercial orientation of the individual farmers could shed more light on further steps to be taken by various commodity organizations, the governments and other role players in order to promote the rural market economy (Balint, 2003).

METHODOLOGY
Study Area

The study was carried out in Osun state in the South Western part of Nigeria. Osun State, covers an area (land mass) of approximately 14,875 square kilometers, lies between longitude 04 00E and 05 05" and latitude 05 558" and 08 07". The estimated population for year 2004, based on the 1991 census is therefore 3.1 million. It is bounded by Ogun, Kwara, Oyo and Ondo States in the South, North, West and East respectively. Osun state is predominantly an agrarian society with about 70% of the population engaged directly or indirectly in agriculture and related activities. For administrative convenience, Osun State is divided into six agricultural zones by Agricultural Development Project (ADP). These zones include Osogbo, Ikirun, Ede, lwo, llesha and Ife. Osun I is made up of Ede and Iwo zones; Osun II consists of Osogbo and Ikirun zones while Osun III comprising Ife and Ilesa zones.

Being part of the cocoa belt, Osun State has been a major destination for migrant farmers from other parts of Nigeria. Some of the migrants work as hired labourers in cocoa, kola nut, tobacco and other cash crops farms while others settle down as crop farmers like yam, maize, cassava etc while a few others are traders.

Sources of Data

The data for this study were obtained mainly from primary sources. Data on household and respondents' characteristics were collected for the study with the aid of structured questionnaires and interview schedules. Personal observation was further used to gather facts relevant to the study. Data were collected on the general living standard of the people which include household characteristics, household physical assets, social capital, transaction cost.

Sampling Procedure

A multi- stage sampling technique was employed in the selection of the respondents for this study. The first stage is the purposive selection of ten Local Government Areas from the six agricultural zones in the state. The selection was based on the intensity of maize production and markets, since the target was maize farmers. The second stage involved random selection of six villages from each Local Government Area (LGA) where maize is being grown in large quantity. The third stage was random selection of 24 farmers

from each village.   The reason behind equal number of questionnaires being allotted to each village is that the population size of the selected villages are not different except some like Ekosin, Okuku and Otan. In all, a total of 240 respondents were proposed for the study but only two hundred and twenty seven were valid for analysis.

Analytical Techniques and Model.

A combination of analytical tools was employed to analyze the stated objectives. These include descriptive statistics, and regression analysis (Tobit and Ordinary Least Square). Descriptive statistics such as frequency distribution table, percentages, means and standard deviation, were used to analyze respondents' socio-economic, demographic characteristics and their level of market participation.

Regression Model

The aim of the study was to look at factors that increase the level of participation in the maize markets. Ideally, the ordinary least square (OLS) model is applicable when all households participate in the market but in reality not all households participate or at the same level in the markets. Some households may not prefer to participate in a particular market in favour of another, while others may be excluded by market conditions. If the OLS regression is estimated excluding the non-participants from the analysis, a sample selectivity bias is introduced into the model. Such a problem is overcome by following a two-stage procedure as suggested by Heckman (1979) or Tobit procedures. These procedures has been discussed broadly in Tobin (1958), Greene (1981, 1993), Maddala, (1988), and Gujarati (1995) and applied in several instances such as Adejobi et al (2006).

Both Heckit and Tobit procedures also addressed this concern. The Heckit procedure is a consistent but not an efficient way to control for selectivity bias, while Tobit procedure is efficient and consistent. Technically, if Heckit specification was run using Maximum likelihood Estimation (MLE) procedure without lambda, the results would be identical to Tobit-MLE selection models with iterations constrained to one. The results obtainable from the Tobit procedure are the MLE or maximum likelihood estimates, as well as the marginal effects. The marginal effects indicate the amount of the sales resulting from a unit change in the explanatory variables. The marginal effects account for the probability of the level of market participation. They have the same interpretation as the OLS coefficients. It is sometimes pertinent to compare the marginal effects and OLS coefficients, though the latter are distorted.

Data providing for market participation tend to be censored at the lower limit of zero. That is, the household may sell some of its produce, while another may not sell at all. If only probability of selling is to be analyzed, Probit or Logit models would be adequate techniques for addressing probability questions. Although it is interesting to know factors that influence the level of sales, at the same time, there is a need for a model that is a hybrid between the Logit or Probit and the OLS. The appropriate tool for such is the Tobit model that uses Maximum Likelihood Regression (MLE) estimation (Tobin, 1958, Gujarati, 1995). A Tobit model answers both of the following questions:
What factors influence the probability of selling? This question is answered by Logit and Probit. What factors determine the level or magnitude of

sales? This question is not answered by Logit and Probit models, but by OLS.

Using this type of econometric model (Tobit) to determine the factors affecting market participation while controlling for other factors is expressed as:

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu_i$$

$Y = 0$ if $y \leq 0$,

$y = Y^*$ if $y > 0$.

Y^* = House Commercialization Index

β = estimated parameter or coefficient

$X_{i=}$ the explanatory variables

ε_i = error term and is normally distributed with zero mean and constant variance.

The dependent variable y equals 0 if the latent variable y^* is below a certain threshold, usually 0. If the values of the latent variable are positive, the dependent variable is equal to the latent variable.

$$y^* = \beta_0 + x\beta_1 + \mu, \mu / x \quad \text{Normal } (0,\sigma^2) \quad (1)$$

$$y^* = \max(0, y^*) \quad (2)$$

The latent variable y^* satisfies the classical linear model assumptions; in particular, it has a normal, homoskedastic distribution with a linear conditional mean.

Equation (2) implies that the observed variable, y, equals y^* when $y^* \geq 0$, but $y = 0$ when $y^* < 0$. Because y^* is normally distributed, y has a continuous distribution over strictly positive values. In particular, the density of y given x is the same as the density of y^* given x for positive values. Further,

$$P(y = 0 / x) = P(y^* < 0 / x) = P(\mu < -x\beta) \quad (3)$$

$$= P(\mu/\sigma < -x\beta/\sigma) = \Phi(-x\beta/\sigma) = 1 - \Phi(x\beta/\sigma) \quad (4)$$

Because μ / σ has a standard normal distribution and is independent of x; we have absorbed the intercept into x for notational simplicity. Therefore,

if (x_i, y_i) is a random draw from the population, the density of y_i given x_i is

$$\left(2\pi\sigma^2\right)^{-1/2} \exp\left[-\left(y - x_i\beta\right)^2/\left(2\sigma^2\right)\right] = (1/\sigma)\phi\left[(y - x_i\beta)/\sigma\right], y > 0 \quad (5)$$

$$P(y_i = 0 / x_i) = 1 - \Phi(x_i\beta/\sigma) \quad (6)$$

Where ϕ is the standard normal density function. From (5) and (6), the log-likelihood function for each observation i is then obtained

$$l_i(\beta,\sigma) = 1(y_i = 0)\log\left[1 - \Phi(x_i\beta/\sigma)\right] + 1(y_i > 0)\log\left\{(1/\sigma)\phi\left[(y_i - x_i\beta)/\sigma\right]\right\} \quad (7)$$

The log-likelihood for a random sample of size n is obtained by summing equation (7) across all i. The maximum likelihood estimates of β and σ are obtained by maximizing the log-likelihood which is easily executed in STATA.

Tobit regression was employed to analyze the determinants of market participation of maize farmers using all the data information acquired. The second stage which is to analyze the factors determining the volume of sales by the farmers, the Ordinary Least Square (OLS) model was used.

The full Tobit model is specified thus;

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu_i$$

Where Y^* is the latent variable (Proportion of maize sold), and x is a vector of independent factors, and μ is the error term

The dependent variable is the proportion of maize sold out of the total produced through sales to output formula while the explanatory variables are specified thus;

X_1 = Quantity of maize sold (in Kg)

X_2 = Age of the farmer (in years)

X_3 = Level of Education (in years)

X_4 = Sex of the Household Head

(male =1, Female =0)

X_5 = Marital Status (married =1, otherwise =0)

$_{X6}$= Household Size (in numbers)

X_7= Farming experience (in years)

X_8 = Ownership of farming equipment

   (If yes =1, No =0)

X_9 = Land size (in ha)

X_{10} = Access to non farm income

   (If yes =1, No =0)

X_{11} = Farmers' association (If yes =1, No =0)

X_{12} = Means of information (If yes =1, No =0)

X_{13} = Transport cost (in Naira)

OLS for Market Participation

The second stage involved OLS using observation in the regression model to be estimated. This OLS regression was used to analyze the factors determining the volume of sales. In this model, the volume of sales of the market participants made up the dependent variable

The model is

$$Y = \beta_o + \beta_i X_i\, U_i$$

Y is the variable representing volume of maize sold, X_i is a vector of farmers' characteristics relevant in explaining the level of market participation, and b_i is the independent variables as specified thus

X_1 = Quantity of maize produce sold (in Kg)

X_2 = Age of the farmer (in years)

X_3 = Level of Education (in years)

X_4 = Sex of the Household Head

   (male =1, Female =0)

X_5= Marital Status (married =1, otherwise =0)

X_6= Household Size (in numbers)

X_7= farming experience (If yes =1, No =0)

X_8 = Ownership of farming equipment

   (If yes =1, No =0)

X_9 = Land size (in ha)

X_{10} = Access to non - farm income

   (If yes =1, No =0)

X_{11} = Farmers' association (If yes =1, No =0)

X_{12} = Means of information (If yes =1, No =0)

X_{13} = Transport cost (in Naira)

Results

The socioeconomic factors considered in this study include gender, age, educational status, household size and farming experience as shown in table 1. The gender distribution of the respondents in the study area shows that 75 percent were male while the remaining 25percent were female. This signifies a typical Nigerian farming system especially in the western region where men are predominantly farmers. The farmers' ages range between 32 and 67 years. About 54.63percent of the farmers are at most 50years while the mean age is 49 years with the standard deviation of 7. The average age of the farmers in the study area shows that they are already ageing which might contribute negatively to productivity consequently low volume of sales or market participation. According to Randela et al, 2008, older farmers view farming as a way of life rather than as a business and have a strong emotional or almost biological connection with farming, land and little or no contact with the outside world.

Table 1: Socioeconomic Characteristics of the Respondents

A. Gender Distribution of Respondents		
Category	Frequency	Percentage
Male	170	75
Female	57	25
B. Age Distribution of respondents		
30 – 39	21	9.25
4o – 49	103	45.38
50 – 59	79	35.00
60 – 69	24	10.37

C. Educational Status of Maize Farmers		
Non	24	10
Formal	67	29
Education	112	48.5
Primary	24	10
Secondary		
Tertiary		
Household Size of Respondents		
1-10	149	65.64
11-20	75	33.04
21-30	2	0.88
>30	1	044
Years of Farming Experience		
1-10	54	24
11-20	109	48
21-30	61	27
31-40	14	6
>40	6	2
Total	227	100

Source: Field survey, 2010

Only 10.0 percent had no formal education. They spent an average of 9years in school which correspond to junior secondary school education in Nigeria with standard deviation of 4.5. This is a reasonable level of literacy among a typical Nigerian rural area but higher education is important as this is likely to lead to the reduction of search, screening information costs and transaction cost in both factor and product market (Matungul et al, 2001). The result of the analysis shows that 98.68percent of the respondents have their household size ranging between 1-20 members with an average of 10 members, standard deviation of 3.7. Larger household with more dependants are likely to have a lower level of commercialization as confirmed by Laper et al, (2003) that propensity to participate in the market economy declines with number of household members. The respondents also have an average of 18 years of marketing experience with standard deviation of 8. Participation in the market is a function of marketing experience. Hence, it is expected that individual with higher marketing experience will have higher commercialization index, thus farmers should be encouraged to participate in the markets.

Table 2: Factors determining market participation of maize farmers

Variables	Coefficient	Std. error	Probability	Marginal effect
Constant	0.1684	0.1368	0.241	
Quantity of maize produced	0.0004	0.0002	0.022**	0.0004
Age	0.0075	0.0022	0.001***	0.0075
Years of Education	-0.0006	0.0033	0.863	-0.0006
Sex of the head	0.0529	0.0325	0.100	0.0529
Marital status	-0.0166	0.0308	0.589	0.0075
Household size	-0.0076	0.0042	0.045**	-0.0006
Farming experience	0.0046	0.0022	0.027**	0.0529
Ownership of farming equip.	0.1944	0.0476	0.000***	0.0075
Land size in hectare	0.0067	0.0111	0.544	-0.0006
Access to non farm income	0.1029	0.0325	0.027**	0.0529
Farmers' association	0.1497	0.0386	0.000***	0.0075
Means of information	0.1429	0.0472	0.002**	-0.0006
Transportation cost	-0.0002	8.54×10^{-6}	0.000***	0.0529

Source: Computer Analysis 2010.

Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

No of observation	227	Significant level 0.000
Log likelihood function	67.01	% of correct prediction = 67
Chi squared	52.93	

The model correctly predicted 67% of the observation with a significant chi square of 52.93 and it shows the overall significance of the model. Nine out of the 13 variables had coefficients significantly different from zero. There is a positively significant relationship (p<0.05), between the proportion of maize sold and total quantity produced, that is, a unit increase in the total quantity produced will increase the proportion offered for sale by 0.0004.

A positive and significant relationship (p<0.01), exist between the proportion sold and age of the respondents as against the *a priori* expectation, though supported by Randela et al., 2008. This means that as farmers grow old, their physical energy reduces, hence they will take their produce to the market to supplement for their inability to produce other crop and have better income. This relationship implies that, a unit increase in age will increase the proportion of maize offered for sale by 0.008. Older and more experienced farmers tend to have more personal contacts, allowing discovery of trading opportunities at low cost (Matungul et al, 2001). Moreover Makhura (2001) opined that older farmers are able to overcome fixed transaction costs since some experiences about the market have been accumulated overtime. A significant (p<0.05) and negative relationship exists between the proportion of maize sold and household size and this is in accordance with the *a priori* expectation. That is, an increase in household size will reduce the proportion of maize offered for sale by margin of 0.0076. This implies that household members tend to consume more than what is sold. Generally, households decide to sell when they cannot consume all they have produced i.e. the

decision to sell is preceded by the decision to consume, the more members the household has, the more likely that most of the produce will be consumed. A significant (p<0.05), and positive relationship exists between the proportion of maize sold and farming experience of the respondents. Thus, a unit increase in the years of experience of the farmers will increase proportion of maize offered for sale by 0.0046. Ownership of cultivating equipment has a positive and significant (p<0.01), relationship and will have a marginal increase of 0.1944 on level of maize sold which goes with the *a priori* expectation. This means that household that owns cultivating equipment will produce more and are likely to offer more for the market than those without. Access to information has a positive and significant relationship (p<0.05). The more information the farmers has on the market location, products' prices, the demand and supply situations about the produce, the lesser the transaction cost they will incur which will improve their level of market participation by 0.1429. Access to non farm income has a positive significant (p<0.05), relationship and will increase the proportion of maize sold by 0.1029. Farmers with an additional source of income will be willing to take risk in producing more for the market. Being a member of farmers' association shows a positively significant relationship at (p<0.01), level with proportion of maize sold and it will bring about 0.1497 increase in the proportion of maize offered for sale. It further strengthens farmers' bargaining and lobbying power and also serves as source of information to the farmers, increasing their propensity to participate in the market. There is a negatively significant relationship (p<0.01), between the proportion sold and transportation

cost. A unit increase in transportation cost will reduce proportion of maize sold by 0.0002. Higher transportation costs to market, increases transaction costs, thereby affecting market participation: that is, the higher the transportation cost, the more difficult and costly it would be to get the produce to the market thereby reducing the quantity taken to the market by the farmers.

Factors that affect the volume of sales using OLS
Table3: Determinants of Volume of Maize Offered for Sale

Variables	Coefficient	Std. error	Prob.
Constant	-8.8614	8.542	-0.361
Quantity of maize produced	0.5395	0.0159	0.000***
Age	0.2759	0.1322	0.038**
Years of Education	0.2959	0.1712	0.088*
Sex of the head	0.6141	1.8228	0.737
Marital status	-3.7937	1.8799	0.045**
Household size	-0.1507	0.2024	0.457
Farming experience	0.1266	0.1057	0.232
Ownership of farming equip.	8.0289	2.4182	0.001***
Land size in hectare	0.3106	0.5211	0.588
Access to non farm income	7.1113	1.6548	0.000***
Farmers' association	4.6102	2.2669	0.0043**
Means of information	5.1919	3.009	0.0086*
Transportation cost	-0.0005	0.0002	0.0041**

Source; Computer Analysis 2010
*** *Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*

Prob>F	0.000	Adjusted R Squared	0.891
R Squared	0.8982	Root MSE	10.866

The model R –Square and adjusted R-Square are respectively 91% and 90% with a significant overall fit. Volume of maize sold in kg by individual respondents was used as the dependent variable. Nine out of the 13 variables are significantly different from zero. Total maize

produced ($p<0.01$), age ($p<0.05$), years of education ($p<0.10$), ownership of cultivating equipment ($p<0.01$), access to non farm income ($p<0.05$), and belonging to farmers' association ($p<0.01$), means of information ($p<0.10$), all had a significant and positive relationship with the volume of sales. This suggests that an increase in any of these variables will lead to an increase in the volume of maize offered for sale while marital status ($p<0.05$), and transportation cost ($p<0.05$), had a negative and significant relationship with the volume of maize sold and this is in line with the *a priori* expectation.

CONCLUSION AND RECOMMENDATIONS

Farmers in the study area are already ageing and this can contribute negatively to productivity consequently low volume of sales or market participation. Majority of the farmers are still into subsistence farming as they will only go to market to sell the excess after consuming enough by the households. They preferred selling at the farm gate or village market due to lack of good roads and information which resulted into high transportation cost and lower farmers' return as a result of middlemen's exploitation. Positive and negative significant relationships in the models inferred that a unit increase/decrease in the variables will reduce/add to the proportion of maize sold. Higher transportation costs to market, increases transaction costs, thereby affecting market participation: that is, the higher the transportation cost, the more difficult and costly it would be to get the produce to the market thereby reducing the quantity taken to the market by the farmers.

The major problems faced by the respondents in the study area were problem of high cost of

transportation; lack of credit facilities which is the major constraint facing the farmers in Sub-Sahara Africa and problem of bad road network from their farms to the various markets. Following this, the study recommends that effort should be made at upgrading roads and support establishment of more points of sales in farming areas in order to lower transportation costs to promote market participation. Also youths should be encouraged to participate in agricultural production and consequently market participation so as to inject new blood into the system.

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Economic appraisal of performance of small and medium scale poultry egg production in Ogun state, Nigeria

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Abstract: The study was carried out majorly to appraise economically the performance of poultry egg farmers by scale in Ogun State, Nigeria. Specifically, the study examined cost structure and profit level in the industry at different scale levels as well as the factors that determine the revenue of the poultry egg farmers. Purposive sampling procedure was used to select 50 representative poultry egg producer from whom primary data were obtained. The results of data analysis showed that costs of feed constituted the largest share of the total costs for the two categories of farm size. Although poultry egg production was profitable in the study area, the level of profit depended on the scale of operation. Amount spent on veterinary services was the only significant determining factors of revenue accruable to poultry egg farmers.

