International Journal of Agricultural Economics and Rural Development

IJAERD E-Journal

Vol. 1, No. 2, 2008

Editor-in-Chief

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IJAERD E-Journal

International Journal of Agricultural Economics and Rural Development

Vol. 1, No. 2, 2008

Published By
Department of Agricultural Economics and Rural Development,
Ladoke Akintola University of Technology, Ogbomoso – Nigeria

Produced by IJAERD Press - Nigeria, 2008

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Access to Fertiliser Subsidy among Food Crop Farmers in Osun State, Nigeria

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Abstract: The Nigeria fertiliser subsidy policy dates back to 1970s. However, it has invariably witnessed inconsistencies and instabilities given the trend of successive government / leadership in the country. The gains are also not widely spread among the targeted beneficiaries hence, a negative implication on the increased food production programme. The study examined access to fertiliser subsidy among food crop farmers in Osun State, Nigeria. Using a multistage sampling procedure, primary data collected from 84 food crop farmers included farm size, fertiliser usage, perception of benefits of the subsidy policy, characteristics of the other known beneficiaries among others. Analytical tools employed were mainly descriptive statistics. The study showed that an average farmer in the study area is a small holder and used 11.27kg per hectare of inorganic fertiliser. Majority (69 percent of the farmers) had low benefit from the policy. Important characteristic of a would-be beneficiary is to be influential / rich or political office holder other than being a farmer. It is recommended that stakeholders in agriculture should come together and fashion better method for the policy delivery.

Keywords: Fertiliser, Subsidy, Food crop, Osun State.

INTRODUCTION

Agriculture has traditionally been characterized as the 'mainstay' of the Nigerian economy with many assigned roles to perform in the course of the country's economic development; such roles were identified as:

(i) Providing adequate food for an increasing population;
(ii) Supplying adequate raw materials to a growing industrial sector;
(iii) Constituting the major source of employment
(iv) Constituting a major source of foreign exchange earnings; and
(v) Providing a market for the product of the industrial sector (Federal ministry of agriculture, water resources and rural development, 1988).

However, the extent to which the expected roles have been adequately played lies greatly in the agricultural productivity. Idachaba (1994) identified six central elements which constitute the pivot on which increases in productivity per unit of land must revolve: first, is high yielding seed varieties that are fertiliser-responsive and resistant to pest; second, is inorganic fertiliser that assists in realizing the full yield potential of the new seed varieties. Third is the capacity to domestically produce adequate quantities of the inorganic fertiliser or to import them. Fourth is the extension system to transmit knowledge on correct fertiliser application and related agronomic practices. Fifth, there is a need for an efficient fertiliser marketing and distribution system to deliver

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fertiliser to farmer in the right quantities and at the time they need them. Finally, there is the need for appropriate national farm input policy covering production, imports, pricing, marketing and distribution.

The Nigerian fertiliser policy subsidy dates back to 1970s. However, it has invariably witnessed inconsistencies and instabilities given the trend of successive government/ leadership in the country. Certain features that amount to inefficiency characterized the fertiliser market in the pre-reform years shortly before 1986. These are among others, leakages, transit losses, inadequate and untimely supply, artificial scarcity, black marketing and smuggling, erratic importation pattern arising from untimely release of funds, transportation bottlenecks, including wrong delivery, non-delivery and under-delivery (Ayoola, 2001). However, reports after five years of deregulation and decontrol process indicate that measures of market inefficiencies still take on high values including the persistence late supplies, high transaction costs, non-agricultural use of fertiliser, inadequate supplies and artificial scarcities through hoarding and smuggling activities. The continuous presence of these features will always keep the benefits of the fertiliser subsidy policy away from the farmers who are the intended beneficiaries while unrecognized middlemen, transporters and other unintended beneficiaries have the gains.

Problem Statement

The attendant situation of land depletion, land tenure and teeming population that is always on the increase have all contributed immensely to the shortage of land available for food crop production. The traditional land use management adopted thus becomes a function of the available land, hence practices like shifting cultivation, bush fallowing, crop rotation are gradually fading away. This calls for increasing dependence on inorganic fertiliser in order to improve the fertility of the available land under use. Fertiliser subsidy policy is also seen as an income transfer and market promotion strategy toward the development of infant industry of agriculture. However, several literatures have shown that the policy implementation is still defective (Idachaba, 1992, 1994; Ogunfowora, 1993; Ayoola, 2001; Eboh *et al*, 2006; Yekinni, 2007 and Salimonu, 2007).

The study of Yekinni (2007) showed that majority (67.8 percent) of the farmers sampled in Oyo State still indicated fertiliser input as a felt need in which the government intervention is required. The problem becomes enlarged in that between 1990 and 1996, fertiliser subsidy expenditure consistently exceeded total capital on agriculture. It was 725 percent, 600 percent, 400 percent and 397 percent of total capital expenditure on agriculture in 1992, 1995, 1991 and 1993 respectively (Okoye, 2003; as cited in Eboh *et al* 2001). Despite these huge expenditure on fertiliser subsidies, farmers access to fertiliser remain as high as prices also remain high; total fertiliser use declined averaging 6.5 percent between 1989/90 and 1999/2001 and total fertiliser use as a percentage of potential demand averaged a mere 7.3 percent in the same period (Eboh *et al*, 2006). This defect has a lot of implications on agriculture and economic development. The achievement of the increased food programme becomes so much impaired if the laxities are allowed to linger.

Several programmes in the past and present staged to reduce the poverty of the rural poor would

not also be well facilitated given the roles of fertiliser in food crop production; a primary occupation of the rural poor. To this end, the following research questions were conceived in the study: Do food crop farmers use recommended fertiliser dose per hectare of farm land? To what extent do farmer benefit from the fertiliser subsidy policy? Who are the other beneficiaries of the policy? What are the alternatives to inorganic fertiliser use? Based on the above research questions, the objectives of the study are to:

1. determine the extent of benefit of the fertiliser subsidy policy by the farmers.
2. identify other known beneficiaries, and
3. identify alternative ways in place of inorganic fertiliser.

METHODOLOGY

The study was carried out in Osun State, Nigeria. The state was chosen because of its location in the rainforest and the availably of food crop farmers. A two stage sampling procedure was used in selecting 84 food crop farmers from 25 farming communities in the three agro-ecological zones in the state. Using structured questionnaire, primary data collected included farm specific characteristics (farm size and quantity of fertiliser used), perception of the benefit of the subsidy policy by the farmers, other known beneficiaries, alternative ways to inorganic fertiliser use. Data were analyzed through descriptive statistics and Likert scale. These include the use of tables, frequency counts, percentages, composite score, mean and standard deviation.

RESULTS AND DISCUSSION

Farm size and fertiliser use

The distribution of farm size and the fertiliser use status is presented in Table 1. It is shown from the Table that highest percentage of farmers (46.4percent) were cultivating between 1-1.99 hectares of farm land while the lowest percentage (2.4 percent) were cultivating farm size greater or equal to four hectares. However, the average farm size for the whole sample is 1.62 hectares. This implies that the farmers were operating on a small scale range (that is, a farm size less than 2 hectare) based on the categorisation by the agricultural development programme of the state. The fertiliser use status with respect to farm sizes is almost represented in a pattern of increasing fertiliser use with farm size. The Table also shows that the overall average fertiliser use for the sampled farmer is 11.27 kilograms per hectare, a quantity that is less than the required. Yayock (1980) as cited in Bamire and Amujoyegbe (2005) recommended 300 kg/ha NPK 12:12:17 + Mg on acid soils and 50 kg/ha N + 60 kg/ha K_2O on other soils in Southwestern Nigeria. According to Henao and Baanante (1999), fertiliser use ranges from nearly 234 kilograms per hectare in Egypt to 46 kilograms in Kenya to less than 10 kilograms in most countries in Sub-Saharan Africa.

Table 1. Distribution of Respondents by Farm Size and Fertiliser Use

Farm Size(ha)	No. of respondents	Percentage	Average farm size	Average fertiliser/hectare
< 1.00	25	29.8	0.61	8.20
1-1.99	39	46.4	1.51	11.50
2-2.99	13	15.5	2.29	14.60
3-3.99	5	5.9	3.71	13.90
≥ 4.00	2	2.4	6.5	16.80
Total	84	100.0	1.62	11.27

Benefits from Fertiliser Subsidy Policy

The farmers' responses, based on their benefits from the fertiliser subsidy policy, are presented in Table 2. The Table shows that the respondents have not benefited in terms of timely availability of subsidized fertiliser (90.4 percent), regular access (84.5 percent) adequate quantity (97.6 percent) and purchase of the fertiliser at the subsidised rate (61.9 percent). However, 67 percent have benefited from the technical training for the use of the fertiliser.

Table 2. Distribution of Respondents by Benefits from Fertiliser Subsidy Policy

Policy Benefits	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Timely Availability	1(1.2)	4(4.8)	3(3.6)	29(34.5)	47(55.9)
Regular Availability	4(4.8)	8(9.5)	1(1.2)	31(36.9)	40(47.6)
Adequately Available	1(1.2)	1(1.2)	0(0.0)	2(2.4)	80(95.2)
Available at Subsidised Rate	4(4.8)	20(23.8)	8(9.5)	24(28.6)	28(33.3)
Technical Training on fertiliser use	26(31)	30(36)	3(3.6)	18(21.4)	7(8.3)

Figures in parentheses are percentages

A composite score was estimated from the responses to the 5 statements. On 5-point scale, a respondent can score a maximum of 25 points and a minimum of 5 points. The mean score is 14.24 while the standard deviation (SD) is 3.05 and the respondents were categorised into three as follows.

Upper category = 25 to (mean + SD)

= 25 to 17.29

Medium category = between upper and lower category = 17.28 to 11.20

Lower category = (mean – SD) to lowest

= 11.19 to 5

The distribution of the respondents on the basis of the category of benefit is given in Table 3. It is shown in the Table that the modal category is the low benefit (69.0 percent). This is followed by medium benefit (22.6 percent) and high benefit 8.3 percent. The result implies that there is a flow of benefits from the intended beneficiary to other unintended beneficiaries. The result further corroborates the existing literatures on agricultural input delivery to farmers in Nigeria (Idachaba, 1994; Yekinni, 2007).

Table 3. Distribution of Respondents based on Category of Benefits

Categories of Benefit	Frequency	Percentage
High Benefit	7	8.3
Medium Benefit	19	22.6
Low Benefit	58	69.0
Total	84	100

Characteristics of Gainers of the Fertiliser Subsidy Policy

The sampled farmers were made to respond to questions describing their perception of the gainers from the fertiliser subsidy policy. Table 4 shows that the majority of the sampled farmers (83.3 percent) disagreed that "to be a farmer" is a factor for benefiting from the policy; this probably infers that farmers either do not have identity or are deliberately/carelessly neglected in the policy delivery. However, the farmers agreed that "to be a political office holder" (76.2 percent), "being rich or influential" (82.1 percent) and "being a member of the ruling political party" (88.1 percent) are the important characteristics of the gainers from the policy. The farmers' response to the characteristic of "being a regular buyer" was distributed almost equally between yes and no responses. The result can therefore permit us to report that small scale farmers that are responsible for the food production in the country and given their current unfavourable socio-economic environment still have to compete with non farmers before they could have access to fertilisers.

Table 4. Distribution of Respondents Responses by the Characteristics of Gainers of the Fertiliser Subsidy Policy

Characteristics of Gainers of the fertiliser Subsidy Policy	Yes	No
He must be a farmer	14 (16.7)	70 (83.3)
He should be a Political office holder	64 (76.2)	20 (23.8)
He should be rich and influential	69 (82.2)	15 (17.9)
He must be a regular beneficiary	44 (52.4)	40 (47.6)
He has to be a member of ruling political party	74 (88.1)	10 (11.9)

Figure in parentheses are percentage response

Alternatives in Place of Fertiliser or Coping Strategies in Absence of adequate Fertiliser

The distribution of farmers' responses on alternative ways or coping strategies at instance of fertiliser inadequacy is shown in Table 5. Most farmers (71.4 percent) were still ready to buy at extra cost if the subsidized ones could not be accessed. However, 28.6percnet of the farmers would rather not buy at extra cost if subsidised one is not available. This may primarily be due to lack of finance. Deforestation/bush fallow was the option of 25 percent while 75 percent were still on the same farm land over years. The extent of deforestation (in order to have access to new farm land) and bush fallow appeared very low (25 percent) due to existing problem of land shortage through land tenure and population increase. Other options, change of enterprise to less fertiliser demanding one accounted for 45.2 percent of the responses while 58.3 percent would align with influential individual in order to have the desired quantities.

Table 5. Distribution of Farmers by Response to Alternative ways or Coping Strategies in place adequate fertiliser Subsidy

Alternative Ways/Coping Strategies	Yes	No
Buy Fertiliser at an extra cost	60 (71.4)	24 (28.6)
I would rather not buy any if subsidised one is not available	24 (28.6)	60 (71.4)
Open new area (deforestation)/Bush fallowing	21 (25)	63 (75)
Change Enterprise to less fertiliser demanding one	38 (45.2)	46 (54.8)
I align with influential individuals	49 (58.3)	35 (41.7)

Figure in parentheses are percentages

SUMMARY AND CONCLUSION

The study established that an average food crop farmer in the study area is a small scale holder. The average fertiliser use per hectare (11.27 kg/hectare) was lower than the expected in sub-Saharan Africa. The study further shows that only 8.3 percent had high benefit from the fertiliser subsidy policy compare to low benefit of 69 percent. This implies that there are other beneficiaries some where other than the targeted farmers. It is revealed in the study that being a farmer is not an important characteristic to have access to fertiliser. The facilitating characteristics were being a political office holder, rich or influential or member of ruling party. In a way to cope with limited access to subsidized fertiliser, majority of the farmers still buy at extra cost or align with influential individual. On the other hand, the extent of bush fallow is low.

POLICY IMPLICATION AND RECOMMENDATIONS

Channelling the subsidised fertilisers to the targeted small scale farmers in Nigeria appears to be a perennial problem and an overall challenge. There is therefore the need for the stake holders in agriculture (policy makers, policy analysts, extension personnel, researchers and farmers themselves) to come together and agree on workable methods of fertiliser distribution in Nigeria. This will go a long way in reducing the complexities of un-timeliness, unavailability, diversion and high cost of fertiliser. The issue of indiscriminate sale of the input would not only frustrate the farmers but may also 'push' them either totally or partially into non-farming activities towards income sustainability; steps toward identifying farmers during sales are therefore necessary to be taken. This could be somewhat effectively achieved by the extension agents who deal directly with the farmers. It is also recommended that farmers' surveys should be carried out at intervals in order to have periodic feed back from the target beneficiaries. This will however provide a basis for the evaluation of the programme.

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An Assessment of Agricultural Extension Activities to Cocoa Farmers in Ekiti West Local Government Area of Ekiti State

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Abstract: Cocoa is an important cash crop that contributes significantly to agriculture's earning in Nigerian economy. Agricultural extension programmes have been targeted at the cocoa farmers to develop the enterprise since the importance of the cash crop. This study assessed the agricultural extension activities to the targeted farmers to identify the institutions that render the services, the farmers' assessment of the services, extent of use of cocoa production technologies (CPTs) and the constraints they have to effective extension services. The study was carried out in Ekiti West local government area of Ekiti State using a multistage random sapling procedure to select 120 cocoa farmers. The findings of the study revealed that the Ekiti State Agricultural Development Programme (ADP) is the dominant source of extension service to the cocoa farmers. Most of the farmers perceived the benefits derived in terms of more profi Table cocoa enterprise based on beneficial advice from the extension services. The constraints perceived by most of the farmers included frequency of visit and inadequate input supply. Chi square was used to establish that farm size, land ownership status, cocoa farm ownership and contact with extension agents influence the extent of use of CPTs. It was recommended that institutional facilitation issues such as efficient input delivery system and adequate personnel:client ratio should be focused to improve extension services to the cocoa farmers; and that cocoa enterprise development projects can be easily implemented through the ADP, which is the dominant source of extension service to the farmers in the study area.

Keywords: Cocoa farmers, extension services and cocoa production technologies

INTRODUCTION

Cocoa is one of the major cash crops through which agriculture contribute to Nigerian economy. The contributions of cocoa to the nation's economic development are vast and have been reported by many authors [Olayide (1969); Olayemi (1973); Abang (1984); Folayan *et al* (2006)]. Cocoa industry in Nigeria had presented a chequered history since it was introduced. This is in term of total production, its foreign exchange earning capacity and income generating ability. In the early 40's, the cocoa industries contributed on the average 21.50% of all foreign exchange earned by Nigeria in the world market. Akande (1994) reported that 154, 275 tonnes of Cocoa were exported in 1993 at the rate of 926 per tonnes thereby contributing a total amount of 71.4297 million naira to the Nigeria economy.

In terms of foreign exchange earnings, no single agricultural export commodity has earned

more than cocoa. With respect to employment, the cocoa sub-sector still provides employment to a sizeable number of people both directly and indirectly. In addition, it is an important source of raw materials, as well as source of revenue to governments of cocoa producing states. Ogunfiditimi (1986) stated that the financial benefit in term of earned income accruing to Cocoa farmer have grown only moderately over the years, the income of farmers has risen at an average amount rate of 9.9 in 1981.

The Federal Government's concern at diversifying the nation's export base has placed cocoa in the centre-stage as the most important export tree crop. Evidence has shown that cocoa production has been declining, which has given rise to a fall in the fortunes of the sub-sector (Nkang *et al*, 2006). Folayan *et al* (2006) also noted that cocoa production in Nigeria witnessed a downward trend after 1971 season, when its export declined to 216,000 metric tons in 1976, and 150,000 metric tons in 1986, therefore reducing the country's market share to about 6% thus placing it at fifth largest producer to date.

Prior to the Structural Adjustment Programme (SAP) in Nigeria, cocoa marketing was carried out by the erstwhile highly regulated Commodity Marketing Board, which was accused of paying farmers far less than the export price of cocoa. This situation affected cocoa production and export in the past as it served as a disincentive to investment in cocoa production. Even after the abolition of the Marketing Boards structure, cocoa production has not faired better as evident in the declining production trend.

Generally, if investment in cocoa production were attractive, farmers/investors would allocate scarce resources to the enterprise. However, the problem is that most people have vague ideas of the potential of the industry and as such are sometimes slow in committing investment funds into the sub-sector. Beyond this, information on how the different management systems affect costs and returns has scarcely been documented (Nkang *et al*, 2007). This thereby emphasises the importance of information on cocoa management systems to the farmers and other categories of stakeholders.

Modern day agriculture is characterised by lots of innovation and improved practices. The practices were mostly generated from agricultural research institutions and to be disseminated through the agricultural extension institutions. However, most of the agricultural practices in use by most farmers remain largely primitive and underdeveloped. This indicates a situation of information gap between the generators and the prospective users of these practices. This is because two essential elements drive human development; people's will to change and the relevant information, in this instance – through extension service, in support of change process (Budelman, 1996).

Extension service constitutes the process whereby the extension worker tries to motivate the clientele to give him the capability to solve his problems. It can also be seen as a process of finding ways of making the encounter between the extension worker and the farmer meaningful such that they will be capable of creating solutions by their own efforts (Bolliger *et al*, 1994). The relationship between the extension workers and the clienteles that is necessary to achieve this goal should be reciprocal; the extension worker must be committed to the welfare

of the clientele and the clienteles must, in turn, appreciate the situation of the extension agents.

Extension service for the cocoa sector is basically an informal education process; an action-oriented programme targeted towards promoting the cash crop farmers and overall agricultural development in the country. The process focuses on the identification of individual, group and community needs and the development and implementation of education programmes to help to satisfy these needs. The needs are concerned with teaching farmers to adopt more effective farming methods and technologies so as to improve production. According to Janny *et al* (2003), a successful extension programme will involve the farmers and will depend on;

- Farmers' sound knowledge of the agro-ecosystem and how this relates to pests;
- A practical approach to manipulating the cropping system to manage pests on a cost-effective and sustainable basis;
- Willingness and ability on the part of both farmers and support systems (extension, research, others) to experiment, modify and innovate;
- Participatory training approaches in cocoa extension services;
- Promotion of cost-effective and environmentally sound methods in cocoa management.

Interaction with the clienteles will let the extension personnel know how to help them in deciding which solution will be preferred by the farmers to a particular problem. This will also provide opportunity to pass across information to the farmers about government policy decisions and the roles they are expected to play. Dissemination of extension information may be affected by some issues such as; the size of the audience, the nature of the message to be disseminated, literacy level among other circumstantial factors of the audience. These factors will determine the communication methods that will be used. The nature of the audience will determine the extent to which a receiver is involved in the communication activities and in essence, who controls the pace of communication and the effectiveness of the message passed across. The communication method used will inform the extent to which the farmers will be influenced by the message(s).

Given the foregoing, this study provides answers for the following research questions:

1. Which extension institutions are involved in the dissemination of cocoa production technologies to farmers in the study area?
2. How do the farmers perceive the extension services to them?
3. To what extent do the farmers use the disseminated cocoa production technologies?
4. What are the constraints associated with extension services to the farmers?

Objectives of the Study

The general objective of the study is to assess the extension services to cocoa farmers in the study area while the specific objectives are to:

1. Identify the extension institutions that disseminate cocoa production technologies to the farmers in the study area
2. Determine the farmers' perception of the extension services to them.
3. Ascertain the extent to which the cocoa farmers use the disseminated technologies.

4. Determine farmers' constraints to extension services.

Hypothesis of the Study

The hypothesis of the study, in null form, states that there is no significant relationship between the enterprise characteristics of cocoa farmers and their use of technologies disseminated through extension service.

METHODOLOGY

The study was carried out in Ekiti-West Local Government area of Ekiti State. It is located within the deciduous forest zone with heavy rainfall almost all year round and an appreciable harmattan yearly. Ekiti West Local Government Area is situated on latitude 7^0 36' North and longitude 5^0 13' East. The vegetation of the Ekiti is rain forest with average rainfall of 1700mm annually. The local government consists of 11 wards and the major occupation of the inhabitants is agriculture, with much emphasis on cocoa farming. The Local Government Area has a land area of 62,413 square kilometres with population of 120,114 according to the 2006 census.

A multistage random sampling procedure was used to select the respondents for this study. The local government was divided on the basis of the political ward. Out of 11 wards, four (4) were randomly selected. In each of the selected wards two (2) communities were randomly selected. From the list of cocoa farmers in the selected communities, 20% of them which amount to 120 farmers were surveyed for the study.

The study used primary data, which was collected with the aid of structured questionnaire, with open and close-ended questions. The instrument was administered as interview schedule to the farmers to circumvent illiteracy constraint and to ensure 100% response rate.

RESULT AND DISCUSSION

Institutions involved in extension services

Table 1 revealed that 71.7% of the respondents have cocoa extension information from the state's ADP, then 13.3% of the respondents have extension information from agrochemical companies, 11.7% of them have information from IITA extension services while only 1.7% have information from some unspecified sources. This shows that most of the respondents got information about cocoa production technologies from the Agricultural Development Programme of the State. This implies that the extension service of Ekiti state ADP is the one that reach out most effectively to the majority of the respondents to fulfil their information needs; this is probably because of the interests of the governments at promoting the enterprise. This finding is supported by the opinion of Arokoyo (2003) that the nation's agricultural research and extension system (NARES) is the most important single determinant of the level of its agricultural development and hence the yard-stick of the quality of life of its people.

Table 1: Distribution of Respondents by Sources of Extension Service

Extension Service Institution	Frequency	Percentage
ADP	86	71.7
Agrochemical companies	16	13.3
IITA	14	11.7
Others	2	1.7
No response	2	1.7
Total	**120**	**100.0**

Source: Field Survey (2007)

Farmers' perception of the extension services to them

Results from Table 2 show the perceptions of the cocoa farmers to cocoa production enterprise on account of extension services to them. Most (94.1%) of them agreed that cocoa production has been more profitable, 73.7% of them are of the opinion that there has been considerable reduction in cocoa production problems while 22.5% are undecided about this; 60.8% of them equally agreed that production input has been easier to acquire while 22.5% of them are undecided about the statement; 65% of them agreed that produce marketing has been easier and more profi Table as a result of the extension service activities while 20.8% are undecided about this; 93% of them also agreed that beneficial advice has enabled increased cocoa production and 94.2% of them believed that quality of produce are better on the basis of extension services to them. This finding highlighted the benefits the respondents derived from the extension services in the study area. It implies that the extension service has assisted majority of the cocoa farmers in their enterprises.

Table 2: Distribution of Respondents by their Perceptions of Extension Services on Cocoa Production Enterprise

Statements on Effect of Extension Services on Cocoa production	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Cocoa production has been more profitable	13 (10.8)	100 (83.3)	6 (5.0)	1 (0.8)	0 (0.0)
There has been considerable reduction in production problems	35 (29.2)	53 (44.5)	27 (22.5)	5 (4.2)	0 (0.0)
Production input has been easier to acquire	13 (10.8)	60 (50.0)	27 (22.5)	19 (15.8)	1 (0.8)
Produce marketing has been easier and more profitable	7 (5.8)	71 (59.2)	25 (20.8)	16 (13.3)	1 (0.8)
Beneficial advice has enabled increased cocoa production	54 (45.5)	57 (47.5)	8 (6.7)	1 (0.8)	0 (0.0)
Quality of produce are better	29 (24.2)	84 (70.0)	6 (5.0)	1 (0.8)	0 (0.0)

Source: Field Survey (2007)

An index was created from these attitudinal responses and the statistics of the index shows that the mean, median and mode are 23.6, 24 and 23 respectively hence it was assumed that the responses were normally distributed. On the basis of this, the responses were categorised using the normal distribution principle ($\bar{x} \pm 1\sigma$) as given below;

Upper category	Between 30 and ($\bar{x} + 1\sigma$)	= 30 to 26.0145
Medium category	Between Upper and Lower category Limits	= 26.0144 to 21.2856
Lower category	Between ($\bar{x} - 1\sigma$) and 16	= 21.2855 to 16

The distribution of the respondents based on the categorisation as given in Table 3 shows that most (75%) of the cocoa farmers' benefit from extension service fall in the medium category, 15.8% of them fall in the low benefit category while only 9.2% of them fall in the high benefit category. This means that despite their favourable perceptions about the extension services, the derived benefits have been on the average level.

Table 3: Distribution of Respondents by Categories of Perception of Benefits derived from Extension Service

Categories of Perception of Benefits	Frequency	Percentage
Low benefit	19	15.8
Medium benefit	90	75.0
High benefit	11	9.2
Total	120	100.0

Source: Field Survey (2007)

Extent of Use of the Cocoa Production Technologies

The results of the analysis as given in Table 4 show that majority (61.7%) of the cocoa farmers use improved seeds sometimes, while 30.0% of them use it all the time. It also shows that 57.5% of the respondents use nursery technology sometime while 20.8% of them rarely use it. Tree pruning/maintenance technique is used all the time by 45.8% of the farmers while 23.3% use the technology sometimes. The result also shows that tree regeneration technology is rarely used by 38.3% of the farmers while 30.8% of them used it all the time. It also shows that majority (88.3%) of the farmers used pest and disease management techniques all the time; 84.2% used cocoa bean processing techniques all the time and 59.2% of them used cocoa bean storage technology all the time. This shows that the technologies that are used substantially are pests and disease management techniques, cocoa bean processing and cocoa storage techniques. This is probably due to the fact that these activities are critical to cocoa production enterprise among the farmers.

Table 4: Distribution of Respondents by Extent of Use of Cocoa production technologies

Cocoa production technologies	All the time	Sometimes	Rarely	Never
Improved seeds	36 (30.0)	74 (61.7)	7 (5.8)	3 (2.5)
Nursery	23 (19.2)	69 (57.5)	25 (20.8)	3 (2.5)
Tree pruning/maintenance	55 (45.8)	28 (23.3)	26 (21.7)	11 (9.2)
Tree regeneration	37 (30.8)	25 (20.8)	46 (38.3)	12 (10.0)
Pest and disease management	106 (88.3)	10 (8.3)	3 (2.5)	1 (0.8)
Cocoa bean processing	101 (84.2)	12 (10.0)	6 (5.0)	1 (0.8)
Cocoa bean storage	71 (59.2)	30 (25.0)	12 (10.0)	7 (5.8)

Cocoa Farmers' Constraints to Extension Services

Information on cocoa farmers' constraints to extension services was elicited and presented in Table 5. The results on the Table show that 64.2% of the farmers deemed frequency of extension agents' visit a mild constraint, 27.5 held it as a serious constraint while 8.3% of them did not see it as a constraint. Adequacy of input supply through the extension institutions was seen as a mild constraint by 80.0% of the cocoa farmers, 15.0% saw it as a serious constraint while 5.0% of them did not see it as a constraint.

