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THE NIGERIAN JOURNAL OF RURAL EXTENSION AND DEVELOPMENT (NJRED)

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Effectiveness of the Community Driven Development Approach for facilitating grassroots development: Lessons from the Local Empowerment and Environmental Management Project (LEEMP) in Nigeria

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ABSTRACT

The need to document the strength and weakness of Community Driven Development (CDD) approach being used for development programmes with the aim of improving its effectiveness for engendering community ownership of projects and sustainability necessitated this study. The study investigated the effectiveness of the CDD approach for facilitating grassroots development; drawing lessons from Local Empowerment and Environmental Management Project (LEEMP) in Nigeria. Study was conducted in three LEEMP participating States of Adamawa, Bauchi and Imo. Data was collected using in-depth interview (IDI) with key informants and field observation of LEEMP processes. Data collection covered LEEMP processes starting from community mobilization through project implementation. CDD strategy was effective in generating the interest of the people in the community development efforts of LEEMP. This was evident by the zero level of resistance to development intervention observed in all communities of study and the ease at which community members keyed into project ideas and also rallied support for the intervention. The CDD approach of LEEMP through ceding of the steering of Project implementation to the benefiting communities was observed to be very effective in ensuring community ownership of LEEMP assisted projects. However, the crucial strategy of LEEMP to build local capacity through its CDD approach was not realized to an appreciable extent. In conclusion, the CDD procedures of LEEMP development interventions are effective in Nigeria communities. Importantly, the level of LEEMP goal attainment of achieving social inclusiveness and ensuring that projects are driven by the beneficiaries can be adjudged as above average.

Keywords: Community Driven Development, Local Empowerment and Environmental Management Project, Ownership, Social inclusion.

INTRODUCTION

The community-driven development (CDD) approach has become a key strategy used by both government and development assistance programs (World Bank, 2006). The popularity of the CDD approach has been propelled by its potential to develop projects and programs that are sustainable and responsive to local priorities, empower local communities to manage and govern their own development programs, and more effectively target poor and vulnerable groups (World Bank, 2005). Empirical evidence of the effectiveness of CDD in achieving these objectives is mixed (Mansuri and Rao, 2004). Among the interesting questions capturing the attention of scholars are the sustainability of donor-supported CDD and its effectiveness in targeting the poor and vulnerable. Alesina and Eliana (1999) observed that projects managed by communities were more sustainable than those managed by local governments because of better maintenance. However, Brown *et al* (2002) and OED (2005) found that CDD projects that lacked external institutional, financial, and technical support were not sustainable. Targeting the poor has been one of the challenges of development and emergency response programs (Arcand and Bassole 2007). One argument in favor of CDD asserts that it can improve targeting because CDD projects make better use of local knowledge to define and identify the targeted groups (Mansuri and Rao, 2004). However, empirical evidence is

mixed concerning the effectiveness of targeting using the CDD approach. One review concluded that in heterogeneous communities with high social inequality, the performance of CDD projects in targeting has been worse than that of externally managed programs (Barron, Smith, and Woolcock 2004). However, the review also revealed that in egalitarian communities with open and transparent systems of decision making, targeting was better with CDD than with development approaches using external project management.

This study was conducted to assess the effectiveness of a CDD project called Local Empowerment and Environmental Management Project (LEEMP), which is one of the largest community development projects in Nigeria. The LEEMP project aims to reduce poverty by supporting communities to develop multi-sectoral micro-projects, increasing the capacity of communities to manage economic activities, and reducing environmental problems. This report evaluates how the project affected the capacity of beneficiaries to manage CDD projects and how the project through its CDD approach has been able to engender community ownership and participation. This report also examine whether the project succeeded in targeting the poor and the vulnerable through its social inclusion strategy.

OBJECTIVES OF THE STUDY

The broad objective of the study is to investigate the effectiveness of the CDD approach for facilitating grassroots development; using the Local Empowerment and Environmental Management Project (LEEMP) in Nigeria as case study. The specific objectives include to:

(i) document the processes involved in the articulation and implementation of LEEMP community driven development programme; and

(ii) give an overall assessment of the current processes being used for LEEMP's project delivery.