Keywords: Scale performance, poultry egg production, economic appraisal

INTRODUCTION

Livestock farming contributes to the proper utilization of land resources and furnishes invaluable foods for proper nourishment, wool and leather for clothing. It also produces useful ingredients and specialized product that are useful in medicine. According to Bamiro *et al* (2006), poultry egg production is one of the major sub-sectors in Nigerian agricultural industry which supply protein, lipids and vitamins of high zoological value to man. Poultry egg, apart from supplying protein is also a good source of high energy nutrients. Egg production is the major index of performance of commercial layer producers and is very often useful for policy purposes.

In recent times, the experience of poultry farmers in Nigerian has shown that the industry has been suffering from some setbacks caused by increasing cost of feeds which had caused significant reduction in the net returns from the industry (Oyetunde, 2003). There is also the problem of lower productivity which has not met up with the demand for eggs. The desire to solve these problems informed the objectives of this study.

Hence, the study provides answers to the following research questions such as:

- How profitable is each scale of poultry egg enterprise?
- What are the significant determinants of revenue accruable to the poultry egg farmers?

Thus, the objectives of this study are to determine and compare the profit level in the poultry egg industry at different scale levels as well as to determine the significant factors influencing the

revenue accruable to the poultry egg farmers in Ogun State of Nigeria. It should be noted that the subject of economic analysis of poultry production in Nigeria has received considerable attention in the literature (Ojo, 2003; Adebayo and Adeola, 2005; Amos, 2006; Okafor *et al* 2006; Bamiro *et al,* 2006 and Bamiro, 2008), none of these studies has appraised economically the performance of egg production by scale in the study area.

MATERIALS AND METHOD

The study was conducted in Ijebu North Local Government Area in the Ijebu division of Ogun State of Nigeria. Ogun State is a fast developing state created in February 1976 and is located in the South-Western part of Nigeria. The state lies within latitudes 6^0N and 8^0N and longitudes 2.5^0E and 5^0E. The state has a land area of about 16, 409 square kilometers and an estimated 2006 population census figure of well over 3 million people. The study area was chosen because agriculture is the main occupation of the people where they engage in crop and livestock farming, poultry keeping and saw milling (FOS, 1998).

Purposive sampling procedure was used to select a total of 20 small-scale poultry egg farmers (farms having less than 1000 birds) and 30 medium scale poultry egg farmers (farms having between 1000 and less than 5000 birds) based on the preponderance of each category of farmers by their scale of operation (Omotesho and Ladele, 1988).

Primary data which were obtained through the use of structured questionnaire were used for the study. Information on inputs and output together with various prices on relevant variables were obtained for the poultry egg farmers through the use of structured questionnaire administered by trained enumerators.

Budgetary and regression technique were employed to analyze the data. Budgetary technique was used to determine the performance of poultry egg producers by scale while ordinary least square regression technique was used to determine the significant variables influencing the revenue of poultry egg farmers at different scale levels. Straight line depreciation method was used to estimate the depreciation value of fixed items used during the production season. Budgetary technique involves the estimation of net farm income (π). Thus the net farm income (π) was estimated as:

π = GM-TFC --------------------------------- (1)

Where:

π represents net farm income

GM represents gross margin (TR – TVC)

TVC represents total variable cost

TR represents total revenue

TFC represents total fixed cost

Following the method employed by Aihonsu, *et al* (2007), economic ratios employed to measure economic performance of the two groups of farms were: Rate of Return on investment (ROI); Operating Ratio (OR); Fixed Asset Turn Over (FAT) and Total Asset Turnover (TAT).

i. Rate of return on investment (ROI) shows the amount gained on every naira (₦) invested. It is measured as:

$$ROI = \frac{E}{C} \text{ X } 100 \quad \text{------------2}$$

Where:

E represents profit before tax (₦)

C represents total cost (₦)

ii. Operating Ratio (OR)=

$$\frac{\text{Total Operating Expenses (TVC)}}{\text{Net Sales (₦)}} \quad\text{-----3}$$

iii. Fixed Assets Turnover (FAT) =

$$\frac{\text{Total Sales (₦)}}{\text{Fixed assets (₦)}} \quad\text{----- 4}$$

Iv Total Assets Turnover (TAT) =

$$\frac{\text{Total sales (₦)}}{\text{Total assets (₦)}} \quad\text{------ 5}$$

The relationship between the factors involved and revenue obtained from poultry egg production was investigated by the use of regression technique of analysis, of all the functional forms fitted to the data namely linear; semi-logarithmic and exponential, linear functional form was chosen as the lead equation based on economic, econometric and statistical reasons. The model is expressed as:

$$Y = f (X_1 \ X_2, X_3, \ X_4, \ X_5, \ X_6, \varepsilon_i) \quad\text{-----6}$$

Where:

Y represents revenue from sales of egg produced(₦)

X_1 represent amount of feed (kg)

X_2 represents cost of water (₦)

X_3 represents veterinary services (₦)

X_4 represents amount of labour (man days)

X_5 represents electricity cost (₦)

X_6 represent costs of purchase of day old chicks(₦)

ε_i represents the stochastic error term

RESULTS AND DISCUSSION

Budgetary analysis

Table 1 shows the cost component of an average poultry egg farmer for the two categories of farms. The results indicated that an average poultry egg farmer invested about ₦1441 and ₦28124 as total costs of production for small and medium scale farms respectively. These included costs of purchase of feed, water, drugs/veterinary services, chicks, labour, electricity and other necessary materials. Cost of feed for the two categories of farms constituted the largest share of the cost (about 73% and 40% for small and medium scale farms respectively). These results support the findings of Effiong and Onyenweaku (2006); Yusuf and Malomo (2007) which claimed that feed cost is the most important cost item associated with poultry egg production probably due to increase in cost of maize, groundnut cake, soya bean meal and the attendant scarcity of wheat plus corn offal (Okafor *et al,* 2006). This was followed by cost of drugs/veterinary services for small scale poultry egg farmers (3. 37%) and electricity costs for medium scale poultry egg farmers (about 15%). It is also revealed in Table 1 that total revenues of ₦1745 and about ₦50602 were earned by an average small and medium scale poultry egg farmer respectively. The analysis in Table 1, further revealed that net farm income of about ₦304 and ₦22478 was received by an average small and medium scale poultry egg farmer respectively. The budgeting analysis for the two categories of poultry egg producers revealed that poultry egg production was profitable and the level of performance depends on level of scale where farmers face similar market conditions. The results obtained here compared favourably with findings of Okafor *et al* (2006); Amos (2006); Yusuf and Malomo (2007).

Table 1: Cost and Return Analysis Per Poultry Egg Farmer Per Annum

S/N	Item	Small Scale		Medium Scale	
A	Revenue (₦)	1745		50601.7	
B	Variable costs (₦)		% of TVC		% of TVC
	Cost of feed	977.2	73.41	3000.07	40.44
	Cost of water	10.6	0.80	328.1	4.42
	Cost of drugs	44.8	3.37	742.8	10.01
	Labour cost	29.95	2.25	505.0	6.81
	Electricity cost	5.25	0.39	1106.8	14.92
	Bird stock cost	263.4	19.78	839.6	11.32
	Tax	-	-	896.6	12.08
C	Total variable cost (TCV) (₦)	1331.2	100.0	7418.9	100.0
D	Gross Margin (GM) = (TR – TVC) (₦)	413.8		43182.8	
E	Fixed cost (₦)				
	Depreciation cost (₦)	109.7		20705.2	
F	Total production cost (₦)	1440.9		28124.1	
G	Net farm Income (₦)	303.9		22477.6	

Source: Survey data analysis   ₦120.57 = $1

Table 2: Summary of Performance Ratios for the two farm types

Ratio	Small scale	Medium scale
ROI	21.09	76.73
OR	0.76	0.15
FAT	15.91	2.44
TAT	1.21	1.80

Source: Survey data analysis

Table 2 shows the summary of performance ratios of the farm types. It could be seen from the table that medium scale poultry egg farmers had higher return on investment (ROI) than their small scale counterparts. The medium scale poultry egg farmers obtained ₦76.73 return on a naira invested while the small scale poultry egg farmers had ₦21.09 return on a naira invested. This is an indication of the fact that medium scale poultry egg farmers were able to minimize operating expense better than their small scale counterparts probably due to economies of size. The values 0.79 and 0.15 obtained for operating ratios for small and medium scale poultry egg farmers respectively also support the above claim.

Table 2 also shows that more fixed and total assets were used up in poultry egg production by the two categories of farms. Thus, in terms of net farm income, medium scale poultry egg farmers performed far better than their small scale counterpart (Table 1).

Regression Result: The estimates of revenue function analysis of the 'best fit' linear functional form are presented in Tables 3 and 4 for small and medium poultry egg farmers respectively. The results showed that there was goodness of fit of the production function based on their significant F-values. Table 3 showed that 67% of the adjusted variability in the revenue obtained by small scale poultry egg farmers was explained by the included explanatory variables in comparison with 72% of the adjusted variability in the revenue obtained by their medium scale counterparts (Table 4). This study revealed that only the amount spent on veterinary services is the major determinant of revenue accruable to the poultry egg farmers. Veterinary cost had positive coefficient for small scale poultry egg farmers compared with negative coefficient obtained for their medium scale counterparts.

The implication of the negative coefficient is that the average cost expended on veterinary services per bird for medium scale poultry egg farmers will be lower than their small scale counterparts. The coefficient of other factors determining revenue from poultry egg production was not significant and hence the result should be taken with caution for policy purposes. The results of the regression analysis conform to the findings of Amos (2006).

Table 3: Production function estimates for small-scale poultry egg farmers

Variables	Coefficient	T-Value
Constant	-2469. 75	-0.2981
Amount of feed	4358.91	1.399
Cost of water	- 326.25	-0.308
Veterinary services	783.83	6.66*
Amount of labour	- 0.716	-0.787
Electricity cost	19.02	0.562
Cost of purchase of day old chicks	0.153	0.8821
R^2 = 0.741, Adjusted R^2 = 0.67, F = 16.999		

*Significant at 5%
Source: Survey data analysis

Table 4: Production function estimates for medium – scale poultry egg farmers

Variables	Coefficients	T-value
Constant	-5296.87	-1.373
Amount of feed	-115.03	-0.65
Cost of water	338.65	1.250
Veterinary services	-5.369	-4.083*
Amount of labour	0.028	0.873
Electricity cost	0.002	0.349
Cost of purchase of day old chicks	0.055	1.772
R^2 = 0.84; Adjusted R^2 = 0.72, F = 20.12		

*Significant at 5%
Source: Survey data analysis

CONCLUSION

This study dwelt on economic appraisal of small and medium scale performance in poultry egg production in Ogun State of Nigeria. It is shown in the study that cost of feed constituted the largest share of the total cost of egg production for the two categories of farm size (about 73% and 40% for small and medium scale poultry egg farms respectively). The study revealed that poultry egg production was profitable in the study area where level of profit depended on the scale of production. Medium scale poultry egg producers were observed to have had a far higher profit than their small scale counterparts. The study revealed that amount spent on veterinary services was the only significant determinant of revenue accruable to poultry egg farmers in the study area. The study recommends that policy focus should be geared towards how small scale poultry egg farmers will increase their scale of operation in order to enjoy the benefits of economies of scale and thereby deriving maximum profit from poultry egg enterprise while meeting the increasing demand for poultry eggs.

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Economics of raising African Giant Land Snail (*Archachatina marginata)* in Osun State, Nigeria

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Abstract: This research was aimed at examining the economics and constraints of raising African Giant Land snail (Archachatina marginata) in Osun State of Nigeria. Data on Socioeconomic characteristics of snail farmers, business environmental characteristics of respondents, constraints on production, quantities and prices of both inputs and output, were collected. The data were analyzed using descriptive statistics, and enterprise budgeting. Estimated gross margin of ₦32, 275 and a net profit of ₦30, 375 were obtained from the study, snail enterprise was seen to be profitable and the payback period for the initial investment was one year meaning that farmers could recover their investment in a single year. The results of the study also indicated that snail farmers were mostly male, literate, sole proprietor, self-financed and took snail farming as part time. Pest attack, lack of funds and poor laying performance (in decreasing order of importance) of snail were the main problems encountered by the farmers. Ensuring high level sanitation and medication to reduce pest attack, credit accessibility from formal and informal sources; setting up demonstration centers that will serve as source of improved foundation stocks.

Keywords: Economics, Constraints, African Giant Land Snail and Osun State, Nigeria

INTRODUCTION

The prevailing malnutrition problem in Nigeria is noted to be highly attributable to low animal protein intake (Fagbuaro *et al*, 2006). The challenge of ensuring a sustainable high level of animal protein supply to Nigeria's rising population has seen the livestock production industry stretched to its production limits. This is typical of most other developing and developed nations of the world. A World Bank Assisted National Agricultural Research Strategy Plan (1996-2010) for Nigeria has projected animal protein supply of 5.322g/head/day, for the estimated population of 159 million by 2010. Okojie (1999) reported 3.8g/h/d as animal protein intake in Nigeria against the FAO (2001) recommended minimum requirement of 34g/h/d for a healthy living of humans. Comparatively, Igene (1992) and Lamorode (1993) reported the average animal protein intake per head per day in North America, Western and Eastern Europe as 66, 39, 33g/h/d respectively. Resource, Inventory and Management [RIM] (1992) and Federal Ministry of Economic Development and Reconstruction [FMEDR] (2000) reported that the meat supply situation in Nigeria remained critical in spite of the relatively large animal production of over 13 million cattle, 34 million goats, 24 million sheep, 3.4 million pigs, about 1.7 million domestic rabbit and 104.3 million local poultry and about 20 million exotic poultry. Hence one of the most serious nutritional problems in the developing

countries is the shortage of high protein food from animal sources.

Animal proteins are more biologically complete than vegetable protein because they contain a complete range of amino acids that are essential for maintenance of health (FAO, 2005). The primary task of addressing the malnutrition problems through increased animal protein intake requires production of protein from animal sources in the right quantity and quality. The contribution made by domestic animals (conventional sources) as protein supply are not enough, there is therefore need to look at some unconventional sources (Etchu, *et al*., 2008). To achieve this, there is need to encourage the raising of some wildlife species such as snail and cane rat. The land snails are non-conventional wildlife protein source in Nigeria and some parts of Africa. It constitutes the major and cheapest source of protein in Nigeria (Yoloye, 1984, Ademolu *et al*, 2004). With a crude protein content of 16.18%, it compares favorably with other conventional source of animal protein like beef, pork and poultry meat (FAO, (1986); Akinnusi, (1998)).

Edible tropical land snails are abundant during the wet season; they are easily gathered especially at night and before dawn. These snails can easily be domesticated and controlled (Ebenso, (2002), Ebenso and Okafor, (2002); Ebenso, (2003)). Land snails habitat ranges from the dense tropical high forest in Southern Nigeria to the fringing riparian forests of the derived Guinea Savanna (Ajayi *et al*, (1980); Odiabo, (1997)). From November to March each year, Nigerian snails aestivate because of the hot dry weather. During this aestivation period, the aperture is temporarily closed by a calcified material known as

epiphragm, a whitish, fragile material (Nisbet, 1974). During aestivation the snails bury themselves in the soil or hide beneath stones in order to avoid direct solar radiation (Schmidth-Nielsen *et al.*, 1971). During rainfall the epiphragm breaks and very cold water stored before aestivation pours out of the aperture (Ajayi *et al*., 1980), and snails emerge to eat new plant growth and the soft soil (Ajayi *et al.,* (1980); Odiabo, (1997)).

There are several giant African snails, for instance, the giant snail in Ghana *(Achatina achatina)*; Nigeria (*Archachatina marginata*) and East Africa (*Achatina fulica*). The *Archachatina marginata* is the main object of this study. It is common in the rain forest belt of Southern Nigeria and can reach a weight of 500-800g when fully mature and has commercial value than other species (Amusan and Omidiji, 1999). The African giant land snail (*Archachatina marginata)* has contributed immensely to the diets of both rural and urban dwellers serving either as delicacies (also known as "congo meat") or as main dishes (Ngenwi *et al,* 2010). Molluscs serve as significant and essential part of the daily diet of Calabars, Itsekiris, Yorubas and many other coastal tribes. Edible part of snail meat contains at least 60% protein, which contributes to the formation of the interior framework of the cell and structure of intercellular substances like osteroids, collagen and dentine (Gohl, 1975). Imevbore and Ademosun (1988) reported that snail meat is particularly rich in calcium and phosphorus, which are lower in beef. Calcium is necessary in metabolic functions such as membrane permeability and muscle contraction. It is also a major constituent of skeletal structure.

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Snail has an extremely low fat and cholesterol content (Hamzat *et al*., (2002); Olufokunbi *et al*, (1989); Omole, (2003)) thus helps cure cardiovascular diseases such as hypertension, kidney diseases, tuberculosis, anaemia, diabetes and asthma. In addition, snails have been found to have aesthetic values. Snails are often utilized for a lot of decorative works and carvings such as flower vases, ash trays and other interior decoration thus making them to have additional economic values (Baba and Adeleke, 2006). Snail enterprise depends solely on decay plant materials or waste. Hence, a snailery enterprise facilitates or enhances proper waste management in that; it can control odours from pathogens as well as stabilize manure and also reduce pollution of surface and ground water (FAO, 2003).

As a result of its excellent nutritional attributes, which can reduce, to some extent, the country's malnutrition and undernourishment problems and roles played in the medical and pharmaceutical fields, it is important to rear African land giant snail on a large scale in order to reduce its erratic supply caused by seasonal factors such as rainfall and relative humidity. Hence, there is need to evaluate the profitability of raising African land giant snail on large scale. Therefore, the objective of the study is to determine the profitability of raising African giant land snail (*Archachatina marginata*) in the study area.

METHODOLOGY

This study was conducted in Osun State of Nigeria, which lies within the tropical zone and in the rain forest and savannah regions of Nigeria, and has two distinct seasons. The rainy season lasts for eight months and the dry season for four months.

A multistage sampling technique was used in selecting snail farmers. Four Local Government Areas (LGAs) and four villages from each LGA were selected using purposive sampling procedure based on snail production potential. Four respondents were selected from each village using snowball technique totaling sixty four. In all sixty-four respondents were sampled, and however, only sixty copies questionnaires were used for analysis, while four were rejected for inconsistency and inadequate information.

Data were collected using a pre-tested, well-structured questionnaire on socio- economic characteristics of the farmers (sex, age, years of experience, educational level); characteristics of snail raising enterprise (enterprise size, sources of breeding stock, production level, breeding environment); quantities and prices of production inputs and farm output, and major constraints to raising of snails. Data collected were analyzed using both descriptive statistics and enterprise budgeting. Descriptive statistics (frequency distribution, mean, median and percentages) was used to analyze data on socio – economic characteristics of the farmers, and of the enterprise and major constraints to snail enterprise. Enterprise budgeting was used to estimate return and costs to snail enterprise to determine the profitability of the enterprise. Both accounting and economic profits were calculated. Accounting profit is revenue less explicit costs (expenses) only, while economic profit equals revenue less both implicit and explicit costs (Dwivedi, 2001). Explicit costs are payments for resource input purchased or hired by a firm in the process of production, while implicit costs are

the opportunity costs of self – owned resources used by a firm (Leftwich, 1979). Depreciation was computed using the straight line method with the value of the used up material assumed to be zero. Returns or revenue is the product of the quantity of output and price per unit of output. The payback period of the snail farming enterprise was also estimated. The payback period of a project is the number of years the project generates sufficient net cash flows to cover the initial investment cost.