Competence of the extension agents was not deemed as any constraint by 69.2% of the cocoa

farmers, 30.0% saw it as a mild constraint while 0.8% of them perceived it as a serious constraint. Fluency of the extension agent was not seen as a constraint by 72.5% of the farmers, 26.7% saw it as a mild constraint and 0.8% of them felt it is a serious constraint. Equally, 74.2% of the farmers do not see dependability of the extension as a constraint, 4.2% saw it as a mild constraint and 21.7% of them perceived it as a serious constraint.

This shows that constraint issues that border on extension agents personality were not perceived by majority of the cocoa farmers while the ones they perceive were external to extension agents' characteristics.

Table 5: Distribution of Respondents by Constraints to Extension Services

Constraints to Extension Services	Serious Constant	Mild Constraint	Not a Constraint
Frequency of visit	33 (27.5)	77 (64.2)	10 (8.3)
Adequacy of input supply	18 (15.0)	96 (80.0)	6 (5.0)
Competence of extension agent	1 (0.8)	36 (30.0)	83 (69.2)
Fluency of extension agent	1 (0.8)	32 (26.7)	87 (72.5)
Dependability of extension agent	26 (21.7)	5 (4.2)	89 (74.2)

Source: Field Survey (2007)

Hypothesis testing between Enterprise Characteristics and Use of Cocoa production technologies

The hypothesis was tested using Chi square to establish whether there is relationship or not between the enterprise characteristics of the farmers and extent of use of the disseminated cocoa production technologies by the extension agents. The aim is to ascertain the characteristics that favourably influence the respondents to use the disseminated technologies.

The result of the analysis, as given in Table 6 revealed that the farm size, land ownership status, cocoa farm ownership status, other occupation apart from farming and contact with extension agents have significant relationship with the level of use of the disseminated technologies. This means that apart from having information about the technologies, size of a farmers' farm, land ownership status, ownership status of the cocoa farm, the other occupation farmers are involved in and whether there is contact with extension agents, do influence the extent of use of the disseminated technologies.

Table 6: Chi-Square analysis between Enterprise Characteristics and Use of Cocoa production technologies

Enterprise characteristics	Chi-value	df	p-value	Decision
Farm size	1186.7	9	0.000	Significant
Land ownership status	3749.0	4	0.000	Significant
Cocoa farm ownership	2884.9	4	0.000	Significant
Other occupation	525.4	5	0.000	Significant
Contact with extension agents	6675.5	2	0.000	Significant

CONCLUSION

The study established that the ADP is the dominant source of extension services to cocoa farmers and that the farmers generally have a favourable disposition to extension services in the study area. The constraints to extension services are those that have to do with issues outside the extension agents' characteristics and the constraints are significant enough to preclude those concerned from benefits of extension services.

RECOMMENDATION

Based on the findings of the study, the following recommendations are made;

1. Institutional facilitation of extension services, such as efficient input delivery and adequate personnel:client ratio, should be focused upon to improve the impact of the services to the target beneficiaries.
2. Any programme that would be targeted at cocoa enterprise development can safely be implemented through the State's ADP, being the dominant source of extension service to the cocoa farmers.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

Analysis of Off-Farm Work among Farming Households in Oyo State

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Abstract: The study analysed off-farm work among households in Oyo state. Multistage sampling was used for the study. Data were collected through interview schedule carried out with two hundred and fifty respondents in twenty five villages in Ogbomoso and Oyo/Iseyin Agricultural Zones of the state. The data were analysed using descriptive statistics and Logit model. The study identified the determinants of farming households' decision to engage in off-farm work. The analysis showed that, five (5) out of the variables considered proved to have significant impacts on the farming households decision to work off-farm. Four of these, educational level of farmers, wife's educational level, hired labour and distance to the farm were positively significant. Wife's age was negatively significant at 5% level. The study also identified the probability of participation in off-farm work. The analysis showed that only wife's age proved to have significant influence on the probability of participation in off-farm activities.

Keywords: Off-farm income, farming household, Oyo state

INTRODUCTION

Nigeria is considered as one of the leading countries in Africa and a country endowed with oil wealth and potential wealth in gas reserves. It has a population of about 140 million people which is more than 15% of Africa's total population (Okunmadewa, 1997). Agricultural production in Nigeria is poor and below expectation. It has been the main occupation of the majority of the people living in the rural area where most of them engaged in the production of food to feed the country population either directly or indirectly (Akindeyin, 2003).

Agricultural system in Nigeria is a low external input agriculture (LEIA) in which the rate of technology adoption (chemical, biological and mechanical technologies) is low and the rate of use is equally low (Uwatt, 1998). Rural areas in Nigeria are plagued with poverty more in terms of incidence, depth and severity (World Bank, 1996). Agricultural production in Nigeria still relies heavily on the rural farmers who constituted about 90% of food producers for the nation (Rahji, 2000). World Bank (1996) described them as small scale operators, tenants or landless, characterized by low income and nutritional deficiencies, limited assets, large family size, high dependency ratio.

The above might have arisen because majority of Nigeria farmers live in rural areas with the practices being so primitive, subsistent and counter productive that the nation has been found wanting in her effort toward making great supports in sufficient food production in quantity and quality for her fast growing population (Ekong, 2003). As a result of this problem of poor performance, many

have put the blame solely on an average Nigerian farmer who is characterized as an irrational, conservative, ignorant and superstitious resource allocator (Olayide, 1993).

Some scholars (Aromolaran, 2002; Godwin, 1997) yet attributed the poor performance of those farmers to the following factors;

(a) Non availability of credit facilities to permit the farmers to make the change over from low productivity usually self sufficient farming to more productive cash crops.
(b) Low level of formal education also affect to a large extent the managerial ability of the farmers, hence it may reduce their tendency for diversification to get higher income especially off-seasons.
(c) More farmers cultivate crops only and they practice rain-fed agriculture and are therefore subjected to risk of crop failure. They depend mainly on good weather condition.
(d) Poor extension services and contact with farmers.
(e) Non–availability of inputs like fertiliser, chemicals and tractorization for farmer's use.
(f) The low hectarage cultivated by most of the farmers hinders hectarage/output expansion with its stagnating effect on income.

In trying to reduce the effect of some of the problems above, some farmers combine one or more occupation with farming hence the genesis of off-farm activities. It follows that additional income must be earned in off-farm work, for most Nigeria farmers, farming is a seasonal occupation except in areas where some form of irrigation are practiced, farmers therefore endeavour to supplement their income with petty jobs outside farming (Ekong, 2003; Lee, 1996).

Early in the 20th century, farming household did little off-farm work because the costs of such participation were prohibitive. Farm households relied on farming as their primary and usually sole source of income (Brewster, 1979). Hence, some farmers may want to abandon farming or seek off – farm work to cushion their productivity and over all welfare (El–Osta, 1996). The income generated by off–farm work may be used to pay the debt of the farmers and to feed their family during scarcity of farm produces i.e. off–season. However, how the farmers pursue this goal will depend on his education and wealth among others (Bessant, 2002).

Some widely known off–farm occupations include the following; saw milling, pottery, weaving, carving, leather works, carpentry, bicycle – repairing, black smiting, knitting and dressmaking, dyeing, retailed trading, barbing and hair dressing, entertainment, drinking parlour operation, teaching, bricklaying and house construction, midwifery native doctoring, preaching, transport operation etc. (Ekong, 2002). Although there are numerous non farming occupation in the Nigerian rural areas, it is observed that the level and intensity of these occupations are usually such that they are over – shadowed by agricultural activities when these are compared with those of the urban area (Ekong 2003).

Studies have shown that farm households engaged in many work as well as farming (Blekesaune *et al*, 1998). The typical farm household is thus faced with the problem of inherent trade – off between or among its many activities and objectives. The growing uncertainties of farming together with increased opportunities for off–farm work have led to

a new arrangement of combining off–farm work with farming (Godwin and Marlowe, 1990).

Since increased agricultural output is the key to future development and prosperity of the developing world at large; it follows that traditional farming systems are the basis of agricultural production among farmers. The fact that rural farmers are plagued by poverty has been one of the most important factors retarding agricultural development in the country (Rahji, 1999). This now makes the farm household members to increase their participation in off–farm work at the expense of farming when the marginal returns to the former become larger than the marginal returns to the latter (USDA, 2001).

The problem therefore centres on understanding the farm households' behaviour or reaction and on identifying the determinants of off–farm activities participation by farming households in Ogbomoso Zone of Oyo state. This study covers only Ogbomoso Agricultural zone of Oyo state Agricultural Development Programme, whereas Rahji (1999)'s work covers the whole state. The specific objectives of the study are to:

i. identify the type of off–farm work in which farming households are engaged with in the study area,
ii. analyse the determinants of participation in off–farm work by households in the study area, and
iii. estimate the probability of participation in off–farm work by households in the study area.

LITERATURE REVIEW

In many rural areas, agriculture alone cannot provide sufficient livelihood opportunities. Rural off-farm employment can play a potentially significant role in reducing rural poverty. Off-farm income provides the cash that enables a farm household to purchase food during a drought or after a harvest shortfall. It is also a source of farm household savings used for food purchase in difficult times (Barrett and Reardon, 2001). Growth in the rural off-farm sector may reduce income inequality if income from such activities disproportionately favour the poor, off-farm income can compensate for inadequate farm incomes of the poorest.

Most evidence shows that non-farm activities in African is fairly evenly divided across commerce, manufacturing and service linked directly or indirectly to local agriculture or small towns and is largely informal rather than formal (Reardon, 1997). Household earn much more from non-farm activity than from wage labour but non-farm wage labour is more important than self employment in the non farm sector (Reardon, 1997).

Livelihood diversification is often characterized as being driven by two processes; distress – push where the poor are driven to seek non farm employment for want of adequate on farm opportunities and demand – pull where rural people are able to respond to new opportunities. In the former situation, large numbers may be drawn into poorly remunerated with low entry barrier activities while the latter are more likely to open a route to improved livelihood. Lanjouw and Feder (2000) pointed out that; "such employment may nevertheless be very important from a welfare perspective for the following reasons; off-farm employment income may serve to reduce aggregate inequality where there exist

seasonal or longer term unemployment in agriculture, household may benefit even from low non-farm earning and for certain sub groups of the population that are unable to participate in the agricultural labour market, non-farm incomes offer some means to economic security."

Ekong (2003) emphasised that off-farm occupation in rural areas in Nigeria share certain characteristics which go to explain their inferior status. These implies that they; generally entail low capital investment and often do not use complex machine, usually entail low levels of division of labour, are usually regarded as part time occupations or other job besides farming, involve minimum or no retraining of workers for better productivity. In most cases other workers apart from the owner of the business serve as an apprentice and usually paid wages. The owner is usually the proprietor/manager thereby making them very private enterprises; his level of education may be so low that the level of his business management, skill and knowledge of market information are all low.

METHODOLOGY

Oyo State is divided into four agricultural zones; these are the Ibadan/Ibarapa, Oyo/Iseyin, Saki and Ogbomoso Zones. Two zones were randomly chosen for the study. They are Ogbomoso and Oyo/Iseyin Agricultural zones. Agriculture is the major occupation in these areas with household constituting the majority of the farm labours.

Ogbomoso Zone of Oyo State is located at approximately latitude $8^0$10'N and longitude $3^0$29'E (Ogbomoso town planning Authority, 1998) while Oyo/Iseyin is on latitude $4^0$2'N and $6^0$5'E (Oyo town planning Authority, 1998). The vegetation of the area is generally regarded as derived savannah for Ogbomoso zone and rain forest for Oyo/Iseyin, the mean monthly temperature is around 28^0C with very little variation in March. The rainy season usually starts in March and last till November, June and July are usually wet months for both zones. The estimated population figure was 208,045 with 99,405 males and 108,640 females for Ogbomoso zone and 240,426 with 106,530 males and 133,896 females for Oyo/Iseyin (National Bureau of Statistics, 2006).The major crops grown include food crops such as maize, cassava, yam, vegetable, beans and tree crops like mango, cashew and orange.

Both primary and secondary data were used for the research work. The primary data was a cross sectional data obtained using structured questionnaire while secondary data was collected by reviewing relevant and past literature. The questions were prepared in English language but were translated into Yoruba during its administration to non-educated farmers.

Multistage random sampling technique was employed for the study. Ogbomoso and Oyo/Iseyin zones comprise of five (5) local government areas each. Three local government areas and two local government areas were selected randomly from Ogbomoso and Oyo/Iseyin zones respectively. From each local government area five (5) villages, were choosen randomly. In each village a sample of 10 farmers were drawn randomly. A total of two hundred and Fifty (250) farmers were interviewed. Descriptive statistics and logit analysis were used for data analysis. The descriptive analysis involved the use of frequency counts and percentages

The logit model postulates that the probability (P_i) that an individual (i) participates in

off – farm work is a function of an index, Z_i. Z_i is also the inverse of the standard logistic cumulative function of P_i i.e.

$P_i (Y = 1) = F (Z_i)$

$Z_i = F\text{-}1 (P_i)$ …… (1)

This index in addition to this summarises a set of the participants attributes (Xs). It is known to be a linear function of the attributes.

So, $b_1 X_1 + b_2 X_2 + \ldots\ldots\ldots Z_i = b_o + b_1 X_1 + b_2 X_2 + \ldots\ldots\ldots b_n X_n$

The probability of participation is given by

$$P_i (Y_i = 1) = \frac{1}{1+e^{-zi}} \quad \ldots\ldots. (2)$$

The probability of non participation is given by

$Q_i (Y = 0) = 1 – P_1 (Y = 1)$

But

$$1 – P_i (Y = 1) = \frac{1}{1+e^{zi}}$$

$$e^{zi} = \frac{pi(yi=1)}{1-pi(yi=1)} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The right hand side of the equation (3) is the ratio of the probability of participation to the probability of non participation.

The Dependent Variable (Y_i) is a dummy. It takes the value of 1 if the individual participates in off – farm work and 0 if otherwise. Because the dependent variable is binary, the ordinary least square (OLS) technique is inappropriate to estimate the model. The Cumulative Distribution function (CDE) is used to estimate such regression. The logistic function is chosen in this case. The probability of participation (P_i) by the individual is calculated from $\overline{Zi}$ values.

The probability of participation for the model is estimated from the average value of $\overline{zi}$ as

$$\overline{Zi} = b_0 + b_1\overline{X}_1 + b_2\overline{X}_2 + \ldots\ldots\ldots + b_n\overline{X}_n$$

The value is then converted into a probability value using the probability table. It was hypothesized that the probability of participation depends on the individual's age (X_1), age of the wife (X_2), years of formal education of farmer (X_3), years of formal education of wife (X_4), farming experience of farmer (X_5), family labour (X_8), farm size (X_9), hired labour (X_{10}) and distance to farm (X_{11}). The selection of these variables is guided by previous studies as well as economic theory.

RESULTS AND DISCUSSION

Farming Household by Off-Farm Income

Table 1 showed that 29.2% of the respondents earned off-farm income between N5000-N50000 from their off farm work. It also shows that 24.0% earned between N50,001–N100,000, 11.2% earned between N100,001 and N150,000, 12% earned between N150,001 and N200,000, 7.0% earned between N200,001 and N250,000, 10.4% earned between N250,001 and N300,000 and 9.3% earned >N300,000 in the year estimated. Based on this findings one may conveniently say that majority of the respondents had less or equal to N100,000 as their annual off-farm income. This means that the respondents have additional income to the family thereby not depending entirely on the farm's income; hence farmers with off farm work have enough money which may translate to better life for them.

Table 1: Distribution of Farming Household by Off-Farm Income.

Off farm income (N)	Frequency	Percentage
≤ 50,000	73	29.2
50,001 – 100,000	60	24.0
100,001 – 150,000	28	11.2
150,001 – 200,000	30	12.0
200,001 – 250,000	19	7.60
250,001 – 300,000	26	10.4
> 300,000	14	5.6
Total	250	100.0
Mean = 139,765		

Sources: Field survey, 2007

Farming households by off farm works.

Table 2 revealed that 22.8% of the respondents were engaged in trading as their off farm work, 9.60% engaged in bricklaying, 9.2% in security work, 9.2% were found doing tailoring, 10.0% engaged in carpentry work, 10.4% in driving, 4.8% were engaged as clerks while 24.0% of the respondents engaged in other activities which were not listed. Respondents engaged in these different activities to supplement farm work.

Table 2 Distribution of farming households by off farm work

Off – farm work	Frequency	Percentage
Bricklayer	24	9.6
Security Work	23	9.2
Trading	57	22.8
Tailoring	23	9. 2
Carpentry	25	10.0
Driving	26	10.4
Clerical work	12	4.8
Others	60	24.0
Total	250	100.0

Source: Field survey, 2007.

Analysis of regression results

Table 3 represented the results of the logit regression model. The Pearson chi-square ($\chi 2$) was used to test for the goodness of fit. The calculated $\chi 2$ which was the same thing as the likelihood ratio was 9.31 for the farmers.

Table 3: Regression results

Variables	Units	Coefficient	Standard Error	t-value
Constant (k)		-.3972169840	.89644369	-.443
Farmers age (X1)	yrs	.3979407037E-03	.22041976E-01	.018
Wife age (X2)	yrs	-.1072847049E-02	.63047313E-03	-1.702*
Farmers Education (X3)	yrs	.54918290	.32022327	1.715*
Wife education (X4)	yrs	.7237249994	.40583918	1.734*
Farming Experience (X5)	yrs	.1658519032E-01	.27759137E-01	.597
Farm Income (X6)	N	.2099843528E-05	.14619467E-05	1.436
Household Net worth(X7)	N	-.1462810496E-05	.11421652E-05	-1.281
Family labour (X8)	manday	.1830000101E-01	.22403291E-01	.817
Farm size (X9)	(Ha)	.1201693515E-02	.41078858E-01	.029
Hired labour (X10)	manday	2.28231326709	.98673293	2.313**
Distance to farm (X11)	Km	.25952163	.13644677	1.902*

Source: Field survey 2007.
Pearson χ^2 = 9.31
Likelihood ratio = 9.31
N = 250
DF = 11
**Significant at 5%, t=0.05
* Significant at 10%, t=0.10

The result of the analysis indicated that farm income (X_6), family labour (X_8), farmer's age (X_1), farming experience (X_5), and farm size (X_9) had positive but insignificant influence on farmer's off-farm work participation which implies that the more these variables increase, the more the participation in off-farm work. This contradicted the

findings of Rahji (1999), which shows that the above variables negatively significant in his study in 1999.

Years of formal education of farmer (X_3), wife education (X_4), hired labour (X_{10}), and distance to farm (X_{11}), had positively significant influence on farmers off – farm work which revealed that the higher the educational level of the farmer, wife education, hired labour and distance to farm, the more the participation in off-farm work. This also contradicted the findings of Rahji (1999) in which those variables were negatively significant in his study in 1999. The household net worth (X_7) was negative and not statistically significant i.e. the lower the net worth the more the participation in off-farm work. The wife's age (X_2) had negatively significant influence on farmers' off-farm work which implies that the higher the wife's age the lower the participation in off-farm work. This conforms to the findings of Rahji (1999) as he found out that household size and wife's age also had negatively significant relationship with off-farm work in 1999.

It should be noted that a positive sign of a parameter indicated that higher value of the variable tend to increase the likelihood of participation in off-farm employment. Similarly a negative sign of a coefficient implies that higher value of the variable would decrease the probability of engaging in off-farm work.

Overall, five of the variables in the model showed a significant influence on the off-farm behaviour of the farming households.

Probability of participation

The result of the analysis indicated that farmer's age (X_1), years of formal education of the farmer (X_3), years of formal education of wife (X_6), family labour (X_8), farm size (X_9) hired labour (X_{10}) had a positive but insignificant influence on the farmer's probability of participation in off farm work which implies that the more the variables the lower the probability of participation in off – farm work. Wife's age (X_2) had a negative but significant influence on the probability of participation of farmer in off-farm work. Household net worth (X_7) and distance to farm (X_{11}) were negative and not statistically significant in the probability of participation of the farming households in off-farm work. This implies that the lower the household net worth and distance to the farm the more the probability of participation in off – farm work; this contradicted the findings of Rahji (1999) in which household net worth and distance to the farm were positive and statistically significant in his study in 1999.

Table 4 Estimated probability of participation

Variables	Units	Coefficient	Standard Error	t-values
Constant (k)		-.9609820671E-01	.21737989	-.442
Farmer's age (X1)	yrs	.9627329532E-04	.53326017E-02	.018
Wife's age (X2)	yrs	-.2595525410E-03	.15223715E-03	-1.705**
Farmer's education (X3)	yrs	.9695433686E-03	.14784074E-02	.588
Wife education (X4)	yrs	.1302661017E-03	.15156658E-03	.859
Farming experience (X5)	yrs	.4012434292E-02	.67154242E-02	.597
Farm income(X6)	N	.5080125109E-06	.35290356E-06	1.440
Household net worth(X7)	N	-.3538959080E-06	.27647729E-06	-1.280
Family labour (X8)	Manday	.4427296291E-02	.54180597E-02	.817
Farm size (X9)	Ha	.2907242048E-03	.99381946E-02	.029
Hired labour (X10)	Manday	4094581230E-03	.11753165E-02	.348
Distance to farm (X11)	Km	-.6074818576E-02	.96337398E-02	-.631

Source: Data analysis, 2007
** Significant at 5%, t0.05

CONCLUSION AND RECOMMENDATION

The study focused on the analysis of off-farm activities among farming households in Oyo State. Primary data were collected with the aids of questionnaire administered to one hundred and fifty respondents.

The study summarises that the respondents had additional income to the family thereby being independent of the farmer's income hence farmers with off-farm work have enough money to purchase fertiliser with pesticide which enhance productivity which translated to better life for them.

It should be noted that a positive sign of a parameter indicated that higher value of the variable tend to increase the likelihood of participation in off – farm employment. Similarly a negative sign of a coefficient implies that higher value of the variable would decrease the probability of engaging in off – farm work. Overall, five of the variables in the model(years of formal education of farmer, wife education, hired labour, distance to farm and wife's age showed a significant influence on the off-farm behaviour of the farming households. Only the wife's age (X_2) had a negative but significant influence on the probability of participation of farmer in off-farm work.

Based on the findings of the study, the following recommendations were suggested;

(1) There should be an awareness campaign for off-farm work, rural dwellers to supplement their income from their farm work. This will go a long way in boosting their income for the family.

(2) Making more land available to the farmers for agricultural production purposes. The more land they have the more labour that will be required. These can only come from the allocation to off – farm work. Farm expansion must be backed with an operational tenure system, Land Use Act and land development agency. In other words, an effective and redistribution policy is called for, these policy options are deemed necessary and sufficient to push agriculture forward and for the country to attain its agricultural development objectives.

(3) Government should provide assistance to the rural farmers by way of providing loans monitoring groups and generally programmes that can generate funds.

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Productivity of Maize Farmers' in Surulere Local Government Area of Oyo State

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Abstract: Low productivity in Agriculture has been observed to be a problem militating against increased and sustainable farm income. The study therefore undertakes the analysis of maize farmers' productivity in Surulere local government area in Ogbomoso agricultural zone of Oyo State. A multistage sampling technique was used to select 30 maize farmers in the study area. The study used a stochastic frontier production model to estimate the efficiency of the farmers. Results revealed that farm size was statistically significant at 5% level while Seed was positive and statistically significant at 1 percent level. The estimated gamma parameter (γ) of 0.56 in the study, indicates that 56% of the total variation in maize output is due to the technical inefficiencies of the maize farmers in the study. The mean technical efficiency (χ) of the farmers was 0.669 while the return to scale (RTS) in maize farming was 2.302;It was therefore concluded that there is a positive and significant relationship between farm size, quality of seed used and maize output in the study.

Keywords: Productivity, Technical Efficiency, Maize farmers Production, Stochastic Production Frontier, Farm size

INTRODUCTION

Recently, the bulk of maize grains produced in Nigeria were from the southwest zone. Although large proportion of the green maize is still produced in all the southwestern part of the country, there has been dramatic shift of dry grain production to the savanna, especially the Northern Guinea savanna. This can now be regarded as the maize belt of Nigeria; in this zone farmers tend to prefer maize cultivation to other grain species. This trend may have been brought about by several reasons including availability of streak resistant varieties, high-yielding hybrid varieties, increase in maize demand coupled with the federal government imposed ban on importation of rice, maize and wheat. Local production had to be geared up to meet the demand for direct human consumption, breweries, baby cereals, livestock feeds and other industries (Iken and Amusa, 2004).

The importance of sustaining agricultural production to improve standard of living has been recognised by all countries throughout the world. However, in the economic literature of the 1950s and 1960s the role of agriculture in development was considered ancillary to that of the modern industrial sector where most of the accumulation and growth was expected to take place. Subsequent theoretical investigations and the very disappointing performance of agriculture in many developing countries have led to the belief that the role of agriculture in development should be re-examined. Erratic and in-egalitarian growths, persistence of malnutrition, periodic famines together with

increased dependence on food from abroad, have continued. The situation is, however, substantially worse than highlighted by these trends. Indeed, the initial conditions from which low growth has taken place were already quite distressing. Average per capita food supply was conspicuously lower than requirement, while food consumption was traditionally much skewed. Recent investigations have shown that such inequality would appear to have increased even in countries experiencing relatively rapid agricultural growth. Thus, the combined effects of low starting points, slow or negative growth of food output per capital and the worsening of income distribution and food consumption explain the increase in the number of people suffering from deficient food intake and why the food threat continues to hang over many developing countries.

Nowadays, there is a large consensus on the need for increasing agricultural output and improving nutritional standards among farmers. However, views and policies differ widely on how to attain such objectives. A large number of strategies have been proposed ranging from the technology option, which stresses the increased use of modern machinery, pesticides and fertilisers, to others which consider that the existing economic and power structure in agriculture is the major obstacle to rural development. According to the latter view, the provision of more and improved inputs, although necessary, would not be sufficient to ensure a fast and egalitarian growth capable of eliminating rural poverty. The increase in input supply should be accompanied by measures ensuring broadly equal access to land and other productive assets to the rural population; this could be achieved through land redistribution (Giovanni, 1996).

Objective of the Study

The main objective of this research is to analyze the productivity of maize farmers in Surulere Local Government Area of Oyo State. The specific objectives are to:

i. determine the technical efficiency of maize production in the study area and
ii. examine the determinants of maize output in the study area.

Hypotheses of the Study

The hypotheses of the study, stated in null form (H_0), are as stated below:

i. There is no significant relationship between farm size and maize output.
ii. There is no significant relationship between the quality of seed used and maize output.

LITERATURE REVIEW

Concept of efficiency and production

Efficiency is the act of achieving good result with little waste of effort. It is the act of harnessing material and human resources and coordinating these resources to achieve better management goal. Farrell (1957) distinguished between types of efficiency (a) Technical Efficiency (TE), (b) Allocative Efficiency (AE) and (c) Economic Efficiency (ER), by saying that farm efficiency can be measured in terms of all these type of efficiency. The appropriate measure of technical efficiency is input saving which gives the maximum rate at which the use of all the inputs can be reduced without reducing output. Technical efficiency is defined as the ability to achieve a higher level of output, given similar levels of inputs. Allocative efficiency deals with the extent to which

farmers make efficient decisions by using inputs up to the level at which their marginal contribution to production value is equal to the factor cost. Technical and allocative efficiencies are components of economic efficiency (Abdulai and Huffman, 2000).

Production is defined as the transformation of goods and services into finished products (that is input-output relationship) and this is also applied to every production process, maize production inclusive. Olayide and Heady (1982) defined production process as one whereby some goods and services called inputs are transformed into other goods and services called output. In agriculture, the physical inputs which we use are: land, labour, capital and management. Pitt and Lee (1981) have estimated stochastic frontiers and predicted firm-level efficiencies using these estimated functions, and then regressed the predicted efficiencies upon firm –specific variables such as managerial experience, ownership characteristics etc in an attempt to identify some of the reasons for differences in predicted efficiencies between firms in an industry. This has long been recognized as useful exercises, but the two-stage estimation procedure has also been long recognized as one, which is inconsistent in its assumptions regarding the independence of the inefficiency effects in two estimation stages. The two-stage estimation procedure is unlikely to provide estimates, which are as efficient as those that could be obtained using a single stage estimation procedure.