METHODOLOGY

The study was conducted in three LEEMP participating states of Adamawa, Bauchi and Imo. In each of the participating states, one local government area was randomly selected from each of the three senatorial districts to make a total of three local government areas. One community was further selected from each of the selected local government areas to arrive at the three main communities of focus for each state. Thus, three communities were selected from each

of the states to make a total of 9 communities. The study population comprised of all individuals and groups who participated in the implementation of micro-projects in the communities. These include the Operation Officers (OOs) and other project officials from State project support units (SPSUs), members of the community project implementation committees (CPMCs), other members of the benefiting communities and local government desk officers. Primary and secondary data were used to fulfill the objectives of the study. Primary data for the study were generated using the qualitative research design such as in-depth interviews (IDIs) with key informants and field observation. Secondary data were also collected from the CPMCs (minutes of meetings), SPSUs and the Local Government Area (LGA) desk offices in the study areas to provide a back-up for the information garnered from the primary sources.

The data collection procedure was achieved by posting 2 observers who had been trained on process documentation research and methodology to each of the study communities. The field data covered the LEEMP community –driven development processes as specified in the LEEMP operational guidelines. These includes community entrance, sensitization and mobilization, participatory rural appraisal, CPMC election, training of CPMC on community development plan formulation, field and desk appraisal and project implementation. Data were also obtained on the roles played by the local governments and the SPSUs in project facilitation.

FINDINGS AND DISCUSION

Sensitization and Mobilization
Strategy for community entrance

Inputs from the various communities studied revealed that the only strategy adopted for gaining access to the communities was the identification of their traditional leaders and chiefs. In Bauchi State however, the local government officials were also used as link to the community heads and chiefs. Reports from the states showed that the team of LEEMP officials from each state identified community leaders in the various communities and paid them a courtesy visit during which they (community leaders) were intimated with the LEEMP development agenda and sought for the cooperation of the various local heads and that of the entire community. Although this method proved to be an effective gateway for

entrance into communities, better results would have been achieved if this method was combined with the identification of groups within the community. For instance, more positive achievements would have been recorded if further efforts were made to mobilize the people through their religious groups, age groups, women and farmers groups etc. as witnessed in Batum community of Adamawa State which resulted in about 60% attendance at the community engagement meeting.

Mechanism adopted for mobilization

The community members were mobilized for the sensitization meeting using community engagement meetings in the various communities. Information on invitation for the meeting was passed by the various village heads through the use of local information methods such as town criers, household heads, and interpersonal contact between members of the communities. No SPSU explored the options of strategic mounting of posters (except in Obinwanne omuaka community of Imo State) and other mass media information dissemination channels.

Attendance and Democratic process

Of all the nine communities covered by this report, only three communities (Batum, Obinwanne omuaka and Tsumba from Adamawa, Imo and Bauchi States respectively) witnessed above average attendance of the community members for the sensitization meeting. Attendance reports from these communities also showed that the composition of the participants at the meeting was socially inclusive in terms of the presence and participation of individuals of different age groups, gender and the socially marginalized. For instance, the breakdown of the attendance at Obinwanne omuaka showed that 199 women were in attendance, followed by youths and adult men who were 184 and 156 in numbers respectively.

The other six communities (Dzurok, Balaifi, Sabongida, Gabchiari, Ezelu-okwe and Nguru nweafor) witnessed poor turn-out of the community for the sensitization meeting, an indication of poor mobilization. For example, only about 11% of the total community's population attended the community engagement meeting in Gabchiari community (Bauchi State) and less than 50 people attended in Balaifi community of Adamawa State.