Depreciation = cost/economic life ……..… (1)

Other derivatives from the budgetary analysis include:

Gross margin (GM) = GR – TVC   …...… (2)

Net Farm Income (NFI) = GM – TFC…... (3)

Where:

GR = Gross revenue, TVC = Total variable cost

TFC = Total fixed cost

Rate of return = average annual net revenue/cost of the investment x 100 ..……. (4)

Payback Period = amount of the investment /

expected annual net cash revenue ... (5)

RESULTS AND DISCUSSION

Socioeconomic characteristics of respondents

Data in Table 1 showed that farmers' age varied between 21 and 60 years. The modal age bracket was between 31 and 40 years which constituted 58 percent of the farmers interviewed. Most of the respondents were within the economically active age (58 percent), male (66.7 percent), married (75 percent), literate (100 percent) and part-time snail farmer (75 percent).

These features can imply that they might be receptive to new ideas and adopt new improved technologies and also suggest that snail enterprise was a subsidiary source of income for majority of the farmers.

Table 1: Summary of Socioeconomic characteristics of snail farmers

Characteristics	Distribution (%)	Mean (Years)
Age (Years)		
21-30	16.7	
31-40	58.0	37.0
41-50	16.7	
51-60	8.3	
Gender		
Male	66.7	
Female	33.3	
Marital Status		
Single	16.7	
Married	75.0	
Divorced/Widowed	8.3	
Literacy Level		
No Formal Education	8.3	
Primary Education	-	
Secondary Education	25.0	
Tertiary Education	66.7	
Occupational Structure		
Full-time	25.0	
Part-time	75.0	
Other Occupation of Part-Time		
Trading	20.0	
Civil Service	40.0	
Artisan	15.0	

Source**:** Field survey, 2007

The major problems encountered (in descending order) were insect pest attack (soldier ants), lack of funds and low level of egg production and low hatchability (Table 2). Almost (88.3 percent) of the respondents encountered low egg production and low hatchability, probably due to genetic and environmental factors. Some foundation stocks were too old hence low level of egg production.

Table 2: Constraints on snail production and proposed solutions

Problem	No of farmers	Distribution (%)	Proposed Solutions
Snail theft	45	75	- Construction of fence - *Counting and trap* **- Native device**
Pest attack	60	100	- Use of oil - Cleanliness -Application of insecticides
Diseases	30	50	- Prompt disposal of dead snails. - Prompt removal of wetting soil, food remnants -Addition of calcium to soil
Low egg production & low hatchability	53	88.3	- Government setting up demonstration centers that will serves as source of improved foundation stocks
Lack of funds	56	93.3	-Loan
Inadequate market	50	83.3	-Stimulate market

Source: Field survey, 2007

Business environmental characteristics of respondents

The distribution of snail farmers by business environment revealed that 53.3 percent made use of a fenced environment while 30 percent raised snail in their residential building (Table 3). This showed that more than half of the respondents preferred the use of fenced environment because it reduces unwanted visitors from entering the pen reducing environmental stress and disease outbreak. Different types of housing were used depending on capital, scale of production and business environment. Half of the respondents made use of wooden house because of the relative ease of moving it from one location to the other.

The two common species found in the area of study were *Archachatina marginata* and *Archatina achatina*. About 43.3 percent of the respondents used *Archachatina marginata* as their foundation stock because they have more flesh compared with *Archatina achatina*, while 40 percent used both *Archachatina marginata* and *Archatina achatina* as foundation stocks because

Archatina achatina produced more eggs than *Archachatina marginata*. Almost (96.7 percent) of the farmers feed their snails with pawpaw (leaf or fruits) and cocoyam leaf while only 3.3 percent feed their snail with vegetables and fruits. Breeding of snails involve both natural and artificial breeding. All (100 percent) of the farmers practiced natural mating.

Table 3: Distribution of snail farmers by business environment

Characteristics	Distribution (%)
Business environment	
Fence	53.3
Shaded tree	16.7
Residential building	30.0
Housing used	
Wooden	50.0
Mud	16.7
Cement house	8.3
Basket	25.0
Species in the area of study	
Archachatina marginata	43.3
Archatina achatina	13.4
Archachatina marginata+ *Archatina achatina*	40.0
Not sure	3.3

Feed and feeding patterns	
Coco yam leaf	18.4
Pawpaw leaf	15.0
Pawpaw fruits	10.0
Vegetables and fruits	3.3
Pawpaw and cocoyam leaf	53.3
Breeding System	
Artificial	Nil
Natural	100

Source: Field survey, 2007

Costs and return in snail production

From Table 4 it was observed that on the average, the estimated revenue realized from snail enterprise raising 500 adult snails was ₦75, 000 while the Gross margin and Net income (profit) were ₦32, 275 and ₦30, 375 respectively. Based on these estimates the enterprise was profitable in Osun State. The implicit cost items were land, labour and investment outlay. Land was obtained by high proportion of snail farmers through inheritance. Labour was provided by snail farmer's family labour; and investment costs were obtained from their personal savings and loans from friends and relatives, which attracted no interest. The explicit costs items were disinfectants, medication, feeds (calcium carbonate, fruits and vegetables) and fixed assets.

The total fixed cost was ₦21, 500 with annual depreciation charge of ₦1, 900 (Table 5). Annual depreciation charge is the annual explicit expenses on fixed assets. The total annual explicit cost is ₦16, 900. The accounting profit is therefore ₦58, 100. The opportunity costs of owned – resources used was ₦3, 000, which was the market price on a piece of land used; ₦ 500/man day for family labour and 15% per annum as earning in alternative investment outlay. Thus, net income / return to management was

Table 4: Average production costs and return for snail farmers in Ile- Ife area per annum

Items	₦	₦
Revenue	500 matured at ₦150 per Snail	75,000
Expenses		
Family Labour	15,000	
Feeding	8,000	
Disinfectants	5,000	
Medication	2,000	
Transportation	5,000	
Interest on capital	7,725	
Total Variable Expense		42,725
Gross Margin		32,275
Fixed Cost (Depreciation)		1,900
Net Income		30,375

Source: Field survey, 2007

₦ = Naira, Nigerian Currency, 1S US D = ₦135

Table 5: Costs of fixed assets of snail raising enterprise

Items	Price/unit	Quantity	Cost	Economic Life	Depreciation
Land	30,000	0.1	3,000	15 years	200
Land improvement and fencing	10,000	-	10,000	15 years	667
Breeding house	5000	-	5,000	15 years	333
Wooden boxes	500	3	1,500	5 years	300
Breeding stocks	200	10	2,000	5 years	400
Total			21,500		1,900

Source: Field survey, 2007

₦30,375 this corroborates the already established fact that snail farms was a subsidiary source of income for almost all the farmers in the study area. The net income/profit accounted for 40.5% of the revenue. For as long as the expected return to management is less than ₦30, 375, the enterprise will give economic profits. It should be noted that the snail farmers considered the opportunity costs of their owned resources to be zero. The project investment outlay fixed cost was ₦21, 500. In the first year of operation, the total variable cost, when all cost items are treated as explicit costs was ₦ 42,725. Project investment outlay when all resources are market priced was covered by net cash inflow with excess at the end of first year suggesting that snail enterprise was profitable. Previous studies also indicated Snail farming was highly profitable (Baba and Adeleke, (2006); Ogunniyi, (2009))

CONCLUSION AND RECOMMENDATIONS

The study examined the profitability of raising snail on a large scale in the four Local Government Areas of Ile-Ife in Osun State. Specifically, the study focused on the determination of the economic viability and business environment of the enterprise. Results of the analyses indicated that snail farmers were mostly male, literate; within the active age bracket of 21 – 60 years with the mean age of 37 years. Snail farm was a subsidiary source of income for most respondents while the main problems encountered were insect pest attack, lack of funds, low egg production and low hatchability (in decreasing order). Most of the respondents used woods for the construction of pens, fed the snail with pawpaw leaves and cocoyam and they all practiced natural mating. The study revealed that it would be profitable to raise snail in the study area.

Given the result of this study, Federal Government and other stakeholders in the agricultural sector should let small scale farmers have access to credit through micro finance institutions. There is need to ensure high level farm sanitation and medication to reduce pest attack. Government should set up demonstration centers that will serve as source of improved foundation stocks.

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Evaluation of socioeconomic characteristics that determine transaction with mobile bankers ("Alajo") among farming households in South-Western, Nigeria

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Abstract: Capital has been the major problem of rural development in the developing countries like Nigeria. Lack of access to formal banking systems in rural areas has kept most farmers from accessing needed capital for development. This study therefore examines alternative banking systems among farming households in Southwestern, Nigeria. Questionnaire was administered to a total of 300 respondents through simple random sampling technique. The result shows that there is negative correlation between the sex of the respondents, (-0.6616427, p = 0.001) age (-0.391956, p = 0.000, years of formal education (-0.0419911, p = 0.05), household's size (-0.0148791, p = 0.596), livestock production (-0.330399, p = 0.090) and savings in convectional banks (-0.575172, p = 0.010) while marital status, cash crop production, arable crop production, artisan and traditional leadership had a positive correlation. Sex, age and saving in convectional banks are significant at 1 percent, marital status and years of formal education are significant at 5 percent while Traditional leadership is significant at 10 percent. The study concluded that the respondents with higher education and traditional leadership status patronize conventional banks more, while the less privileged patronize the non-conventional banking system.

Keywords: Assessment, Banking Behaviour, farming household and unorganized banking

INTRODUCTION

United Nations (2004) reported that the world population is currently estimated to be over 6 billion of which about 52 percent resides in rural areas. Rural areas are blessed with abundant mineral resources most of which are yet to be exploited (Agbonoga, 1998). At the beginning of this millennium, poverty was estimated to affect 1.5billion people in the world (UNDP, 2008). Africa's share of this global poverty is monumental as over 400 million Africans which are about 50% of the continent's populations are living below one dollar a day poverty line.

In Nigeria, it was also estimated that 70% of the total population resides in rural areas and over 80% of these rural households engage in one agricultural activity or the other as their source of livelihood. (Akinola and Aloba, 1994). One of the major constraints of rural development is the problem of inadequate financial resource which has a greater influence on level of productivity and general well being of rural households. Adebayo and Adeola (2008) reported that the relevance of the financial institutions (banks) in the rural areas are to enhance productivity and promote standard of living by breaking the vicious cycle of poverty in the rural areas. Over the years, Government has made many efforts to address the issue of Agricultural financing that would increase agricultural productivity and thereby improving rural households' standard of living. This attempt has given birth to so many Agricultural policies.

However, one of these policies is the Central Bank of Nigeria (CBN) rural Banking policies of 1977 and this was to bring banking services to rural households whose main economic activities are Agriculture. Banking is a commercial institution that takes deposits from and loan to individuals and organizations. All banks are concerned mainly with making and receiving payments on behalf of their customers, accepting deposits and making loans to private individual companies, public organizations and governments. Banks also provide money transmission and other monetary intermediation services to their customers (Okoye and Opkpala, 2008). According to Oke (2000), banks' dominant position in mobilizing saving gives them a lead role in allocating credit and this centrality has made banks magnet for government control.

The term bank and banking do not lend themselves to precise definition as reaction is that a great variety of financial institutions participate in fulfilling one or more of the operation generally regarded as banking functions. Rural household are characterized with various methods of banking. This involves process of saving their money and lending for improvement of their standard of living and general well being. The roles of banks either formal or informal cannot be over emphasized in that they perform intermediate functions between savers and those in need of credits (Smiths, 2002).

Rural banking system in Nigeria is dualized (Iganiga and Asemota, 2008) in that it consists of formal banking system which are organized (formal financial institutions) and informal banking system (Unorganized or informal financial institutions). Formal banks whether in developed or developing economy like Nigeria operates under the regulation and supervision of CBN. Donli (2007) reported that formal institution consist of financial intermediation and provision of an efficient payment system which are properly organized and served as conduit for the implementation of monetary policies. On the other hand, indigenous banks or unorganized financial institution consist of all banking activities that are not regulated or supervised by CBN. According to World Bank (1997) report, the unorganized financial institutions and scheme include Professional money lenders, Part-time money lenders, Esusu or Isusu collectors, credits unions and cooperatives societies. The patronages of all this banking systems are encouraged and necessary to boost and improve agricultural productivities and other related activities of rural households and in order to alleviate the poverty status as well as improve their standard of living.

World Bank (2008) reported that three out of every four poor people in developing countries live in rural areas. It was further estimated that over 70% of Africa population resides in rural settings which are poverty stricken. Poverty defies objective definition because of its multi-dimensional nature. It has no geographical boundaries; it is present in the north, south, west and east. World Bank (1990) defined poverty as the inability to attain a minimum standard of living. According to German governments description, poverty is a condition in which poor people are unable to live a life which defined poverty as not having enough to eat, a high rate of infant mortality, a low life expectancy, low educational opportunity, poor water, inadequate health care, unfit housing and a lack of active participation in the decision making process.

Rural households patronize the banking sector for various reasons. These include for saving their money, sourcing for funds and lending money to boost their production as well as improving their standard of living and general well being. This banking system or the rural financial intermediaries are generally classified into two major institutions. Iganiga and Asemota (2008) described them as Formal Rural Financial Institutions (FRFIs) and Informal Rural Financial Institutions (IRFIs). This description is necessary in view of the scope of the study as well as explaining the observed relationship between these institutions.

Statement of the Problems

Rural households are generally characterized by poverty. This has over the years affected their Agricultural and other livelihood activities. Major factor that have contributed to rural household poverty is inadequate financial capital to carry out their livelihood activities. Before the inception of conventional financial institutions, rural households have been involving in saving, borrowing and lending activities. This indigenous banking system needs to be identified and the rate at which rural households still make use of it need to be determined. Also their involvement in conventional banking system need to be studied as well as the factors that influence which type of banking system employed by rural households   For the forgone reasons, this research was designed to identify Socioeconomic characteristics of the respondents, determine banking methods they use, attitude of respondents towards conventional bankers and determine the relationship between Socioeconomic characteristics and banking methods.

METHODOLOGY

The study was carried out in Southwestern geopolitical zone of Nigeria. The zone has six (6) States which are Ekiti, Oyo, Osun, Ogun, Ondo and Lagos.   A multi-stage random sampling technique was used to select respondents. Two (2) States were randomly selected from six States (Ekiti and Oyo States). Two (2) Local Governments Areas were selected from each senatorial district of the two States. Two (2) rural communities were randomly selected from each Local Government Area while twelve (12) rural households were selected from each rural community, to arrive at a total of 288 respondents. During data analysis, 274 interview schedules were used for the study because they contained complete information while the remaining 14 were discarded. Interview schedule was used to obtain information on the specific objectives of the study. Data collected were analyzed using descriptive statistics such as frequency counts, percentages and tables. Probit regression was used to analyze the relationship between the choice of mobile bankers (Ajo) and Socioeconomic characteristics of the respondents. The Socioeconomic characteristics were the explanatory variable while the Mobile Bankers (alajo) was used as the dependent variable. The postulated model expressing the relationship between the explanatory variables and the dependent variables was expressed as:

The general probit model is stated below

Pr $(y=1) = F(B_o + X_i B_i)$

Pr = probability function.

X_i = n x k matrix of explanatory variable

B_i = k x 1 vector of parameter to be estimated

(i = 0, 1, ---, k)

F = cumulative probability distribution

Therefore, the probability of choice of banking method is a function of the vector of unknown parameters.

The specified choice of mobile bankers' model for the study is as follows.

$$Y = B_o + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 \ldots BX_n + E_1$$

Where,

Y is transaction with mobile bankers mobile bankers (Ajo ojoojumo) (dependent variables)

$X_1 \ldots X_n$ are independent variables (Socioeconomic characteristics).

$X_1 =$ Gender (male =1, female = 0)

$X_2 =$ Age (years)

$X_3 =$ Households size

$X_4 =$ Marital status (married = 1, non-married = 0)

$X_5 =$ Year of formal education

$X_6 =$ Cash crop production

$X_7 =$ Arable crop production

$X_8 =$ Saving in convection bank

$X_9 =$ Livestock production

$X_{10} =$ Traditional leadership

$X_{11} =$ Artisan

$B_i =$ Coefficient

$B_0 =$ Intercept

$E_1 =$ error term.

Perception of respondents about conventional bankers was measured using 5 points Likert scale of strongly agree, agree, undecided, disagree and strongly disagree. some statements on the importance of conventional bankers and respondents were asked to indicate whether they strongly agree, agree, undecided, disagree and strongly disagree.

RESULTS AND DISCUSSION
Socioeconomic Characteristics of the Respondents

Table 1 shows that 46.5% of the respondents fall between 30 years and below and only 17.4% have their age fall between 60 years and above. The result of age analysis shows that majority of the respondents are still within the active age range between of less than 30 and 60 years. Also, 54.0 percent of the respondents were male while 46.0 percent of the respondents were female. About 64 percent of the respondents are Christian while 33.6 percent practice Islamic religion. This implies that banking behaviour does not come in conflict with any religion. Most of the respondents (83.0%) are married while 14.6 percent are single, 2.2 percent are widow. Table 1 also shows that about 13 percent of the respondents never attended any formal school, 21.2 percent attended primary school, and 36.5 percent attended secondary school, while 29.2 percent had tertiary education. This implies that the respondents are fairly educated. This educational distribution of the respondents may affect their choice of banking methods, educated respondents would like to patronize conventional bankers because they would be better informed about conventional bankers. Also, 57.7 percent of the respondents have households' sizes between 0-5, 37.2 percent have between 6-12 while 5.1 percent have households size greater than 12. This implies that the higher the household size the less patronage of conventional bankers by rural households The Table also shows that 50.7 percent of the respondents have less than 10 years of working experience, 18.6 percent have working experiences between 10 and 20 years, 15.3 percents have working experiences between 20 and30 years, 5.5 percent falls between 41-50 years while 0.7 percent have working experience above 50 years. As

regards to occupation of the respondents, 18.6 percent of the respondents are civil servants, 17.9 percent are artisans, and 40.1 percent are farmers while 23.4 percent are traders. This can also affect the choice of banking methods because traders would like to patronize informal bankers where they can have access to short term and small loans compared with civil servants whose salary would be paid to bank account.

Banking Methods of Rural Households

Table 2 shows the frequency distribution of the respondents by banking method of their choice, 33.2 percent of the respondents chose mobile bankers (Alajo) as their banking method, 19.0 percent chose ROSCAS (esusu), while 11.0 percent chose non-ROSCAS (Awidodun) as their banking methods. Twenty-six point six percent of respondent patronize conventional bankers. This implies that higher percentage of the respondents have informal/unorganized banking methods as their choice and therefore the most preferable banking system among rural households.

Attitude of Rural Households towards conventional Bankers

This section reports the attitude of rural households towards conventional bankers. Table 3 shows that 75.5 percent of the respondents are undecided about higher volume of loan released by convectional banks. This implies that rural households are not aware of the proportion of loan released by conventional bankers as a result of low level of patronage. Also 53.6 percent of the respondents strongly agree that savings in convectional banks are secured. About 66 percent are undecided about loan accessibility without stress in convectional banks. This implies that greater percentage of rural households has no idea

about loan from convectional bankers. Also 53.3 percent are undecided about the attitude of convectional banks staffs to customers. 69.3 percent of the respondents strongly agree that convectional banks are far away from rural households and this may be one of the reasons for low level of patronage. Also, 63.5 percent of the respondents strongly agree that interest rate on loan in conventional bank is high. This may be the reason for their undecided attitude towards taking loan from convectional banks. Also 68.6 percent of the respondents strongly disagree that unorganized financial institutions are trust worthy while 63.9 percent strongly agree that only small amount of loans are available in unorganized rural financial institutions.