Stochastic Frontier Production Function

Empirical estimation of efficiency is normally done with the methodology of stochastic frontier production function. The stochastic frontier production model has the advantage of allowing simultaneous estimation of individual technical and allocative efficiencies of the farmers as well as the determinants of technical efficiency (Battese and Coelli, 1995). Economic application of stochastic frontier model for efficiency analysis include Aigner *et al*., (1977) in which the model was applied to US agricultural data, Battese and Corra (1977) applied the technique in the pastoral zone of eastern Australia, Ogundari and Ojo (2005), Ajibefun *et al*., (2002), Bravo Ureta and Pinheiro (1993) and Ali and Byerlee (1991) in which they offer comprehensive review of the application of the stochastic frontier model in measuring the technical and economic efficiencies of agricultural producers in developing countries. Technical efficiency is the ability of the firm to produce the maximum output from its resources. One firm is more technically efficient if it produces a level of output higher than another firm with the same level of input usage and technology. Measures of technical efficiency give an indication of the potential gains in output if inefficiencies in production were to be eliminated. Recent measures of technical efficiency in the Soviet Union have been incongruous with the presumption that bureaucratic obstacles in the command-economy system inherently foster waste in resource utilisation and inefficiencies in production. Koopman (1989), in his analysis of time-series data of aggregate Soviet Republic agricultural production, estimated that the average level of technical efficiency in Soviet Agriculture is almost 95 percent, with little variability among the republics.

Technical efficiency was also defined by Koopmans (1951), as the ability to minimize input use while maintaining a given output level, or the

ability to maximize output production while fixing the amount of input use. The ideas of production function can be illustrated with a farm using n inputs: X_1, X_2 … X_n, to produce output Y. Efficient transformation of inputs into output is characterized by the production function f (Xi), which shows the maximum output obtainable from various inputs used in production. Therefore, for the sake of this study, the stochastic frontier production function in which Cobb-Douglas was proposed by Battese and Coelli (1995) and confirmed by Yao and Liu (1998) represents the best functional form of the production frontier and was used for data analysis in order to better estimate the inefficiency of the maize farmers in this study.

METHODOLOGY

The study area - The study was carried out in Surulere Local Government area in Ogbomoso Agricultural zone of Oyo State; this LGA comprises of different villages, which are rural in nature. Ogbomoso is located approximately on the intersection of latitude $8^{0}08$' North and longitude $4^{0}15$' East. It is about 105 km North East of Ibadan (State capital), 58 km North West of Osogbo, 53 km South West of Ilorin and 57 km North East of Oyo town. The population was approximately 166,034 as of 2006 census, an area of 3542.82 square kilometres with about 60% of the dwellers being civil servants and also engaged in farming (both crops and animal production), Ogbomoso is regarded as a derived Savannah vegetation zone and a low land rain-forest area.

Sampling procedure - Maize farmers are the respondents for this study; forty small holder maize farmers were selected from the local government, but only thirty was used for the study.

The sampling technique employed is a multi-stage stratified random sampling technique. The first stage involved purposive selection of small scale maize farmers from these rural areas such as, Gambari, Igbon, Saba ode, Arolu, Araromi and Sadiwin respectively because the farmers are more concentrated in this area. The second stage involved a systematic simple random sampling to draw thirty maize farmers from the constructed sample frame through random selection of five farmers per settlements.

Research instrument - Questionnaire and interview schedule were the research instruments used for this study to collect information such as the physical quantities of production inputs and outputs from the farmers. While the test retest method was used to determine the consistency of the research instrument, the instrument was administered thrice on an interval of one week.

Data collection - Primary data were obtained with the interview schedule administered to the maize farmers. Also, observations and additional information given by the farmers that were not covered by the interview schedule were also recorded.

Data analysis

The data obtained from the field were subjected to analysis using inferential statistics. The Stochastic frontier production model was used to determine the relationship between the dependent variable (maize output) and the independent variables as well as to determine the technical efficiency in farmers operation in the study area.

Model Specification

$Y = f(X_1, X_2 \ldots Xn)$ ……equation (1)

Y = Output, value of total maize produced (kg)

X_1 = Farm size (hectares)

X_2 = Family labour (man day)

X_3 = Hired labour (man day)

X_4 = Seeds (kg)

X_5 = Fertilizer (kg)

The stochastic frontier production model

Linear function

$Y = b_0+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+\mu+v$.... equation (2)

Cobb-Douglas Production Frontier Function

$LnY_i = \overset{5}{LnA+\sum}\beta_i LnX_i+V-U$ ……equation (3)

$lnY = \overset{I=1}{b_0}+b_1lnX_1+b_2lnX_2+b_3lnX_3+b_4lnX_4+b_5lnX_5 +\mu+v$ …… equation (4)

Inefficiency model

$U_i = \delta_0 + \sum \delta_i Z_i$ …… equation (5)

$U_i = \delta_0+\delta_1Z_{1i}+\delta_2Z_{2i}+\delta_3 Z_{3i}+\delta_4Z_{4i}$ … equation (6)

Where

Z_1 = level of education

Z_2 = Years of farming (year)

Z_3 = Family size (number)

Z_4 = Land right (dummy, with land right=1, without land right=0)

Where Y = dependent Variable,

X_i = independent Variables

μ and v = error term, b_1's = parametric estimates and b_0's = the intercept term

A and B_i = parameters to be estimated (i = 1, 2... 5)

X_i = the vector of (transformations of the) *i*th input used by *j*th farm

β = is a vector of unknown parameters and

V = random variables

U = non-negative random variables which are assumed to account for technical inefficiency in production.

δ_0 and δ_i = parameters to be estimated (i = 1, 2,.....4) together with the variance parameter.

$\sigma^2_s = \sigma^2 + \sigma^2_v$

$\sigma^2 = \sigma 2v + \sigma^2_u$

$\lambda = \sigma_u / \sigma_v$

$\gamma = \sigma 2u / \sigma^2_v$

This measures the effect of Technical Efficiency variation of observed output.

γ >1 this indicates that one-sided error dominates the symmetry error indicating a good fit and correctness of the specified distribution and assumption.

On the assumption that V_i and U_i are independent and normally distributed, the parameters β, σ^2_u,σ^2_v, σ^2, γ and λ were estimated by the method of Maximum Likelihood Estimates (MLE), using the computer FRONTIER Version 4.1 (Coelli, 1996) which also computed the estimates of Technical Efficiency.

RESULTS DISCUSSION

Estimates of the stochastic frontier function

The cobb Douglass production function was adopted for this result compare to the Ordinary Least Square (OLS) functional form because of the higher number of significant variables and it also caters for both increasing and decreasing returns to scale unlike the linear functional form which considers only the constant returns to scale which rarely exist in agricultural production activities.

The parameters and related statistical test results obtained from the stochastic frontier production function analysis are presented in Table 1.There is a positive and significant relationship between farm size and maize output in this local

government area. Land is therefore a significant factor associated with changes in output in this local government area. The coefficient of seeds is positive and statistically significant in the local governments' area. This implies that seed is a positive factor influencing maize output in the study area. In other words, the more the quality (variety) of seeds used in kilogram, the more the output of maize produced.

Sources of inefficiency

The sources of inefficiency were examined using the estimated (δ) coefficients associated with the inefficiency effects in Table 1, the inefficiency effects are specified as those relating to education, experience, family size and land right.

The estimated coefficient of education is appropriately signed (apriori expectation) in this study and statistically significant. The implication is that farmers with more years of formal education tend to be more technically efficient in maize production, presumably, due to their enhanced ability to acquire technical knowledge, which makes them closer to the frontier output.

The estimated coefficient of farming experience is positive and statistically significant at 5 % in this Local Government Area. The positive coefficient indicates that farmers with more years of farming experience are relatively less technically efficient or more inefficient in maize production.

The estimated coefficient of family size is positive and insignificant in the study. This implies that maize farmers with more family size tend to be more technically efficient in maize production.

Return to Scale

The Return to Scale (RTS) in maize farming was 2.302 in Surulere LGA; this indicates a positive increasing return to scale in this area, which implies that maize production was in stage I of the production surface. This shows that effort should be made to expand the present scope of production to actualize the potential in it. That is, more of the variable inputs should be employed to achieve more output.

The diagnostic statistics

The estimated sigma square for maize production in Surulere LGA (0.017) is significantly different from zero at 1 percent. This indicates that one sided error term dominates the symmetry error indicating a good fit and the correctness of the specified distributional assumptions. Therefore if γ is statistically different from zero implies that traditional average (OLS) function is not an adequate representation for the analysis.

Determinants of technical efficiency

The determinants of technical efficiency of the maize farmers in the study area include farm size, seed, and year of maize farming experience. The implication is that the variables greatly impact on the TE of the maize farmers in the Local Government Area, which means that the tendency for any maize farmer to increase his productions depend on the amount of farm size and seed available to him in the study area.

Gamma parameter (γ)

The estimated gamma parameter (γ) of 0.56 in the study area indicates that 56% of the total variation in maize output is due to the technical inefficiencies in the Local Government Area.

Table 1: Results of the frontier estimates for the Study area

Ordinary Least Square result

Variables	Parameter	Coefficient	T-ratio
Constant	β0	-1.584	-1.541
Farm size	β1	0.332**	2.433
Family labour	β2	0.019	0.263
Hired labour	β3	0.096	1.117
Seeds	β4	0.306 ***	3.152
Fertiliser	β5	1.262 ***	2.105

Maximum Likelihood Estimator result

Variables	Parameter	Coefficient	T-ratio
Constant	β0	1.851	-2.167
Farm size	β1	0.324 *	2.973
Family labour	β2	0.003	0.050
Hired labour	β3	0.087	1.305
Seeds	β4	0.233 ***	2.719
Fertiliser	β5	1.655	3.346
Inefficiency Model			
Level of education δ1		-0.060 *	-1.708
Years of farming δ2		0.009**	1.956
Family size δ3		0.039	1.464
Land right δ4		-0.089	-1.113
RTS		2.302	
Sigma squared σ2		0.017 ***	3.610
Gamma γ		0.56	0.424
Mean efficiency χ		0.669	
Log Likelihood Function		19.655	

Notes: * =10%; ** = 5%; *** = 1% level of significance

Source: Result from data analysis, 2007.

N.B: if the estimate for the γ (gamma) parameter in the stochastic frontier production function is quite large, which means that the inefficiency effects are highly significant in the analysis of the value of output of the maize farmers.

Technical efficiency for the study area

In Surulere local government, the predicted technical efficiencies differ substantially among the maize farmers; ranking from 0.484 and 0.895 with the mean technical efficiency estimated to be 0.669, a frequency distribution of the technical efficiencies is presented in Table 2 and figure 1. This shows that the highest numbers of farmers have technical efficiencies of between 0.6 and 0.7; this also indicated that there is a wider distribution of technical efficiencies among the maize farmers in the area, which revealed that there is a considerable room for effecting improvements in the technical efficiencies of maize farmers in the local government.

Therefore, there is scope for increasing maize production in this LGA by 33.1 percent with the present technology.

Table 2 showing the frequency and decile range of farmers' efficiency

Range	Frequency	Percentage
< 0.5	1	3.3
0.5 – 0.6	8	26.7
0.6 – 0.7	12	40.0
0.7 – 0.8	4	13.3
0.8 – 0.9	5	16.7
> 0.9	0	0.0
Total	30	100.0

Source: Result from data analysis, 2007.

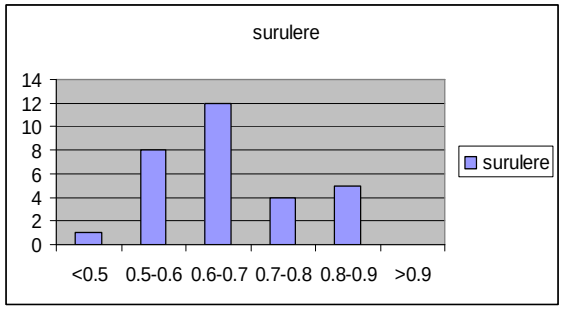

Figure 1. Graph showing decile range of farmers in the study area

Source: Result from data analysis, 2007.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study undertakes the analysis of maize farmers' productivity in Surulere LGA in Ogbomoso Agricultural Zone of Oyo State. A multistage sampling technique was used to select 30 farmers in the study area. Data were collected and subjected to inferential statistics and the Stochastic frontier production model which was used to determine the relationship between the dependent variable (maize

output), the independent variables and the technical inefficiency in farmers' operation in the study area.

The regression results revealed that farm size was statistically significant at 5 % level while Seed was positively and statistically significant at 1 percent level in the Local Government area. The estimated gamma parameter (γ) of 0.56 in the study area, indicates that 56% of the total variation in maize output is due to the technical inefficiencies in the study. The mean technical efficiency (χ) was 0.669 and the return to scale (RTS) was 2.302 in the area.

It was inferred that there is a positive and significant relationship between farm size, seed used and maize output in the study area.

CONCLUSION

It can therefore be concluded that there is a positive and significant relationship between farm size, quality of seed used and maize output in the study area therefore, the Null hypothesis were rejected and also availability and access to good quality seed have positive impact on output and increase in size of production resulting in better output.

Recommendation

Based on the findings in the study area, the following are recommended.

i. Farmers need to organize themselves into groups for easy access to formal sources of credit to acquire the needed farm implements, quality seeds etc.
ii. Also more efforts should be intensified on the part of extension agents in educating the farmers so as to boost their efficiencies in maize production.
iii. Results of better researches of improved agronomic practices should be extended to the farmers by the extension agents.

Contribution to knowledge:

i. The study confirmed that more land can still be open for maize production in the study area with the current level of input because the production is at stage 1 of the production phase.
ii. The study also provides policy recommendations of relevance to maize production in the agricultural zone and the nation at large.

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Appraisal of Finance Constraints to Small Scale Farming in Etsako East Local Government Area of Edo State

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Abstract: The study examined the finance constraints to small scale farming in Etsako East Local Government Area of Edo State. Data were obtained using questionnaire from 150 farmers randomly selected from 11 villages in the Local Government. Findings show that majority of the respondents (58%) are female; 79% are between 21 and 60 years old; 53.3% are married, 46.7% have no formal education. The result also shows that only 7% have access to bank loan while most (93%) access loan from other sources like cooperative societies; personal savings and relations. The correlation analysis shows that farmers' net income is significantly related to finance constraints ($r = 0.15$; $p < 0.05$); but farmers' age is not ($r = 0.18$; $p < 0.05$). Chi square analysis shows that finance source is significantly related to finance constraints ($x^2 = 26.27$, $p < 0.05$). The study therefore recommends that strategies that would enhance agricultural financing with the aim of improving the standard of living of farmers in the area, be put in place.

Keywords: Finance, constraints, small-scale farmer, Edo state.

INTRODUCTION

Agricultural business is vested mainly with small-scale farmers who are found mostly in rural areas in Nigeria; and are responsible for production of food that is consumed both in rural and urban communities; and raw materials needed by the industrial sector of the economy (Rahji, 1999). In discharging these responsibilities; they face a lot of problems that include inadequate or restricted access to capital and limited access to credit facilities (Ajakaye, 1985). FAO (1990), attributed the downward trend in per capita food production in Nigeria to increase in farming population which demands a continuous cropping on the soils without adequate fallow periods resulting into infertile soil, nature of land tenure in the country and restricted access to credit facilities to expand farm holdings.

According to Shephard (1997); credit determines access to all of the resources on which farmers depend. Credit serves as a source of funds to farmers that can be utilized in production process. Ogundeji (1998) stated that agricultural business like any other business can be financed through personal savings, friends or family assistance, partnership, bank loans, private placements, credit terms, hire purchase and cooperative societies. Though, the Federal Government of Nigeria, in recognition of the need to finance agricultural business, directed all licensed banks through Central Bank of Nigeria (CBN) in 1977 to open bank branches in the rural

Produced by IJAERD Press - Nigeria, 2008

areas. This is to encourage banking habit, provide agricultural credit with minimal interest and redress the lopsidedness in the availability of banking services in rural areas; farmers are still constrained in their access to credit facilities from banks and other funding sources.

Objectives

The main objective of this study is to appraise the finance constraints to small scale farming in Etsako East Local Government Area of Edo State; and specifically, the study intends to:

i. identify the socio-economic characteristics of the farmers.
ii. identify the sources of finance available for farming.
iii. identify the constraints to finance of farm business.
iv. make recommendations on strategies for strengthening Agricultural finance.

Hypotheses of the Study

The hypotheses proposed for the study, in null form, are as stated:

i. There is no significant relationship between some selected socio-economic characteristics (Age and Net Income) of farmers and their finance constraints.
ii. There is no significant relationship between sources of finance and finance constraints

METHODOLOGY:

The study was carried out in Etsako East Local Government Area of Edo State. The population of the study consists of all farmers in the 36 villages that make up the Local Government. Thirty percent of the villages (about 11) were selected for inclusion in the sample. A total of 150 farmers were randomly selected and interviewed. Questionnaire used to collect information on farmers' socio-economic characteristics; sources of finance; constraints to finance and suggestions on how farm financing can be strengthened, was face validated by experts. The following hypotheses were; however, tested:

Measurement of Variables

Independent Variables: The independent variables measured and analyzed were age, net Income and sources of finance.

Age: Respondents were asked to state their actual age in years.

Net Income**:** The net income was measured as the Estimated Total Revenue less the Estimated Total Cost of Production per enterprise per hectare for each respondent. It is a measure of farmers' propensity to save. Farmers' access to financial assistance from banks or other financial agencies is at times, among many other factors, dependent on their savings with such agency, which is a function of their net income. In estimating the total cost, respondents were asked to state the crops produced, the hectarage cultivated, the quantity and the amount spent on inputs: seeds, seed dressing chemicals, weeding or herbicides, insecticides, harvesting and processing last season. The total cost was then estimated as the total amount spent per crop per hectare for the last cropping season.

Total Revenue**:** In estimating total revenue, respondents were also asked to state the crop yield obtained in bags or baskets and sold after harvesting and the amount realized from the sale was estimated and used as the total revenue.

Sources of Finance: Respondents were asked to indicate their sources of finance; which were categorized as formal and informal sources and

assigned scores of one (1); and zero (0) respectively. Responses in each category were counted and used.

Dependent Variable: Finance constraint is the dependent variable. This was measured by asking respondents to indicate their responses on a 3-point likert type scale. The response categories ranged from "not at all" to "very strong" and scaled 1 to 3 respectively. The nine finance constraints factors used were unavailability of processing and storage facilities, fluctuating commodity prices, interest charged by lending agencies (La Due *et al*; 1992, Nayak and Turvey; 1997, Lot; 1996). Others include collateral adequacy, farm size and farmers' income, size of loan or credit requested, loan repayment ability and previous loan performance (Ekong; 1988, Asala, 2000, Rahji 2000). The maximum finance constraints score for any respondent was 27 while the minimum was 9. Finance constraints scores were obtained by adding the response scores in each category for each respondent and used to test for relationship between age and farmers net income. The finance constraints scores were then operationalised as very strong (21 to 27), strong (15 to 20) and weak finance constraint (9 to 14), and responses in each category counted and used in the determination of the relationship between finance sources and finance constraints.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of farmers

Data in Table 1 show that women (58%) are more actively engaged in farm works than men (42%). The age structure reveals that majority (79.4%) are between productive ages of 21-60 years. The average age of the farmers is, however, 40.6 years. These groups, given all necessary assistance, have the strength to increase hectarage cultivation and output.

Majority (53.3%) of the respondents are married and majority (46.6%) had no formal education. This implies that even if they can access technological information from agricultural journals and bulletins, they may have little comprehension of such information and may not be able to put them to profi Table use without outside assistance.

The Table also shows that 87% are engaged in farming as their major occupation; though, they are also engaged in other income generating activities outside rain-fed farming. These other enterprises have the potentials of being properly harnessed and developed to further improve the income and standard of living of the rural poor.

Table 1. Distribution of Farmers according to socioeconomic characteristics

Characteristic	Frequency	Percentage
Gender:		
Male	63	42
Female	87	58
Age (Years):		
Below 20:	10	6.6
21 – 40	70	46.7
41- 60	49	32.7
61 and Above	21	14.0
Marital Status:		
Single	25	16.7
Married	80	53.3
Divorced	10	6.7
Separated	20	13.3
Widowed	15	10.0
Level of Education:		
No Education	70	46.7
Primary Education	22	14.7
Secondary Education	48	32.0
Others	10	6.6
Major Occupation:		
Farming	132	88
Others	18	22

Other Income Generating Activities:		
Teaching	25	16.7
Farming	15	10.0
Trading	60	40.0
Brick laying	05	3.3
Barbing	12	8.0
Food Vendor	23	15.3
Security Personnel	10	6.7
Total	150	100

Farmers' Enterprise Characteristics

Eighty-eight percent access fairly large farm size of between 0.5 hectare to 10 hectares but majority (74.7%) only cultivate between half to three hectares of their farmland. The average farm size owned and cultivated by the farmers are 2.46 and 2.36 hectares of farmland, respectively. In rural areas, these are fairly large hectarages; though, other factors of production may be limiting in the area. The study shows that though 86% obtained their landholdings through inheritance while 73.3% have put in more than 10 years into farming; the average years of farming experience of farmers in the area was 9.12 years while their average annual income amounted to N30,316.67.

Table 2. Distribution of Farmers' Enterprise Characteristics

Characteristic	Frequency	Percentage
Farm Size Owned/Ha:		
½ - 5	95	63.3
5 - 10	37	24.7
10 and Above	18	12.0
Hectarage Cultivated:		
½ - 2	52	34.7
2 - 3	60	40.0
3-5	38	25.3
Years of Farming Experience:		
1-5	7	4.7
5-10	33	22.0
10 and Above	110	73.3
Estimated Net Annual Income (N):		
10,000 – 20,000	37	24.7
20,000 – 50,000	85	56.7
50,000 and above	28	18.6
Total	**150**	**100**

Distribution of Farmers According to Access to extension services, Ownership of farm record, Sources of and Access to loan

The study also shows that few respondents (30%) had access to extension services while majority (83%) did not keep adequate record of their farming activities. This may be due to low literacy level in the area. There is, therefore; the need to beef up extension activities in the area. Only seven percent accessed bank loans while 93% accessed loans from other sources. Thirty one percent and 46% respectively accessed loans from credit cooperative societies and personal savings to skip bank bottlenecks and problems of collateral security. This supports the assertion of Thorsten (1996) that Cooperative Financing Agency made sizeable amount of loans available to farmers though Cooperatives thereby overcoming problems of collateral experienced with the banks. It also supports the claim of Adewale and Ogunniyi (2000) that rural banking scheme have not been very successful in granting attainment of its objectives of encouraging banking habits and granting of loans to agriculture. They reported that few rural farmers have developed bank savings habit that most of the farmers, in addition, did not benefit from the bank credit facilities; that a large proportion made savings to cooperative societies and also obtained credit for farming activities from these societies.

Table 3. Distribution of Farmers According to access to extension services, ownership of farm record, sources of and Access to loan

Characteristic	Frequency		Percentage	
Access to Extension Services:				
Yes	45		30	
No	105		70	
Ownership of Farm Record:				
Yes	25		16.7	
No	125		83.3	
Sources of loan:				
Personal Savings	69		46.0	
Relations and friends	23		15.3	
Local money lenders	-		-	
Commercial bank	-		-	
Cooperative society	47		31.4	
Community bank	-		-	
Agricultural bank	11		7.3	
Access to loan:	**Bank**	**Other Sources**	**Bank**	**Other Sources**
Yes	11	139	7.3	92.7
No	139	11	92.7	7.3
Total	**150**	**150**	**100**	**100**

3.4 Relationship between Farmers' Net Income and their Finance Constraints

It was found that there is a statistical significant relationship between farmers' net income and their finance constraints ($r = 0.45$; $p < 0.05$). The implication is that farmers with higher net income have higher saving capacities and tendencies, and, unexpectedly have higher constraints to finance their farm holdings compare to low-income farmers. This may mean that those who have higher income may have larger family size that places higher demand on their income and hence may not have developed banking habit.

Data however show that farmers' age was not significantly related to their finance constraints ($r = 0.18$; $p < 0.05$). That implies that both young and old farmers are affected by different finance constraints. This is in line with findings from previous studies by Adewale and Ogunniyi (2000) that the ages and formal education of farmers have no significant relationship with their access to bank agricultural credit.

Table 4. Relationship between Age, Net Income and Finance Constraints

Characteristics	Critical Value @ P = 0.05		Decision	Remark
	r calculated	r tabulated		
Age	0.18	0.1946	Accept H_0	Not significant
Net Income	0.45	0.1946	Reject H_0	Significant

Relationship between Finance sources and Farmers' Finance Constraints

The study reveals that finance source is significantly related to finance constraints ($\chi^2 = 26.27$; $P < 0.05$). This implies that the ease or difficulty with which farmers' access fund varies from source to source. The easiest accessible source is personal savings of farmers. The collateral requirements of banks, need for adequate farm record and the unwillingness of banks to finance agricultural

enterprises is likely to make banks fund more difficult to access.

Table 5. Relationship between Sources of Finance and Farmers' Finance Constraints

Characteristics	Critical Value @ P = 0.05		Decision	Remark
	$\chi 2$ calculated	$\chi 2$ tabulated		
Sources of finance	26.27	5.99	Reject Ho	Significant

CONCLUSION

The study reveals that Agricultural business is still not adequately funded in the study area. If all stakeholders in areas of agricultural financing or funding fail to revive agricultural production through carefully planned; and well-monitored agricultural financing programmes, farmers may further be pushed below their subsistence level of living and still live in abject poverty.

RECOMMENDATIONS

Based on the findings of this study; it is recommended that small-scale farmers be mobilized into true Self Help Groups/Cooperative Societies. Managers of these groups and Extension personnel should, as a matter of necessity, continuously build the capacities of members through their various educational programmes, and encourage them to rely more on their group savings. Any outside credit assistance should then be channelled through the groups, which will effect disbursement to members and ensure timely repayment. Government should identify the implementation bottlenecks and review the implementation strategies of the defunct Agricultural Credit Guarantee Fund Scheme; and also increase her equity contribution to the fund. Besides, government should also come up with policies and action plans that would ensure regular market and attractive market prices for agricultural produce. These would encourage farmers to expand their farm holdings and increase significantly their output. This is expected to bring about the desirable standard of living to farmers and their family.

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Attitudinal Disposition of Children towards Participation in Cassava Processing Activities in Oyo State

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Abstract: The study focused on the attitudinal disposition of children towards participation in cassava processing activities in Oyo state. Data collection was made using interview schedule from eighty children participating in cassava processing activities. Also forty parents were cross-interviewed in order to validate the children's responses on attitude to participation in cassava processing activities. The result of the analysis revealed that children had positive or favourable attitude towards participation in cassava processing activities. The study reveals that there was significant difference between children's and their parents' attitude to participation in cassava processing activities (t=5.367).The result of correlation analysis showed that there exists positive and significant relationship between age and attitude to participation in cassava processing activities (r=0.297). It is therefore recommended among others that appropriate cassava processing technology should be developed for children that would make cassava processing activities interesting.

Keywords: Attitude, children, participation, cassava, processing activities.

INTRODUCTION

Agriculture is one of the economic sectors where child labour is common (FAO 2006). ILO (2006) suggested that at least 120 million children between the ages of 5 and 14 are fully at work and more than twice as many (or about 250 million of those for whom work is secondary activity are included. Of these 61percent were found in Asia, 32 percent in Africa and 7 in Latin America and at least 5% were found in developing countries. Although, Asia has the largest absolute number of children workers; the proportion of working children between 5 and 14 year is highest in Africa.

The largest proportion of children workers is in economic activities and occupations related to agriculture. Although, the average proportion of children in agricultural activities is between 70 to 74 percent it can be as high as 90 to 95 percent in some countries. According to ILO (1999) rural children particularly girls tend to begin to engage themselves in economic activities at an early age under the age of 10 years. In Bangladesh, 82 percent of the country's 6.1 million economically active children work in the country's sisal, tea, sugarcane and tobacco plantations. Children are believed to comprise a quarter of all agricultural workers in Kenya. A study in Malawi found that majority of children living on tobacco estates were working full or part time (78 percent of 10 to 14 years old and 55 percent of 7 to 9 years old respectively) (Bitter Harvest, 2006).