Probit Regression Analysis of Choice of Mobile Bankers (Alajo) and Socioeconomic Characteristics of respondents

Table 4 shows the result of the probit regression analysis of mobile bankers as a choice of banking method. Socioeconomic characteristics shows that gender (-0.6616427, p = 0.001) Is significant and has a negative coefficients and this implies that male save less or patronize mobile bankers lesser than female counterpart. This shows that female save with mobile bankers than male, Age (-0.391956, p = 0.000) is also significant and has positive coefficients. This implies that the higher the age, the lower the saving/patronizing rate. The significance shows that age is one of the Socioeconomic characteristics that affect banking behaviour of rural households. Marital status (0.46225024, p = 0.028) is also statistically significant and has a positive coefficient. This implies that married person tends to patronize mobile bankers than their unmarried counterpart.

Years of formal education (-0.0419911, p = 0.050) has a negative coefficient meaning that the higher the level of education the lesser is their transaction with mobile bankers. It is significant and this may be the reason for higher rate of patronage of mobile bankers by rural households. Household's size (-0.0148791, p = 0.596) has a negative coefficient showing that the higher the households size the lesser the rate of transaction of rural households with mobile bankers. The reason could be that the larger households may have little to save because of household's expenditure.

CONCLUSION

The contribution of rural banking systems to the growth of the Nigerian economy is quite significant. Based on the findings, it was revealed that unorganized /informal rural households banking methods is the most preferred banking methods by the rural households. The study concluded that female respondents patronize informal bankers than their male counterparts. Most of the respondents are not aware of the advantages of patronizing convectional bankers. It was also discovered that organized/formal rural banking methods are far away from rural households up about 5 to 10 kilometres so they cannot access them. This forms the bases for the low level of patronage despite the fact that convectional banks are reliable and trustworthy.

The choice of mobile bankers (Alajo) can be influenced by their, age, years of formal education, savings in convectional banks, marital status and traditional leadership.

Recommendation

Based on the findings, the following recommendations are made to address the problems of rural finance in the rural communities.

- Unorganized rural banking methods should be strengthened through government intervention so as to guide their activities.
- Convectional banks should extend their operation unit to rural communities by making use of the unorganized rural banking systems.
- There should be awareness campaign in the rural areas on the relevance of conventional banks so that rural dwellers can patronize them.

There should be public awareness creation among rural households on the importance of conventional bankers' patronage.

Table 1: Frequency Distribution of Socioeconomic Characteristics of Respondents

Variables	Frequency	Percentage
Age		
30 &below	132	46.5
31-45	59	21.5
46-60	40	14.6
Above 60	45	16.4
Gender		
Male	148	54.0
Female	126	46.0
Religion		
Christianity	175	63.9
Islam	92	33.6
Traditional	7	2.2
Marital status		
Single	40	14.6
Married	228	83.2
Widow	6	2.2
Educational status (years)		
Never attended (0)	36	13.1
Primary (6)	58	21.2
Secondary (12)	100	36.5
Tertiary (> 12)	80	29.2
Households' size		
1-5	158	57.7
6-12	102	37.2
> 12	14	5.1

Years of working experience		
Below 10	139	50.7
11-20	51	18.6
21-30	42	15.3
31-40	15	5.5
41-50	25	9.1
Above 50	2	0.7
Income generating Activities		
Cash crop production	22	8.0
Livestock production	6	2.2
Fish farming	5	1.8
Arable crop production	66	24.1
Farm produce processing	11	4.0
Civil service	51	18.6
Artisan	49	17.9
Trading	64	23.4

Source: field survey 2010.

Table 2: Frequency Distribution of Banking Methods of Rural Households

Banking methods	Frequency	Percentage
Conventional banks	51	18.6
Microfinance banks	22	8.0
ROSCAS (esusu)	52	19.0
Non-ROSCAS (Awidodun)	30	11.0
Mobile bankers (Alajo)	91	33.2
Cooperative society &credit union	28	10.2
Total	274	100

Source: field survey 2010.

Table: 3 Constraints Facing Rural Households in their Choice of Banking Methods.

Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Convectional banks release higher volume of loan at a time	1 (0.4)	4 (1.5)	207 (75.5)	16 (5.8)	46 (16.8)
Savings in convectional banks are secure	2 (0.7)	147 (53.6)	17 (6.2)	107 (39.1)	1 (0.4)
Loans in convectional banks are accessible without stress	11 (4.0)	8 (2.9)	181 (66.1)	10 (3.6)	64 (23.4)
Convectional banks staffs are friendly	1 (0.4)	3 (1.1)	146 (53.3)	21 (7.7)	103 (37.6)
Form filling process in convectional banks is discouraging	86 (31.4)	16 (5.8)	137 (50.0)	4 (1.5)	31 (11.3)
Convectional banks are far away from rural households	190 (69.3)	15 (5.5)	62 (22.6)	5 (1.8)	2 (0.7)
Convectional banks Loans attracts higher percentage of interest	174 (63.4)	17 (6.2)	77 (28.1)	3 (1.1)	3 (1.1)
Request for loans in rural unorganized financial institutions is easy	12 (4.4)	3 (1.1)	57 (20.8)	17 (6.2)	185 (67.6)
Unorganized financial institutions are trustworthy	13 (4.7)	4 (1.5)	57 (20.8)	12 (4.4)	188 (68.6)
Unorganized financial institutions are near to rural households	6 (2.2)	2 (0.8)	53 (19.3)	18 (6.6)	195 (71.2)
Small amount of loans are available in Unorganized financial institutions	176 (63.9)	20 (7.3)	64 (23.4)	1 (0.4)	14 (5.1)
Saving activities is easy in Unorganized financial institutions	2 (0.7)	1 (0.4)	55 (20.1)	18 (6.6)	198 (72.3)

Source: field survey 2010.

Table 4: Probit Regression Analysis of Choice of Mobile Bankers (Ajo) and Social Economic Characteristics

Variables	Coefficients	T	p>z
Gender	-0.6616427***	-3.33	0.001
Age	-0.391956***	-4.45	0.000

Households size	-0.0148791	-0.53	0.596
Marital status	0.462339**	2.19	0.028
Year of formal education	-0.0419911**	-1.96	0.050
Cash crop Production	0.6225024	1.56	0.120
Arable crop Production	0.1683374	0.65	0.517
Saving in convectional banks	-0.575172***	-2.59	0.010
Livestock production	-0.330399	-0.04	0.968
Traditional leadership	0.5802027*	1.69	0.090
Artisan	0.1076035	0.54	0.589

Source: Field survey 2010.

Log likelihood = -143.45213   Prob > chi 2 = 0.0000

***	Coefficient significant at 1 percent
**	Coefficient significant at 5 percent
*	Coefficient significant at 10 percent

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Marketing Margin and Price Transmission Analysis for Beef in Benin Metropolis

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Abstract: What are the socio-economic characteristics of beef marketers in Benin? What are the marketing channels for Beef? What is the market margin for beef? Is beef marketing profitable? What is the effect of marketing costs on the marketing margin? What is the nature of price transmission for beef? To answer these questions, the study examined marketing margin and price transmission for beef in Benin metropolis of Edo state using set of household heads. The simple random sampling technique was used to select 120 respondents from the sampling frame of the registered butchers in Benin City main abattoir, other slaughtering slabs and some markets. Data collected were analysed using the cost-return principle, descriptive and inferential statistics. The result of the descriptive statistics showed that 57.5% of the respondents were married, female, small-size family beef marketers who were in the age bracket of 30-49 years, with secondary education, and mainly retailers of 8.7 years marketing experience and an average marketing margin of ₦150.75. The results of the inferential statistics showed that a unit increase in packaging and handling cost would respectively increase marketing margin by ₦7.64 and ₦12.34 while unit increase in the packaging and transportation cost would decrease marketing margin by ₦1.00 and ₦0.32 respectively. The result of the price transmission regression showed that the long-run marketing margin elasticity was 0.976, while the short-run marketing margin elasticity of wholesalers and retailer at retail price were respectively 0.906 and 0.911. Though beef marketing in Benin is profitable with incomplete price transmission, there is an imperfect transmission of price from the wholesalers to the retailers while the margin between producer and retail prices is divergent in the short-run.

Keywords: beef, marketing, price, margin, and profitability

INTRODUCTION

The marketing margin represents the costs for all assembling, processing, transporting, marketing and retailing added to the farm products, i.e. the cost of providing a bundle of marketing services (Elitzak, 1997), as well as valuations for risk and expectations on how markets will evolve. It is the difference between the retailer's and the producer's or farm gate price. It represents marketing costs such as transport, storage, processing, wholesaling, retailing, advertising, etc. Marketing margins are the result of demand and supply factors, marketing costs, and the degree of marketing channel competition. Thus, they reflect aggregate processing and retailing firm behaviour which influence the level and variability of farm prices and may influence the farmer's share of the consumer food spending (Gardner, 1975; Tomek

and Robinson, 1990; Wohlgenant, 1989). These margins have been examined on many occasions, often in response to concern at a time of sharp movements in farm-gate or retail prices (London Economics, 2004; Niemi. and Jansik, 2006). There are a great number of empirical studies dealing with marketing margin and asymmetry problems in livestock markets. Measuring the spread in vertical price relationships and analysing the nature of price transmission along the supply chain from the producer to consumer have evolved as widely used methods to gain insight into the functioning of, and degree of competition in food markets. A common perception is that responses to price increases differ from responses to price decreases. More exactly, retailers tend to pass more rapidly price increases to consumers, whilst it takes longer for consumer prices to adjust to producer prices if the latter decrease. Von Cramon-Taubadel (1998) found asymmetrical price transmission on the German pork market. Goodwin and Harper (2000) in their pork market study found a unidirectional price information flow from farm to wholesale and retail levels. Dawson and Tiffin (2000) identified a long-run price relationship between UK lamb farm-retail prices, and studied the seasonal and structural break properties of the series, concluding that the direction of Granger causality is from the retail to producer prices; thus lamb prices were set in the retail market. BenKaabia, *et al.* (2002) established a symmetric price transmission, concluding a long-run perfect price transmission, where any supply or demand shocks are fully transmitted through the system. They also observed that an increased horizontal concentration allows retailers to exercise market power. In Nigeria, there is high rate of spoilage of Agricultural products, including beef,

arising from poor storage and transportation facilities thereby hampering the total supply of food reaching the consumers' table (Okuneye, 2002). There has been a continuous problem of price and sales volume fluctuation over the years as a result of marketing inefficiencies which have led to short supply of beef and beef products. Beef cattle trade provides the largest livestock market in the country. Millions of Nigerians make their livelihood from beef enterprises as producers, marketers and transporters. Beef forms an important aspect in the diet of people living in Benin City and those marketing it also depend on it as a source of livelihood. The questions in the mind of every prospective beef marketers in Benin are: is beef marketing profitable; and what is the nature of the price transmission? The study, therefore, examined marketing margin and price transmission for beef in Benin metropolis in Edo state. To achieve this, the study examined the Socio-economic characteristics of beef marketers, identified the marketing channel for beef, estimated the market margin for beef, determined the effect of marketing cost on the marketing margin in the study area, and the price transmission for beef

Theoretical Framework

The marketing margin is the difference between the retailer's and the producer's price. It represents marketing costs such as transport, storage, processing, wholesaling, retailing, advertising, etc.:

RP = PP + M

Where RP is retailer price, PP is producer price and M, the marketing margin, is composed of an absolute amount and a percentage or mark-up of the retail price:

M = a + b*RP, where a ≥ 0 and 0 ≤b< 1.

If prices are determined at producer level, the mark-up model is used. A common perception is that responses to price increases differ from responses to price decreases. More exactly, retailers tend to pass more rapidly price increases to consumers, whilst it takes longer for consumer prices to adjust to producer prices if the latter decrease. There are several major explanations for the existence of price asymmetries. First, asymmetrical price transmission occurs when producers can take advantage of quickly changing prices. This is explained by the theory of the search costs (Miller and Hayenga, 2001). They occur in locally imperfect markets, where retailers can exercise their local market power. Although customers would have a finite number of choices, they might face difficulties in quickly gathering information about the pricing of the competing stores because of the search costs. Thus firms can quickly raise the retail price as the producer price rises, and reduce much slower retail prices when upstream prices decline. Second comes the problem of perishable goods (Ward, 1982), that withholds retailers from raising prices as producer prices rise. Wholesalers and retailers in possession of perishable goods may resist the temptation to increase the prices because they risk a lower demand and ultimately being left with the spoiled product. Third, the adjustment costs or menu costs (Goodwin and Holt, 1999) may underlie asymmetric price adjustments. Menu costs involve all the cost occurring with the re-pricing and the adoption of a new pricing strategy. As with perishable goods, menu costs also act against retailers changing prices. Finally, the exercise of oligopoly power can favour asymmetric price transmission. It appears in markets with highly inelastic demand and concentrated supply; many food chains have such market organisation characteristics. It also needs to be mentioned that such collusive behaviour is rather difficult to maintain in long run, because of the incentive for one firm to cheat the others (Miller and Hayenga, 2001).

METHODOLOGY

The study was conducted between June and August 2011 in Benin City, the capital of Edo State. Administratively, the state is divided into 18 Blocks (Local Government Areas) and three Senatorial Districts. The main occupation of the people is farming and carving. They also engage in other occupation like other small- and medium-scale business. In this study, the two Local Government Areas chosen were Egor and Ikpoba-Okha out of the three LGAs in metropolis. The target population for the study was the set of household heads that market beef, whether as wholesalers or retailers, in the study area. Only primary data were used to generate information for the study. These data were collected with the use of a well-structured questionnaire for information on costs of marketing, income of households from beef sales, and households home beef consumption. Data were also collected on the demographic variables, such as age, education level, household size, sex, age of household heads, and other Socio-economic characteristics of households. The simple random sampling technique was used to select 120 respondents from the sampling frame of the registered butchers in Benin. This was drawn from the list of registered butchers in Benin main abattoir, other slaughtering slabs and some markets (New Benin and Uselu) in Benin City. Data collected were analysed using the cost-return

principle, descriptive and inferential statistics. The descriptive statistics used were frequency counts and percentages, while the inferential statistics employed the multiple regression analysis to estimate the marketing margin function for the study. The Net Return was used to determine the total profit of the marketers of beef in the study area. To achieve this, the difference between the marketing cost and revenue was calculated for each marketing channel. The resulting weighted sum of this difference was calculated to obtain the marketing margin for beef in the study area.

$$MG = TR - TVC \qquad [1]$$

Where TR is total revenue, TVC is total variable cost. If the marketing margin is positive, it means that beef marketing is profitable in the study area and if negative, not profitable. Multiple regressions were used to determine the effect of marketing costs on the marketing margin. The method used for the analysis was Linear Regression Model using the ordinary least square method. The model in explicit form was stated as

$$MG_i = \beta_0 + \beta_1 HC_i + \beta_2 PC_i + \beta_3 PRC_i + \beta_4 TRC_i + \mu_i \qquad [2]$$

Where MG is marketing margin, HC is the handling cost, PC is the packaging cost, PRC is the processing cost, TRC is the transportation cost, and μ_i is the stochastic error term.

In beef, marketing margin involves producer-wholesale (PW) and wholesale-retail (WR) marketing margins (which constitute the farm-retail margin). The regression was, thus, applied respectively.

Marketing margin, being the difference between the retail price (PR) and the producer price (PP) or farm-gate price can be represented as:

$$MG = PP - RP \qquad [3]$$

MG, the marketing margin, is composed of an absolute amount and a percentage or mark-up of the retail price:

$$M_i = \alpha + \beta * RP_i \text{, where } \alpha \geq 0$$

and $0 \leq \beta < 1$. $\qquad [4]$

We used the log-log model instead of the above level form equation (4) to determine the long-run elasticity between the prices from the marketing margin model.

$$\ln M_i = \alpha + \beta * \ln RP_i, \qquad [5]$$

To determine the short-run price transmission elasticity from the producer price (PP) towards the consumer price (RP), at the producer level, we use the mark-up model:

$$RP_i = \rho + \varepsilon * PP_i, \qquad [6]$$

where ε is the price transmission elasticity from the producer price (PP) towards the consumer price (RP). If $\varepsilon = 1$, there will be perfect transmission, and thus the mark-up will be $(e^\rho - 1)$. $0 < \varepsilon < 1$ implies that the transmission between the two prices is not perfect.

Results and Discussion

Table 1 shows the distribution of respondent by Socio-economic characteristics in the study area. The table shows that more than half (52.5%) of the respondents were female beef marketers while 47.5% of them were male. This suggests that a greater proportion of beef marketers in the study area are females, and suggests that beef marketing in Benin metropolis is both male and female-oriented business but with a female bias. This may imply contracting their male counterpart for the cattle slaughtering and thus a greater handling cost which will finally be transferred to consumers. The study further showed that the age range of beef marketers was 20-49 years. Table 1 also shows that age had a mean of

33.42 years with a large proportion (87.5%) of the respondents in the age bracket of 30-39 years, 11.7% of the respondents are in the age bracket of 20-29 years while only 0.8% of them are in the range of 40 to 49 years of age. This suggests that majority of beef marketers in Benin metropolis are between the ages of 30 and 39 years. The study showed that 85% of the respondents were married while only 15% of them were single. There were no respondents for the separated, widow and divorce categories in the study area. The result suggests that majority of the beef marketers are men and women with wives and husbands respectively. This is an indication that beef marketing can be a source of household livelihood. Table 1 also shows that beef marketers with secondary education has the highest proportion (62.5%) followed by those with primary education (25.8%) and then those with no-formal education (10.0%) while those with tertiary education has the least proportion (1.7%). This suggests that, on average, 90.0% of beef marketers in the metropolis are in the educated level categories of primary, secondary and tertiary education. The Table also shows that the average of family size was 5.68, while 53.3%, 35.0% and 11.7% of the respondents were respectively in the family-size category of 1-5, 6-10 and above 10. The result suggests that more than half of the beef marketers in the metropolis are in the 1-5 family-size category and the probability of getting a beef marketer in the family size of 1-5 is 0.53. Table 1 also shows that the mean years of experience was 16.2 with a larger proportion of the marketers having beef marketing experience of 6-10 years (31.7%). This is closely followed by those with experience of 26-30 years (23.3%) and then those with experience of 11-15

years (21.7%). This suggests that the beef marketers scarcely leave the business, thus indicating stability.

Table 1: Socio-economic Characteristics of Beef Marketers in Benin Metropolis

Variables	Frequency	Mean	Percentage
Sex			
Males	57		47.5
Females	63		57.5
Age			
20-29	14		11.7
30-39	105	33.42	87.5
40-49	1		0.8
Marital status			
Married	102		85.0
Single	18		15.0
Family size:			
1-5	64		53.3
6-10	42	5.68	35.0
Above 10	14		11.7
Years of experience			
1-5	5		4.2
6-10	38		31.7
11-15	26	16	21.7
16-20	10		8.3
21-25	13		10.8
26-30	28		23.3
Level of education:			
No formal education	12		10
Primary education	31		25.8
Secondary education	75		62.5
Tertiary education	2		1.7

Source: Field Survey 2012

Marketing Channel for Beef in Benin City

Table 2 shows the distribution of the marketing channels for beef in the study area. The result shows that the main marketing channels in the area are wholesalers and retailers. It suggests that beef marketing in Benin metropolis does not involve producers as in other agricultural commodities. However, majority of the marketers were retailers (79.2%) who dealt directly with the

consumers. Only 20.8% of the marketers were wholesalers.