Nigeria is one of the major producer and consumer of cassava in the world today. The recent revolution in Nigeria's agriculture has led to discoveries of numerous important uses of cassava, locally as food crop and internationally as an export crop. It has been established that the post harvest system of cassava requires more labour than most other staple crops (IITA, 1996). One hectare of cassava containing 10tons of root (the average root yield in Africa) needs approximately 721 man hours to harvest and process. This labour 212 man-hours are needed for harvesting, 156 for handling and 353 for processing. The Collaborative Study of Cassava in Africa (COCSA) has shown that women along with children participated up to 92 percent in cassava processing activities, although, children's contribution to economic development goes unrecognised. Therefore, children are seen as providing a silent and obedient labour force. At times large numbers of these children are forced to work in the farm sector. In addition, children who live in poor rural communities are exposed to great risks from hazardous and exploitative agricultural labour. Children involved in processing crops such as cassava suffer respiratory problems due to inhalation of smoke and other poisonous substances such as cyanide, skin problems from handling sharp tools such as knife and burn to mention a few.

It is worthy of note that it is the nature and conditions of children's work which determines whether they are exploited or not; but the fact is that, if they work for a few hours a day to contribute to the family's well being, whether by performing domestic duties or helping in the family fields, this is more likely to foster a child's development than damage it (New Agriculturist, 2006). It is against this background that the following research questions were addressed.

i. What are the personal characteristics of the children participating in cassava processing activities in the study area?
ii. When do the children participate in the processing activities?
iii. What is the attitude of children towards participation in cassava processing activities?

Objectives of the study

The general objective of the study is to determine the attitude of children towards participation in cassava processing activities in Ogbomoso zone of Oyo state.

The Special objectives are to:

i. identify the personal characteristics of the children in the study area,
ii. ascertain period / time of participation in cassava processing activities, and
iii. determine the attitude of children towards participating in cassava processing activities in the study area.

Hypotheses

Based on the objectives of the study, the following were hypothesised:

i. There is no significant relationship between children's personal characteristics and attitudinal disposition towards cassava processing activities.
ii. There are no significant differences between children's and their parents' attitude to participation in cassava processing activities.

METHODOLOGY

The study was carried out in Ogbomoso agricultural zone of Oyo state, Nigeria. The zone comprises five local government areas from which

two were randomly selected namely: Ogbomoso South and Ogbomoso North local government areas. From each of the local government areas selected, two major cassava processing centres were purposively selected due to high concentration of the processors. The centres sampled are: Aarada market processing centre, Isale-ora processing centre, and cooperative society's gaari processing centre Molete and Ora-processing centre. Proportionate sampling technique was used in the selection of the respondents based on the population of children in each of the selected processing centres. A total of 80 children whose age falls between four (4) and 15 years old were interviewed from one hundred and twenty children in the study area for this study. Forty parents were also randomly selected who were also cross-interviewed in order to validate some of responses gathered from the children on attitudinal disposition towards participation in cassava processing activities.

Data were collected through structured and validated interview schedule. Data analysis was carried out using frequency counts, percentages and mean as descriptive statistics while t- test and Pearson Moment correlation analysis were used as inferential statistical tools.

The dependent variable of the study is the attitude of children toward participation in cassava processing activities. This was measured on 5 – point Likert scale for 10 attitudinal statements with 5 stated as positive and others stated as negative statements. The maximum attitudinal score for a respondent was calculated by multiplying the number of attitudinal statement with highest point on the rating scale to make a total of fifty (50) and the minimum score to be ten (10).

RESULTS AND DISCUSSION

Personal characteristics of the respondents

The result reveals that majority (61.2%) of the sampled children were between the ages of 12 and 15 years while more than one-quarter (28.8%) were between the ages of 8 and 11 years and the remaining 10.0% were between the ages of 4 and 7 years (Table 1). The mean age is 11.7years. This finding shows that majority of the sampled children are still in their childhood tending towards adolescent stage of life.

About two-thirds (67.5%) of the respondents interviewed were females while the remaining (32.5%) were males. This shows that female children dominated the processing activities in the study area. This finding tally with the findings of ILO (1999) and Awoyinka and Ogunba (1999) who reported that high proportion of female children in the rural areas predominantly carries out processing activities.

About 48.8% of the children had primary education, 36.2% are in junior secondary schools, 8.7% of them are in senior secondary schools while only few 6.3% of the sampled children were either in Nursery school or had no formal education. This implies that majority of the sampled children were engaged in educational activities. The relative high level of educational engagement among the children-respondents would eventually contribute to their proneness to adoption of modern technologies in agriculture especially processing technologies. This assertion is in line with the fact established by Obibuaku (1983) that farming population, which has higher concentration of young people (children), accepts new ideas more rapidly than older (parents)

who are influenced by their low level of education. Conversely, relative high level of education may have implication on migration of the respondents to larger cities for better opportunities.

Table 1: Distribution of respondents according to personal characteristics

Variables	Frequency	Percentage
Age (years)		
4-7	08	10.0
8-11	23	28.8
12-15	49	61.2
Gender		
Male	26	32.5
Female	54	67.5
Education		
No formal education	03	3.8
Nursery	02	2.5
Primary education	39	48.8
Junior education	29	36.2
Senior secondary education	07	8.7

Source: Field survey, 2006

Period of participation in cassava processing activities

Majority (68.7%) of the respondents indicated the time of participation in the processing activities as daily after the school hours, 15.0% indicated weekends while about 13.8% indicated holidays and only few (2.5%) participated in the processing activities daily before they go to school (Table 2). This implies that period of children's participation in the processing activities does not affect their schooling activities; although their participation in such activities could be termed exploitative because they cannot exercise their liberty since part of their leisure time is being spent on cassava processing activities. This findings tally with the assertion of ILO (2006) that children in rural communities face great risks especially in terms of exploitative agricultural labour.

Table 2: Distribution of sampled children according to period of participation in cassava processing activities

Period of participation	Frequency	Percentage
Daily before school	2	2.5
Daily after school	55	68.8
Weekends	12	15.0
Holiday	11	13.8
Total	80	100.0

Source: Field survey, 2006

Attitudinal disposition towards cassava processing activities

The result in Table 3 shows that 71.6% of the children-respondents have favourable disposition to participation in cassava processing activities. This indicated that majority of the children were favourably disposed to participation in cassava processing activities. This could be as a result of their early life exposure to processing activities by their parents, which probably stimulated their interests in the cassava processing activities. Meanwhile, 65.7 percent of the parent-respondents fell within the unfavourable zone. This indicated that majority of the children and parents are favourably and unfavourably disposed to participation in cassava processing activities respectively. Table 3 further revealed that the attitudinal statement: 'cassava processing activities has economic gains' were ranked first and 'children's participation could be hazardous to their health' was ranked the least. This implies that even though, there is economic gains in children's participation in cassava processing activities but children are not aware of the health implication associated with cassava processing activities. It was also revealed that there was a significant difference in the attitude of children and their parents' attitude towards their participation in cassava processing activities ($t=5.367$, $p< 0.05$)

Table 3: Distribution of sampled children according to attitude towards participation in cassava processing activities

Attitudinal Statements	Mean Score	Rank	Standard Deviation
Children's participation in cassava processing activities is a way of training children in agriculture while they are young	3.96	2	0.803
Cassava processing has improved children's knowledge in modern processing methods	3.91	3	0.860
Cassava processing has economic gains hence children involvement.	4.30	1	0.644
Children's participation in cassava processing activities is only for leisure	2.89	7	1.079
Cassava processing activities has exposed children that want to become future processors	2.59	8	0.990
Children's participation in cassava processing activities affects children's educational performance	3.72	4	0.729
Children's participation in cassava processing activities is a form of child labour	3.65	5	0.828
Children's participation in cassava processing can be hazardous to their health	1.80	10	1.011
Children's participation in cassava processing may increase production output of parents	1.86	9	0.413
The problem of children participation in cassava processing activities is enormous since they been force to do what they do not like	3.44	6	0.939

Grand Mean of the total scale item X = 3.21 S.D =0.365
Source: Field survey, 2006

Results from Table 4 indicate that the parents were not favourably disposed to their children's participation in cassava processing activities. The parents did not really like their children's participation in cassava processing activities but may have engaged the children in the activities due to their poor economic conditions. Also, it simply means that parents have higher visions for their children rather than been a life time cassava processors.

Table 4: Result of t- test analysis showing significant differences between attitude of children and their parents

Variables	Mean Score	Std. Dev	t - cal	df	t - tab	Remark
Attitude (parent) Attitude (children)	33.00 34.00	3.742	5.367	3	3.182	Significant

Source: Field survey, 2006 S – significant

The result of the correlation analysis revealed that age (r = 0.297) has positive and significant relationship with attitude towards participation in cassava processing activities. This implies that as the age of the respondents advance, they have favourable disposition towards participation in cassava processing activities (Table 5).

Table 5: Result of Correlation analysis showing relationship between selected variables and attitude towards participation in cassava processing activities.

Variables	r - value	Remark
Age	0.297*	Significant
Sex	0.125	Not Significant
Education	0.170	Not Significant
Time of participation	0.066	Not Significant

Source: Field survey. 2006

CONCLUSION AND RECOMMENDATIONS

The study revealed that female respondents dominated the processing activities in the study area and most of the children participate in cassava processing activities daily after the school hours. Generally, the participating children had positive and favourable attitude towards participation in cassava processing activities.

Based on these findings it was recommended that

(i) Enlightenment programme should be put in place by the government for the parents in order to create awareness on the implications of child labour.

(ii) There is need to intensify the on going poverty alleviation programme in the study area by the government in order to boost the economy of individual families in order to discourage parents in involving their children in an exploitative works in the study area.

(iii) Age as an important factor in determining the disposition towards participation in cassava processing activities should be considered by the extension institution in promoting programmes for children.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

Child Labour and Schooling in Rural Areas of Nigeria

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Abstract: This paper examined the impact of labour on the formal human capital development of children. The data used for the study was obtained from the 2001 Child Labour Survey conducted by the then Federal Office of Statistics (now National Bureau of Statistics) Data size comprised 20,830 household units with 100,785 individuals of which 25,542 were children between 5 and 17 years. The data were analyzed using sequential probit model. The age of a child was found to be an important determinant of participation in paid employment and enrolment at school as older children were found to be more enrolled than younger ones. Older children were able to combine school with work as it was easier for them to manoeuvre between the two activities. Gender of a child showed that the male children were more favoured in terms of schooling activity. The marginal effect showed that for every six children enrolled, five were males. A biological child of a household head had a greater chance of attending school than a non-biological child. .

Keywords: child labour, child schooling, sequential probit model, rural Nigeria

INTRODUCTION

In developed economies, where human development indices are high, child labour market is almost non-existent. In such societies virtually all children of school age, whether in the rural or urban areas attend school. This ideal situation is however not the case in developing countries, particularly in the rural areas where rural households supply the bulk of the child workers in the economy because rural people only manage to eke out a living from subsistent agriculture. For example, in countries like Norway, with a high human development index, the net primary school enrolment in 2004 was 99 percent (UNDP, 2006). At the other end are the countries with low human development indices where, like in Nigeria the net primary school enrolment in 2004 was 60 percent. The situation in rural Nigeria is much worse than this national average. The children that are either not enrolled in school or drop out of school constitute the pool of child labour from which family and non-family members find child workers.

In Nigeria, as in most developing countries, the phenomenon is a fundamental problem with consequences on low economic development. The importance of human capital accumulation as a catalyst or pre-requisite for development cannot be over emphasized. Childhood is probably the best time for acquiring knowledge from the formal education system, if schooling is considered as an investment in human capital which yields a return in the labour market. In this sense, it is natural to see schooling as the preferred alternative to child labour (Grootaert, 1998). Child labour is thus a major impediment to economic progress as it hampers human capital

development and the potentials of the economies of developing countries to grow (Ravallion and Wodon, 2000).

The existence of a large number of child workers, beside the social and individual suffering, represents a major development challenge threatening the achievement of the Millennium Development Goals (especially on education and youth empowerment) and hampering the possibility of growth by perpetuating the existence of an unskilled labour force .Most, if not all of these children missing out on primary education are child labourers. Child labour also affects the academic achievement of the considerable number of children who combine school and work, contributing to the early drop- out and entry into full time work. As children are rarely responsible for their own choices, the design of preventive measures requires an understanding of factors influencing household decisions relating to schooling and working. This study therefore, examines the impact of child labour on child schooling.

The number of hours spent working is important as a measure of child welfare (for example, as a measure of forgone leisure), and also, for evaluating the cost of work in terms of human capital accumulation. This paper therefore examines the amount of work supplied by children and the impact on schooling.

THEORETICAL FRAMEWORK FOR HOUSEHOLD DECISION MAKING

The theoretical framework that guides this work also draws from Chiappori (1992). In the traditional approach to microeconomic theory, households are considered elementary decision units. They are modelled as 'consumers' in the usual sense, that is, they are characterised by a single utility function that is maximised under a budget constraint.

A generic Becker (1981) type household decision model such as the one articulated by Portner (200lc), or Cigno and Rosati (2000) and summarized by Schultz (1997) assumes that the household acts to maximize utility, which is a function of the number of children, the schooling per child, the leisure time per child, the leisure of the parents, and a composite consumption good. These goods are produced using a composite commodity purchased in the market place and the time of household members. The time inputs to produce the composite consumption well can be supplied by the mother or by the children. Household income can be earned by selling goods produced in a household enterprise or by working as a wage labourer. Inputs to the production of the household enterprise good include physical assets owned by the family and by parent and child labour. Markets for labour, goods, and capital are taken to be perfectly competitive, at least initially.The husband allocates time between market work and leisure; the mother allocates time among market work, child rearing, and home production; and children allocate time among market work, education, leisure, and home production.

The rest of the paper contains the methodology adopted, in the study as well as method of data analysis. This is followed by results and discussion while the last segment concludes the paper.

METHODOLOGY

Source and type of data - This study used the data from the 2001 Child Labour Survey (CLS) which was conducted by the Federal Office of Statistics (FOS, now the National Bureau of Statistics, (NBS). The data were collected using a multi stage sampling technique. The data size comprised 20,830 household units with 100,785 individuals, of which 32,308 were children aged between 5 and 17 years. The statistics obtained were on demographic and socio-economic characteristics of households as well as schooling, non-schooling and work activities of children. The demographic variables include household composition and demographic characteristics, economic characteristics of all members of household aged 5 years and over, household income and expenditure as well as the usual economic activity of children 5-17 years old during the last 12 months. The survey data were generated by states and geo-political zones of North Central, North East, North West, South East, South South and South West.

Method of data analysis - Child labour and Child schooling were analysed, child labour supply as a sequential decision making process using a binary probit model.

Model equation specification

P2= [1-F (b11)] F (b21X)

Where

P2 = probability to go to school and to work.

F = Standard normal distribution function

b1& b2 = Vectors of model parameters

X = Vectors of explanatory variables

The explanatory variables are:

P_2= [1-F (b^1_1)] F ($b_2{}^1$X)

Where

P_2 = probability to go to school and to work.

F = Standard normal distribution function

b_1& b_2 = Vectors of model parameters

X = Vectors of explanatory variables

The explanatory variables are:

X_1 = Age of the child in completed years

X_2 = Square of age of child

X_3 = Sex of child (1 = male, 0 = female)

X_4 = Earnings from paid employment activities in naira.

X_5 = Enrolment status of children (1 = enrolled, 0 = not enrolled)

X_6 = Age of household head in completed years.

X_7 = Sex of household head (1 male, 0=female)

X_8 = Employment status of mother (1 = mother is working, 0 = mother is not working).

X_9 = Household size which comprises total person present in household.

X_{10} = Household's main economic activity (1 = Farming, 0 = Non-farming).

X_{11} = Household head with primary school education (1 if household head has primary school education; 0 otherwise).

X_{12} = Household head with secondary school education (1 if household head has secondary school education, 0 otherwise).

X_{13} = Household head with post-secondary education (1, if household head has post-secondary education, 0 otherwise).

X_{14} = Zone Dummy 1 (1, if North East, 0 otherwise).

X_{15} = Zone Dummy 2 (1, if North West, 0 otherwise).

X_{16} = Zone Dummy 3 (1, if South East, 0 otherwise).

X_{17} = Zone Dummy 4 (1, if South South, 0 otherwise).

X_{18} = Zone Dummy 5 (1, if South West, 0 otherwise).

RESULTS AND DISCUSSION

The result of the determinants of child's participation in paid employment along with school attendance is presented in Table 1 which is the second stage of the sequential probit analysis. The second estimation stage eliminates from the sample, the children who go to school and do not work. The probability to be determined is that of combining schooling and work.

Some children who attend school also work (Dalhi, 2001). In some cases, working actually makes it possible for children to go to school. The result in Table 1 shows that age is a significant variable in the decision to combine work with schooling. As a child grows older, he or she is able to combine work with schooling. The marginal effect shows that as a child's age increases by 1 year, the probability of combining these two activities is about 4 per cent. Similarly, Grootaert and Kabur (1995) in their study found that older children are likely to participate in work and less likely to attend school. In Cote-d'Ivoire, Grootaert (1998) reports that the probability of combining work and school rises with the Childs age, until after a point, after which it becomes more likely that the child drops out.

The coefficient of age squared is also significant. The sign shows that the probability of combining school and work is initially high. But as the child grows older, this probability decreases. This is because school hours are fixed and the number of hours in a day is also fixed. A child's time is therefore shared between these two activities. Thus, the probability of combining these two activities is possible only up to a certain point after which some trade-offs will necessarily come in. Thus, ability to combine school with work diminishes as the child moves from primary to higher levels.

The gender of the child is also a determinant of whether or not, school activities will be combined with work. The result shows that the male child is more likely to combine these two activities than the female as reflected in the marginal effect value of 1.2 per cent, in favour of the male child. The result by Grootaert 1998 however also shows that girls are less likely to combine school and work and are more likely to drop out of school.

The probability of combining school and work is also influenced by the employment status of the mother. The marginal effect shows a 3.2 per cent increase in the probability of children combining these two activities, if the mother works compared with children of non-working mothers. In essence, children whose mothers are employed are more likely to be able to combine schooling with work.

With respect to the economic activity of household head, the probability of a combined work-school outcome is lower for children from farming households compared with non-farming households. It is however the opposite in Cote-d'Ivoire where the probability of a work- school outcome is higher in farming than non-farming households. Across zones, the probability that children from the North West, South East and South West zones will combine work with school is lower compared with children from the North central zone. The South east and South West zones are also characterised with higher percentage of working mothers, whose income complement the household's income; the need for children to work is

therefore reduced. However, in North West, it has been established that enrolment of children into primary school is very low compared with the North Central.

Table 6.2: Probability of Working and Schooling

Variable	Probit Coefficient	Standard Error	|P| z > z|	Marginal Effect
Constant	-2.481	.198	0.000	-
Child characteristics				
Age of Child (ag)	0.231***	0.028	0.000	0.037
Square of Age of Child (g2)	-0.007***	0.001	0.000	-0.001
Sex of Child (Sexchd)	0.074***	0.026	0.005	0.012
Parent Characteristics				
Sex of Household Head (SexHh)	-0.051	0.039	0.198	-0.008
Age of Household Head (age)	0.006	0.005	0.268	-0.001
Employment Status of Mother (mot work)	0.203***	0.030	0.000	0.032
Household Characteristics				
Household Size (hhsize)	-0.004	0.004	0.229	-0.001
Household economic activity (farming)	-0.060**	0.030	0.046	-0.010
Household Head that has Primary School Education (hh-prysc)	0.043	0.033	0.195	-0.067
Household Head that has Secondary School Education (hh-secsc)	0.012	0.044	0.781	-0.002
Household Head that has Tertiary Education (hh-tersc)	0.032	0.061	0.595	-0.005
Location				
North East (zone 2)	0.011	0.042	0.793	0.002
North West (zone 3)	-0.142***	0.425	0.001	-0.021
South East (zone 5)	-1.028***	0.051	0.000	-0.114
South South (zone 4)	0.028	0.037	0.449	-0.005
South West (zone 6)	-0.874***	0.069	0.000	-0.085

Log likelihood ratio = -5842.6072
n = 18234
Chi - Squared = 1176.76
Source: Computer printout of regression result
*** Significant at 1 per cent.
** Significant at 5 per cent.

Education and incidence of child labour

The number of hours that a child spends in labour work is important for evaluating the cost of work in terms of human capital accumulation. The links between human capital and child labour is seen here, in the context of the broader role of human capital for economic growth. Generally, economic growth is increasingly based on knowledge, and less on physical capital or natural resources. In other words, the more people have access to knowledge, the greater are its likely economic benefits. This is why it is important to ensure that children have access to school and to quality education. The tobit regression result agrees on the positive role that education can play in influencing child participation in paid employment and schooling. Child participation in paid employment has been shown to reduce with increase in the number of hours spent for schooling.

Similarly, there is a link between the incidence of child labour as well as years of education of household head. Table 2 shows the relationship between the educational status of household head as well as the incidence of child labour. Participation of children in paid employment is high where the level of education of household head is low and the rate of participation reduces as the educational status of the head improves.

Table 2: Educational status of household head and child labour incidence

Years of Formal Education	Educational Status of Household head	Child Labour Incidence
No Primary Education	58.1	68.7
Primary Education	26.2	48.7
Secondary Education	11.3	44.4
Post Secondary Education	4.3	26.3

Sources: (a) Computation based on FOS/ILO/SIMPOC Survey, 2001
(b) Poverty Profile for Nigeria, NBS, 2005.

Primary school enrolment and incidence of child labour

There is a relationship between the education of parents, school enrolment as well as child labour. Theoretical mechanism draws attention to the impact that parental education has on human capital formation of children. Empirical studies by Psacharopoulos and Arriagada (1989) and Grootaert (1998) have shown that the level of education negatively affects the likelihood of child working. Some studies such as Hind (1996) found that father's education affects boys the most, while others (Canagarajah & Coulombe, 1997) revealed that father's education affects the likelihood of working and mother's education influences only the schooling participation. This is because educated parents have a better appreciation of education and are thus expected to send their children to school rather than the labour market at tender ages. Again, where school – age children are enrolled in schools, the incidence of child labour is expected to be low. Thus the relationship between education and child labour is such that as parents become more educated, they also ensure that their wards receive the right education which will ultimately result into low incidence of labour.

Table 3 compares the adult literacy rate and primary school enrolments in year 2001, with those of 2006 in order to see whether or not, a prior expectation are met. Empirical evidence from Table 3 reveals that literacy level has improved. There has been an increase of about 17 percent in adult literacy rate within the five -year period. Contrary to expectation however, primary school enrolment fell from about 76 percent in 2001 to about 57 percent in the year 2006, a decrease of 19 percent. Also, enrolment rates of male and female children reduced over the years. The implication of this decrease in enrolment rate is that more children are likely to be engaged in paid employment. A plausible explanation for this deviation from expectation is that perhaps the parents of those children who are involved in paid employment are not educated and they also do not participate in the adult literacy programme so they are not able to influence their wards.

Table 3: Adult literacy and primary school enrolment

Literacy Level	Child Labour Survey	Core Welfare Indicator Survey
Adult Literary	41.2	58.6
Primary School Enrolment	75.6	56.6
Male	74.6	58.3
Female	64.4	54.6

Sources: (a) Computation based on FOS/ILO/SIMPOC Survey, 2001
(b) NBS CWIQ Survey Report, 2006.

CONCLUSION

The outcome of this study has also supported the belief that education is pivotal to human development in any society. The more educated the household head, the lower the likelihood or the chances that a child will be involved in paid work.

Policy Implication and Recommendations

The following recommendations are made based on the findings of the study:

There is need for access to education through such measures as provision of more schools, better and more qualified teachers, and improved allowances to those posted particularly to rural areas. Efforts should also be intensified to promote western education especially in the northern zones of the country. This is because western education discourages participation of children in labour as it exposes them to early childhood education.

For gender balance and gender mainstreaming to be achieved in the educational sector, there is the need for more sensitization and public awareness on the education of the girl child, especially in the northern zones where enrolment rates of female children are still lower than those of males. Parents need to be educated on the benefits of gender equality among children, and in the interest and development of the society at large. These sensitization activities may be done through traditional as well as religious leaders.

Promoting adult literacy education - The evidence from the study supports the fact that parental education has a significant influence on child labour participation. Therefore adult literacy programmes should be encouraged. This is because educated parents are likely to have a better understanding of the returns to education and/or be in a position to help their children exploit the earning potential acquired through education.

Returns to education are an important determinant of human capital investment decision. The decision to enter and to remain in school depends on the expected benefits. If chances of employment after "graduation" are low or transition from school to work is difficult and lengthy, it is likely that children, especially from poor household, will decide to leave school early and begin to work as a child. Youth employment policies, as well as policies aimed at improving school to work transition are likely to reduce child labour and early drop out.

Children may also be enticed to go to school through programmes such as free lunch. This 'free lunch' programme may further boost the socio-economic status of unemployed women or mothers who are the potential food vendors in the suggested programme.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

Cost Structures Analysis in the Nigerian Insurance Market: A Translog Approach

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Abstract: Recapitalization process that has recently become an imperative process in the Nigerian Financial industry has implications for the survival of insurance sector, especially on their service delivery efficiency. This study therefore seeks to investigate the problem of inefficiency in the Nigerian Insurance market from the perspective of their cost structures. The study takes advantage of secondary data of financial reports of thirty randomly selected insurance firms which span over a period of ten years and applied transcendental logarithm model to evaluate their performance from the cost structures strategy. The results indicate that only large scale firms enjoy cost saving advantages. Twenty% firms sampled belong to this category. The result suggests that premium income would contribute to insurance firm's performance, only when a sound investment decisions are made.

Keywords: Transcendental Logarithm, Cost Structures, Insurance firms and Efficiency

INTRODUCTION

Insurance companies as a service firm, attract a different class of policies from the economy, pool the premium together to help bear risk whenever the holder of an insurance policy suffers genuine loss. The roles of insurance company as risk taker, saving mobiliser and financial intermediary of sorts affects not only the pace but also the pattern of economic activity particularly in developing countries. The way and manner in which a financial system functions determine to a large extent the capital shortage problems often experienced in the less developed countries (Soyode, 1983). This is because entrepreneurship in the business activity of any economy can be enhanced better when insurance companies help bear losses that are often more severe, where both internal and external business environments are hostile to the extent, that it stifles rather than encourage business enterprises. Consequent upon restructuring, especially deregulation of interest rates in the finance sectors of the Nigeria economy, most financial institutions have had to operate in an increasingly competitive environment.

Insurance companies, like banks, also operate in a competitive environment where issue of cost has become a critical element of survival. Cost efficiency estimates how production costs of an individual company differs from the production costs of a best-practiced company under the same condition and producing same outputs. Efficiency of production is measured with regards to cost function that is normally constructed from the observation of all companies considered within the sample set. Cost functions are derived from the production function

which describes the best available efficient methods of production at any point in time. Total cost is a multivariable function as it is determined by many factors. Such factors might include the quantities and qualities of factor inputs, the efficiency of the entrepreneur as regards the optimum choice and combination of both technical and economic inputs to produce the maximum output (Kwan, 2001).

Statement of the Problems

Insurance companies engage in the production of various classes of services and hardly have there been any particular service where they have performed optimally, as there are inadequacies in the production cost of insurance services of some companies which in any case affects proper insurance practice (NAICOM, 2004). Insurance companies much like banks are supposed to mobilize funds through pooled premiums in order to be able to indemnify their policy holders who might have suffered genuine losses. The other crucial financial intermediation role is when insurance companies reinvest pooled premiums into investment in reinsurance or other sectors of the economy. The inability of many insurance firms arising from poor performance to indemnify their suffered clients has also discouraged prompt payment of premiums on the part of existing clients and lack of interests for insurance policies on the new and would-be clients (Chukwulozie, 2007). The implication of this problem is that premium mobilization which is the backbone of an insurance business has suffered a great deal. This problem is coupled with high cost of operation arising from large number of branches, overhead cost among other costs (Bouno and Eakin, 1990). High cost of producing insurance services and low premium rates have both tampered with operational efficiency and business performances of Nigerian insurance sector, as many of them find it difficult to take high risk businesses in the economy. The public attitude towards insurance policy and other services in Nigeria is generally not encouraging. The aggregate view centers on the observed inadequacy in the payment of compensation indemnity to the holders when they have suffered losses.

Justification for the study

The general disenchantment and disregard for insurance services among insuring public in Nigeria, arising from inefficient firms requires a closer examination and proactive measures in order to ensure the continued usefulness of the industry as conduit for economic stabilization which this study intends to examine.