Table 2: Distribution of Marketing Channels for Beef in the Study Area

Variable	Frequency	Percentage (%)	Cumulative (%)
Wholesaler	25	20.8	20.8
Retailer	95	79.2	100.0
Total	**120**	**100.0**	**100.0**

Source: Field Survey 2012

The result in Table 3 shows that the average marketing margin is about ₦150.75. Average cost of packaging of beef was about ₦189.37, while average processing cost was ₦8.22. Also the average transportation cost was about ₦188.55. The result also shows the average total variable cost to be ₦410.71 and average total revenue to be ₦561.46. Comparatively, the handling cost (₦29.10). Transport cost (₦217.76), packaging cost (₦334.01) and processing cost (₦11.22) in Edor Local Government Area of the study were higher than those in Ikpoba-Okha Local Government Area which were respectively ₦23.84, ₦184.28, ₦154.04, and ₦9.85, however, the marketing margin in Ikpoba-Okha Local Government Area was higher (₦170.44) than in Egor Local Government Area (₦59.75) of the study. The result suggests that, on the whole, beef marketing in the area is profitable since the marketing margin is positive. Nevertheless, beef marketing is more profitable in Ikpoba-Okha Local Government Area than Egor in the study area.

Table 3: Summary Statistics of Marketing Costs and Revenue

	Marketing margin ₦ per Kg	Handling Cost ₦ per Kg	Packaging Cost ₦ per Kg	Transport Cost ₦ per Kg	Processing cost ₦ per Kg	Total variable cost ₦ per Kg	Total Revenue ₦ per Kg
Entire sample							
Mean	150.7525	24.56333	189.3742	188.5458	82.22500	410.7058	561.4583
Median	163.4500	23.00000	209.9500	162.0000	70.00000	409.5000	510.0000
Maximum	922.2000	63.00000	670.0000	437.0000	30.00000	1024.500	1530.000
Minimum	-464.5000	10.00000	12.00000	89.00000	10.00000	132.8000	200.0000
Std. Dev.	239.3611	10.64926	158.2447	78.45530	56.73815	192.3055	233.2536
Egor							
Mean	59.74545	29.09545	334.0045	217.7545	112.1818	592.0727	651.8182
Median	30.95000	25.00000	338.2500	210.0000	85.00000	612.9500	540.0000
Maximum	490.0000	53.00000	488.2000	375.0000	300.0000	803.6000	1230.000
Minimum	-263.2000	15.00000	184.9800	120.0000	34.00000	382.2000	400.0000
Std. Dev.	189.0826	11.67425	75.94373	87.75660	77.05572	130.3909	270.9707
Ikpoba-Okha							
Mean	170.4418	23.81122	154.0418	184.2745	98.45918	364.9735	541.9592
Median	197.4000	23.00000	79.00000	146.5000	67.00000	348.8500	510.0000
Maximum	922.2000	63.00000	670.0000	437.0000	234.0000	1024.500	1530.000
Minimum	-464.5000	10.00000	12.00000	89.00000	10.00000	12.00000	200.0000
Std. Dev.	245.8530	10.61449	153.4909	77.65171	23.39776	183.4784	220.6931

Source: Author's calculation

Table 4 shows the results of the regression of marketing costs on the marketing margin in the study area for all respondents. The result shows that the handling cost, packaging cost, processing cost and transportation cost explained over 90% of the variation of the marketing margin in the study area. The linear model fit the variables well as indicated by the F-statistic significant level (1%). Also, all the independent variables were statistically significant at 1% level of significance.

The coefficients of the handling and processing costs were 12.34 and 7.64 respectively while those of packaging and transportation cost were respectively -1.00 and -0.32. These are in line with *a priori* expectation. The results showed that a unit increase in packaging and handling cost would respectively increase marketing margin by ₦7.64 and ₦12.34 while unit increase in the packaging and transportation cost would decrease marketing margin by ₦1.00 and ₦0.32 respectively.

The Table also shows the results of the regression of marketing costs on the marketing margin in the study area for wholesalers. The result shows that the handling cost, packaging cost, processing cost and transportation cost explained over 92% of the variation of the marketing margin in the study area. The linear model fit the variable well as indicated by the F-statistic significant level (1%). Also, handling and packaging costs were statistically significant at 1% level of significance while transportation and processing costs were significant at 5% level. The coefficients of the handling and processing costs were 11.09 and 7.94 respectively while those of packaging and transportation cost were respectively -1.06 and -0.56. The results showed that a unit increase in handling and processing cost would respectively increase marketing margin by ₦11.09 and ₦7.94 while unit increase in the packaging and transportation cost would decrease marketing margin by ₦1.06 and ₦0.56 respectively. Also presented in Table 4 are the results of the regression of marketing costs on the marketing margin in the study area for retailers. The result shows that the handling cost, packaging cost, processing cost and transportation cost explained over 92% of the variation of the marketing margin

in the study area. The linear model fit the variable well as indicated by the F-statistic significant level (1%). However, only transportation cost was significant at 5% level of significance while the other cost were significant at 1% level. The coefficients of the handling and processing costs were 12.26 and 7.59 respectively while those of packaging and transportation cost were respectively -0.99 and -0.28. The results showed that a unit increase in packaging and processing cost would respectively increase marketing margin by ₦12.26 and ₦7.59 while unit increase in the packaging and transportation cost would decrease marketing margin by ₦0.99 and ₦0.28 respectively.

Also presented in Table 4 are results of the regression of marketing costs on the marketing margin for respondents in Egor Local Government Area in the study area. The result shows that the handling cost, packaging cost, processing cost and transportation cost explained over 81% of the variation of the marketing margin in the study area. The linear model fit the variable well as indicated by the F-statistic significant level (1%). However, only the handling and packaging costs were significant at 1% level of significance. The coefficients of the handling and packaging costs were 15.37 and -0.98 respectively. The results showed that a unit increase in handling and processing cost would increase marketing margin by ₦15.37 and ₦1.65 while unit increase in the packaging and transportation cost would decrease marketing margin by ₦0.98 and ₦0.41.

The Table also presents the results of the regression of marketing costs on the marketing margin for respondents in Ikpoba-Okha Local Government Area in the study area. The result

shows that the handling cost, packaging cost, processing cost and transportation cost explained over 89.7% of the variation of the marketing margin in the study area. The linear model fit the variable well as indicated by the F-statistic significant level (1%). Also, all the independent variables were significant at 1% level of significance. The coefficients of the handling and processing costs were 15.92 and -2.86 respectively while those of packaging and transportation cost were respectively -1.02 and -0.24. The results showed that a unit increase in handling cost would increase marketing margin by ₦15.92 while unit increase in the packaging, processing and transportation cost would decrease marketing margin by ₦1.02, ₦2.86 and ₦0.24 respectively.

Table 4: Estimated Parameters, and Associated Asymptotic Errors and t- statistics of the Models for Beef Marketing

Variables	Entire sample	Wholesaler	Retailer	Egor	Ikpoba-Okha
Handling	12.34406*	11.09232*	12.26045*	15.36724**	15.92413*
	1.089605	2.501428	1.315106	5.177898	1.085473
	(11.32893)	(4.434393)	(9.322788)	(2.967854)	(14.67022)
	0.00000	0.000300	0.000000	0.008600	0.000000
Packaging	-1.000422*	-1.061812*	-0.985314*	-0.975774*	-1.017035*
	0.042934	0.080959	0.050768	0.265226	0.057358
	(-23.30146)	(-13.11544)	(-19.40810)	(-3.679025)	(-17.73120)
	0.00000	0.000000	0.000000	0.001900	0.000000
Transportation	-0.322875**	-0.559952**	-0.277373***	-0.407143	-0.244036***
	0.118607	0.221320	0.141087	0.568658	0.142823
	(-2.722232)	(-2.530055)	(-1.965974)	(-0.715972)	(-1.708668)
	0.007500	0.019900	0.052400	0.483700	0.090800
Processing	7.642061*	7.941422**	7.591960*	1.651675	-2.860298*
	1.840128	3.055198	2.250038	6.284772	0.387607
	(4.153005)	(2.599315)	(3.374148)	(0.262806)	(-7.379369)
	0.000100	0.017200	0.001100	0.795900	0.000000
Constant	350.3521***	1114.770***	249.4543	86.69891	210.6675
	195.7868	567.7004	229.1313	1070.021	249.4159
	(1.789457)	(1.963660)	(1.088696)	(0.081025)	(0.844644)
	0.076200	0.063600	0.279200	0.936400	0.400500
R-squared	0.915380	0.924741	0.915586	0.813357	0.897863
Adj.R-squared	0.912437	0.909689	0.911834	0.769442	0.893469
F-statistics	311.0059*	61.43688*	244.0441*	18.52080	204.3843*
Prob(F-statistics)	0.000000	0.000000	0.000000	0.000005	0.000000

Values in parentheses are t-statistics, *significant at 1%, **significant at 5%, ***significant at 10% level
Source: Author's Calculation

Table 5 shows the result of the price transmission regression of retail price on marketing margin of the beef marketers in Benin. The regression has an R- square of 95%, a 1% statistically significant F-statistic of 1529.34 and a lower Akaike Information Criterion (AIC) of -0.169 compared to the level linear model. This implies that the double logarithmic model fits the data appropriately, and that the retail price explains about 95% of variation of the marketing margin. The marketing margin elasticity of wholesalers to retailers is 0.976. This is the long-run elasticity between the prices from the marketing margin of wholesalers to retailers and implies an imperfect transmission of price from the wholesalers to the retailers. This means that changes in the producer

price are imperfectly and un-instantaneously transmitted to the retail price, prices thereby not maintaining the margin between producer and retail prices even in the long-run.

The Table also shows the result of the regression of producer price on retailer price of wholesale beef marketers in Benin. The regression has an R- square of 41.96%, and a 1% statistically significant F-statistic of 85.30. This implies that the retail price explains about 42% of variation of the marketing margin. The short-run marketing margin elasticity of wholesalers to retailers is 0.906. This implies an imperfect transmission of price from the wholesalers to the retailers. This means that changes in the producer price are not completely and instantaneously transmitted to the retail prices, thus not maintaining the margin between producer and retail prices. This implies that since price changes are not passed-through instantaneously, but after some time, price transmission will be incomplete, and therefore imperfect in the short run, leading to a short-term divergence in the margin between producer and retail prices.

The Table shows the result of the regression of producer price on retailer price of beef retailers in Benin. The regression has an R-square of 18.60%, and a 5% statistically significant F-statistic of 5.26. This implies that the retail price explains about 17% of variation of the marketing margin. The marketing margin elasticity of wholesalers to retailers is 0.911. This is the short-run elasticity between the prices from the marketing margin of wholesalers to retailers and implies an imperfect transmission of price from the wholesalers to the retailers. This means that changes in the producer price are not completely and instantaneously transmitted to the retail prices thereby not maintaining the margin between producer and retail prices. This also implies that since price changes are not passed-through instantaneously, but after some time, price transmission will be incomplete, and therefore imperfect in the short run, leading to a short term divergence in the margin between producer and retail prices.

Table 5: Estimated Parameters, and Associated Asymptotic Errors and t-statistics of the Price Transmission Models for Beef Marketing

Variables	Entire sample		Wholesaler	Retailer
	OLS	log-log		
Retailer price	0.715*	0.976*	0.906*	0.911**
	0.015	0.025	0.098	0.398
	(47.2)	(39.11)	(9.236)	(2.292)
	0.000	0.000	0.000	0.031
Constant	40.93	-0.113	-3034.22*	-2447.50
	58.26	0.198	595.78	2102.39
	(0.70)	(-0.570)	(-5.093)	(-1.164)
	0.484	0.570	0.000	0.256
R-squared	0.95	0.95	0.420	0.186
Adj.R-squared	0.95	0.95	0.414	0.151
F-statistics	2223*	1529*	85.302*	5.255**
Prob(F-statistics)	0.000	0.000	0.000	0.031
AIC	15.436	-0.169	18.498	18.338

Values in parentheses are t-statistics, *significant at 1%, **significant at 5%
Source: Author's calculation

Conclusion

The study examined marketing margin and price transmission for beef in Benin metropolis of Edo state using the net return principle, descriptive and inferential statistics. The result showed that although beef marketing in Benin is profitable, the price transmission is incomplete, there is an imperfect transmission of price from the wholesalers to the retailers and the margin between producer and retail prices is divergent in the short-run.

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Poultry Farmers Awareness and Knowledge of Improved Production Practices in Afijio Local Government Area, Oyo State, Nigeria

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Abstract: The study was conducted to determine the awareness and knowledge of poultry production techniques of farmers in Afijio Local Government Area, Oyo State, Nigeria. A purposive sampling procedure was used to select 85 poultry farmers who were interviewed for the study. Findings revealed that majority of the poultry farmers were male within the age bracket of 30 – 39 years and were literate. Majority of the farmers did not belong to any poultry association (65.1%), and (69.9%) of them preferred the keeping of layers than any other class of poultry production. Poultry farmers showed high level of awareness of the production techniques on improved/automatic housing (85.1%), feeds and feeding (88%) and daily routine operation (80.7%). However their awareness of diseases/parasites (13.3%) and marketing strategies (14.5%) was very low. Farmers were of the opinion that radio (92.7%) and Television (90.3%) were the main source of their awareness on poultry production techniques. Inadequate capital (83.2%) and high cost of feeds (86.8%) were the most severe constraints encountered by the farmers in their operation. Findings also showed that there was no significant relationship between poultry farmers age and awareness of poultry production practices ($r = 0.145$, $p < 0.05$), however, significant relationship exist between farmers attitudes and awareness of improved poultry production practices, ($r = 0.455$, $p > 0.05$). It is therefore recommended that, the extension agents should be encouraged to focus their extension activities on the poultry farmers who are not aware of their programmes.

Keywords: poultry, awareness, production, techniques, and knowledge.

INTRODUCTION

The word "poultry" is applicable to chicken or domestic fowl. The domestic fowl is the commonest avian species raised in most countries such as Nigeria for either table meats or for eggs or both for human consumption throughout the world, the domestic fowl is unique for its use for both meat (e.g. turkey, duck and guinea fowl). Some strains of ducks notable Khaki Campbell and Indian Runners are exception. They excel the egg laying strains of the domestic fowl in egg production. The Khaki Campbell laying duck can lay as many as 360 eggs per annum while the White_Leghorn layer can lay up to 230 eggs (Stanley, 2002).

Poultry farming has now developed into commercial enterprise involving thousands of birds. Large poultry units have replaced the backyard and poultry units while more efficient strain of meat or egg type birds, balance feed,

intensive housing and better poultry equipment came into use by farmers. Nevertheless, commercial poultry farming has not been fully developed in the tropics unlike the temperate regions. The bane of this is attributed to several reasons. Nigerian poultry industry is less capitalized and it is based on small holdings owned by the peasant farmers. Birds usually perform at a low level and hence, production cost is higher and consequently selling prices of poultry products are higher beyond the reach of average Nigerians. Thus, *per capita* consumption of poultry products is lower in most tropical countries, thereby giving rise to protein deficiency factors in food in these countries since feed cost represent over 70% of the total cost of poultry production, reduction in feed cost is expected to reduce production cost and hence lower the prices of poultry products within the range that an average Nigerians can afford thereby increasing *per capita* consumption of the products, (Gerry Bolla ,2001). The poultry industry has many branches but the two main branches are egg and table meat production. The other branches include the production of chicks, point of lay by pullet or ready lay birds, poultry feeds, manufacturing of poultry equipment and the processing, marketing of eggs and table birds.

Poultry manure is a cheap source where poultry farmers can earn income in addition to what they realize from the sales of their products. For instance, Fulhage (1992), declared that the basic nutrients in animal manure (N,P,K,) are the same as in commercial fertilizer and are equally effective in promoting plant growth. Also, animal manure may be utilized as a fuel as in the UK, for example, a company known as Fibrominn, a subsidiary of Fibrowatt has been operating power

plants fuelled by poultry litter to generate electricity for more than a decade. The company has signed agreements to build poultry litter fuelled power plants in Mississippi, among the top ten poultry producing states in the USA (Hill, 2002). Another alternative use of poultry and swine manure is the production of methane from anaerobic fermentation. The micro-biological process by which methane is produced from animal wastes has been practiced in many parts of the world for decades as a means of providing fuel for cooking food, powering motor vehicles and generating electricity (EL Boushy and Van der Poel, 2000,Pond and Pond,2000.

However, Ukagha (2003), opined that markets and marketing are a major driving force for the expansion of livestock production. What it does is that whatever is produced must find a market otherwise the level of production cannot be sustained. Many countries use price support and subsidies to stabilize output and prices of meat and milk. In Switzerland for example, government pays $2000 per cow per annum to keep the dairy farmer in production. What is most needed is the development of infrastructure in livestock markets, abattoirs, processing plant and storage facilities together with price incentives. The ultimate objective of this measure is to position the livestock industry in Nigeria to compete effectively with the imported commodities from around the world.

Poultry production in all its ramification represents one of the viable farming enterprises providing the much needed animal protein sources (table egg and meat) to ameliorate the protein deficiency factor in Nigerian food crisis. However, commercial poultry production is faced with many

problems, such as high cost of feeding and veterinary drugs, poor quality of commercial feeds due to formulating abuses of the manufacturers, inadequate capital investment and lack of knowledge of nutrients and energy requirements of the various classes of poultry. Diseases/parasites, mortality, high cost of fixed inputs as said by Aromolaran (1999), are giving poultry farmers serious problems to manage and thus, hindering poultry business. This culminates to low production and subsequently reduced income which frustrates the business venture and sometimes lead to financial bankruptcy. Technical proficiency usually account for most crisis experienced in poultry production. Therefore, there is need for a diagnosis in the area of poultry production technique by the commercial poultry farmers and thus identity deficiencies and solutions to them if the poultry enterprise is to be profitable and maintained.

Objective of Study

The study examined poultry farmers' awareness and knowledge of improved poultry production techniques in Afijio Local Government Area, Oyo State. Specifically the study attempted to:

1. Determine the personal characteristic of poultry farmers

2. Determine the awareness level and knowledge of poultry farmers about improved practices in the study area.

3. Investigate the constraints faced by poultry farmers in the study area.

Research Hypotheses

H01: There is no significant relationship between the selected personal characteristics of the respondents and awareness of improved poultry production practices.

H02: There is no significant relationship between poultry farmers' attitudes towards improved production practices and awareness of poultry production variables.

METHODOLOGY

The study was conducted in Afijio Local Government Area of Oyo State, Nigeria. It lies in the South – Western Zone of the State, which is roughly enclosed by latitude 7.8^0 and 4.4^0 North of the equator. It covers a total land mass of 1.365 square kilometers, with about 30 towns and villages. Afijio Local Government Area have a population of 84,504 (2006, NPC). The local government is bounded in the West by Akinyele Local Government, in the East by Oyo West Local Government, in the North by Iseyin Local Government and in the South by Lagelu Local Government. Major towns in the Local Government include, Akinmoorin, Aawe, Ilora, Ilu-Aje, Imini, Iware, jobele and Fiditi. The major occupation of the peoples is farming, whereby the major crops grown are fruits and vegetables. Also many of the people in the Local Government Area were involved in livestock production like poultry and fishery.

Afijio Local Government is specifically selected for this study because of its contribution to Poultry Industry in Nigeria and high concentration of poultry farmers within the area(Oyeyinka and Raimi,2011) The local government houses big poultry farms like Amo Byn Nigeria Limited, Folawiyo's Farm Nigeria Limited among others. Also the climate of this area has been adjudged to be the most suitable for poultry production in the

south – western Geo – political zone of Nigeria (Oyeyinka and Raimi, 2011). Through the assistance of the extension agents working in the local government area, snowball sampling technique was used to select eighty five (85) medium and small scale poultry farmers from the five (5) major towns in the study area. These are Ilora (40), Aawe (20), Akinmoorin (15), Fiditi (05) and Jobele (05). These towns were purposively selected for the study because of the high concentration of poultry farmers in the area. A validated questionnaire with reliability co – efficiency value of 0.80 was used for collecting the data on the objectives of the study. Data collected were analysed with the use of descriptive statistics like frequency counts, percentages, and inferential statistics like chi–square = X^2 and PPMC.

RESULTS AND DISCUSSIONS

Personal Characteristics of Respondents

The personal characteristics examined include age, gender, marital status, level of education and family size of the respondents (Table 1). The results revealed that majority were within the age range of 30 – 39 years, 66.3% were male while 84.3% of them were well educated. The implication of this findings is that majority of the respondents might have acquired knowledge and skills involved in poultry production through various forms of education they acquired during schooling. The results further showed that 48.2% of the respondents have family size of 1 – 4 that help them on their poultry farms. Only a few 3.6% have a family size of 7 and above. The results also showed that majority of the poultry farmers 65.1% did not belong to any poultry association indicating that the association had no benefits to the farmers,

hence reason why they were reluctant to be members of the poultry association.

Table 1

Frequency distribution of the respondents in respect of personal characteristics (n = 83)

Characteristics	Frequency	Percentage
Age (yrs)		
20-29	30	36.1
30-39	36	43.4
40-49	14	16.9
50-59	3	3.6
Gender		
Male	55	66.3
Female	28	33.7
Marital status		
Single	18	21.7
Married	55	66.3
No response	10	12.0
Educational level		
NCE and above	45	54.2
Grade II and secondary education	25	30.1
Others	08	9.7
No response	5	6.0
Family size		
1-4	40	48.2
5-6	12	14.5
7 and above	3	3.6
No response	28	33.7
Membership of poultry association		
Yes	29	34.9
No	54	65.1

Source: - Field Survey, 2010

Number of birds at the start of the business

Table 2 shows that 65.1% of the respondents started poultry business with 50-100 birds while 26.5% started with 101-400 birds. The finding implies that majority of the respondents started as small-scale farmers. This was probably when they were still learning the basics tenets of the profession.

Number of birds at Present

Table 2 indicates that majority of the farmers (89.1) keep between 100 and 900 birds as at the time of the study and while 2.4% keep 901-

1100 birds, 6.1% keep above 1,100. The finding shows that poultry business is profitable to some extent if number of birds at present is compared to number of birds at the start of the business.

Types/class of poultry being raised

Table 2 reveals that majority of the respondents (69.9%) are keeping layers while minority of 28.9% are keeping broilers and cockerels. Considering the finding, it is likely that keeping layers is profitable to the farmers more than broilers and cockerels in the study area. Also people in the study area may rely on other sources of meat like cattle and goat that are cheaper when compared with chicken that are taken mostly during the period of festivals. This leaves eggs that have no substitute, as a viable product which may be sold locally or elsewhere.

Table 2

Frequency distribution of the respondents in respect of number and class of birds used in production (n = 83)

Number and class of birds	Frequency	Percentage
Number of birds at the start of the business		
50-100	54	65.1
101-200	16	19.3
201-300	5	6.0
301-400	1	1.2
No response	7	8.4
Number of birds at present		
100-300	26	31.3
301-500	28	33.7
501-700	12	14.5
701-900	8	9.6
901-1100	2	2.4
1100 and above	5	6.1
No response	2	2.4

Types/class of poultry being raised		
Layers	58	69.9
Broilers	7	8.4
Cockerels	17	20.5
No response	1	1.2

Source: Field survey 2010

Awareness of Poultry Production Practices

The respondents that scored average and above were categorized as those that have high awareness of poultry production practices while those that scored below average were categorized as the one that have low awareness of poultry production practices.

Awareness on Improved/automatic housing system

Table 3 shows that 85.5% of the respondents have high awareness of improved housing system for keeping their birds while others (14.5%) have low awareness of it. This indicates that majority of the poultry farmers are aware of improved poultry houses like deep litter, battery cages system.

Awareness on Feeds, feeds preparation and feeding methods of the birds

Table 3 indicates that majority of the respondents (88.0%) are highly aware of feeds, feeds preparation and feeding method of the birds while 12.0% have low awareness of it.

Awareness on Diseases/parasites prevention and control

Table 3 reveals that majority of the respondents (86.7%) have low awareness of various diseases, parasites and their preventions/controls while (13.3%) are highly aware of it. The finding indicates that the issues of diseases and parasites preventive and controls go beyond the knowledge of ordinary poultry farmer except being a veterinarian or otherwise, receive

adequate information, knowledge and skills from the extension agents will go along way in creating the awareness and control of Diseases and parasites.

Awareness on Daily and special routine operations

Table 3 shows that 80.7% of the respondents have high awareness of the daily and special routine operations involved in poultry production while minorities (19.3%) have low awareness. The finding is a revelation of necessary operations like changing of litters, cleaning of cobwebs, regular supply of feeds and waters, evacuation of dead birds, collection of eggs, debeaking, vaccination, despairing, delousing, culling and keeping of records daily, that majority of the farmers are aware of and that 19.3% that have low awareness of the operations are likely to be those that are just part-time that have no time for the business but who rely on hired labour alone.

Awareness on Vital Poultry records to be kept

Table 3 shows that majority of the respondents (72.3) have high awareness of vital records to be kept in poultry production while 27.7% have low awareness of vital records to be kept in poultry production. The finding is an indication that majority of the small scale poultry farmers in the study area are aware of records keeping. Though, they might not know the recording strategies, however, they keep records. Others that are not aware of it might be those with lower educational background and who do not take poultry business as priority for their means of livelihood.

Awareness on Marketing Strategies

Table 3 indicated that majority of the respondents (85.5%) have low awareness of marketing strategies of the poultry and poultry products while 14.5% of the respondents are highly aware of it. This is an indication that the respondents have not been gaining up to the expected profits and that they are adopting poor marketing strategies of their products.

Table 3: Awareness of poultry production practices, N=83

	Poultry Production practices	Low awareness	Percentage (%)	High Awareness	Percentage (%)
1	Improved/automatic housing system	12	14.5	71	85.5
2	Feeds and feeding	10	12.0	73	88.0
3	Diseases/parasites prevention and control	72	86.7	11	13.3
4	Daily and special routine operations	16	19.3	67	80.7
5	Vital poultry records to be kept	23	27.7	60	72.3
6	Marketing strategies	71	85.5	12	14.5

Source: - Field Survey, 2010   Multiple responses

Sources of awareness of poultry information on production techniques

Table 4 shows, that a higher percentage (92.7%) of the farmers became aware of the recommended practices through Radio and (90.3%)

from Television while a very few (18.9%) were aware of the practices through veterinary doctor and feed millers. Also those who got their awareness from the extension agents are few (30.1%). This is an indication that the extension

agents in the area have not been disseminating adequate information on poultry production techniques.

Table 4: Sources of awareness of poultry information on production techniques

Awareness sources	Yes	No	Row total %
Radio	77(92.7)	06(73)	83(100)
Television	75(90.3)	08(9.7)	83(100)
Extension Agents	25(30.1%)	58(69.9%)	83(100)
Family/Friends	23(27.7)	60(72.3)	83(100)
Veterinary officers	15(18.9)	68(81.9)	83(100)
Poultry Association	43(51.8)	40(48.2)	83(100)
Feed Millers	15(18.9)	68(81.9)	83(100)

Source: - Field Survey, 2010

Attitude of the poultry farmers towards improved poultry production practices

Table 5 shows that, 30.1% of the respondents have unfavourable attitude towards improved poultry production practices while 69.9% showed favourable attitude towards improved poultry production practices in the study area. The finding reveals that majority of the respondents showed favourable attitude to improved poultry production practices which is an indication that majority of them want changes in respect of modern management practices of poultry production. Farmers that showed unfavourable attitude towards improved poultry production practices might be those that take to poultry business as part – time for means of livelihood.

Table 5: Attitude of the poultry farmers towards improved poultry production practices

Attitude	Frequency	Percentage
Unfavourable	25	30.1
Favourable	58	69.9

Source: Field Survey 2010.

Constraints faced in Poultry Production by Poultry Farmers

Table 6 shows the major constraints encountered by the farmers in the poultry business. The table shows that, inadequate capital (83.2%), high cost of feeds (86.8%) and marketing problems (81.9%) were the most severe constraints. Also, inadequate water (84.4%), diseases and parasites (78.4%) and poor weather condition (81.9%) were the partially severe constraints encountered, while problem of labour supply (74.7%), lack of veterinary knowledge (86.8%) and pilfering and theft (84.4%) were the constraints that were not severe for the poultry enterprises.

Table 6: Constraints faced in Poultry Production by Poultry Farmers

Constraints	Not severe	Partially severe	Severe
Inadequate capital	10(12.0)	04(4.8)	69(83.2)
Inadequate water Supply	08(9.6)	70(84.4)	05(6.0)
High cost of feeds	07(8.4)	04(4.8)	72(86.8)
Marketing problems	09(10.8)	06(7.2)	68(81.9)
Disease & Parasites	08(9.6)	65(78.4)	10(12.0)
Labour supply	62(74.7)	10(12.0)	11(13.3)
Lack of credit facilities	15(18.1)	58(69.9)	10(12.0)
Poor weather condition	08(9.6)	68(81.9)	07(8.4)
Lack of veterinary knowledge	72(86.8)	8(9.6)	3(3.6)
Pilfering & theft	70(84.4)	05(6.0)	08(9.6)

Source:- Field Survey, 2010
Multiple responses

Hypothesis Testing

In Table 7, the chi – square(X^2) analysis reveals that at (P > 0.05) there is no significant relationship between sex and awareness of improved poultry production practices. The implication of this is that gender does not influence

poultry practices awareness of the farmers. However, there is significant relationship at (P < 0.05) between marital status, levels of education and farmers awareness of poultry production practices. This is an indication that the duo (marital status and level of education) had influence on farmers' awareness of various poultry production practices.

Table 7: Chi-square results of relationship between personal characteristics of the respondents (sex, marital status, level of education) and awareness of poultry production practices

Variables	χ^2	df	P	Decision	Remark
Sex	0.145	1	0.703	NS	Accept
Marital status	6.136	1	0.013	S	Reject
Level of education	19.679	5	0.001	S	Reject

In Table 8, the PPMC analysis given r = 0.162 and p=0.145 shows that there is no significant relationship between poultry farmers' age and awareness of poultry production practices. This implies that poultry farmers' age had no influence on their awareness of poultry production practices. However, the PPMC (r) analysis in table 8 also shows that (r = 0.455, p = 0.001), there is significance relationship between poultry farmers' attitudes towards improved production practices and awareness of poultry production variables. This implies that as awareness of poultry production practices increase, attitude of the small scale poultry farmers increases and vice versa.

Table 8: Pearson Product Moment Correlation (PPMC) test of relationship between awareness of poultry production practices and personal characteristics of the respondents

Variables	r	P	Decision
Age	0.162	0.145	Not significant
Attitude	0.455	0.001	Significant

Source: Field Survey (2010).

CONCLUSION AND RECOMMENDATIONS

The study concludes that majority of the farmers were aware and adhere to poultry production recommended practices and that their source of poultry production practices were radio, television, feed millers, and extension agents. The study also concludes that the knowledge of poultry production practices was very high on improved automated housing, However, majority of the poultry farmers were of the opinion that they are not aware of diseases/parasites and marketing strategies and production techniques. Based on the findings of this study it is recommended, that government should provide veterinary personnel who will intimate the farmers of the routine management of poultry. Poultry farmers should be encouraged to join or form association as this will foster unity among them, and enable them to benefit from government subsidies and loans. Also the extension agents should be encouraged to focus their extension activities on the poultry farmers who are not aware of their programmes.

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Relative Technical Efficiency of Credit and Non-Credit Users in Rice-Based Enterprises in Lavun Local Government Area, Niger State, Nigeria

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Abstract: This study examined the relative technical efficiency of rice-based crop farmers in Lavun Local Government Area, Niger State, Nigeria. Primary data were generated using a multi-stage sampling technique. The sample size comprised of 60 rice-based farmers that utilized credit and 60 rice-based that did not have access to credit giving a total of 120 respondents. The additive multiplicative dummy variable approach was used to compare the technical efficiencies of the farmer groups. Results indicated that farmers with access to credit were more technically efficient in rice production as compared with farmers without access to credit. The intercept shift dummy in its additive form had an estimated regression coefficient of 0.389 which is positive and statistically significant at the 0.05 probability level implying that there exists a shift in technology between the two farmer groups. The positive value of the dummy also implies that the production function for farmers with access to credit has larger intercept denoting a higher level of output and technical efficiency. It is recommended that policies that would make credit available and accessible to farmers should be designed.

Keywords: Technical efficiency, credit, production function, rice production.

INTRODUCTION

Over the years, there has been a growing concern regarding the dwindling agricultural production in Nigeria. The poor performance of agriculture has led to high food import bills, lingering food insecurity, escalating social vices of insustainability of the national resource base (Mbah, 2001). Low agricultural productivity, technical and allocative inefficiencies resulting in low farm income has weakened the financial position of the farmers, a condition that is linked to poor funding of their economic activities (Nwaru *et al.,* 2004). Consistently, farming in Nigeria is characterized by low level of private capital investment and changing technology (Mbah, 2001, Nwaru *et al.,* 2004), resulting in low output and income. Since the main vehicles for economic development are capital and technology,

agricultural credit availability has become prominent in rural production as it encourages diversified agriculture which stabilizes and increases size of farm operations and resource productivity (Odiase-Allegimelen, 2004). Additionally, it facilitates adoption of innovation leading to increased farm production and income, encourages capital formation, market efficiency and smoothens farmers' consumption (Nwaru *et al.*, 2004). The provision of credit has thus been increasingly regarded as an important tool for raising the incomes of rural populations, mainly by mobilizing resources to more productive uses.

Governments of West Africa and many other countries have recognized the role credit can play in agricultural production and have established a number of special agencies to provide agricultural credit to farmers. In Nigeria, for

example, the Agricultural Co-operative Bank as well as the rural banks were established mainly to provide credit for agricultural purposes and other rural ventures. Despite these efforts, agricultural productivity and total food and fibre production in Nigeria is pitiably much below expectation (Ogunsumi, 2007). Nigeria agriculture is characterized by low farm incomes, low level of capacity to satisfy the food and fibre needs of the country. In recent times, there is growing emphasis on the need for a rapid development of the agricultural sector of the economy to break the vicious cycle of poverty that is prevalent in the rural sector. Lending credence to this, Jirgi et al., (2007) observed that on several occasions, Nigeria government have initiated more encompassing credit and non-credit programs for small scale farmers. In a similar vein Okoronkwo and Anozie (2007) observed that, despite agricultural credit schemes introduced by the government in the country in a bid to boost small scale agricultural production, this dream has remained elusive. Small scale farmers are still left in the cold in spite of their relentless effort to embrace these credits. The inaccessibility of farm credit to small scale farmers has continued to be a major reason for the persistence of subsistence farming. Nigerian agriculture inevitably requires some capital injection from formal and informal financial sectors of the economy if this vicious cycle is to be broken.

Although informal credit institutions have proved relatively successful in meeting the credit needs of small scale agriculture in Nigeria, their limited resources restrict the extent to which it can effectively and sustainably satisfy the credit needs of these entrepreneurs. This is because, as the small

scale farmers expand in size, the volume of loans required becomes increasingly difficult for informal credit sources to satisfy (Aryeetey and Udry, 1997). To reap the benefits of credit facilities farmers need information relating to sources of loan such as names of lenders, location and types of existing credit (Onyebinama, 2000). Small-scale farmers are faced with enormous difficulties in acquiring credit facilities such as: late disbursement of agricultural loans, non-fulfillment of security collateral requirement, and diversification of funds by the bank management for non-agricultural purposes and inability of the bank to reach small-scale farmers at the grass root. One of the major constraints small-scale farmers are facing in Nigeria is that of inability to access credit facilities for agricultural production.

The need for self sufficiency in food production cannot be over emphasized, because, producing sufficient quantity and quality is an objective of agricultural development. CBN (2006) observed that a sectoral analysis in 2006 of the real GDP for instance, indicated that the agricultural sector contributed about 42 percent of the GDP compared with 41.2 percent in 2005 (CBN, 2006). The growth rate of the contribution of the agricultural sector to the GDP at 1990 constant basic prices grew from 4.2 percent in 2002 to 7.2 percent in 2006. The agricultural sector also employed over 60 percent of the total labour force in Nigeria in 1999 (Adeoti, 2002).

Rice is the third most frequently consumed crop in Nigerian households, but is the sixth most important contributor to daily per capita consumption of food. In West Africa Sub-region, rice is considered to be the source of food and income for both rural and urban dwellers in Nigeria

(FAOSTAT, 2003). It is one of the crops that received priority research attention possibly due to its increasing importance as a food crop produced mostly in Northern Nigeria and consumed nationwide. The crop is therefore a security crop for farming households in meeting the consumption needs of producers as well as generating income for them to buy other food condiments. Due to its increasing importance, the government had designed a number of strategies to reduce the importation of rice in order to boost domestic production. This policy stance was informed by continuous decreasing trend in area under cultivation and productivity manifested in supply not keeping pace with demand. If Nigeria is to become self-sufficient in rice production, productivity must increase. This implies that resources allocated to rice production, must be efficiently utilized. It was against the backdrop that agricultural credit facilitates adoption of innovation leading to increased farm production and income, encourages capital formation, market efficiency and smoothens farmers' consumption that this study attempted to examine the allocative and technical efficiency in resource utilization by credit and non-credit user farmers in the study area.

Hypotheses

1. There is no significant difference between the output of rice-based farmers with access to agricultural credit and those without access, i.e. $Y_1=Y_2$.

2. The two farmer groups (i.e. credit users and non-credit users) have the same production functions, i.e., $\beta_0=0$, and all β_i (i= 1,2,,3,4, 5,) = 0.

METHODOLOGY

Area of study

The study was conducted in Lavun Local Government Area (L.G.A) in Niger State, Nigeria. The state lies between the latitudes $8^{\circ}21'$ and $11^{\circ}30'N$ and longitudes $3^{\circ}30'$ and $7^{\circ}20'E$ of the Greenwich. Niger state was created on the 3rd of February 1976. It is bordered to the north by Sokoto state, to the northwest by Kebbi state, to the south by Kogi state, to the southwest by Kwara state, while Kaduna and the Federal capital territory border the state to the northeast and southeast respectively.