The ability of the government to implement consistent policy that will lead to realization of net economic benefits could only be assisted by empirical studies of this nature. This study attempts to predict the quantitative effects of cost, scale and scope on performance that may possibly arise from structural and behavioural changes induced by the regulatory agency. In a situation where the empirical evidence reported for the banks production characteristics is to be taken for cost estimation in the finance industry as a whole, proper attention will have to be directed at devising relevant concepts in the factor input cost analysis for the insurance industry, as it has not attracted much attention in Nigeria. Afolabi and Osota (2001) have made use of translog model to analyze production characteristics in the banking industry .This effort is therefore an

attempt to employ the translog models to evaluate performances in the Nigerian Insurance sector.

To the insurance business, it enables it to carry out comparative analysis of performance among competitors, operating within the same market environment, especially as firms use differently entrepreneurial efforts as a key for marketing insurance policies. This evaluation could be done in terms of aggregate results and in terms of the major indices of performance evaluation. It helps insurance business in planning both the technical and economic allocation of resources as a basis for required adjustment over immediate and future periods.

Objectives of the study

The broad objective of this study is to examine cost efficiency of the insurance industry in Nigeria. The specific objectives are to:

i. examine cost efficiency characteristics across various sizes of insurance companies vis-à-vis large, medium and small sizes, and
ii. investigate optimal production scale in the Nigeria Insurance Industry

LITERATURE REVIEW

In order to make an assessment of the effects that cost structures are likely to have on efficiency, there is a need to define a framework over which costs can be analyzed. Economists generally assume that firm minimizes the cost of producing every level of output, based on the prices paid for factors of production and the technology available to the firm, (Bitzan, 2000). Although Cobb-Douglas production function has been widely used for many empirical studies, especially as it is well behaved in terms of monotony and convexity. This function has been tactically criticized on two grounds. The first criticism borders on the assumptions of additivity and homogeneity, suggesting that factor shares are constant. The second criticism has to do with the elasticity of substitution and the cross-partial elasticity of substitution being limited to unity. In a bid to find a leeway and create flexibility so as to take care of the difficult restrictions imposed by the Cobb-Douglas production function; (Christensen, Jorgenson and Lau 1975) came up with an alternative representation of the production possibility frontier, called transcedental logarithms, (Translog function).

Rosko, Proenea and Zinn (2002), examined the relationship between membership in different types of systems and hospital cost inefficiency. They made use of stochastic frontier analysis to measure hospital efficiency vis-à-vis different systems. The study reported that a decreased inefficiency was associated with centralized and decentralized systems whereas an independent system was associated with increased inefficiency. One particular issue of interest was the fact that cost structure, employing capital was used to determine operational efficiency in a hospital system. In the contention of these researchers, there was an argument to suggest that a system may be in position to achieve greater efficiency because of multi product nature of services being provided in the hospital which allows the employment of a more richly specialized group of personnel in big organisation than in a small one (Conrad and Shortfell, 1996); (Carey, 2003) and (Bazzoli, Shortfell and Baunno, 2000). This is in line also with the views of (Ermman and Gabel 1985) on the cost saving advantage of marketing and business advertisement cost of large organisations. The

difference in system characteristics is important as different system stands to have different impact on business performance. This position however was a clear contrast from the work of Becker and Sloan (1985), which reported less than significant result ($\rho < 0.05$) on the study that related systems to performance.

Almost similar to the above studies on hospital efficiency, Evans (1999) examined the significance of quality in the specification of hospital cost function, scale economies effect on hospital cost efficiency and reported that cost increases with the desires for quality. Like many previous studies on hospital efficiency and much like Evans, Bays (1980) work addressed the need to introduce physician variable in order to measure size. Bays in his work estimated two regressions on cost functions: one with physician service as one of the inputs and another without physician service as one of the inputs. Bays findings however suggested a decrease in average cost for a medium sized hospital but that average cost will start to increase as the size of the hospital becomes larger. Not only this, although there was a difficulty in obtaining physician input data, Bays work concluded that managing physician inputs might become unmanageable as the size of the hospital grows larger. Because insurance firm is also a multi-product in production of services, much like hospital, similar approach can be used to study it.

In addition to the conventional inputs such as capital, labour and intermediate input, the financial intermediation activity of insurance carriers use an extra input, premium reserve which needs to be accounted for in the production function. The output of this activity, measured by the investment is derived in a large part from the premium reserve. These are in effect lent to the company by policyholders and for which they do not receive any explicit interest revenue (Harchaous 2005). To achieve earlier stated objectives therefore, this study, therefore adopts the unrestricted, functional translog form which has been typically used for several studies on production.

METHODOLOGY

Sources of Data for the Study - The insurance financial data were obtained from Annual Reports and Accounts of each of the sampled Nigeria insurance companies. The Annual Reports and Accounts of each of the insurance company comprises sufficient data that measure all the variables of the cost, economies of scale and economies of scope that are necessary for this study.

The specific data for this study were assembled from the followings:

- Returns of Assets and liabilities
- Returns of current year's profit and loss account
- Annual analysis of policy and provisions for indemnities.

The above data and information sourced from insurance companies; regulatory authority and the Central Bank yearly bulletin are adjudged, in the literature, to be sufficient enough to elicit necessary data and information needed to estimate the production in the financial industry variables (Afolabi and Osota, 2001).

Sample Size - NAICOM (2003) reported that apart from about thirty (30) insurance companies whose operations were partial, insurance companies in Nigeria could be segmented into three major sizes; twenty (20) belong to large size firms, twenty nine

(29) to the medium size firms, while forty-six (46) belongs to the small size category. This study therefore randomly selected one-third of each of this categories such that six (6) was chosen for the large size firms, nine (9) for the medium size and fifteen (15) for the small size firm

Analytical techniques - The cost and production functions can be specified by estimating a stochastic cost frontier (Leigh, 2001). It allows modeling of a multi-input, multi-output production process. For translog flexible functional form, Young's theorem requires that the second order parameters of the cost function must be symmetric.

Translog cost function is a logarithmic regression model a seemingly unrelated system of equations that is effective to determine coefficients. Many of the standard regression techniques were used to determine the fit of the model. F-tests and t-tests were used to determine the significance of the model and coefficients. The r-squared value will describe how well the model explains the true cost function. Also Durbin Watson statistic was used to explain if the model has a problem with serial correlation. These tests and values verified the effectiveness of the model and the model's ability to explain cost structure in the insurance industry. This study therefore attempts to study Nigerian insurance firms using stochastic cost frontier analysis of a translog model.

Model Specification:

Translog is a local, second-order approximation to an arbitrary cost function. It places no a priori restriction on the elasticities of substitution and allows the economies of scale estimate to vary with the output level. For the approximation of the underlying cost function to be made at local point, this study normalize all independent variables at their median point.

The translog function could be specified as follows:

$$\ln C = a_0 + \sum \alpha_r C_n \ln \gamma_r + \tfrac{1}{2} \sum j \sum i \alpha_{ri} \ln \gamma_r \ln \gamma_i + \ln W + \tfrac{1}{2} \sum_i \beta_i \ln W_i \ln W_j + \delta_z \ln Z$$
$$+ \tfrac{1}{2} \sum \sum \delta_z \ln Z_i \ln Z_j + \delta_{ms} \ln Ms + \tfrac{1}{2} \sum \sum \delta_{ms} \ln Msi \ln Msj + \sum_i \sum r \delta_{ri} \ln \gamma_r \ln W_i$$
$$+ \sum r \sum i \delta_{ri} \ln \gamma_r \ln Z_i + \sum r \sum ms \delta_{rms} \ln \gamma_r \ln Ms + \sum_j \sum ir \delta_{iz} \ln W_i \ln Z_{iz}$$
$$+ \sum i \sum ms \delta ms \ln W_i \ell(_n M_S + \sum \sum \delta_{zms} \ln Z \ln Ms + \psi Cn + \sum_n$$

Where In – logarithm; C – Total cost, Output are indexed by = total indemnities (CL) and Investment (I) and inputs are indexed by W, j = capital input price (Kp), Labour Input price (Lp) and Entrepreneurial price (Ep). The following parameters α, β, δ and ψ are expected to be estimated. The subscript depicts coefficient of the variable to be estimated δMs for instance, is the coefficient estimated for Market share variable and δ_z is the coefficient estimated for the size variable. Where there are two letters in the subscript, it implies measurement of cross-product relationship such as δ_{zms} is the $$coefficient of the cross product of size and the market share. In which case, the cross elasticities are easier to compute from Translog regression results. For instance, the cost elasticity of output can be represented as

$\sum_{cn} \delta \ln / \delta \ln Yr$

(Greene, 1993 and Evans, 1999)

RESULTS AND DISCUSSION

The quadratic terms generated which are specified with the cross products and squares allows for elasticity of factor substitution to be unrestricted (Green, 1993). The basic translog model works well or even better than Cobb-Douglas in terms of describing Nigerian Insurance cost function in a manner that produce the cost structures in the Nigerian Insurance Industry (Usman, 2007). To confirm this, insurance firm is conceived to maximize profit and increase efficiency by selecting an optimal mix of production technologies such as capital, labour, entrepreneurial skills, premium income and market share that minimizes production cost of indemnity and investment services. The result of this study has shown that output/input price combination in this study is capable of reducing costs by 0.2%. So also the interaction between firms' size and market share is capable of reducing total cost by approximately 0.3%. However, a 1% increase in the output will on the average increase the total cost by 0.13%.

The cost elasticities under translog estimation, total output, premium income, have positive results of 0.134232 and 0.253644 respectively which denotes that holding other factors constant, a 1% increase in the total output leads on the average to about 0.1 increases in the total cost and 0.3 increases in the total cost for premium income. However, both factor input price and market share have negative signs meaning that a 1% increase in the use of these inputs reduces total cost of production of insurance services by 0.1% for market share and 0.5% for factor input prices. By this result, market share reduces total cost in both models. The square input prices contribute to total cost by 0.3%. Looking at Table 1 which reports Translog model result for the entire sample, it can be noted that variables such as output, square of output, square of input prices and firm size all have positive signs except for market share and square of market share which have negative signs. While the former (variables with positive signs) have a strong corollary in the Varian conditions for cost estimation, the latter (variables with negative signs) have failed to meet up with our apriori expectations in this study. The own price elasticity is even inelastic.

By this result, a 1% increase in the market share on the average reduces total cost of operating an insurance branch in Nigeria by 11%. Interactions between output/firm size and output market share are all cross substitutes but the figures are very small when compared with the theoretical limit of infinity for perfect substitution. On the other hand, the cross interaction between output and input prices; input prices and firm size; firm size and market share are all complements. If the price of the substitu Table product increases, then there is a proportionally higher fall in the quantity demanded as consumers shift to the nearer available substitutes. The same result is reported for input price and firm size and firm size and market share. The adjusted R2 is indicative of the magnitude of usefulness of the explanatory variables to explain changes in total cost variable

Table 1: Translog function result for the entire firms

Variable	Parameter	Co-efficient	T-statistics
Constant	C(1)	10.73992 (5.368676)	2.000478**
Output	LNY	0.134232 (0.066783)	2.009974**
Square Output	5*(LNY)2	0.209768 (0.028690)	7.311585**
Input price	LNW	-0.464710 (0.522953)	-0.888627
Square of Input price	5*(LNW) 2	0.267907 (0.037819)	7.083971**
Firm size	LNZ	0.253644 (0.317417)	0.799088
Square of Firm size	5*(LNZ) 2	-0.007736 0.0119288)	-0.401072
Market share	LNM	-1.110858 (2.187336)	-0.507859
Square of market share	5*(LNM) 2	-0.560056 (0.470132)	-1.191275
Cross elasticities of output and input prices	LNY*LNW	-0.240280 (0.021215)	-11.3617**
Cross elasticities of output and firm size	LNY*LNZ	0.040801 (0.009804)	4.161795**
Cross elasticities of output and market share	LNY*LNM	0.215863 (0.090790)	2.377594**
Cross elasticities of input price and firm size	LNW*LNZ	-0.016105 (0.011901)	-1.353178
Cross elasticities of input price and market share	LNW*LNM	0.267354 (0.091880)	2.909827**
Cross firm size and market share	LNZ*LNM	-0.286334 (0.075687)	-3.783116**
Pre and post consolidation	CN	-2.455003 (1.119750)	-0.192456
R- square	R2	0.817914	
Adjusted R-square		0.807910	
Durbin-Watson		0.682227	

** Significant at 5%,
* Significant at 10%

Factor input prices has statistically negative relationship with medium and small firms. A one% increase in the cost of factor inputs reduces total cost for medium firm by 7.06% and small firm by 3.58%. Market share reduces total cost by 22.38% for large firm, by 9.60% for medium firm and by 10.5% for small firms. In Table 2 below, firm size measured by the premium income does not have significant contribution to total cost. However, interactions between output and input prices are negative and significant only for small size firms but positive for medium size firms. Interaction between output and firm sizes is positive for all categories and significant only for medium and small size firms. While the interaction between output and market share shows a negative relationship with total cost and significant only for the medium size firms. Input prices/firms size is not significant for all categories. Input prices and market share is positively significant only for medium size firm. Firms size/market share is significant for small category of firms. The R^2, (i.e. coefficient of determination) obtained for large firms, is significant at 96% confidence level whereas the R^2 determination for medium firms is 97% and 85% for small firms. These results have shown that explanatory variables employed in this model have been able to account for changes in total cost of providing insurance services in Nigeria at very high percentage. Similar result has been obtained for the adjusted R^2.

Durbin Watson result has indicated a minimum serial correlation among variables employed in this analysis. However, it is pertinent to note here that out of the three categories of insurance firms in this work, the result obtained for medium is best behaved both in terms of economic and statistical criteria of the analysis. Cost efficiency gains have been indicated for medium size firms especially in factor combination of output and market share. This result suggests that insurance companies could save costs by 1.9% if their business expansion strategies could be pursued side by side with opening of more branches.

Table 2: Translog Model results for Large, Medium and Small Firms

Variables	Parameter	Large firm Co-Efficient	Large firm T-Statistics	Medium firm Co-Efficient	Medium firm T-statistics	Small firm Coefficient	Small firm T-statistics
Constant	C(1)	428.7688 (266.1137)	1.611216*	137.6461 (54.74269)	2..514419**	-124.2944 (35.71281)	-3.480388**
Output	LNY	-10.17656 (9.302529)	-1.093956	5.227706 (1.629782)	3.207611**	3.8424471 (1.788550)	2.148373**
Squared Output	5*(LNY)2	0.634473 (0.528838)	-1.199749	0.095776 (0.048969)	1.955858**	-0.205672 (0.064852)	-3.171380**
Input price	LNN	3.462090 (5.825450)	0.594304	-7.065864 (1.349885)	-5.234421**	-3.587788 (1.556265)	-2.305384**
Squared of Input price	5*(LNN) 2	-0.097096 (0.465272)	-0.208685	0.148045 (0.053879)	2.747718**	0.323499 (0.063804)	0.507218
Firm size	LNZ	1.077517 (8.976571)	0.120037	1.290537 (1.195277)	1.079697	3.346507 (1.557607)	2.148492**
Squared of Firm size	5*(LNZ) 2	-236.3053 (138.4283)	-0.894571	-0.076865 (0.030834)	-2.492844**	-0.087400 (0.041848)	-2.088494**
Market share	LNM	-223.8151 (138.4283)	- 1.616831*	-96.08422 (42.44795)	-2.263577**	10.56499 (22.27637)	4.742691**
Squared of premium income	5*(LNM) 2	49.11057 (33.51489)	1.465336	33..37694 (16.83590)	1.982486**	-48.70695 (7.442249)	-6.544654**
Cross elasticities of output and input prices	LNY*LNW	0.481371 (0.519404)	0.926777	0.136315 (0.051797)	-2.631712**	-0.103506 (0.027849)	-3.716735**
Cross elasticities of output and firm size	LNY*LNZ	0.346052 (0.423929)	0.816297	137.6461 (54.74269)	1.726276*	0.072997 (0.024858)	2.936551**
Cross elasticities of output and market share	LNY*LNM	2.601419 (3.191857)	0.015017	-1.940962 (0.645027)	-3.009118**	0.291463 (0.741091)	0.393289
Cross elasticities of input price and firm size	LNW*LNZ	-0.418519 (0.281254)	-1.488012	0.009050 (0.018212)	0.496890	0.019120 (0.019827)	-0.964328
Cross elasticities of input price and market share	LNW*LNM	-0.944089 (1.875659)	-0.503337	2.940124 (0.536907)	2.940124**	0.560146 (0.586245)	0.955481
Firm size and market share	LNZ*LNM	1.799462 (2.602822)	0.691350	-0.468867 (0.500211)	0.937338	-1.466101 (0.533556)	-2.747791**
Pre and post consolidation	CN	0.105347 (0.413979)	0.254475	-0.299697 (0.148422)	-2.019217	-0.273399 (0.320729)	-0.852429
R- square	R2	0.964032		0.973936		0.857331	
Adjusted R-square		0.947683		0.969226		0.839933	
Durbin-Watson		-51.77957		1.404951		0.840977	

** Significant at 5%,
* Significant at 10%

Output elasticity with respect to total cost is positive and implies that a 1% increase in the production of total output (indemnity and investment) *ceteris peribus*, will on the average increase the total cost by approximately 0.4%. This result indicates the presence of operational functions derived from managing multiple outputs. The cost elasticity of investment is highly significant and it is almost perfectly elastic. However cost elasticity of indemnity is inelastic but significant. The implication of this result is that investment product has a very high significant relationship with total cost of producing insurance services in Nigeria. However, the outcome of this result follows Caves (1984); Filippini and Luchsinga (2005) which reported economies of scale as a proportional increase in total cost brought about by a proportional increase in output holding all other factors constant. Both cost elasticity of total output and cost elasticity of indemnity indicates increasing return to scale whereas cost elasticity of investment indicates constant return to scale. Increasing returns to scale is when a larger quantity of the firms' output is produced at a lower average cost than are smaller quantity of the output. The implication of this result is that insurance firms in Nigeria enjoy economies of scale in the production of the output and more importantly in the provision of indemnity product.

Table 3: Calculation of elasticities and scale economies (SCE) from Translog regressions

Elasticities	**Elasticities Value**	**SCE**
Cost Elasticity of output	0.36	1 – 0.36 = 0.64
Cost Elasticity of Investment	0.99	1 – 0.99 = 0.01
Cost Elasticity of Indemnity	- 0.83	1 + 0.83 = 1.83

Further, firms in the large category performed best in terms of efficiency and results generated from Translog indicates that well over 90% changes in the cost have been explained by the specified explanatory variables.

The translog model results for the three categories have similar and dissimilar results. For instance, in Table 2, in the case of large firm, the coefficient result is -10.1766 which implies own-price inelastic and that holding all other factors constant, a 1% increase in the total output, would on the average reduces the total cost by 10% which is cost efficiency gains. Similar result was reported by (Wuyts and Cayseele, 2004) on cost efficiency in the European security settlement and safekeeping industry. Although, this result must be interpreted with caution as it does not conform to Varian Cost conditions (which expects cost function to be linearly homogenous, increase in output and price but concave in all input prices). But in another case, the economies of scale suggest a cost saving advantage as the production goes into large scale. It can on the strength of this result posit that there exist economies of scale for large scale insurance firms in Nigeria. The R2 is significant at 96% confidence level, implying that the explanatory variables used in this model are almost perfect. When viewed, the result with medium and small scale, which reported 5.223 and 3.8425 respectively, one can simply conclude and in line with economic theory that economies of scale could only be enjoyed by large scale

producing firm. Also in the medium and small firms both the input prices and market share own prices elasticities are inelastic. However, in all the three categories, the results have shown, ceteris paribus, that market share reduces total cost. This might be true as more branches create opportunity for more businesses and capacity to mobilize larger premium income which on the long run reduces cost of operation.

CONCLUSION

The strict analysis of cost structures in Nigerian insurance industry suggest that factor input prices contributed mostly to total cost. Over the period of study it is evident that Nigerian Insurance sector was characterized by increasing returns to scale, hence insurance market stands to reduce cost of production when it is well recapitalized.

Based on the results of the estimated model, it could be reported that most Nigerian insurance firms operations are still cost inefficient. Of all the three categories, the coefficients results obtained for large firm in the model reported high significances. The implication of this is that economies of scale is achievable by larger insurance firms, hence performance can be enhanced through cost minimization advantages associative of large scale business. It is also pertinent to conclude that there is a need to retain the best sui Table experts/personnel in insurance industry through attractive remuneration packages that is comparable with bank workers, since both operate in the same finance industry. This issue becomes more pertinent in the light of universal banking system which tries to create a level playing ground for all financial products in the financial supermarkets.

The study also concluded that mobilization of premium income is not enough to enhance insurance performance what is much more important is the ability to reinvest pooled premium income into high yielding investments, such that the rate of returns obtainable supersedes the level of risks associative of such mobilized premium income. This firm size represented by premium income would contribute to firm's performance only when a sound and sui Table investment decision are made.

The result also implied that optimal production scale from production of insurance services in Nigeria is attainable when they grow into larger scale firm. As it is presently constituted, more than 80% of Nigerian insurance firms are either in medium or small scale

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Economics of Palm Oil Processing in Southwestern Nigeria

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Abstract: The study was designed to investigate the economics of palm oil processing in Southwestern Nigeria. Hydraulic hand press technique was the predominantly used method in processing while the profitability analysis revealed that palm oil processing was profitable. Multiple regression analysis showed extraction cost and cost of palm fruit to be negatively and significantly associated with net return while depreciation of tools and other inputs showed inverse relationship with net return. In contrast no significant relationship was found to exist between net return and such factors as processing experience and cost of labour.

Keywords: Oil, Processing, Returns, Regression, Cost

INTRODUCTION

The oil palm is a perennial crop that originated in the tropical rain forest of West Africa. It spread to South America in the 16th century and to Asia in the 19th century. During the 1970s, Asia overtook Africa as the principal oil palm producing region in the world. In recent decades, the domestic consumption of palm oil in West Africa has increased more rapidly than its production. After centuries as the leading producing and exporting region, West Africa has now become a net importer of palm oil.

Between 1961 and 1965 world oil palm production was 1.5 million tons, with Nigeria accounting for 43%. However, since then, oil palm production in Nigeria has virtually been stagnated. But today, world oil palm production amounts to 14.4 million tons, with Nigeria which is one of the largest producers in West Africa, accounting for only 7%. Kei *et al* (1997) compared the characteristics of the Oil palm sectors in Malaysia and Nigeria and found out that Malaysia's success is built on plantation management together with processing in large modern bills. The plantation mode of production is characterized by large scale monoculture under unified management. In Nigeria by contrast, 80% of production comes from dispersed small holders who harvest semi wild plants and use manual processing techniques. Several million smallholders are spread over an estimated area of 1.65 million hectares in the southern part of Nigeria. In addition, to the agro-climatic and structural (size and scale of production and processing sectors) there are other environmental and coordination factors like little use of modern inputs and extension service; previously controlled by monopoly marketing board; low provisions of market information, standards and quality control (Udom,1986)

Since independence in 1960, Nigeria's agricultural sector has experienced slow output growth that has not kept pace with population increases. This has resulted in declining agricultural exports and domestic food supplies

and a growing reliance on imported food. Nigeria has been particularly fortunate in having vast oil reserves but it has also been plagued by economic chaos and political instability over the past three decades while the decline in the agricultural sector can be partly explained by drought and serious pest and diseases infestations, there are other prominent reasons for its decline, including the neglect of the agricultural sector after the oil boom, and unfavourable government policies which greatly affected the technology generation capacity and technology environment, farm level production and marketing environment and production and coordination machinations between different stages of the oil palm sector in Nigeria (Hyman, 1990).

Because of the increased demand for palm oil resulting from an increase in population and income growth, relative to the low productivity of the oil palm sector, Nigeria has become a net importer of palm oil. At the same time, the rapid devaluation of the Naira combined with high transportation costs from ports to internal markets put imported oil in a competitively disadvantaged position. Thus Nigeria's first goal is to meet the domestic demand and then if possible seeks to become competitive in export markets. Nigerian palm oil production is potentially competitive in the domestics market if oil palm industry would enhance the overall economic development through the income and employment effects in the rural and urban economies.

Palm oil processing is a major source of income and employment to a large proportion of the resource poor rural population in Nigeria especially in the southwestern part of the country. In recent times, its production has drastically downsized. Evidence from (CBN/ NISER, 1992) revealed that this situation has been brought about by a number of socio-economic and political factors along with the technological know how in the industry. Principal among the factors responsible for this decline is the inefficiency that exists in the production system for palm oil processing. Such inefficiencies arise from high cost of labour, lack of linking roads for transportation, electricity, water, inadequate credit facility.

The processors in the study area process oil palm to get palm oil, kernel and fiber. The methods of getting these products are very tedious and laborious. This requires substantial proportion of labour force. The success or failure of a processing depends largely upon how labour and other associated resources are efficiently used. An efficient processing technique increases the quality and quantity of food available for consumption and trade (Ukpabi, 2004).

Having recognized that small scale palm oil processing is inefficient (Omoti, 2004) and unprofi Table the study was focused on medium-large scale processors. The research was under taken to pursue these objectives

i. Identify the existing rural holders processing techniques
ii. Evaluate the profitability of palm oil processing enterprises and
iii. Determine the factors affecting the net return of the processors.

LITERATURE REVIEW

The oil palm sub- sector of the agricultural sector of the economy presented itself as a potential productive sector that could be used to diversify the economy after years of neglect. Historically, this subsector has been a source of

growth in a stagnant economy because of the numerous economic potentials of the oil palm (Purvis, 1970). Ahmed (2001) highlighted the importance of the economic tree crop in providing direct employment to about 4 million Nigeria people in about 20 oil palm growing states in Nigeria and indirectly to other numerous people involved in processing and marketing. Omoti (2001) stated that Nigeria has enormous potential to increase her production of palm oil and palm kernel primarily through application of improved processing techniques. Agboola (1993) opined that improved technologies that meet both growth and sustainability goals can be effectively used by oil palm processors. However, most technologies are designed for developed rather than developing countries. Nevertheless, most farmers in developing countries use imported seed materials obtained from research stations but without a corresponding application of packages which are meant to be used with them. Even where these packages are used as instructed, yields are always lower than those obtained in research stations where seeds are bred. Efforts to raise agricultural production and farmer's standard of living require the introduction of improved farm equipment and technologies as well as increased availability and utilisation of energy and power. However, the vast majority of farmers work at near subsistence level of production (Cobezas *et al*, 1995).

Jalani, *et al* (2000) stressed that oil palm processors should embrace well integrated capital intensive, high volume and high extraction rate in their processing method in other to encourage high transformation of oil palm industry in the country. Kei *et al* (1997) highlighted that the stagnation in the oil palm sector in Nigeria was influenced by the overall agricultural policies that could be classified into three periods. Following the independence (1960-1970), the industrialization was financed by export taxes through commodity marketing boards which monopolized commodities such as cocoa, groundnut, palm oil, cotton and rubber. The resulting producer price had a damaging effect on the production of export crops. In addition, the civil war from 1967 to 1970 had devastating effects on the economy. In the oil export boom period (1970-1985) with OPEC's intervention oil prices in early 1970 increases fourfolds and oil became the dominant export commodity and source of government revenue.

The appreciation of the Naira and the reduction of duties on food imports made food imports cheaper than domestic staples. These actions created biases against agricultural exports (Forest, 1993). During the sap period (1993-2003) on the positive side there was a rise in output prices, improvement in production efficiency and on an increase, in opportunities for small business enterprises. On the negative side however, it led to increased input prices and a sharp increase in the cost of living relative to nominal income (CBN/NISER, 1992) so, national-level consumption has declined following sap implementation. Kei, *et al* (1997) in their study observed that because of the increased demand for oil palm products, resulting from an increase in population and income growth, relative to the low productivity of the oil palm sector, Nigeria has become a net importer of palm oil. At the same time, the rapid devaluation of the Naira combined with the high transportation costs from ports to internal markets put imported oil in a competitively disadvantage position.

Thus, Nigeria's first goal should meet the domestic demand and then if possible, seek to become competitive export markets. Nigerian palm oil production is potentially competitive in the domestic market if oil palm sector productivity is increased by shifting the technology frontier further. Transformation of the oil palm industry would enhance the overall economic development through the income and employment effects in the rural and urban economies. Based on these premises, the present study dwells on the profitability of oil palm processing techniques in Southwestern Nigeria.