Furthermore, the state has a common international boundary with the republic of Benin at Babanna in Borgu Local Government Area of Niger state. The state covers a total land area of 83,266,779 square kilometer or about 8.3 million hectares, which represents 8% of the arable land. The major occupation of the people of Lavun is farming and blacksmithing. About 85% of the people are farmers, while the remaining 15% are engaged in other vocations such as white collar jobs, manufacturing, business, production of crafts and arts. Niger state experiences distinct dry and wet seasons; the wet season starts from April-October and the dry season falls between November-March. The annual rainfall varies from 1,100mm in the northern part of the state to 1,600mm in the southern parts. The maximum temperature is 34.5°c. The major ethnic group is the Nupe. Major crops grown are rice, sorghum and groundnuts.

METHOD OF DATA COLLECTION

Primary data were used for this study. A well structured questionnaire was used to elicit relevant information from the sampled farmers.

The sampling frame was the totality of all rice-based crop farmers in the study area. In each village, a comprehensive list of all the farmers were obtained either from the village head or from leaders of organized farmer groups or associations. Lavun LGA was purposively selected for the study based on the preponderance of rice-based cropping enterprises in the area. Multi-stage random sampling technique was used to select respondents. In the first stage, six villages were selected randomly from the Local Government Area. In the second stage, twenty (20) rice-based farmers (comprising of ten farmers with access to credit and ten without access to credit), were selected randomly from each of the villages. This gave a total of 120 farmers. Data were collected on the Socioeconomic characteristics of respondents such as age, marital status, level of education, years of farming experience, access to credit, etc. Input information on farm size, labour, farm tools and equipment, agrochemicals, etc., output information as well as input-output prices were also collected for the study.

Analytical technique

Production function analysis was used to examine the allocative efficiency of resources by estimating equation (3). The additive multiplicative dummy variable approach which involves multiple regression analytical technique was adopted in ascertaining relative technical efficiency in rice production by the two farmer groups instead of the traditional method of fitting separate models and testing the equality of coefficients between them following Baggi (1981); Banwo (1986); Onyenweaku (1994) and Nwaru *et al* (2004). The model is specified in implicit form as:

$$Y=f(X_1, X_2, X_3, X_4, X_5, D, X_1D, X_2D, X_3D, X_4D, X_5D, e) \qquad \text{- - - (1)}$$

Explicitly, the log linear Cobb-Douglas functional form is specified as;

$$Y=lnA_0+\beta_0D+A_1lnX_1+\beta_1DlnX_1+A_2lnX_2+\beta_2DlnX_2+A_3lnX_3+\beta_3DlnX_3+A_4lnX_4+\beta_4DlnX_4+A_5lnX_5+\beta_5DlnX_5+e \qquad \text{- - - (2)}$$

Where, Y=output of rice-based cropping enterprise (₦); X_1=total area of farmland under cultivation (ha), X_2=labour input in man-days, X_3=capital input in (₦) (which include depreciation of farm tools and equipment, machinery, etc, interest charges on borrowed capital, repair and maintenance costs etc), X_4=other inputs in (₦)(such as improved seeds, agrochemicals, etc.), X_5=fertilizer input (kg), A_0=intercept, β_0=coefficient of the intercept shift dummy or neutral technical efficiency parameter, D=dummy variable which takes the value of 1 for credit users and zero otherwise, $X_1D, X_2D, X_3D, X_4D, X_5D$ = are the slope shift dummies for farmland, labour, capital, other inputs and fertilizer respectively, e=error term.

Measurement of technical efficiency

Technical efficiency refers to the ability of an entrepreneur or a given set of entrepreneurs to employ the best practice in an industry such that not more than the necessary amounts of a given set of resources are used in producing the "best" level of output. The main objective here is to establish whether any distinct group of farmers under consideration is characterized by neutral production function, factor-biased production function or the same production function. Neutral production function implies that the two production functions differ in the intercept while the slope coefficients are the same for corresponding inputs

in each function, i.e. if $\beta_0 \neq 0$, but β_i (i= 1, 2, 3, 4, 5,) =0. Factor-biased or non-neutral production function arises if one or more of the slope coefficients differ significantly, whether or not the intercept terms are the same in both production functions, i.e., if at least one β_i (i= 1,2,3,4, 5,)$\neq$0. However if there are no significant differences in both the intercepts and slope shift coefficients for the two production functions (for the two group of farmers), i.e., β_0=0, and all β_i (i= 1,2,,3,4, 5,)=0, it indicates that both farmer groups face the same production function. If the coefficient of the dummy variable (D) in the additive form, which is β_0 is positive and significant, it implies that the production function for credit users has larger intercept term, indicating a higher level of technical efficiency and vice-versa.

Allocative Efficiency

A vigorous comparison of the allocative efficiency of any two group of farms require that they are characterized by constant returns to scale and the same configuration of input and output prices (Onyenweaku, 2004). The following implicit production function was estimated for each of the two groups of farmers in order to examine their respective allocative efficiencies:

$$Y= f (X_1, X_2, X_3, X_4, X_5, e) \qquad --- \quad (3)$$

All variables are as previously defined in equation (2). Four functional forms of equation (3), namely, the linear, semi-logarithmic, Cobb-Douglas and exponential were tried for each data set and the equation with the "best fit" was used. Point of allocative efficiency was determined by equating the marginal value product (MVP) of the ith input to its acquisition cost or marginal factor cost (MFC).

That is, $MVP_{XI}=P_{Xi}$ $\qquad --- \quad (4)$

Or $\quad P_yf_i=P_{xi}$ $\qquad --- \quad (5)$

Where in equations (4) and (5), MVP_{xi} (i= 1, 2, 3, 4, 5,) = marginal value product of the ith input, P_{xi} (i= 1, 2, 3, 4, 5,) = unit price or marginal factor cost of the ith input, $f_i=\partial Y/\partial X$= marginal physical product of the ith input and P_y= unit output price.

For resources measured in physical units, the allocative efficiency index, Wij, for each group of farmers is given as:

$$MVP_{xi}/P_{xi}= P_yf_i/ P_{xi}=Wij \qquad --- \quad (6)$$

Where i is the particular resource, j is the farmer category and all other variables are as previously defined. For any resource measured in monetary terms, equation (6) becomes:

$$MVP_{xi}=P_yf_i=Wi \qquad --- \quad (7)$$

Since the dependent variable Y (output of rice-based enterprises) is measured in naira, the marginal product (MP) is in monetary terms. The output price P_y thus, becomes irrelevant and equations (6) and (7) become:

$$MVP_{xi}=f_i/P_{xi}= Wij \qquad --- \quad (8)$$

Therefore,

$$MVP_{xi}=f_i= Wij \qquad --- \quad (9)$$

Maximum or absolute allocative efficiency for a particular group of farmer is confirmed with respect to a given resource if Wij=1. Thus, a resource is over-utilized if Wij<1 and under-utilized, if Wij>1. The two groups of farmers would have achieved equal allocative efficiency if Wij1=Wij2.

To show the extent to which a particular resource should be increased or decreased from the current level of use in order to achieve maximum allocative efficiency, the following formula was evaluated:

$$Kij = (1-Wij) 100 \qquad --- \quad (10)$$

Where Kij is the percentage by which the level of use of a particular resource should be increased or decreased in order to attain maximum allocative efficiency. A negative Kij implies that an increased employment of the resource is required and vice-versa. If Kij=0, then absolute allocative efficiency has been attained.

RESULTS AND DISCUSSION

Socioeconomic characteristics of the respondents

The Socioeconomic characteristics of rice-based farmers such as; age, gender, marital status, level of education, household size, etc are presented in Table 1. Results in Table 1 indicated that about 68.3% and 73.3% of the respondents were below 46 years of age. Majority, i.e. 93.3% and 98.3% of the respondents with access to credit and those without access respectively were married. A greater proportion of the respondents, i.e. 83.3% and 88.3% of credit and non-credit users respectively had household sizes of equal to or greater than eleven household members. All the sampled respondents had attained one form of education or the other. An overwhelming majority of the respondents, i.e. 91.7% and 76.6% of credit users and non-credit users respectively had over seventeen years of experience in the business. About 63.3% of the credit users cultivated less than 1.6 hectares. Results in Table 1 also indicate that farmers associations and friends/relatives were the dominant sources of credit.

Production Function Analysis

Production function analysis was done to generate relevant ordinary least squares (OLS) estimates to aid in computations of the marginal value products of resources by estimating equation (3). Various functional forms were fitted to data obtained from the two categories of farmers and the one adjuded to be the best based on the normal economic, econometric and statistical criteria were used for further analysis. A summary of the estimated production functions for farmers with access to credit and those without access to credit are presented in Tables 2.

Allocative efficiency of resources

The results obtained by fitting the collected data to equation 3 were summarized and presented in Table 2. The double log functional form was chosen as the lead equation for farmers without access to credit, while the linear functional form was the equation of best fit for farmers with access to credit. Results in Tables 3 and 4 indicated that all the resources were not efficiently allocated. The ratio of MVP to MFC with respect to farm size for farmers with access to credit is 13.528 which is greater than one. This implies that farm size was underutilized. To maximize output, a rice farmer in this category will have to increase his/her farm size. Larger farm sizes coupled with good management practices should translate into increased output. Small holder farmers usually cultivate several plots of farm land usually of less than one hectare. To consolidate on their gains, they should expand their farm sizes. The elasticity of output with respect to farm size was computed as 0.483. This implies that, if farm size is increased by 1%, holding other variables constant, output will increase by 0.483%. Other inputs were the most mal-allocated with a percentage derivation from optimality value of -308691.80. The return to scale with respect to all the production inputs was computed as 0.814. This indicates that decreasing returns to scale prevail in the area. Similarly, in the case of farmers without access to credit, farm size,

Table 1. Distribution of respondents according to age

	Credit users		Non-credit users	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Age				
<40	26	43.3	30	50.0
40-45	15	25.0	14	23.3
46-51	14	23.3	6	10.0
>51	5	8.3	10	16.7
Total	60	100.0	60	100.0
Marital status				
Single	4	6.7	1	1.7
Married	56	93.3	59	98.3
Total	60	100.0	60	100.0
Household size				
<5	4	6.7	1	1.7
5-10	6	10.0	6	10.0
11-16	20	33.3	23	38.3
>16	30	50.0	30	50.0
Total	60	100.0	60	100.0
Level of education				
Koranic	25	41.7	20	33.3
Adult	8	13.3	3	5.0
Primary	14	23.3	22	36.7
Secondary	13	21.7	15	25.0
Total	60	100.0	60	100.0
Experience				
<5	1	1.7	2	3.3
5-10	2	3.3	3	5.0
11-16	2	3.3	9	15.0
17-22	6	10.0	8	13.3
>22	49	81.7	38	63.3
Total	60	100.0	60	100.0
Farm size (ha)				
0.1-1.5	38	63.3	34	56.7
1.6-3.0	22	36.7	26	43.3
Total	60	100.0	60	100.0
Source of credit				
Friends/relatives	14	23.3		
Farmer assoc.	26	43.3		
Commercial	8	13.4		
Money lenders	12	20.0		
Total	60	100.0		

Source: Field survey data, 2010

Table 2. Ordinary Least Square estimates for farmers with access to credit.

Variables	Linear		Cobb-Douglas		Semi-logarithmic		Exponential	
	CU	**NCU**	**CU**	**NCU**	**CU**	**NCU**	**CU**	**NCU**
Intercept	0.777	0.866	-1.165	-2.063	-4.442	-2.984	0.391	0.002
	(2.160)**	(2.708)***	(-1.947)*	(-3.273)***	(-2.256)**	(-1.824)*	(3.439)***	(0.18)
Farm size	0.646	0.361	0.383	0.290	1.251	0.558	0.192	0.184
	(5.968)***	(3.084)***	(6.262)***	(3.199)***	(6.222)***	(2.369)**	(5.603)***	(3.733)***
Labour	0.005	0.001	0.226	0.107	0.684	0.123	0.002	0.001

	$(2.280)^{**}$	(0.569)	$(2.299)^{**}$	(1.354)	$(2.115)^{**}$	(0.599)	$(2.313)^{**}$	(1.155)
Capital	-4.84E-005	0.000	0.020	0.039	-.0088	0.107	-1.53E-005	4.20E-005
	(-1.358)	(1.020)	(-1.818)	$(1.809)^{*}$	(-1.079)	(1.055)	(-1.356)	(0.758)
Other inputs	4.91E-005	4.04E-005	0.085	0.063	0.348	0.129	1.31E-005	1.86E-005
	$(1.694)^{*}$	(1.417)	(1.462)	(0.913)	$(1.810)^{*}$	(0.726)	(1.431)	(1.548)
Fertilizer	0.001	0.003	0.063	0.286	0.207	0.558	0.000	0.001
	(0.519)	$(2.326)^{**}$	(0.616)	$(3.145)^{***}$	(0.619)	$(2.369)^{**}$	(0.516)	$(2.755)^{***}$
R^2	0.615	0.438	0.591	0.651	0.590	0.509	0.584	0.523
R^2adj	0.580	0.386	0.553	0.619	0.552	0.463	0.546	0.479
F-statistic	17.279^{***}	8.413^{***}	15.620^{***}	20.156^{***}	15.548^{***}	11.194^{***}	15.174^{***}	11.848^{***}

Source : Field Survey Data, 2010

Note: CU=credit users, NCU=non credit users.

Table 3. Allocative efficiency of farmers with access to credit

Variables	(b_i)	(P_y)	MVP	MFC	MVP/MFC	(1-MVP/MFC×100)	Decision
Farm size	0.483	42000	20293.140	1500.00	13.528	-1351.800	Under utilized
Labour	0.244	42000	10264.800	450.000	22.810	-2181.000	Under utilized
Other inputs	0.087	42000	3643.794	1.180	3087.918	-308691.800	Under utilized

Source: field survey Data, 2010

Note: b_i= elasticity of output, P_y= price of unit of output.

Table 4. Allocative efficiency of farmers without access to credit

Variables	(b_i)	(P_y)	MVP	MFC	MVP/MFC	(1-MVP/MFC×100)	Decision
Farm size	0.293	42000	12306.000	1500.000	8.204	-819.400	Under utilized
Capital	0.001	42000	1.818	1.180	1.541	-153.100	Under utilized
Fertilizer	0.003	42000	126.000	90.000	1.400	-1.800	Under utilized

Source: Field survey Data, 2010

capital and fertilizer input were not efficiently allocated and were underutilized since the computed MVP to MFC ratio were greater than unity. The sum of elasticities of output with respect to all the inputs is 0.297. This indicates that decreasing returns to scale prevailed for this group as well.

Relative Technical Efficiency of Credit and Non-credit Users

A summary of the results obtained by fitting numerical data to equation (2) is presented in Table 5. The exponential functional form was chosen as the lead equation. It has an R^2 value of 0.676, which implies that the explanatory variables included in the model accounted for about 67.60% of the variation in the dependent variable. The F-ratio was statistically significant at the 0.01 level of significance suggesting that the explanatory variables adequately explained the model. The

slope, intercept shift dummy and three variables namely, farm size, other inputs, and fertilizer were

statistically significant at 1 percent, 5 percent, 1 percent and 10 percent levels respectively.

Table 5. Ordinary Least Squares estimates obtained by introducing the additive multiplicative dummy in the production function

Variables	Linear	Cobb-Douglass	Semi-log	Exponential
Intercept	0.688	-0.267	-0.5900	0.780
	(0.903)	(-0.196)	(-1.465)	(2.793)***
Farm size	0.361	0.290	0.558	0.184
	(2.908)***	(3.242)***	(2.108)**	(4.043)***
Labour	0.001	0.107	0.123	0.001
	(0.536)	(1.372)	(0.533)	(1.250)
Capital	0.000	0.039	0.107	4.20E-005
	(0.962)	(1.022)	(0.939)	(0.821)
Other inputs	4.04E-005	0.63	0.129	1.86E-005
	(1.336)	(0.925)	(0.646)	(1.677)*
Fertilizer	0.003	0.286	0.558	0.001
	(2.194)**	(3.187)***	(2.108)**	(2.984)***
Intercept D	0.089	-0.898	1.458	0.389
(D)	(0.185)	(-1.034)	(0.568)	(2.206)**
X_1D	0.285	0.092	0.693	0.008
	(1.769)*	(0.848)	(2.155)**	(0.133)
X_2D	0.004	0.119	0.561	0.001
	(1.564)	(0.937)	(1.500)	(0.889)
X_3D	0.000	-0.060	-0.195	-5.73E-005
	(-1.272)	(-1.297)	(-1.434)	(-1.088)
X_4D	8.70E-006	0.023	0.219	-5.45E-006
	(0.213)	(0.252)	(0.822)	(-0.364)
X_5D	-0.002	-0.223	-0.351	-0.001
	(-0.921)	(-1.633)	(-0.870)	(-1.469)
R^2	0.582	0.646	0.590	0.676
R^2-adj	0.539	0.610	0.548	0.633
F-statistic	13.661***	17.909***	14.134***	13.352***

Source; Field Survey Data, 2010

The primary objective is to ascertain whether any defined farmer group is characterized by neutral, factor-biased or the same production function.

If the co-efficient of the dummy variable D (in the additive form) is positive and significant, it implies that the production function for farmers with access to credit had larger intercept denoting a higher level of technically efficiency. The slope and intercept shift dummy were critically examined. The intercept shift dummy had an estimated regression coefficient value of 0.389 and statistically significant at the 5% level implying that there exists a shift in technology between rice-based farmers with access to credit and those without. Moreover, the intercept, shift dummy in the additive form is positive. It implies that the production function for farmers with access to credit had larger intercept denoting a higher level of technical efficiency. In other words, farmers with access to credit were more technically efficient as compared with farmers without access to credit.

Test of Hypotheses

Hypothesis 1 states that there is no significant difference between the output of rice-based farmers with access to agricultural credit and those without access to credit. Student t-test was computed which was compared with the critical value. The results are presented in Table 6.

Table 6. Paired samples t-test for the output of farmers with Access to Credit and those without

	Paired differences					
	Mean	Standard deviation	Standard mean error	t_{cal}	$t_{critical}$	Decision
Access & without access	0.51158	1.30923	0.17341	2.950	2.660	Reject

Results in Table 6 indicated that the computed t-value is 0.2950 which is greater than t-critical value of 2.660 at 0.01 level of significance and 57 degrees of freedom. We hereby reject the hypothesis that there is no significant difference between the output of rice-based farmers with access to credit and those without access to credit and accept the alternative that there is a significant difference in the output of the two groups of farmers. In other words, the difference in outputs is attributed to the availability of credit.

Hypothesis 2 states that the two farmer groups had the same production functions. Results in Table 5 indicated that the intercept shift dummy is positive (0.389) and significant at the 0.05 level of probability. This implies that the groups of farmers do not have the same production functions.

We hereby reject the null and accept the alternative hypothesis. The implication is that farmers with access to credit realized more output as compared with their counterparts who did not have access to credit.

CONCLUSION AND RECOMMENDATIONS

Analysis of data revealed that credit users achieved a higher level technical efficiency as compared with non-credit users who were more technically in-efficient in the use of farm resources. Both farmer groups are characterized by factor biased or non-neutral production functions. In other words, both groups of farmers are characterized by different production functions The results further revealed that none of the farmer groups achieved absolute allocative efficiency in the use of any resource. The credit users underutilized farm size,

labour, and other inputs, while the non- credit users underutilized farm size and capital and over utilized fertilizer. The computed returns to scale values are 0.814 for credit users and 0.296 for non-credit users. This implies that decreasing returns to scale prevail in the study area for the two categories of farmers.

It is recommended that farmers should expand their farm size in order to maximize output. Increase in farm size should necessitate the formulation of appropriate policies and the creation of a favourable macroeconomic environment by the government as well as making production inputs available at terms and times convenient to the farmer. Credit was observed to have a positive impact on the output of farmers. Credit facilities should be made available to farmers at concessionary interest rates to enable them purchase production inputs to boost production.

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Women's Awareness and Utilization of Agroforestry Practices in Oluyole Local Government Area of Oyo State, Nigeria

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Abstract: The farmers have not received enough information on agroforestry activities. Few women have opportunities of education and training in agroforestry. Many programmes tend to overlook women's specific needs regarding agroforestry mainly because policymakers and planners lack adequate information to address them. Hence this study is designed to provide information on women's awareness and utilisation of agroforestry practices in Oluyole local government area of Oyo state, Nigeria. There are 10 wards in the local government and 4 wards were randomly selected with an average of 25 women farmers randomly interviewed in each of the selected wards giving a total sample size of 100 respondents. Data were collected from the respondents using opened-end questions administered as interview schedule.

The results showed that majority (86.0 %) of the respondents were within the age of 20 and 49 years. Sixty-five percent of respondents have no formal education while 64.0% of the women were engaged in farming activities. Ninety-six percent of the women were married. Ninety-one percent have family size ranging from 3 to 10 persons within their households. Also, majority of the women had access to land. High numbers of respondents are aware of shifting cultivation (92.0%), pastorium (79.0%), household garden (78.0%), border planting (74.0%) and apiculture (61.0%) while few are aware of alley cropping (15.0%), taungya (31.0%) and green fences (33.0%). The systems of agroforestry most of the respondent are still practicing are pastorium (64.0%), while few still practice household garden (24.0%), border planting (20.0%), taungya (7.0%) but none of the respondents is practicing green fences. There was significant relationship between the number of practices the women were aware of and the number of practices they use (r=0.285, p<0.05). There was no significant relationship between education acquired, marital status, family size and the level of utilisation of agroforestry by women. Although, there was a significant relationship between age and the number of practices utilised (r=0.279, p<0.05), age, marital status, education, family size had no significant relationship with awareness of agroforestry possessed.

Based on the result of the study, it can be inferred that the level of agroforestry practices used are determined by the number of practices the women are aware of or exposed to. Also, the older people used fewer practices while the younger ones used more. Therefore, information about agroforestry should be effectively extended to women.

 Key words: women's knowledge, utilisation, agroforestry, practices, rural area

INTRODUCTION

Agroforestry can be defined as all practices that involve a close association of trees or shrubs with crops and or livestock for ecological and economic reasons. It combines the best attributes of forestry and agriculture, and is one of the most promising alternatives to the conventional approaches to increase agricultural productivity (Thrupp, 1994).

Agroforestry practices can be used in crop lands where trees or shrubs are interspersed with annual crops, on contour strips and boundaries, where multi purpose trees provide numerous products including poles, fuel, fruits and folder. Agroforestry can be practiced on public or shared land where trees can be grown for wood, fodder, food or cash crops. In woodlots, managed woodlands and rehabilitated woodlands areas are where food and crops can be grown together with seedlings in the first years of growth. Hence, agroforestry provides additional important benefits to the farmer. It can improve soil fertility, provide animal fodder, create a favourable microclimate for crops and livestock, produce tree-fruits, supply and produce a variety of wood products for farmers' home use. Many Nigerian farmers are facing serious problems of sustaining their livelihoods due to urbanization and extensive use of land. Therefore, the drive towards ensuring food security should be channelled towards developing agricultural practices and system that will be environmentally friendly and also focus on productivity on the long term rather than immediate production and accruing returns. Ogunlana (1998) said sustainable land use is that which achieves production combined with conservation of the resources on which production depends, thereby permitting the maintenance of productivity. The use of sustainable land management practices must be promoted according to Fakoya et al (2002), and these practices must be compatible with the environment and local cultural practices. Hence, agroforestry is an innovation that can overcome the problem of land degradation in Nigeria which is a pressing problem and the system is the only viable option for combating environmental degradation, agricultural stagnation and population explosion in developing countries such as Nigeria.

There are many reasons why the environmental protection idea of agroforestry requires emphatic consideration of women who are the children's first teachers and impression makers. Thereby, it requires women involvement in agroforestry for them to pass it to generations to come for sustainable agroforestry practice.

The objective of agroforestry is to create sustainable land management strategies which increase the overall yields of the land which are, also compatible with the environment and local cultural practices (Onumadu e*t al*, 2000).

WOMEN IN AGROFORESTRY

Familiar pictures of poor women in the rural area shouldering many loads of fuel wood vividly portray their role in household, farm, Livestock and forestry activities. Thrupp (1994) reported that the principal beneficiaries of agroforestry research are small farmers, the majority of whom are women. Throughout the developing world, women make significant contribution to agroforestry. In Nigeria, many women farmers have been using some of these agroforestry practices, though unconsciously, in their traditional farming methods while other

women farmers are not even aware of any of these systems and the immense benefits they offer. Gender inequality is a constraint to the sustainable use and management of agroforestry system throughout Nigeria. For instance, Gupta (1995) reported that in some parts of Kenya among Luryi tribe, women are prevented from planting trees. It was considered a curse but once the male emigration to Nairobi and other cities started from rural Kenya where this tribe lived, the responsibility of women increased in manifold.

Onumadu (1995) reported that farmers in Oluyole local government area of Oyo State, Nigeria received very negligible information/assistance from Oyo State forestry services. Also, Thrupp (1994) stated that few women have opportunities for education and training in agroforestry. Adekoya (1997) reported that environmental decline gives women know how and if only they can be exposed to its tremendous advantages and benefits of agroforestry they could play a significant role in utilising agroforestry technologies.

THE OBJECTIVES

The general objective of the study is to know the women's awareness and utilization of agroforestry practices in Oluyole local government area of Oyo State, while the specific objectives are to:

i)   determine the personal characteristics of the women farmers.

ii) identify the components of agroforestry women have knowledge about.

iii) determine the level of utilisation of knowledge of agrofrestry.

METHODOLOGY

Study area

There are 30 local government areas in Oyo State, Nigeria. Out of these, Oluyole local government with an area of 629 km² and a population of 202,725 (2006 census), whose headquarter is Idi Ayunre was selected for this study. The population considered for the study consists of all women involved in farming in Oluyole local government of Oyo State. There are 10 wards in the local government and 4 wards were randomly selected and an average of 25 women farmers were randomly interviewed in each of the 4 wards giving a total sample size of 100 respondents.

Data collection:

The data collections were done through a formal questionnaire. The questionnaire had closed and opened-end questions that were administered in the form of interview, especially to collect information from the non-literate respondents on various Socioeconomic characteristics such as age, educational background, marital status, occupations, family size, types of tree planted, access to land, awareness of agroforestry, number of tree planted and their locations.

Method of data analysis

The Descriptive Statistics (DS) was used as software to organise and analyse the data collected. Frequency distributions and percentage coupled with inferential statistics, chi- square and Pearson product moment correlation were used to interpret and summarize the information obtained.

RESULTS AND DISCUSSION

Personal characteristics of respondents

Table 4.1 shows that from 100 respondents, the mean age is 38.3 ± 11.1 and therefore majority of the respondents (86.0 %) are within the active age group (20-49). Being within

the youthful ages, it is also an indication that they may be amenable to changes and education according to Fakoya et al. (2007).

Table 1: Age of respondents

Age categories	Frequency	Percentage	Mean
20-29	18	18.0	
30-39	34	34.0	38.3
		±11.1	
40-49	34	34.0	
50-59	13	13.0	
>60	1	1.0	
Total	100	100.0	

Source: Field Survey (2002)

From Table 4.2, it is evident that majority of the respondents are married (75.0 %) and stay with their husbands. The single and separated are 4.0 % and 8.0% respectively while 9.0 % have divorced.

Table 2: Respondents marital status

Marital Status	Frequency	Percentage
Single	4	4.0
Married	75	75.0
Separated	8	8.0
Divorced	9	9.0
Widow	4	4.0
Total	100	100

Source: Field Survey (2002)

From Table 4.3, majority (67.0 %) of the respondents are involved in farming as their primary occupation while 33.0 % are engaged primarily in non-agricultural occupation. This means those extracting their means of livelihood from the environmental resources would likely get involved in the agroforestry practices.

Table 3: Respondents' occupation

Primary occupation	Frequency	Percentage
Farming	67	67.0
Non-farming	33	33.0
Total	100	100.0

Source: Field Survey (2002)

Most of the respondents (51.0 %) in Table 4.4 have family size between 3-6 persons within the household. Forty percent have family size

between 7-10 persons. This large family sizes could be attributed to the old family size practiced in the rural areas, especially when people do not know the implications and then adopt family planning method to reduce the size of their families. Also, this large size cannot be separated from the reports by Oruboye (1995) that since Nigeria is still largely agrarian and due to low level of technology prevailing in agriculture and communal land tenure practices, especially in the rural areas, emphasis has been strongly on large family size. As much as most cultures permit only male children to share in family land holdings within the context of the extended family structure and communal ownership of land where farming is central to economic life, then the most economically rewarding target to pursue by a couple is large family to have many males children. To them, raising children who can engage in farming work would not be as expensive as giving them quality education (Wusu, 2001) that may even help them in other areas of life. Besides, agroforestry is a labour-intensive technology and large family often has a large number of working members. The larger the family, other things being constant, the higher will be the probability of adoption. (Kebede et al, 1990).

Table 4: Respondents family size

Family size categories	Frequency	Percentage
<2	4	4.0
3-6	51	51.0
7-10	40	40.0
>10	5	5.0
Total	100	100.0

Source: Field Survey (2002)

Table 4.5 shows that majority of them had no formal education (65.0 %). That implies that most of them are illiterates. Meanwhile, 35.0 % had one form of formal schooling in which 28.0 %

had primary education and 7.0 % had secondary education. Literacy is expected for enhancement of understanding of environmental processes relating to agroforestry. The low level of education may relatively have adverse effect since formal education plays vital role in making up some of the deficiency in man and this will help to enhance communication and understanding in agricultural practices (Adams, 1982).

Table 5: Respondents' educational level

Educational categories	Frequency	Percentage
No formal Education	65	65.0
Primary	28	28.0
Secondary	7	7.0
Total	100	100.0

Source: Field Survey (2002)

Table 4.6 shows more than half (66.0 %) of the respondents have access to land since majority of these women are married (75.0 %) and stay with their husbands. Meanwhile, 34.0 % used rented land. Since the primary occupation of majority of these women is farming (67.0%) according to Table 4.3, no husband will want his wife to be idle. The usual practice is that most of the women that stay with their husbands either get land freely from their husbands, relations or rent through them besides the inherited lands (Fabiyi et al, 2007).

Table 6: Respondents access to land

Access to land	Frequency	Percentage
Yes	66	66.0
No	34	34.0
Total	100	100.0

Source: Field Survey (2002)

According Table 4.7, eighteen percent plants timber trees and 19.0 % plants fruit trees. Sixty-three percent plants other types of trees. Those who planted fruit trees used it as source of income as well as those who planted timber trees.

Table 7: Types of trees respondents planted

Types of trees	Frequency	Percentage
Timber	18	18.0
Fruits	19	19.0
Others	63	63.0
Total	100	100.0

Source: Field Survey (2002)

Table 4.8 shows that the 32.0 % respondents have about 20 trees on their farmland, 8.0 % have between 21-80 trees on their farm while 3.0% have more than 80 trees on their farm. On the average, all the respondents could successfully count at least 10 trees planted on their farmlands. This small number of trees planted by these women is evident that majority of them had no enough awareness on the needs and benefits of agroforestry to enhance more tree planting. This could be the consequence of their low educational level mentioned above according to table 4.5 which could have helped them in more understanding about the need for agriculture or agroforestry and plant more trees (Adams, 1982).

Table 8: Number of trees respondents planted

Numbers	Frequency	Percentage	Mean
1-20	32	32.0	
21-40	3	3.0	$\approx$10.0
41-60	1	1.0	
61-80	4	4.0	
>80	3	3.0	

Source: Field Survey (2002)

Table 4.9 shows that most of the people plant the trees on their farmlands (45.0 %), while only one respondent plants at home. There could still be some of them that have trees around their homes because they are naturally growing there and they derive benefits from them.

Table 9: Location of trees planted

Place	Frequency	Percentage
On farm	45	45.0
At home	1	1.0
Nil	54	54.0
Total	100	100.0

Source: Field Survey (2002)

The table below (4.10) shows that majority of the women are aware of border planting (74.0 %), shifting cultivation (92.0%), household garden (77.0 %), apiculture (61.0 %) and pastorium (79.0 %). The table also shows that respondents are aware of taungya (31.0 %), alley cropping (15.0 %) and green fences (33.0 %).

Table 10: Respondents awareness of agroforestry practices

Practices	Frequency	Percentage
Border planting	74	74.0
Shifting cultivation	92	92.0
Taungya	31	31.0
Alley cropping	15	15.0
Green fences	33	30.0
Household garden	77	77.0
Apiculture	61	61.0
Pastorium	79	79.0

Source: Field survey (2002)

Table 4.11 reveals that the agroforestry system most of the women are still using are pastorium (64.0 %) and household garden (63.0 %) while very few still practice shifting cultivation (24.0 %), Border planting (20.0 %) apiculture (8.0 %), taungya(7.0 %), while none of the respondents is practicing green fences.

Table 11: Levels of utilization of agroforestry practices.

Agroforestry practices	Never use	%	Use but Stopped	%	Still Using	%
Border planting	41	41.0	12	12.0	20	20.0
Shifting cultivation	21	21.0	9	9.0	24	24.0
Taungya	11	11.0	6	6.0	7	7.0
Green fences	29	29.0	2	2.0	Nil	Nil
Household garden	31	31.0	14	14.0	63	63.0
Apiculture	38	38.0	4	4.0	8	8.0
pastorium	5	5.0	4	4.0	64	64.0

Source: Field survey (2002)

Education: The chi-square test result on the table above shows no significant relationship between the levels of education acquired and the level of utilization by women, thus the null hypothesis is accepted. It implies that utilisation does not depend on whether a person had acquired formal education or not. However, their personal characteristic may have influenced their ability, for example, to interpret pictures in agroforestry according to Olujide and Oladele (2011) and then utilize them with keen interest in planting 45.0 % trees on the farms and planting 63.0 % trees different form both timber and fruits.

Marital Status: The chi-square test result on table 4.12 does not show any significant relationship between marital status and utilization by women. Therefore the null hypothesis is accepted, implying that whether married or single status it does not influence utilisation of agroforestry practices. Compared to Olujide and Oladele (2011), the insignificance of marital status may be that the women reinforce the knowledge of others than their husbands to utilize agroforestry practices.

Table 12: Chi-square analysis showing the relationships between marital status, education and utilization of agroforestry

Characteristic	X2	p-value	Df	Decision
Education	4.506	0.0609	6	N.S
Marital Status	5,013	0.082	2	N.S

Age: The correlation analysis in Table 4.13 shows that there is a significant relationship between age of the women and their number of practices/

utilisation of agroforestry systems. But the correlation relationship is negative, which implies that older people use fewer practices. The implication with respect to age distribution of respondents is that those within active age (20-49 years) utilised more practices than those from 50 years and above. This might be due to high family economic demands and innovativeness of youthful age. According to Olujide and Oladele (2011), age is significantly related to the knowledge of agroforestry except shelterbelt and windbreaks. Besides, while the older people may be elders in the zone and have preferential access to new information or technology on agricultural practices, the younger ones within the active age may adopt new technologies or practices and then invest in long term productivity of soil since they are likely going to stay for more years in that area (Nkamleu and Manyong, 2005).

Family size: The correlation analysis shows no significant correlation between the family size and number of practices utilised by the women. This implies that the number of people within the household does not influence the utilisation of agroforestry practices. However, the size recorded may have to do with the desire of the couple involved to have more males to inherit land properties in accordance with customs. Compared with the report that a large family often has a large number of working members (Kebede et al, 1990), the insignificance observed may be that the women work alone or hire labour to utilize agricultural practices, unlike the old practices when both family size and marital status contributed tremendously to the utilization (Fabiyi et al., 2007).

Table 13: Correlation analysis showing relationship between women's characteristics and utilisation level

	r-value	p-value	Decision
Age	-0.279	0.005	S
Family size	0.073	0.472	N.S

Marital status: The table below (Table 4.14) shows that there is no significant relationship between the marital status of the women and the awareness they have about agroforestry. Therefore the null hypothesis is accepted. This implies that whether they are single or married, it does not affect their awareness of agroforestry. As mentioned above, it may be that these women depend on other means than their husbands for awareness about agroforestry practices (Olujide and Oladele, 2011).

Education: The chi-square analysis (Table 4.14) shows that there is no significant relationship between their level of education and their awareness of agroforestry, therefore the null hypothesis is accepted. This implies awareness of agroforestry does not depend on whether a person acquires formal education or not. This shows that their personal characteristics may have played vital role in the awareness they have about the agroforestry just like those that were able to interpret pictorial agroforestry without formal educational (Olujide and Oladele, 2011).

Table 14: Chi-square analysis showing relationship between marital status, education and awareness of women on agroforestry

Characteristics	X^2	p-value	Df	Decision
Marital status	1.061	0.588	2	N.S
Education	4.965	0.548	6	N.S

Age: Table 4.15 shows that there is no significant relationship between age of the women and their awareness of agroforestry. Therefore, the null hypothesis is accepted.

Family size: As shown in Table 4.15 below, there is no significant relationship between the family size and their awareness of agroforestry. Therefore

the null hypothesis is accepted and the coefficient of correlation is quite low.

Table 15: Correlation analysis showing the relationship between women age, family size and the women awareness of agroforestry

Characteristics	r-value	p-value	decision
Age	-0.173	0.086	N.S
Family size	-0.160	0.111	N.S

Conclusion

This study has been able to show that age of the women in Oluyole local government area of Oyo State significantly affected the number of practices utilized in agroforestry systems and that the younger ones adopted more practices in agroforestry than the older people. It also revealed that despite their low level of education which could have hindered their level of utilization of the agroforestry practices, personal characteristics played vital roles. This shows that the women personal characteristics in the rural areas cannot be overlook when orientating and encouraging farmers to participate in agroforestry practices.

In view of the findings above on the discontinuation observed in some agroforestry practices, it is therefore necessary to still pursue a study on the levels of utilization of agroforestry practices in this study area, especially to ascertain and know the reasons for both the continuation (still in use) and discontinuation of the agroforestry practices mentioned in Table 4.11. The results of the findings will help the agricultural extension officers to come to the needs of the women there and educate them on the needs for continuation.

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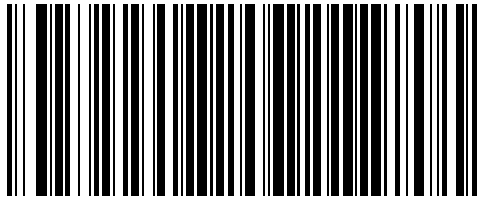
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