METHODOLOGY

The data used in this study were primary data colleted by means of structured questionnaire administered on a random sample of 120 processors in Ondo state, which is a major palm oil processing area in Southwestern Nigeria. Five towns were purposively selected for the study viz: lrele, Okiti pupa, Eseodo, Odigbo and lkale. From each town, twenty four palm oil processors were selected using random sampling technique. The analytical tools used in this study were descriptive statistics, profitability technique and multiple regression analysis.

The profitability technique can be expressed as

NFI = GFI (P (Q).Q) – TC (VC + FC)

Where:

NFI - Net farm income

GFI- Gross farm income

PQ – Price per unit of output

Q- Total output

TC- Total Cost of production

VC- Variable Cost

FC- Fixed Cost

The multiple regression technique was applied using three functional forms namely, linear, semi-log and Cobb-Douglas. The best fit was selected after considering the levels of estimated error, magnitude of R2, number and signs of estimated regression coefficients. Explicitly the model is specified as follows

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, U)$

Where

Y= Net returns of palm processors (₦)

X_1=Education (years)

X_2= Processing Experience (years)

X_3= Labour Cost (₦)

X_4=Extraction Cost (₦)

X_5= Depreciation on Tools (₦)

X_6= Cost of Palm Fruits (₦)

X_7= Processing Period (days)

X_8=Other Costs (water transport, firewood etc.)

X_9= Technology Used dummy 1-improved method, 0 – traditional method

U- error term.

Descriptions, measurement and expected signs of variables.

Dependent Variable (Y): Net returns of palm processors (₦) - The dependent variable Y which represents the actual net returns of palm processed by respondents, is a continuous random variable measured in Naira.

Independent Variables (X*i*):

X_1 Education (years)- This refers to the level of formal education received by the farmers. It is measured by the year of schooling. Educational level of the farmers is expected to have positive relationship with the net returns since educated farmers are more likely to be business alert and possess the ability to seize business initiatives or advantage.

X_2= Processing Experience (years)- This indicated the number of years spent so far in processing business. According to Omoti (2001), the primary determinants of a potential processor's capabilities are experience in business and the quality of the information provided as far as extension workers are concerned. Based on their exposure it could be adjudged that they posses greater ability to predict possible problems and likely solutions that result in higher income. It is therefore expected that the farm experience will have a positive relationship with net returns.

X_3= Labour Cost (₦), X_4=Extraction Cost (₦), X_5= Depreciation on Tools (₦), X_6= Cost of Palm Fruits (₦), X_8=Other Costs (water, transport, firewood etc.) - These variables are measured in terms of amount spent on hired labour used, extraction, depreciation of fixed items, palm fruits, water, transport and firewood respectively. They are measured in naira and expected to have negative relationship with the net returns.

X_7= Processing Period (days) - This is the number of days between the time of fruits harvest and final output. The oil palm fruit is harvested manually using a cutlass, after which it is shredded, picked, parboiled, pounded and pressed. Delay in the time interval between harvest and final output may render the quality of red oil produced low, hence reduces the net returns from the final output (Onwubuya, 1997). It is measured in days and expected to have negative relationship with the net returns.

X_9= Technology Used (dummy) 1-improved method, 0 – traditional method –users of improved method of processing like mechanical, diesel - powered digesters are scored 1, while users of crude method like use of manual digesting/producing of parboiled fruit, using pestles and mortars are scored zero. This choice of scoring was adopted based on past literature (Jalani, *et al* 2000).

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Sampled Processors

The mean age of sampled processors was 56 years and this implied that those involved in the processing of palm oil are no more in their active age and so, are growing old. However, younger ones should be encouraged to participate in these processing operations. Education plays an important role in palm oil processing operations since it will facilitate the adoption of innovations that will improve palm oil processing. The study revealed that 50% of the respondents had primary education, 44% had secondary, and 1% had tertiary education while 4% had none.

The average size of palm plantation of the processors was 2.2 hectares, 64% of processors had farms less than two hectares while 36% of processors had plantation ranging between three and four hectares. This characterized the stagnant nature of oil palm production in Nigeria with 80% of national production from smallholders (Hyman, 1990). Out of 120 sampled processors 20% has been in processing for between 1-5 years, 50% had 6-14 years processing experience, the remaining 30% had been in processing for 15 and 20 years. The mean processing experience is 13 years.

About 76% of processors acquired plantation through inheritance, while 24% was acquired through rentage. The average household size of processors is 8 persons while the processing industry was dominated by men with 76% of male and 24% of female. The most

prominent system of labour requirement is family, which accounts for 64% while 36% is provided by hired labour.

The method of processing used by sampled processors were manual pressing method, power propelled hydraulic press and hydraulic hand press. About 9% of the processors used hand pressing technique while 53% and 48% used hydraulic hand press and power propelled hydraulic press respectively.

Profitability Analysis in Palm Oil Processing

The mean annual cost of inputs and output in palm oil processing is shown in Table 1. The total cost of palm oil processing was ₦1, 477,095.16. The total fixed cost which was ₦624, 548.13 represented 42% and the total variable cost was ₦ 852,547.03 represented 57.7% of total costs. Palm fruits were the most important cost factors in palm oil processing, accounting for about 56.1%. However, the gross return was ₦1, 911,700 while a net return and return per naira from the enterprise were ₦434, 504.84 and 29.4% respectively implying that on every naira invested, a profit of 29 kobo was realised.

Benefit-Cost Ratio (BCR=TR/TC). As revealed in Table 2, this ratio is high (1.29), this shows an increase in returns. It indicates that the enterprise is profitable. It is probable that with increased capital, improved technology and skilled labour, this ratio will increase.

Expense Structure Ratio (ESR=FC/TC). The value of ESR is 0.423 which implies that about 42.3% of the total cost of production is made up of fixed cost components. This makes the business worthwhile to invest.

Table 1: Costs and Returns in Palm oil Processing Enterprise at Ondo State

Items	Value (₦)	Percentage contribution to total cost
Returns		
Palm oil	1,870,000	
Palm kernel (cracked)	15,600	
Palm kernel (uncracked)	23,300	
Sludge	2,300	
Total Gross Return	***1911,700***	
Variable Cost		
Palm Fruits	478,759.00	32.4%
Hired Labour (Harvesting and Processing)	122,644.50	8.3%
Extraction charge	83,702.61	5.6%
Cracking charge	64,218.72	4.3%
Other expenses (transport, water, firewood)	103,221.80	6.9%
Total variable cost	***852,547.03***	57.7
Fixed Cost		
Rent (plantation)	378,321.63	25.6%
Interest on borrowed capital	136,503.70	9.2%
Depreciation on assets	24,000.00	1.62%
	85,722.80	5.8%
Total fixed Cost	***62,454.13***	42.3%
Total Cost (TVC+TFC)	1,477,095.16	100.00
Net Return	434,604.84	
Return per Naira	29.4%	

Source: Field Survey, 2007

Gross Ratio (GR=TC/TR). This is 0.77. This implies that from every ₦1.00 return to the industry, 77.00k is being spent.

Table 2: Profitability of Palm Oil Processing.

Benefit Cost Ratio	1.29
Rate of Return	0.29
Gross Ratio	0.77
Expenses Structure Ratio	0.423

Source: Field Survey, 2007.

Multiple Regression Results

The results of Multiple Regression of processor's net return on resource inputs in Ondo state is presented in Table 3. Double log production function is selected as the lead equation based on (i) the magnitude of R^2 (ii) the significance of F-value (iii) the t-values and (iv) the appropriateness of the signs of the regression coefficients. The F-ratio value is statistically significant at 1% which implies that the model is adequate for use in further analysis. The

coefficient of determination (R^2) was 68%. This implies that the independent variables explain at least 68% of the variability in processors net returns in the study area.

The coefficient of labour cost, other inputs and processing periods are negative with the use of other inputs significant at 10% showing indirect relationship with processors net returns. This implies that those costs have decreasing impact on net return. The same thing applies to the coefficient of depreciation cost significant at 5% level indicating that as depreciation decreases the net return increase. These costs although essential are expected to decrease, so having increasing value on processor's net return. The coefficient of variables extraction cost, cost of palm fruits are negative and are both significant at 5% levels of probability, showing indirect relationship with the processors net return. This implies that they have decreasing impacts on the net return.

The coefficient of the improved method is positive and significant at 1% level. Efforts to raise agricultural production and farmer's standard of living require the introduction of improved farm equipment and technologies as well as increased availability and utilisation of energy and power. This therefore implies a positive relationship with the net returns from the oil palm processing. An advantage of the use of mechanical digestion is the shorter period expended, which means that the mash has higher temperature than when it is pounded manually. High temperature means that oil extraction is more efficient unlike with manual processing, which is slower and oil yield is cold and there is less output. (Cobezas *et al*, 1995). In contrast, no significant relationship exists between the coefficients net return and such factors as processing experience and processing periods but their signs follow the *a priori* expectation.

Table 3: Determinants of Processors' Net Return at Ondo State.

Explanatory Variable	Regression Coefficient	T-Ratio
Processors Experience	0.2748	0.7893
Labour Cost	-0.05398	-0.3319
Extraction Cost	-0.8681	- 2.5889***
Depreciation on tools	-0.3241	-2.4326**
Cost of palm fruits	-1.3589	-3.26781***
Processing periods	-0.1742	-1.30731
Other input costs (transport, water, firewood)	-0.8751	-2.58231***
Improved Method	1.2134	4.0121***
Intercept	-1.8459	
R^2	0.68	
F	12.72***	
No of observation (n)	120	

Source: Data Analysis, 2007
** Significant at 5% levels.
*** Significant at 1% levels
R^2 - Coefficient of determination

CONCLUSION

The present investigation was under taken with a view to analyzing the critical issues relating to economics of palm oil processing in Ondo state, Nigeria. Among the palm oil processing techniques about 9% of the processors used hand pressing techniques, while others used hydraulic hand press and power propelled hydraulic press. The results of the profitability analysis in palm oil processing in the area showed a level of profitability while factors such as high rentage of palm plantation, extraction and transport costs were the most critical factors inhibiting profi Table palm oil processing.

The results on the determinants of net return showed that extraction cost, cost of palm fruits are positively and significantly associated with the net return while depreciation of tools and other inputs were negatively but significantly related with the net return. On the other hand, no significant relationship was found to exist

between net return and such variables as processing experience and labour cost.

In order to accelerate the net returns in palm oil processing in the state, the government should endeavour to build roads in the area where they do not exits and maintained ready existing ones for easy access to raw materials and thus reduce transportation cost in order to boost the revenue of the processors. Processors should be encouraged to form co-operative groups so as to pooll their resources together in order to acquire modern equipment thereby reducing extraction cost and enhance their revenue base.

Social amenities like electricity should be regularly supplied while pipe borne water should be provided in areas where oil is processed to facilitate palm oil production

Palm oil processors should adopt good management strategies to ensure efficient utilisation of assets. Processors revenue base can be more enhanced if multipurpose automatic machine could be supplied by government at subsidized rate to reduce extraction cost. In addition the Nigerian Institute of Oil Palm Research (NIFOR) should be revitalized, because it had been unproductive, inefficient and financially unsustainable.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

Information Needs of Cowpea Farmers in Ibadan/Ibarapa Agricultural Zone of Oyo State, Nigeria

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Abstract: This study gives an account of information needs of cowpea farmers in Ibadan/Ibarapa Agricultural zone of Oyo State. Multistage random sampling technique was used in the selection of 90 respondents as the sample for the study and structured interview schedule was used to solicit information from the respondents. The data were collected from Akinyele, Ido and Lagelu local government areas of Oyo state. The data were analyzed using frequency counts, means, percentages, standard deviation and Chi-square. The study reveals that majority (60%) of the respondents belong to the high group of information need on cowpea production technology whose information needs include land preparation, high yielding varieties, seed treatment, seed rate, method of weed control, pest and disease management of cowpea, doses and methods of pesticide application, harvesting, processing storage and marketing. The result also shows that the higher (or lower) the farming experience of cowpea farmers the higher (or lower) their information needs suggesting that several years of cowpea farming could inform their quest for new knowledge about its production. The study therefore concluded that cowpea farmers in the study area are very keen to seek information about improved techniques of cowpea production.

Keyword: Information needs, Cowpea, Technology, ADP

INTRODUCTION

In Nigeria, several efforts have been made to reverse the trend of agricultural decline during the past two decades. Besides, one of the problems militating against the development of agricultural sector has been closely linked with ineffective agricultural extension services. Through agricultural extension, farmers are informed of improved farming practices as well as new technical and economic possibilities that could be of great benefits if adopted. Hence, the ingredients of success in agricultural transformation through extension must include the fact that:

- Extension must have something to extend such as new technology and practice.
- Innovation must be effectively communicated to farmers.

However, rejection of an innovation by farmers may be due to lack of the above conditions and not that the farmers are conservative as often erroneously believed (Obibuaku, 1996). Agricultural information can be viewed as a process of communicating ideas, skills, and technology from extension to farmers. The importance of such information as an ingredient for the advancement of agriculture cannot be over-emphasized as its inadequacy

could be dangerous and turn to become a major constraint to agricultural development.

Many Non-Governmental Organisations (NGOs) and Private Extension Agencies (PEAs) in Nigeria now undertake agricultural extension services to people as part of their development programmes. For instance, the Agricultural Programme of Shell Petroleum Development Company (SPDC) offers free agricultural services to their host communities as part of their social responsibilities. Justice for Peace and Development Commission of Catholic Diocese is also in this category. This is an indication that PEAs services are taking active part in agricultural technology transfer process in the country (Isifel, 2001).

Cowpea is a legume that is extensively grown throughout the sub-Saharan Africa. It is a subsistence crop often intercropped with sorghums, maize and millet. It is cultivated for its leaves, green pods, grains and stover and mature pods. The young leaves and immature pods are used as vegetables while snacks and main meal dishes are prepared from the grain. Cowpea is one of the cheapest sources of plant protein to a majority of the people in Nigeria.

Current estimate places annual world cowpea grain production at 4.9 million Mt (Singh *et al*, 1997) and about 95% of this is grown in Africa. Nigeria in turn accounts for upwards of 62% of world production. Nigeria is the largest cowpea producer in the world with about 3 million Mt on 4.4 million hectares annually (FAOSTAT, 2006).

Cowpea grains are consumed directly following boiling, or as a component of meals which also include porridge made from cereals or root crops. Cakes (*akara*) made from mashed and fried seed are also sold as fast food along roadside in Nigeria. (IITA, 1997).

As a result of the role played by cowpea in the diet of Nigerians there is need to involve farmers in the identification of information needs perceived by the farmers as relevant to cowpea production. Besides, the unique nature of climatic conditions of Ibadan/Ibarapa zone characterised with heavy rainfall, relative high humidity, which favour the disease infestation and problems of insects attack on grains both in the fields and stores, make it imperative for the farmers to have access to information as regard the basic cowpea production technologies in the study area.

Objectives of the study

The study is out to give an account of information needs of cowpea farmers in Ibadan/Ibarapa Agricultural zone of Oyo State. Specifically, the study is set out to:

i. examine the personal characteristics of farmers in the study area.
ii. determine the farmers' perception of information needs on cowpea production technologies.

METHODOLOGY

The study was carried out in Ibadan/Ibarapa agricultural zone of Oyo state, Nigeria. The climate is equatorial, notably with dry and wet seasons and relatively high humidity. The dry season lasts from November to March while the wet season starts from April and ends in October. The vegetation of the zone is mostly evergreen forest, found in the southern part of the state where lumbering, plantation farming of cocoa, oil palm and cashew is practiced. Majority of the inhabitants are farmers who engage in

cultivating various food crops like maize, soybean, cowpea, yam, cassava, melon, sorghum and vegetables. The zone is blessed with state, federal and international agencies that provide advisory services and technical support to farmers. Such agencies include:

(i) Oyo State Agricultural Development Programme (OYSADEP)
(ii) National Institute for Horticultural Research and Training (NIHORT)
(iii) Institute of Agricultural Research and Training (IAR&T)
(iv) Cocoa Research Institute of Nigeria (CRIN)
(v) International Institute for Tropical Agriculture (IITA)

A multi-stage sampling procedure was employed to purposively select three local government areas in the zone namely Akinyele, Ido and Lagelu, based on the concentration of cowpea farmers in these areas. Each local government represents an agricultural extension block of the OYSADEP. Three cells were randomly selected from each of the blocks. In each cell, 10 cowpea farmers were further selected purposively to arrive at a sample size of 90 respondents.

A structured interview schedule was used to obtain necessary information relating to cowpea production. The instrument was tested for both its content validity and reliability on other local government councils (Afijio, Egbeda and Oluyole) neighbouring the study area. Content validity of the instrument was determined with the assistance of experts while its reliability was determined using the test-retest method. Results of the two administrations were correlated and reliability coefficient ranged from 0.74 to 0.87. Data were analysed using frequency counts, percentages, means and standard deviation.

Measurement of Variables - The dependent variable is the information needs on cowpea production technology viz. land preparation, high yielding varieties, seed treatment, seed rate, method of weed control, pest and disease management of cowpea, doses and methods of pesticide application, harvesting, processing storage and marketing.

A rating scale of 1 to 3 was used to measure the degree of information need. Respondents were asked to indicate on a scale of 1(No need) to 3 (Great need) the extent of their information needs on cowpea production technologies.

RESULTS AND DISCUSSION

Results from Table 1 show that majority of the respondents (75.5%) fell within the age range of 26 - 40 years while only 20% of the respondents were within the age group of above 40 years. This is an indication that majority of the respondents are young and active with enough strength for farming. Also, their relatively young age might make them receptive to new techniques of farming (Eddy, 2002). About 93% of the respondents were male while 7.2% were female. This is an indication that female participation in cowpea cultivation in the study area is very low. This agrees with the findings of Tiplida *et al* (2006) that few women cultivate cowpea.

Also a majority of the respondents (90%) had one form of formal education or the other while only 10% had no formal education. This may positively influence their knowledge of innovations as asserted by Williams *et al* (1984)

that educated people tend to embrace knowledge of modern farming practices. More than half of the respondents (66.6%) cultivated farm-land ranging from 1 to 5 hectares while 27.8% cultivated less than 1 hectare of land and others cultivated more than 5 hectares of farm land. It may be inferred that the bulk of the farmers are small holders.

About 46.7% of the respondents had farming experience greater than 10 years with 40% of them indicating farming experience within the range of 5 to 10 years while, only 13.3% had farming experience less than 5 years. This long farming experience is likely to enable them identify correctly their information needs regarding techniques of cowpea production. Most of the respondents (93.3%) had access to extension services being rendered by OYSADEP extension outfit. This is an indication of effective and wide coverage of the study area by the extension unit of OYSADEP.

Table 1: Personal characteristics of respondents (n = 90)

Category	Frequency	Percentage
Age (years)		
20 -25	4	4.4
26 – 30	27	30.0
31 – 35	20	22.3
36 – 40	21	23.3
40 and above	18	20.0
Gender		
Male	84	92.8
Female	6	7.2
Education		
No formal education	9	10
Adult education	7	7.8
Primary education	13	14.4
Secondary Education	25	27.8
Post secondary Education	36	40
Farming Experience		
< 5	12	13.3
5 -10	36	40.0
> 10	42	46.7
Access to OYSADEP extension services	*84	93.3
Access to extension services rendered by other agencies	30	33.3
Total	90	100

Source: Field Survey, 2004
* Multiple Responses

As shown in Table 2, the total score of information need of each respondent on cowpea production technology was obtained. Means and standard deviations were calculated and the respondents' information needs were categorized into low, medium and high levels. The study revealed that majority (60%) of the respondents belonged to high information need group followed by medium (34.4%) and low (5.5%) information need group.

The above trend could be attributed to high level of contacts by respondents with extension personnel which resulted in high level of awareness and innovativeness. Besides, high level of education by a majority of respondents might also be responsible for high degree of information needs on cowpea production technology.

Table 2: Classification of respondents based on information needs on cowpea production technologies (n = 90)

Category of information needs	Score on information	Frequency	Percent
Low	> 20	5	5.50
Medium	20 – 25	31	34.40
High	26 – 30	54	60.00

Field Survey: 2004

It is evident from Table 3 that respondents rated the information need on cowpea production technology in declining order of need; storage was rated as the greatest with a mean of 2.72 followed by harvesting and processing (mean = 2.69), pests and diseases management (mean = 2.63), marketing (mean = 2.63), high yielding variety (mean = 2.61), seed treatment (Mean = 2.60), method of weed control (mean = 2.52), doses and method of pesticide application (mean

= 2.50), seed rate (mean = 2.47) and land preparation (2.27).

Table 3: Respondents' perception of information needs on cowpea technologies (n = 90)

Variables	Mean	Standard Deviation	Rank
Storage	2.72	0.50	1
Harvesting and Processing	2.69	0.47	2
Pest and Disease management	2.63	0.48	3
Marketing	2.63	0.51	4
High yielding variety	2.61	0.61	5
Seed treatment	2.60	0.49	6
Weed control	2.52	0.60	7
Doses and methods of pesticide application	2.50	0.62	8
Seed rate	2.47	0.69	9
Land preparation	2.27	0.78	10

Field Survey: 2004

Based on the relationships between the demographic characteristics of the respondents and the degree of information need on cowpea production technology among farmers in Ibadan/Ibarapa zone area of Oyo State, farming experience happens to be the only significant independent variable (Table 4). This is an indication that farming experience plays a significant role in the identification of the areas where farmers require information on cowpea production technology. Besides, several years of experience in cowpea production might be a contributory factor that makes the farmers to seek information about solving persistent production problems.

Table 4: Relationship between the needs of farmers on cowpea production technology and their personal characteristics

Variable	$\chi 2$ – value	Degree of freedom	P - value
Age	1.95	5	0.377
Gender	1.95	2	0.398
Educational level	1.02	2	0.400
Farming experience	66.33	25	0.000* *
Access to OYSADEP extension services	1.76	1	0.387
Access to extension services from other agencies	1.06	3	0.095

* * Significant at 0.01

CONCLUSION AND RECOMMENDATIONS

The study has brought out several practical implications on the identified information needs and greater efforts are required towards this direction by the change agencies for effective transfer of cowpea production technology and its utilisation by the farmers to enhance productivity. Also, it established the existence of greater linkage between the OYSADEP extension outfit and farmers in the study area as greater percentage of farmers had access to its extension services. However, despite farmers' greater accessibility to extension services, information on improved cowpea production technologies is still inadequate.

Therefore, agents of OYSADEP extension unit and other agencies responsible for transfer of technology should intensify efforts at training of farmers on improved technology of cowpea production.

Besides, the training given to farmers should be aided with bulletin, brochure and extension leaflets on cowpea production since most of then are literates. Also, the linkage between the research institutes and OYSADEP extension unit should be strengthened so that extension agents could have access to recent work on cowpea production technology.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

Labour Use Pattern among Farmers in Ife Central Local Government Area of Osun State

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Abstract: The inequi Table distribution of income arising from low productivity of labour input and rising labour shortage in Ife Central Local Government area of Osun state, Nigeria has called for a research into the Labour use pattern among farmers in the area. The sample for the study consists of 100 farmers randomly selected from 10 villages in the area. Relevant data needed for the study were obtained from the respondents through the use of questionnaire.

Findings revealed that majority of the respondent (71%) were male, 82% were above 40 years and 75% were married. The study also revealed that 81% employed between 11 to 30 labourers per season while none of the respondents employed hired labourers for the whole farm work. Labour is rarely available (94%) and rarely used (88%) by the respondents. The correlation analysis revealed that farmers' age (r=0.20), labour cost (r=0.46), labour input productivity (r=0.46) were positively correlated with labour use pattern; with all the relationship in each case being significant at p=0.05. It was also revealed that labour availability (r=0.20) was not significantly correlated with labour use pattern. The relationship between crop types grown by the farmers and labour use pattern was found to be significant (χ^2=29.68; p=0.05). It is recommended that rural labour market be organized to ensure continuous availability of labour; especially at the peak of production season. There should also be parity in rural wage structure comparable with urban non-skilled wages to reduce rural-urban migration as an impetus for Agricultural development.

Keywords: Labour use, Rural-urban migration, Labour productivity, Wage structure, Agricultural development

INTRODUCTION

The Agricultural sector plays a major role in domestic employment and external trade. From 1980 to 1986, agriculture contributed 34% of the total Gross Domestic Product (GDP); employed 80% of the labour force and accounted for about 26% of foreign exchange earnings (Mkadawire; 1987). For the past two decades however; agricultural sector in Nigeria had declined or remained stagnant in terms of its ability to provide man's needs- food, shelter and clothing. Harwood (1990) observed that Nigeria had experienced a decline in per capita food production during the last two decades. The decline in agricultural sector is due to the nature of agricultural production and problems underlining its improvement. Farmers have little or no ability to expand their farm size, while production is mostly through the use of outdated farm implements. They have little or no access to external fund for proper farm finance, lack proper agricultural advisory services and have access mainly to their own labour and those of their families. These force farmers to depend on their own labour and

could not make any appreciable improvement in their production. The most influential of the problems is low labour availability and utilisation , which may have resulted from labour migration from rural to urban cities. The above therefore points to the importance of labour, which involves all human efforts employed in production. The labour use patterns thus go a long way to affect farmers' yield and the drive at achieving food security.

Objectives of the study

The general objective of this study is to determine the labour use pattern among farmers in the study area. The study will specifically attempt to:

i. determine the demographic characteristics of the farmers,
ii. identify the crop types grown by the farmers,
iii. identify the sources of labour supply to farmers,
iv. determine the labour use pattern of the farmers,
v. determine the availability of labour to farmers,
vi. estimate the cost at which farmers hire labour and
vii. determine farmers' labour input productivity,

Hypotheses

The following hypotheses are stated in null form for pursuit by the study.

i. There is no significant relationship between age of the farmers and their labour use pattern,
ii. There is no significant relationship between the crop types grown by the farmers and their labour use pattern,
iii. There is no significant relationship between labour availability and farmers' labour use pattern,
iv. There is no significant relationship between labour cost and labour use pattern and
v. There is no significant relationship between labour input productivity and labour use pattern

METHODOLOGY

The study was carried out in Ife Central Local Government Area of Osun State. The Local Government shares boundary with the Ife East, Ife North, Ife South and Atakunmosa Local Government Areas of Osun state. The inhabitants of the area, though engaged in other income generating activities, are predominantly farmers who specialize in the cultivation of both food and cash crops like maize, yam, cocoyam, cassava, cocoa, kolanut, palm oil etc. They also keep poultry birds. Rainfall in the area is adequate with a relatively high humidity. From about 33 villages in the area, about 10 villages were randomly selected and from each village, at least 8 farmers were sampled for inclusion in the study. A total of 100 farmers were sampled, though, all farmers in the area constitute the population for the study. Information were collected from respondents through the use of questionnaire which was face validated by experts. The data were analysed using descriptive statistics like frequencies and percentages. The relationship between some variables measured at interval level of measurement were analysed using Pearson Product Moment Correlation; while Chi-square was used to test the relationship between the crop types grown, which was categorized as Food, Cash and Food and Cash crops; and the labour use pattern, which was measured at interval level and then operationalised as low and high labour use.

Measurement of Variables - The dependent variable measured in this study is Labour use pattern. This is measured by asking the respondent to indicate the number of labour employed, frequency of use of labour and the proportion of farm work for which labour is used for some farm operations like bush clearing, ridge making, planting, weeding, harvesting, processing and marketing. A maximum score of 5 was assigned for 5 or more labourers used for any operation while 4 scores, 3 scores, 2 scores and1 score were assigned to 4, 3, 2 and1 labour employed, respectively. Frequent use of labour for any farm operation was scored 3, 2 for rarely use and 1 score for not using labour. Use of labour for the whole farm work was scored 5, use of labour for three-quarter of the farm work was scored 4, use of labour for half of the farm work was scored 3, Use of labour for a quarter of the farm work was scored 2 and None use of labour at all was scored1. The maximum labour use score was 81 while the least was 21. Labour use scores of between 21 and 50 was categorised as Low labour use while scores of between 51 and 81 was categorized as high labour use.

The independent variables measured were:

Age: Respondents were asked to indicate their actual age in years

Crop types grown: Respondents were asked to indicate the crop types grown as food crops only, cash crops only, food and cash crops.

Labour availability: Respondents were asked to indicate if labour is readily, rarely or not available for some farm operations like bush clearing, ridge making, planting, weeding, harvesting, processing and marketing. Any farm operation for which labour is readily available was scored 3; any farm operation for which labour is rarely available was scored 2 while any farm operation for which labour is not available was scored 1. The maximum labour availability score was 21 while the least was 7

Labour cost: The actual amount the farmers spent on hired labour per season per unit area of land for the last cropping season was used.

Labour input productivity: This was measured by finding the ratio of the crop output obtained to the man-hour of labour employed.

RESULTS AND DISCUSSION

Table 1 shows that 71% of the respondents are male while 29% are female; implying that men are more actively engaged in farm work than women; although the kind of farm works engaged in by men are different from women. This supports the observation of Khabele (1980) that labour can be divided and used for different operations depending on the age and sex, the nature of the task to be performed and the size of land to be cropped.

Table 1: Demographic characteristics of the farmers (n=100)

Characteristics	Frequency	Percentages
Gender		
Male	71	71
Female	29	29
Age		
21-40	18	18
41-60	67	67
61 and Above	15	15
Education level		
No formal Education	62	62
Standard six	12	12
Primary School	10	10
Secondary School	8	8
Post Secondary School	1	1
Others	7	7
Marital Status:		
Single	6	6
Married	75	75
Widowed	16	16
Separated	3	3
Crop Types Grown		
Food crops only	19	19
Cash crops only	3	3
Food and cash crops	78	78
Labour Sources		
Self and Family	2	2
Hired Labour only	14	14
Self, family and hired	57	57
Self, family and communal	2	2
Self, family, hired and communal	25	25
Reasons for using hired labour as against other labour sources		
Family size is small	60	60
It is more readily available and cheap	5	5
Other sources are less popular	35	35

Source: Field Survey 2007

This result however contradicts the observation of Okoriji (1990) in his study of women's labour household management and agricultural technology in a rural farming community of Anambra state that women take less part in off-farm employment compared with men; and do not engage actively in community development projects. He reported further that farm and household chores compete for women's labour in the area; and compared with men, women work more hours per day (14 hours on the average) to perform their duties to be able to meet the competing labour demand. The Table further shows that 82% are old; above 40 years while 18% are young; below 40 years. This age structure implies that labour would likely be low as the strength to work on the farm declines as one advances in age. The study also revealed that 62% have had no formal education, 12% completed standard six, 10% and 8% completed primary and secondary schools respectively, 1% had some form of tertiary education while 7% attended some other higher schools. The Table also shows that 75% are married, 6% are single

while 16% and 13% are widowed and separated respectively. Most married respondents have more than one wife and this supports the assertion of Ekong (1988) that farmers marry many wives to raise large families that could cope with labour required in farms. The analysis of the crop type grown reveals that 78% cultivate both cash and food crops, 3% grow cash crop only while 19% grow food crops only. This shows that farmers cultivate crops not only for consumption but also for income. Results presented in Table 1 also show that most respondents relied on more than one source of labour. Labour supply through self and family is low (2%); and this supports the findings of Babiker and Mohammed (1987) that family participation rate was low in their study of labour supply for cotton picking in the Blue Nile Agricultural Scheme (BNAS) of the Sudan. This, however, does not support Olayide and Atobatele (1980) in their studies of peasant farms in Kwara state, those family members and friends constitute the major source of farm labour. They reported that 27% of respondents in the survey indicated heavy reliance on family labour; and that while 43% of the respondents used hired labour all year round; most farmers used seasonal hired labour during specific peak farm activities and operations. This, however, amplifies the findings of this research since majority (57%) relied more on family and hired labour; 14% of the respondents relied solely on hired labour while 2% employed family and communal labour. This corroborates the submission of Oluwasanmi (1966) that communal labour is declining very fast because of the loosening of tribal ties, development of commercial agriculture as well as expansion of education and migration. The result further reveals that 60% relied on hired labour because their family size is small and hence low family workforce. This may be due to movement of farmers' dependants away from the communities to more urban centres. Five percent of the respondents used hired labour because they considered it cheaper and readily available while 35% used hired labour because other labour sources are no longer popular. The implication is that labour cost may be high as hired labourers may have free days in charging higher prices for their services.

Table 2 shows that 81% employed between 11 and 30 labour per season, 10% employed above 30 labours while 9% employed between 1 and 9 labour per season. This may be due to high cost of labour resulting from labour unavailability. None of the farmers employed labour for the whole farm-work, 9% employed labour for none of their farm-work. Also, 20% and 7% of the respondents respectively cultivated less than 1 hectare and above 2 hectares of farmland while 73% cultivated farmland of between 1 and 2 hectares.

Respondents would need additional labour force to cope with work on the farm since they operated a fairly large farm size in the traditional rural settings. Any reduction in farmers' internal labour force would force them to seek labour such as hired and other forms.

Table 2: Distribution of Respondents according to the Number of Labour employed per Season, Proportion of Farm-work for which Labour is employed and Farm Size (n=100)

Characteristics	Frequency	Percentages
Number of labour employed per season		
1-10	9	9
11-20	53	53
21-30	28	28
31 and above	10	10
Proportion of farm-work		
The whole farm-work	-	-
Three-quarter farm-work	13	13
Half farm-work	38	38
One-quarter farm-work	40	40
None of the farm-work	9	9
Size of farmland (hectare)	20	20
Less than 1	73	73
1 - 2	7	7
Above 2		

Source: Field Survey, 2007

Results in Table 3 reveal that labour is rarely available (92%). Few (2%) of the respondents claimed that labour is readily available to them. This implies that there is labour shortage in the area. This is expected to affect farmers' output especially if the shortage is experienced at the peak of production. This may lead the few available labourers to charge very high for their services; and, hence produces a dwindling effect on income accruable to farmers from sales of farm produce. The Table also reveals that 9% use labour regularly while 88% rarely use labour for their farm operations. This is expected to consequently limit the farm size, which could be cropped, the output and farmers' net income. Majority (74%) spent as high as N30,000.00 on labour per cropping season. Kigbu (2006) commented that high cost of labour reduces farmers' income significantly and affect their standard of living drastically.

Table 3: Distribution of Respondents According to Labour Availability, Frequency of Use and Labour Cost (n=100)

Characteristics	Frequency	Percentage
Labour Availability:		
Readily Available	2	2
Rarely Available	92	92
Not Available	6	6
Frequency of Use:		
Regular	9	9
Rarely	88	88
Not Use	3	3
Labour Cost (N):		
Less than 10,000.00	4	4
10,001.00 - 20,000.00	6	6
20,001.00 - 30,000.00	16	16
30,001.00 - 40,000.00	42	42
Above 40,000.00	32	32
	0	0
	0	0
	0	0

Source: Field survey, 2007

Testing Hypotheses

$H_0$1: There is no significant relationship between age of the farmers and their labour use pattern

The result of the correlation analysis of the relationship between the age and the labour use pattern of farmers in Table 4 shows a statistical significant relationship (r=0.36; p=0.05). This implies that older farmers use more labourers on their farms than the younger and more agile ones. This supports the fact that the strength to work on the farms decreases as one advances in age.

Table 4: Relationship between Age of farmers and their Labour Use Pattern

Characteristic	Df = (N-2)	r-value @ p=0.05		Decision
Age	98	Cal	Tab	Significant
		0.36	0.2050	

Source: Field Survey, 2007

$H_0$2: There is no significant relationship between crop type grown by the farmers and their labour use pattern

Chi square analysis of the relationship in Table 5 shows that there is a statistical significant relationship between the tested variables (X2=29.68; P=0.05). This implies that the cultivation of both Food and Cash crops together requires higher labour input than the cultivation of either cash or food crops solely. This is supported by Bello (2005) and Kayode (2006) that the maintenance of cash crops requires higher labour input than food crops, but also require much more labour input when combined with food crops.

Table 5: Relationship between Crop type grown by farmers and their Labour Use Pattern

Characteristic	df=(r-1) (c-1)	X2 value @p=0.05		Decision
		Cal	Tab	
Crop type grown	2	29.68	5.99	Significant

$H_0$3: There is no significant relationship between Labour Availability and Farmers' Labour Use Pattern

In Table 6, it is revealed that a statistical significant relationship does not exist between the variables tested (r=0.20; p=0.05). This implies that the availability of labour does not explicitly explain the labour use pattern of the farmers.

Table 6: Relationship between Labour Availability and Farmers' Labour Use Pattern

Characteristic	Df = (N-2)	r-value @p=0.05		Decision
Labour availability	98	Cal	Tab	Not Significant
		0.20	0.2050	

Source: Field Survey, 2007

$H_0$4: There is no significant relationship between Labour Cost and Farmers' Labour Use Pattern

Findings in Table 7 reveals that there is a statistical significant relationship between the variables (r=0.46; p=0.05). This indicates that labour cost is increased with increase in labour use. This means as more labourers are hired, more expenses are incurred on labour. This is supported by Alabi (2006) that labour cost increases as more labour is hired; and this causes a reduction in the farmer's net income.

Table 7: Relationship between Labour Cost and Farmers' Labour Use Pattern

Characteristic	Df = (N-2)	r-value @p=0.05		Decision
Labour Cost	98	Cal	Tab	Significant
		0.46	0.2050	

Source: Field Survey, 2007

$H_0$5: There is no significant relationship between Labour Input Productivity and Farmers' Labour Use Pattern

The findings in the Table 8 shows a statistical significant relationship between labour input productivity and farmers' labour use pattern tested (r=0.46; p=0.05). This implies that labour

use contributes conspicuously to farmers' output. The more the labour employed on the farm, the higher the farmers' output and hence, their income. This is in line with the assertion of Alabi (2006) that the shorter the farm distance from farmer's residence, the more productive his labour input. He stressed further that a direct relationship exists between labour employed and the farm output, under good labour management.

Table 8: Relationship between Labour Input Productivity and Farmers' Labour Use Pattern

Characteristic	df = (N-2)	r-value @p=0.05		Decision
Labour Input Productivity	98	Cal	Tab	Significant
		0.46	0.2050	

SUMMARY

The inequi Table distribution of income arising from low productivity of labour input and rising labour shortage in Ife Central Local Government area of Osun state, Nigeria has called for a research into the Labour use pattern among farmers in the local government area; with the aim of identifying the crop types grown in the area and the sources of labour available to farmers; determine labour availability, labour input productivity and labour use pattern, and to estimate the cost of labour in the area. The data for the study was collected through the use of face validated questionnaire in 1997 for the purpose of Master degree thesis but was updated in 2007. Appropriate statistical tools were employed in the analysis of data. It was revealed that labour for farm work is scarce and the available few are still not optimally utilized in the area. The organisation of rural labour market to ensure continuous labour supply throughout the production season is recommended.

Conclusion

The research findings reveal that Labour is still not optimally utilized in the Area. This may be due to the fact that labour is not readily available during the cropping season, and partly due to high cost of the available labour. If labour availability and labour use continue at this present rate, farmers may become more impoverished for a long time.

Recommendations

In the light of this research into the Labour use pattern among farmers in the area; and the need for optimal labour use on small-scale farms, it is pertinent that programmes which will encourage able-bodied youth, who could provide labour needed to boost agricultural production in their communities, be put in place by all stakeholders in agriculture at all levels, to restrict youths movement to cities in search of jobs. These include adequate development of rural infrastructures; and institution of policies that will reduce the gap in the structure of rural and urban wages of non-skilled workers.

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Marketing Analysis of Plantain in Owo and Ose Local Government Areas of Ondo state, Nigeria

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Abstract: This study analyzed plantain marketing in Owo and Ose Local Government Areas of Ondo State, Nigeria. Systematic sampling technique was used in the selection of one hundred and ten plantain marketers in the study area. A well structured interview schedule was the instrument used for data collection. Data collected were analyzed using both descriptive and inferential statistics. The study revealed that most of the marketers (70%) were female with mean age of 43years. Herfindahl index of 0.3 revealed that plantain market tends toward pure competition. Costs and returns analysis showed that plantain marketing is profi Table in the study area with monthly gross margin of N12,214.57 and benefit cost ratio of 1.43. The regression analysis revealed that marketing costs and net returns are negatively related with R2 value of 0.52 and F – value of 21.478 which is significant at 1%. The major marketing problem identified by the highest percentage of respondents is finance. The study therefore recommends that plantain marketers should come together to form plantain marketers cooperative groups from which members could obtain loans at very low interest rates.

Keywords: Marketing analysis, Plantain.

INTRODUCTION

Plantain is one of the most important staple food crops for millions of people both in developed and developing countries, a fact reflected in the gross value of its production. It reaches its greatest importance in parts of East Africa where annual consumption is over 200kg per capita and in West and central African where more than 10 million tons are produced annually and are traded locally (International Institute for Banana and Plantain, 2001).

The economic importance of plantain lies chiefly in its contribution to subsistence economy (Olorunda, 1998). According to him, the continuous availability of harves Table bunches from established areas makes it possible for the crop to contribute to all year round food security for consumers and income among marketers and producers.

In Nigeria, four main types of plantain are available with distribution strictly based on their bunch characteristics. These are; the horn type, French type, false type and false horn type. The false horn type is the most widely distributed because of its ability to tolerate poor soil conditions. The producing states include Ondo, Ogun, Osun, Oyo, Cross-river, Imo and Abia

State (Wikipedia, 2007b; Robinson, 1996; Ndubizu, 1995).

Plantain is found in the diet of many Nigerian families. It is a good source of carbohydrate no matter what form it is consumed. It is also a good source of protein, mineral and vitamins. It can be boiled and consumed directly or taken in convenient forms like *Dodo* (fried ripe pulp), Chips (fried unripe pulp) or processed to produce such as plantain flour, local beer (plantain baby food), as well as *Dodo Ikire* (produced from over-ripped plantain). Plantain also possesses medicinal properties.

It can be used to cure ailments like sore throat and tonsillitis, diarrhoea and vomiting. Soya Musa is used in treating Kwashiokor (John and Marshal, 1999; Frison and Shamrock, 1998). It is used to clear mucous, treat lung conditions and ease bladder infection. In addition, plantain has been found to be a powerful antitoxin used to neutralize poison. Externally it is used to stem bleeding and as tropical anti-inflammation for dressing wounds and snake bites. Fermented plantain can be used as a source of alcoholic drink. Further more, dried plantain can be made into flour, which can be eating with soup (Saturday Punch, 2007). Over the years, plantain peel has been traditionally used to feed goats and sheep. These peels fresh or dry can be processed into feed with little modification.

Due to the nutritional importance of plantain, venturing into its enterprise holds promising potentials. However, the relatively little attention given to plantain is focused on its production technology while only a few is done on its marketing. It is obvious that increased production without corresponding increase in marketing may amount to wastage of resources leaving people on the same platform of malnutrition. The study therefore analyses the complexities of plantain marketing using Owo and Ose local government areas as a case study. Idachaba (2000) claims that it is not sufficient for policy makers to concentrate on solving production problems without reference to their marketing problems because even though actual production may be adequate, marke Table and marketed surplus may be inadequate and unreliable. Plantain is a seasonal crop with relative short shelf life hence, it is available for a limited period and post harvest losses are very high. These situations necessitate a scientific survey of its marketing system. This study aimed at providing answers to the following questions.

i. What are the socio-economic characteristics of plantain marketers?
ii. What are the marketing activities and functions performed by plantain marketers?
iii. What is the structure of plantain market in the study area?
iv. Is plantain marketing a profi Table business?
v. What are the problems militating against plantain marketers?

Objectives of the study

The general objective of this study is to analyse the marketing system of plantain in Ose and Owo local government areas of Ondo State. The specific objectives are to;

i. identify the socio-economic characteristics of the respondents in the study area,
ii. investigate the marketing functions and practices of respondents in the study area,
iii. describe plantain market structure in the study area,
iv. evaluate costs and returns to plantain marketing in the study area,

v. identify the problems facing plantain marketers in the study area.

Hypothesis of the study

The hypothesis of the study stated in the null form is as follows:

Ho: There is no significant relationship between plantain marketing costs and net returns of respondents.

METHODOLOGY

The study is carried out in Ose and Owo local government areas of Ondo State, Nigeria. Ondo state is one of the most popular states in Nigeria with a total human population of 401,147 (National Population Commission, 2006). The state falls under the rainforest vegetation zone with a mean annual rainfall of 1500mm. It has an area of 14606km2 and lies on latitude $7^0$10'N and longitude 5^0 05'E of the equator. It has 18 local government areas (Wikipedia, 2007a). The study was conducted in Ose and Owo LGAs of the state purposively because these areas are well known for plantain and banana production. They as well produce cocoa, palm oil, cashew and timber.

Two major plantain markets were chosen from the two LGAs i.e Ose and Owo agricultural produce markets. The plantain marketers' stalls found in clusters within the markets were then numbered. Systematic sampling technique was used to select the plantain marketers in every third stall as respondents for this study. A total number of one hundred and ten (110) formed the sample size for this study.

A well structured interview schedule was used to obtain needed information from the respondents and the data were subjected to both descriptive and statistical analysis. Objectives 1, 2 and 5 were analysed by tables using frequency counts, mean values and percentages. Objective 3 was achieved by computing the Herfindahl index for the market and drawing inference from the results. Objective 4 was achieved by calculating the benefit cost ratio, gross margin and net returns of respondents. Multiple regression analysis of the linearised cobb-douglas function was carried out to test the stated hypothesis.

The formulas used in the analyses were as follow:

(1) The herfindahl index (HI)

$HI = \Sigma S_i^2$

Where S_i = Market share for respondent i, calculated as: $S_i = \frac{q_i}{q}$

Where qi = bunches of plantain sold per month by respondent i

q = total number of bunches sold per month by all respondents.

(2) The cost and returns analysis

Total cost (TC) = Variable cost (VC) + fixed cost (FC)

Total Revenue (TR) = Price per bunch x number of bunches sold

Benefit cost ratio (BCR) = $\frac{\text{Total Revenue}}{\text{Total Cost}}$

Gross Margin = Total Revenue – Variable Cost

Net Return = Gross Margin – Fixed Cost

i.e Total Revenue – Total Cost

(3) The Cobb – Douglas Regression Model

Log Υ $b_0 + b_1 + b_2 \log X_2$ …….. + b12 $\log X_{12}$

Where Υ = Net return (Measured in Naira)

X1 = Price (Naira)

X2 = Labour cost (Naira)

X3 = Rent (Naira)

X4 = Transport cost (Naira)

X5 = Age of respondent (Years)

X6 = House hold Size (Actual number of household members)

X7 = Purchase cost (Naira)

X8 = Years of Plantain marketing experience (Years)

X10 = Source of capital (Dummy)

X11 = Storage Cost (Naira)

X12 = Level of Education (Years of Schooling)

RESULTS AND DISCUSSION

Table 1 revealed the socio-economic characteristics of respondents. Thirty% of the respondents were male while 70% of them were female. This finding corresponds with Akalumbe (1998) that post harvest handling of plantain is still within the domain of women while men are more involved with its production. The Table further showed that most of the respondents (80.9%) fall between 31 and 50 years of age. The mean age was 43 years. The implication of this is that most of the respondents are in their active age when they have the ability of going about their business with vigour. On marital status of respondents, the Table revealed that 62.7% were married while 20.9% were widowed. The remaining respondents claimed to be single, divorced or separated. This shows that only a few of them were not married. Marital status is therefore no barrier to involvement in the business. On the issue of household size, 4.5% have less than three household members, 92.8% claimed between 3 and 8 household members while only 2.7% claimed to have above 8 household members. This revealed that respondents with large, medium and small household size were found in plantain marketing.

Table 1 further revealed that 23.6% of the respondents had no formal education while the remaining were educated to some extent. The analysed data further showed that 73.7% of the marketers claimed to have between 11 and 30 years of plantain marketing experience while the remaining 12.7% and 3.6% claimed ten years or below, and greater than thirty years respectively. The average was found to be 16 years. On the issue of major source of capital the respondents use in financing their plantain business, more than half of them (68.2%) claimed personal saving, followed by 26.4% who claimed to take loans from different cooperative groups to which they belong. Very few submitted that they borrow from friends and relatives while 3.6% took bank loans.

Table 1: Socioeconomic Characteristics of Respondents

Socioeconomic Characteristics	Frequency	Percentage
Sex		
Male	33	30
Female	77	70
Age		
≤ 30	5	4.6
31 – 40	34	30.9
41 – 50	55	50.0
51 – 60	12	10.9
> 60	4	3.6
Marital Status		
Single	2	1.8
Married	69	62.7
Divorced	10	9.1
Separated	6	5.5
Widowed	23	20.9
Household size		
< 3	5	4.5
3 – 5	36	32.4
6 – 8	66	60.4
> 8	3	2.7
Level of Education		
No formal education	26	23.6
Primary	62	56.4
Secondary	10	9.1
Tertiary	11	10.0
Adult Education	1	0.9
Years of marketing experience		
≤ 10	14	12.7
11 – 20	72	65.5
21 – 30	20	18.2
> 30	4	3.6
Major Source of Capital		
Personal savings	75	68.2
Friends and relatives	2	1.8
Cooperative loan	29	26.4
Bank loan	4	3.6
Total	110	100.0

Source: Field Survey, 2007

Table 2 showed that the marketers perform transportation function, and in doing this, 99.5% of them uses vehicles as means of transport while 2.7% and 1.8% respectively opted for motor bikes and headloads. Information collected further showed that the respondents perform storage function. Analysis showed that 29.1% store their ware under sheds, 57.3% store in rented shops while 13.6% claimed to store right in their houses.

On the issue of plantain bulk purchase as part of their marketing function, 40.9% of the respondents buy directly from the producers' farms, 1.8% opted for suburbs while 57.3 claimed that they meet with their suppliers right in the market place. Data analysed showed that the marketers in carrying out their distributing function uses diverse channels. About 10.9% claimed to supply their wares in wholesales. The remaining 26.4%, 42.7% and 20% sell directly to the retailers, final consumers and processors/food vendors respectively. On the issue of labour type used, 54.5% claimed to use family labour, 27.3 claimed to use hired labour while 18.2% submitted that they combine both.

Table 2: Marketing Functions and Practices

Variable	Frequency	Percentage
Transportation means		
Vehicle	105	99.5
Motor bike	3	2.7
Head load	2	1.8
Storage facilities		
Shed	32	29.1
Rented shops	63	57.3
Home	15	13.6
Purchase source		
Farm	45	40.9
Suburb	2	1.8
Market place	63	57.3
Distribution channel		
Wholesalers	12	10.9
Retailers	29	26.4
Consumers	47	42.7
Processors /food vendors	22	20.0
Labour type		
Family	60	54.5
Hired	30	27.3
Both	20	18.2
Sales (bunches sold per month)		
≤ 50	10	9.1
51 – 100	13	11.8
101 – 150	22	20.0
151 – 200	45	40.9
> 200	20	18.2
Total	110	100.0

Source: Field Survey, 2007

In order to determine the market structure of plantain market in the study area, the herfindahl index was computed making use of total sales (bunches of plantain) per month. Herfindahl index is calculated as:

Herfindahl index (HI) = ΣS_i^2

Where S_i = market share for respondent i, calculated as: $S_i = \frac{q_i}{q}$

Where q_i = bunches sold per month by respondent i

q = total no of bunches sold per month by all respondents.

Thus, the herfindahl index (HI) = ΣS_i^2

= 0.3

The highest value obtainable here is 1. A very low herfindahl index (0.3) obtained here revealed that the concentration ratio for plantain marketers is very low, thus the market structure of plantain tends toward perfect competition, which is characterized by (1) The product sold is homogenous, (2) There is no barrier to entry in to the business (3) There are many buyers and sellers in the study area.

The Costs and Returns analysis of respondents revealed the following on per monthly average basis:

Variable Cost (VC) = N22,262.11

This include transport cost + storage cost + labour cost + cost of plantain purchase.

Fixed Cost (FC) = N1,874.30

This include transaction land rent + miscellaneous

Total Cost (TC = VC + FC) = N24,136.41

Total Revenue = N34,476.68

Benefit cost ratio (BCR) = Total Revenue

Total Cost = 34476.68

24136.41

= 1.43

The business is very profi Table since the benefit – cost ratio is greater than one. The BCR revealed that for every N1 invested into plantain business by the respondents, N1,43k is obtained.

Gross Margin = Total revenue – variable cost

= N(34,476.68 – 22, 262.11)

= N12,214.57 per month

Net Return = Gross Margin – Fixed Cost

= N(12214.57 – 1,874.30)

= N10,340.27 per month

The costs and returns analysis revealed that on the average each plantain marketer in the study area makes a profit of N10,340.27 per month.

Table 3 showed the major plantain marketing problems identified by respondents. About 27.2% claimed that finance is the major

problems confronting them, 20.9% opted for rapid deterioration in quality nature of plantain, 25.4% for high transportation costs, 9.1% submitted that price fluctuation is a major problem in plantain marketing. The remaining 12.7% and 4.7% identified pilfering and infestation of pests and diseases respectively as major problems.

Table 3: Major Problems Identified

Major Problem	Frequency	percentage
Finance	30	27.2
Rapid deterioration in quality	23	20.9
High transport cost	28	25.4
Seasonality (price fluctuations)	10	9.1
Pilfering	14	12.7
Pests and diseases	5	4.7
Total	110	100.0

Source: Field Survey, 2007

The relationship between marketing costs of plantain and net returns to marketers was determined by regression analysis of the Cobb-Douglas functional form. The model is specified as follows:

$\text{Log } Y = b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + \ldots\ldots. + b_{12} \log X_{12}$

Where Y = Net return

X_1 = Price, X_2 = Labour Cost, X_3 = Rent, X_4 = transport cost, X_5 = Age, X_6 = Household size X_7 = purchase cost, X_8 = quantity sold X_9 = Years of plantain marketing experience, X_{10} = Source of capital X_{11} = storage cost, X_{12} = level of education.

b_0 = constant, b_1…….. b_{12} coefficient of variables.

The result obtained is as follows:

Variable	Coefficient	t-value
Constant b_0	1.245	0.39
Price (X_1)	0.747	6.719
Labour cost (X_2)	0.027	0.264
Rent (X_3)	-0.181	-1.949
Transport cost (X_4)	-0.185	-1.728
Age (X_5)	0.105	0.796
Household size (X_6)	-0.030	-0.275
Purchase cost (X_7)	-0.214	-2.111
Quantity sold (X_8)	0.237	2.099
Years of experience (X_9)	0.223	2.082
Major Source of capital (X_{10})	0.017	0.715
Storage Cost (X_{11})	0.010	0.075
Level of Education (X_{12})	-0.66	-0.548
$R^2 = 0.520$		
F – value = 21.478 (0.0000) ***		

The equation is thus written as:

$\text{Log } Y = 1.245 + 0.747 \log X_1^{***} + 0.027 \log X_2 + 0.181 \log X_3^{*} - 0.185 \log X_4^{*} + 0.105 \log X_5 - 0.030 \log X_6 - 0.214 \log X_7^{**} + 0.237 \log X_8^{**} + 0.223 \log X_9^{**} + 0.017 \log X_{10} + 0.010 \log X_{11} - 0.66 \log X_{12}$

N.B: *** significant at 1%, ** significant at 5%, * significant at 10%

Result of the analysis revealed that X_1 (Price), X_8 (quantity sold) and X_9 (Years of plantain marketing experience) are positively related to net returns. Thus, 0.747, 0.237 and 0.223 unit increase each in X_1, X_8 and X_9 will bring about one unit increase respectively in respondents net returns.

On the other hand, variables X_3 (Rent), X_4 (transport cost) and X_7 (purchase cost) were found to be negatively related to net returns. That

is, 0.181, 0.185 and 0.214 unit increase in each of X_3, X_4 and X_7 will result in corresponding one unit decrease respectively in respondents net returns. The R^2 value of 0.520 means that the estimated variables included in the model explained 52% of variation in net returns of respondents. The F –value of 21.478 is also significant at 1%.

CONCLUSION

From the findings of this study, it could be concluded that plantain marketing is profi Table in the study area. Also, net returns to plantain marketing are affected by estimated plantain marketing costs and selected personal characteristics of marketers. Finally, plantain marketing in the study area could be more profi Table and efficient by finding lasting solutions to various problems faced by the marketers.

Recommendations

Based on the finding that finance is the top-most major problem facing the marketers, this study recommends that the marketers should come together to form plantain marketers cooperative groups, from which members could obtain loans at very low interest rates to finance their business. Such groups can also have a common warehouse with adequate storage facilities and security, where members could store their plantains before they are ready to be sold. This will guard against deterioration in quality as well as pilfering.

Based on the finding that marketing costs and net returns are negatively related, policies and actions that lower the costs of marketing will lead to better market performance and profitability. The three tiers of government can do their own part by renovating existing bad roads and constructing new ones, especially those that link the rural areas with urban areas. This will help in getting the produce to market places in good time and in good shape (quality). It will also bring about a reduction in transportation cost and hence the cost of marketing.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

Technical Efficiency of Maize Farmers in Ogbomoso Agricultural Zone of Oyo State

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Abstract: The objective of the study is to determine the technical efficiency of maize farmers in Ogbomoso agricultural zone of Oyo state Agriculture Development Programme (OYSADEP) .Descriptive statistics and Maximum Likelihood Estimate (MLE) using stochastic frontier production model were used to analyze the data obtained from one hundred and twenty (120) sampled farmers. The result of the maximum likelihood estimate (MLE) showed that 52% of the variation in output of maize among the farms was due to technical inefficiency. The technical inefficiency index computed shows a mean efficiency ratio of 0.763 implying that substantial inefficency exists among the maize farmers in the study area. It was concluded that the farmers in the study area were technically inefficient.

Keywords: Technical efficiency, maize, small-scale farmers

INTRODUCTION

Maize (zea mays L.) is a cereal crop of *Graminae* family which is cultivated for their seeds (grains). It constitutes a large percentage of the world's food supply. Maize is important in the feeding of human being and livestock because they have high starch (carbohydrate) content and varying amount of proteins and seeds can be dried to low moisture content. (Komolafe and Adegbola, 1978).

Maize is one of the most useful crops ever grown in history. It can be boiled or roasted or made into a paste eaten by adult and children. It can also be used to make "*abodo*" and "*elekute*" in Nigeria and "*kenke*" and "*akpele*" in Ghana.

Fried maize is also good in making popular refreshment called "*guguru*" or pop corn. This is eaten all over the world. Industrial use of maize includes the production of breakfast cereals like custard, cornflakes, corn oil, glucose, starch and alcohol (Komolafe and Adegbola, 1978).

The food problem in Nigeria has been exacerbated by the level of productivity of resources used in recent time. This has necessitated the supplementation of domestic supply with large importation of food. The food import bill rose significantly from N 801.97 million in 1987 to N 147,301.60 million in 1996 (FOS,1997). This constitutes a great drain on the country's foreign reserve. Also, a country that depends heavily on food importation from other countries can not be said to be truly independent. This is because food importation may constitute a drain on the country's foreign reserves and at times the importing country can be held to ransom in critical times, especially when there is policy change (e.g. export restriction) or unforeseen circumstances in the exporting country.

The objective of this paper is to determine the technical efficiency of maize farmers in the Agricultural Development

Programme (ADP) zone of Ogbomoso. Determination of input-output relationship for any particular economic activity is important, at least for three reasons. The estimated parameters of the production function will show the

i. Elastic of output with respect to particular input
ii. Elastic of output with respect to a proportional change in all inputs and
iii. Elasticity of substitution between inputs

Furthermore, the main concern of any economic activity is to achieve the maximum possible by transforming a set of given input into some output defined by the production function. It has been the general consensus that in the developing countries, farmers do not exploit resources fully. (Bathese and Coelli, 1995)

The concept of technical efficiency can be clearly understood by referring to figure 1. In figure 1, the curve YM shows the maximum possible total output (at the frontier) as input X increased, while the curve YA shows the input response in an average farm.

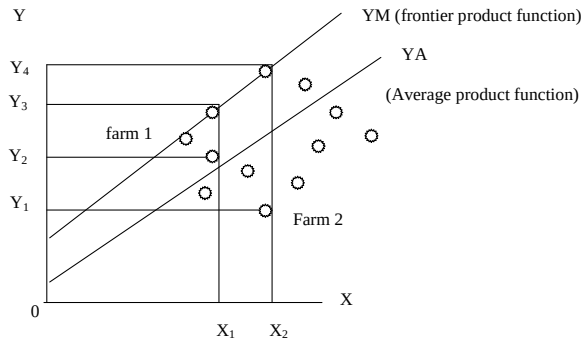

Figure 1: Technical efficiency

The technical inefficiency is given by Y_2 / Y_3 for a given input level X_1 farm. For farm 2 technical i.e. inefficiency is given Y_1 / Y_4 using input X_2.

Numerous studies have attempted to determine the technical efficiency of farmers in developing countries because determining the efficiency status of farmers is very important for policy purposes. Efficiency is also a very important factor of productivity growth in an economy where resources are scarce and opportunities for new technologies are lacking, inefficiency studies will be able to show that it is possible to raise productivity by improving efficiency without increasing the resource base or developing new technology. Estimate on the extent of inefficiency also help to decide whether to improve efficiency or to develop new technologies to raise agricultural productivity.

According to Yao and Liu (1998), for efficient farmers, government can expedite development by emphasizing new investment or technologies rather than extension and education efforts which were aimed at less efficient farmers.

Nevertheless, studies by Alimi (2000), Ayanwale (1995) and Jandrow *et al* (1982) found evidence of technical inefficiency among farmers in the developing countries.

METHODOLOGY

The study was carried out in Ogbomoso agricultural zone. This comprises of five (5) local government areas. These are Ogbomoso North, Ogbomoso South, Ogo-Oluwa, Orire and Surulere local government areas. The population for the study are the ADP maize farmers in the study area. The zone experience both wet and dry season annually. The climate of the area favours maize production. The rainy season usually starts in March and last till November. The dry season is usually very hot except during harmattan period when it is cold and dry. Majority of the populace combines subsistence farming with other

occupation like trading and civil service (school teachers)

A multi-stage sampling technique was used. A list of all the maize farmers in all the five local government areas was obtained from the ADP zonal headquarters in Ogbomoso. From the lists 3 villages were randomly selected from each of the five local government areas and from each of the 3 villages, 8 maize farmers were selected. This gives a total of 120 respondents.

Method of data analysis - A combination of descriptive and stochastic production function model using the method of Maximum Likelihood Estimate (MLE) with computer programme FRONTIER version 4.1 (Coelli, 1994) were used to analyze the data obtained from the farmers. Descriptive tools (percentages and frequency) were used to analyze the socio-economic characteristics of the farmers while Maximum Likelihood Estimate (MLE) was used to analyze the technical efficiency of the farmers.

The model is expressed as

$$Y_i = \exp\ (X_i\beta + V_i - U_i)$$

…… (1)

The technical efficiency of production of the ith farmer in the appropriate data set, given the level of these inputs, is defined by

$$TE_i = \exp(-V_i) = Z_i\sigma$$

…… (2)

From equations (1) and (2), the random factor (v) is independently and identically distributed with N (O, σ2v) while the technical inefficiency effects U is often assumed to have a half normal distribution /N (O, σ 2 v).

The farm specific technical efficiency (TE) of the ith farmer was estimated by using the expectation of vi condition on the random variable (Ei) as shown by Battese and Coelli (1995). The TE of an individual farmer is defined in terms of the ratio of the observed output to the corresponding frontier output given the available technology, that is;

$$TE = Y_i = \frac{\exp(X_i\beta + V_i - U_i)}{esp(X_i\beta + V_i)}$$

$$Y_i* = \exp(-U_i)$$ …..…… (3)

(Tadesse and Krishnamurthy, 1997)

So that 0 < TE < 1 i.e. technical efficiency is between 0 and 1)

In the study area, a separate stochastic frontier production proposed by Bathese and Coelli (1995) was applied in the analysis of data to capture the efficiency of ADP maize farmers. The empirical model of the stochastic production frontier is specified as

$$\ln Yij = \beta_0 + \beta_1 \ln X_1 ij + \beta_2 \ln X_2 ij + \beta_{3j} \ln X_3 ij + \beta_4 \ln X_4 ij + \beta_5 \ln X_5 ij + \beta_6 \ln X_6 ij + Vij - Ui$$

…… (4)

Y – Maize output in Kg

Y_1 - Total quantity of seed used (Kg)

Y_2 - Total quantity of labour used (Mandays)

Y_3 – Cost of transportation (Naira)

Y_4 – Quantity of herbicides used (Kg)

Y_5 – Quantity of fertilizer used (Kg)

Y_6 – Cost of farm implement

Vij – is a random error term independently and identically distributed (have a normal distribution with mean zero and variance σ 2 v) intend to capture event beyond the control of farmers.

Uij – is non-negative random variable called technical inefficiency effects associated with

technical efficiency of production of farmers involved.

In- is the natural logarithms (to base e).

RESULTS AND DISCUSSION

Socio- economics characteristic of the farmers

The age distribution of the respondents according to Table 1 shows that most of the farmers (32%) are between 40 and 49 years of age. About 29% are between 30 and 39 years while 23% are between 50 and 59 years of age. The mean age of the respondent is 42.50% years. This shows that the farmers are still in their active age. Majority of the farmers are male (83.3%). While only 16.7% are female. Also from Table 1, 88% of the respondent are married while only 8.3% are single, 2% each are divorced or widowed. This shows that majority of the respondents are married men and women. On the level of education, majority of the respondents are literate while only 25% have no formal education.

The mean year of experience of the maize farmer in the study area is 11year. This shows that maize production has been in existence long ago as majority of the farmers (about 86%) have been in maize production for about 20 years. The mean household size of the respondent is about 7. This shows that farmers can have easy access to additional labour from the family members.

Table 1: Socioeconomics Characteristics of the Respondents

Variables	Frequency	Percentage
Age (years)		
≤ 29	12	10
30-39	36	29
40-49	38	31.5
50-59	28	23
≥ 60	6	6.5
Sex		
Male	100	83.3
Female	20	16.7
Marital status		
Single	10	8.3
Married	106	88.3
Divorced	2	1.7
Widowed	2	1.7
Education		
No Formal Education	30	25
Primary Education	42	35
Secondary Education	32	26.7
Tertiary Education	16	13.3
Experience (years)		
≤ 10	86	71.7
11-20	1.8	14.7
21-30	8	6.8
31-40	8	6.8
Household size		
1-5	72	60
6-10	38	31.6
11-15	10	8.4

Source: computer from field survey data, (2007)

Result of Ordinary least square estimate

- The OLS method was used to analyze the data. The result shows that quantity of seed, labour, transportation, herbicides, fertiliser and other cost were significant at 1% level. The coefficient of labour and herbicide have negative signs, which implies that an increase in the use of these inputs leads to a decrease in the level of maize production and the technical efficiency of the farmers. Other variables with positive co efficiency imply that they contribute positively to the productivity of maize in the zone. The quantity of these inputs should be increased in order to increase the technical efficiency as well as the productivity of maize farmers.

$$Y = 0.817 + 0.601\log X_1 - 0.121\log X_2 + 0.132X_3 - 0.116\log X_4 + 0.143\log X_5 + 0.10\log X_6$$
(0.629) (0.680)* (0.112) (0.619)* (0.119)* (0.129)* (0.139)

Maximum Likelihood Estimate (MLE) Result- The maximum likelihood estimate (MLE) of the parameters result is presented in Table 2. It shows the efficiency in the use of the available resources and technology. Four of the explanatory variables included in the model have positive relationship with the output of maize while only two variables, labour and herbicides have negative relationship with maize output. This implies that an increase in the use of these variable decrease maize output. All the variables are significant to maize output. This corroborates the result of the OLS

The estimated variance of parameters which is the ratio of the performance of farm specific efficiency indices to the total variance of output was 0.524. This implies that 52% of the variation between the observed output and the frontier output are due to technical inefficiency. In essence, the shortfall observed in output from the frontier output is due primarily to factors within the control of the farmers. The variance of the parameter is significant and statistically different from zero which confirms that there is technical inefficiency in the production of maize in the study area.

Table 2 – Frontier Analysis Result

Variable	OLS Estimate	Frontier estimate
Constant	0.817 (0.629)	0.925 (0.94)
Quantity of seeds (X_1)	0.601 (0.68)	0.609 (0.96)
Labour (X_2)	-0.121 (0.112)	0.41 (0.99)
Transport (x_3)	0.135 (0.619)	0.14 (0.91)
Herbicides (X_4)	-0.116 (0.119)	-0.12 (0.99)
Fertiliser (X_5)	- 0.143 (0.124)	-0.14 (0.98)
Other cost (X_6)	0.109 (0.139)	0.11 (0.99)
Log likelihood function		-0.607
Sigma- square		0.408
Gamma a		0.524

Source: Computed from field survey data, 2007
The value in parenthesis is the T ratio
* Significant at 1% level

Technical efficiency distribution

In Table 3, the technical efficiency index is presented using Jondrow *et al* (1982) procedure. The minimum estimated efficiency is 30% while the maximum efficiency is 92.5% and the mean level of technical efficiency is 76.3%. According to Grabowski *et al* (1990) a farm is considered technically inefficient even if the farm register a technical efficiency index of 82%. Going by this standard the number of maize farmers considered efficient technically is less than 15% of the total maize farmers in the sample under study. This indicates that maize farmers can increase their productivity by raising the technical efficiency through increased input usage.

Table 3: Technical Efficiency Distribution.

Efficiency index	Frequency	Percentage
0.30 – 0.39	4	3.33
0.40 – 0.49	20	16.67
0.50 – 0.59	22	18.33
0.60 – 0.69	48	40.00
0.70 -0.79	08	6.67
0.80 – 0.89	10	8.33
0.9 – 1.00	08	6.67
Total	120	100.0

Source: computed from field survey data, 2007
Mean efficiency = 76.3%
Maximum efficiency = 92.6%
Minimum efficiency = 30%

CONCLUSION

The study examined the technical efficiency of ADP maize farmers in Ogbomoso agricultural zone of Oyo state. Maximum likelihood estimation procedure was used to analyse the data obtained from the sampled farmers to derive the frontier production function. The technical efficiency index computed indicated strongly that most of the maize farmers in the

study area are highly technical inefficient with a mean efficiency ration of 0.763. This shows that great potential exists for the farmers to further increase output using the available inputs and technology

Conclusively, the research findings show that there is a big scope to increase technical efficiency of the farmers with the existing level of inputs. This implies that the technical efficiency can be increased substantially with extension services with all necessary technical assistance for the dissemination of timely information to farmers and to relay their problems to researchers for solution. This will go a long way to increase the level of technical efficiency and output of the maize farmers.

Therefore effort should be directed in education, extension services, credit facilities for the purchase of necessary input(seed, fertiliser and herbicide) as well as other support services in order to improve the technical efficiency of the maize farmers in Ogbomoso agricultural zone of Oyo state.

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IJAERD E-Journal International Journal of Agricultural Economics & Rural Development - 1 (2): 2008

The Incidence and Severity of Poverty among Small-scale Farmers in Ogbomoso Area of Oyo State

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Abstract: This study investigated the incidence and severity of poverty among small-scale farmers in five local government area of Ogbomoso ADP Zone, Oyo State. Systematic random sampling was used to select the small scale farming households and structured questionnaire was administered on selected sample of one hundred and fifty (150) respondents. Head count ratio, Poverty gap index. Sen Index, frequency counts was used to analyze the data.

The study revealed that most small-scale farmers in the area were male, mature and responsible but with large household size and no formal education, their income level is also quite low. About 28% of small – scale farmers were extremely poor, 20% were moderately poor and 52% are non- poor. It was revealed that severity of poverty was seriously felt in Ogbomoso North and South than in Orire LGA and the poverty gap was considerably large at Oriire LGA. The probability of being poor is reduced by increase in educational level, farming experience, number of farm enterprise, farm size and income level of the farmers. But the probability of being poor is increased by increase in household size. Farmers should be encouraged to diversify into many enterprises and also increase their farm size in order to increase their income

Keywords: Poverty, severity, incidence, small-scale farmer, and household.

INTRODUCTION

Poverty as a concept does not lend itself to an easy and precise definition. The analytical exploration of the concept and definition is fraught with a number of difficulties. This is because it affects many aspects of the human conditions/ situations including physical, moral and psychological that a concise and universally accep Table definition is elusive (Blackwood and Lynch, 1994).

Poverty is often defined in terms of inadequacy of income or disposable resources to support a minimum standard of decent living, its characteristics of poor nutritional status, lack of physical assets and inability to work are sufficiently well correlated with income and consumption expenditure to allow us focus on these two variables (Ravallion, 1992) However, indicators such as illiteracy, access to education, safe water, health and housing if adequate are also used to measure poverty (Rasheed, 1996).

The general consensus is that most of the poverty in Nigeria is related to agriculture. The World Bank (1996) reported that the number of rural poor is about twice that of the urban and that the depth of poverty is more than double in rural area. Small – scale family land operators still dominate the agricultural sector in Nigeria. Most

farming households operate land owned through inheritance and acquisition through family ties. More than 50% of farmers own their land (invariably small pierces of land) and few are in rental or squatter tenureship (Okunmadewa, 1993).

Interestingly, the owner operators in view of the fragmented structure of such farmlands as well as other issues surrounding the operation of such land are less prosperous than renters and squatters. The poverty headcount or incidence among owner occupied farmlands is higher (Okunmadewa, 1993).

Poverty can be chronic or transitory depending on how long poverty is experienced by an individual or a community. Poverty can also be absolute or relative. Absolute poverty is the situation of lack of access to resources needed to obtain the minimum necessities required to maintain physical efficiency. Relative poverty, on the other hand, is the inability to maintain a given minimum contemporary standard of living (Okunmadewa, 2001)

The significance of micro or small scale enterprises as defined in terms of the general role in economic development which focuses on firms as the instruments for poverty alleviation is rooted in the fact that poverty is produced, sustained and substantiated within the household (Falusi, 1995). In Nigeria, the household based small/micro enterprises are the sure bet for poverty alleviation. This set of the populations according to Idachaba (2000) will constitute the backbone of Nigeria agriculture for the next 25 years, the contrary wishful thinking of some leaders and policy makers not withstanding.

The poor small –scale farmers are the central focus in poverty studies, people are termed poor when their measured standard of living in terms of income or consumption is below the poverty line (Obadan, 1997). Constraints to growth and performance of small/micro enterprise in the agricultural sector include: Low – productive production technology, low technology adoption and low rate of use of adopted technologies, low- income, low capital formation in agriculture, decreasing man- land ratio, other constraints to growth and performance are low level of investment and low budgetary allocation to the sector, low level of rural savings mobilization, problems of unworkable agricultural credit administration, low level of agricultural growth of less than 3% per annum and finally problem of agricultural policy mistakes, policy failure and policy distortions (Rahji, 2000).

Poverty thresholds were the dollar amounts used to determine poverty status. Poverty line has been described as the “cut – off” or the minimum standard of expenditure on food or per capita income, below which an individual is described as poor (Ravallian, 1992).

The objectives of the study

Specific objectives of the study are to:

i. identify and describe the socio-economic characteristics of the small-scale farmers sampled,
ii. find out the main livelihood activities and income sources among the respondents, and
iii. describe the poverty incidence and severity among the small scale farmers.

The hypothesis was stated in null form as follows; There is no significant relationship between the farmers’ socio economics characteristics and their poverty level.

METHODOLOGY

The study was conducted in Ogbomoso in Oyo State. Cross –sectional observation of one-hundred and fifty (150) small – scale farmers was made. Ogbomoso is the second largest town in Oyo State with an urban population of about 657,417 (FGP, 2006 Census) and lies between latitude 8^0 29' North of the equator and between $4^0$30' North of the Greenwich Meridian. Ogbomoso has an area landmass covering about 37,984 square kilometres and located in the northern part of Oyo State.. The vegetation of Ogbomoso is dominated by derived savannah vegetation and agriculture is the main occupation of the people.

Both primary and secondary data were used in the study; copies of questionnaires were administered to the small- scale farmers. Some of the information gathered in this study includes the socio- economic characteristic of the respondents, information relating to respondent with crop and livestock production, income and expenditure of the small scale farmers.

About one hundred and fifty (150) small – scale farmers were sampled using multistage random sampling technique within Ogbomoso zone. There were five local government areas in Ogbomoso zone (Ogbomoso North, Ogbomoso South, Ogo-oluwa, Oriire, and Surulere) and two communities/villages were randomly selected from each local government area, systematic random sampling was used to choose fifteen (15) small-scale farming households in each community/village; all the samples made a total of one hundred and fifty (150) respondents.

Descriptive and inferential analyses were used, data were analyzed using such tools like headcount index, poverty gap index, severity index, and frequency distribution

The first three measures are represented mathematically thus:

(i)……. $P_0 = q/n \quad - \textit{ headcount ratio}$

(ii)…….. $P_1 = 1/n = \frac{q}{\Sigma}[Z - Yi] \quad - \textit{ poverty gap index}$

(iii)

$S = P_0\{PGR + (1 - PGR)GP - \textit{Severity index}$

The variable in the model are:

$Y_1 = \textit{Income of the poor}$

$Z = \textit{Poverty line}$

$q = \textit{Number of people below the poverty line}$

$P_0 = q/n = \textit{headcount ratio}$

$PGR = \sum\left\{\frac{(z - y_i)}{qz}\right\} = \textit{Poverty gap ratio}$

$GP = \textit{Gini co} - \textit{efficient among the poor}$

$S = P_0(PGR + (1 - PGR)\,GP)$

Gini coefficient GP is simply expressed as

GP = $1 - \sum XY$ where X = percentage of poor in the category (each LGA)

Y = cumulative proportion of the poor in the whole study area

Model Specification

Logistic distribution

$$\Pr ob(y=1) = 1 - L\left(\sum_{k=1}^{k}\beta k \times k\right) = L\left(\sum_{k=1}^{k}\beta k \times k\right) = L = ek = \frac{1\beta k \times k}{\sum_{1+ek=1}^{k}\beta k \times k}$$

For the logit model the choice probabilities are given by:

$$P_1 = F\left(x_i^{\,1}\beta\right) = F(1_i) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where F(i) is the cumulative distribution of a logistic random variable and given by:

$$P_1 = F\left(x_i^{\,1}\beta\right)$$

$$= \frac{1}{1+e}\beta x \quad (\log it) \qquad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

RESULTS AND DISCUSSION

Concerning the socio economic characteristics of respondents, 83.3% were male farmers while 16.7% were female. Larger percentages of the farmers (38.7%) are in the age range of 41-50 years. Majority were married (80.0%) while 41.3% of the respondents had no formal education. About 34.0% had an average of 8 household members and 52.0% had an average of N12,500 as their monthly income . This implies that most small-scale farmers in the area are male, mature and responsible but with large household size and no formal education, their income level is quite low.

Table 1. Socio-economics characteristics of the respondents

Variables	Frequency	Percentage
Sex		
Male	125	83.3
Female	25	16.7
Age		
< 20	7	4.6
21- 30	15	10.0
31- 40	30	20.0
41 - 50	58	38.7
50 and above	40	26.7
Educational Level		
No formal education	62	41.3
Primary	26	17.3
Secondary	30	20.0
Tertiary Education	32	21.3
Marital Status		
Married	120	80.0
Separated	-	-
Divorced	-	-
Widowed	9	6.0
Single	21	14.0
Households Size		
1- 3	26	17.3
4- 6	42	28.0
7- 9	51	34.0
10 and above	31	20.7
Income level/month		
1,000 - 5,000	10	6.7
5,001 - 10,000	15	10.0
10,001 - 15,000	78	52.0
15,001- 20,000	21	14.0
20,001 - 25000	15	10.0
> 25,000	11	7.3
Total	150	100

Source: Field Survey, 2007

Table 2.0 revealed the poverty incidence, depth and severity among the small-scale farmers. The use of the poverty lines consistent with the typical consumption and expenditure behaviour among small-scale farmers in the study area suggested the poverty incidence in the study area. The results indicated (in Table 2) that 28% of the farmers' households were extremely poor, 20% were moderately poor and 52% were non-poor in the area. Incidence of poverty was far more intense in Ogbomoso North Local Government Area (8%) than in Orire Local Government Area (3.3%), and in all 42 households of the small- scale farmers out of a total of 150 were poor in Ogbomoso; this is well explained in Table 3.0.

Table 2: Poverty incidence of small-scale farmers

Location	Extreme Poor	Moderate Poor	Non-poor	Percentage
Ogbomoso North	8.0	2.6	11.6	22.2
Ogbomoso South	6.0	1.8	7.8	15.6
Ogo-Oluwa	4.7	4.5	9.2	18.4
Oriire	3.3	9.4	14.7	27.4
Surulere	6.0	1.7	8.7	16.4
Total	28	20	52	100

Source: Field Survey, 2007

Table 3: Distribution of Poor Farmers in each Locality Surveyed.

Location	Total household	Poor H/H	Percentage
Ogbomoso North	30	12	40
Ogbomoso South	30	9	30
Ogo-Oluwa	30	7	23.3
Oriire	30	5	16.7
Surulere	30	9	30
Total	150	42	

Source: Data Analysis, 2007 Field Survey

Table 4.0 showed that poverty gap index was considerably lower (small) in Ogbomoso North (5.4%), Ogbomoso South (7.1%) and Surulere LGA (7.1%), than in Orire which was 12.9%. The poverty measures P2 suggested higher severity of poverty in Ogbomoso North (8.4%)

than in Orire LGA (3.6%). In order to locate the poor, the percentage distribution of the poor was derived from the headcount index (Po) and it confirmed that 42.9% and 32.1% of the poor households were located in Ogbomoso North and South LGA respectively. The normal distribution of poor farmers in each locality surveyed (Table 3) also supported the above conclusion.

Table 4: Poverty Incidence and Severity among the respondents

Location	Headcount (Po)	Poverty Gap (P1)	Sen Index (P2)	Percent share poor	percent share Population	Location Index
OGBOMOSO	28.0	1.5	19.7	100	150	100
Ogbomoso North	8.0	5.4	8.4	28.6	40.0	71.5
Ogbomoso South	6.0	7.1	6.4	21.4	30.0	71.3
Ogo-Oluwa	4.7	9.2	5.1	16.7	23.3	71.7
Oriire	3.3	12.9	3.6	11.8	16.7	66.5
Surulere	6.0	7.1	6.4	21.4	30	71.3

Source: Field Survey, 2007

A location index was derived to know the percentage share of the poor in each LGA. This is done by dividing the percentage share of the poor in each region by the corresponding percentage share of respondents in each LGA. The index revealed that the percentage share of poor in Orire LGA was the least amidst other LGA.

The hypothesis was tested using logit model, poverty level of the farmer was the dependent variable and the socio economics characteristics were the explanatory variables. From Table 5.0, it was revealed that educational level, farming experience, number of farm enterprise, income level and farm size were negatively significant while household size was positively significant. This means that the probability of being poor is reduced by increase in educational level, farming experience, number of farm enterprise, farm size and income level of the farmers. But the probability of being poor is increased by increase in household size.

Table 5: Logit Analysis showing Relationship between the poverty level and socio –economic characteristic of small scale farmers in the study Area

Description of the Variable	Co- efficient	t - ratio
Farmer's Sex (1= female, 0 = male)	3.262	2.637
Farmer's Age(years)	- 0.202	-0.701
Marital status (1 single, 0 = married)	25.030	0.348
Household size	0.322	0.904*
Education level	- 0.596	-2.453**
Major occupation (farming)	2.869	3.063***
Farming Experience (years)	0.210	0.901*
Type of farming (Enterprise)	- 2.322	2.106**
Social Group	- 0.513	-1.049 *
Accessibility to farmland	0.208	2.929***
Farm size	-0.115	-1.009
Number of Right Predictions	125	
percentage of Right Predictions	83	
Sample Size (number)	150	
Log –Likehood function	- 57.776	
Log – Likehood(0)	- 88.943	
Likehood Ratio test (13)	62.335	

*** = Significant at 0.01 level ** = Significant at 0.05 level * = Significant at 0.10 level
No of valid cases: 150. Source: Field Survey, 2007

CONCLUSION AND RECOMMENDATION

The study exposed the level of poverty among small scale farmers in all the local government areas of Ogbomoso zone. It was revealed that severity of poverty was seriously felt in Ogbomoso North and South than in Orire LGA and the poverty gap was considerably large at Oriire LGA. Also there is high probability of being poor if the farmer continues to increase his household size. Whereas increase in educational level, farming experience, number of farm enterprise, farm size and income level of the farmers will reduce the probability of being poor.

Based on the results from this study, it is therefore recommended that;

i. A s Table environment should be provided to promote rapid economic growth; policies that make productive use of labour will definitely expand the employment and income earning opportunities for the majority of small – scale farmers in the study area.
ii. Poverty remedies should include provision of the adequate basic social services for the small- scale farmers' especially adult education, primary health care and family planning. Provision of these social services will improve their lot and enhance their chance of moving out of poverty line.
iii. Farmers should be encouraged to diversify into many enterprises and also increase their farm size in order to increase their income. Forming cooperative society and group farming should be encouraged so that the expansion can be made possible.

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