Information Dissemination by SPSU

Information dissemination especially the intimation of community members with LEEMP

objectives was achieved through contact meetings with the community leaders and engagement meetings with the community at large. Attempts were made by the various operation officers in charge of each community to ensure that community members were sensitized using their various local dialect, and where more than one dialect is predominant, interpretations were made from the major dialect to others to ensure everybody is carried along. However, the non-availability of teaching aids like film strips, posters, fliers, video shows and pictorials which could easily enhance the understanding of the people on the past and present efforts of LEEMP was a major gap observed in the process in all the communities. Studies have shown that people especially adults; learn faster when teaching aids that involve pictorials and films strips are used for information dissemination.

Furthermore, the information disseminated adequately covered the contents of the CIM however, the CDA members in all the communities of study were not served with copies of the CIM. Also, there was no provision to obtain background and post sensitization knowledge of the community members of LEEMP objectives which could have served as an empirical basis for assessing the effectiveness of the sensitization efforts. In addition, there was no provision for the use of public address system in all the communities except in Balaifi (Adamawa). The non-utilization of the public address system was responsible for the crowded sitting arrangement observed in all the communities meetings as each participant tried to be as close as possible to the facilitators.

Election of Community Project Management Committee (CPMC)
Transparency in conducting elections

Observations from all the States showed that the elections were held in places centrally located within the various communities thereby giving all members of the various communities' equal opportunity to participate in the process. In most of the communities, primary schools or village squares were used as venue for the meeting.

The voting option adopted in all the communities of Adamawa and Bauchi States was not by show of hands as recommended by the LEEMP operation manual but by voters' queuing behind their candidates of choice. By comparative analysis, this method proved to be more effective than the show of hands as it allowed for easy counting of the voters and minimized cases of disagreement on the total number of votes as

witnessed in the three participating communities of Imo State. Use of "counting of hands method" would have posed similar challenge in the other two states and possibly disruption of the process especially in communities where high level of attendance were recorded given the dispersed sitting arrangement of people at the community meetings.

Election results in all the communities were announced immediately after the conclusion of the process.

Attendance and Democratic process

Most of the communities recorded attendance level of above 50% of the total population at the election meeting except in Gabchiari, Batum and Ezelu-okwe communities of Bauchi, Adamawa and Imo States respectively, where below average attendance was observed. In all the communities, the composition of attendance could only be said to be gender and age group balance as the attendance of the socially marginalized including the widows, landless and vulnerable was not observed.

On the requirement of inclusion of minimum of 2 women and a youth as members of the CPMC, a total compliance was observed in all the communities. For instance, the outcome of the election in Ezelu-okwe returned 4 men, 3 women and 1 youth as members of the CPMC while in Obinwane Omuaka community, 4 men, 2 women and 1 youth were elected as CPMC members. However, the nomination of candidates to vie for elective posts within the CPMC could not be said to be democratic in most of the observed communities. For instance, in Dzurok, Sabongida and Tsumba communities, nomination of candidates for the election was done by the elites, CDAs, and village heads leaving out other members of the community (elitist capture). Similar experience almost occurred in Ezelu-okwe community of Imo State but for the fierce opposition of the youths who resisted the list presented by the community head and his chiefs and insisted on a participatory process.

Roles of LGA, CDA and SPSU in conducting elections

Representatives from the Local Government, Community Development Associations (where it exists), and the SPSU were present at the election meeting in all the communities to monitor and lend their support for the process except for Batum community of Adamawa State where observation revealed that the LGA was not represented at the meeting. The CDA officials in Tsumba and Sabongida communities of Bauchi

States helped to resolve the conflict that evolved during the election in their communities. In Imo State, the CDA helped in mobilizing the community members. The Operation officers conducted the elections in all the communities where no CDA exists except in the three communities of Imo State where the conduct of the election process was led by the operation officers due to perceived lack of competence on the part of the CDA officials.

Training of Community Project Management Committee (CPMC)
Training content

The training content in all the communities was observed to cover all the topical issues required by LEEMP manual. However, insights from all the communities revealed that content were very shallow such that they could only be understood by someone with a fore knowledge of the training expectations. The training approach was not systematic and seemed to be a mere sensitization programme for the CPMC.

Effectiveness of delivery by the Operation Officers

Taking into cognizance the indicators of effectiveness such as duration of the training, language used, level of understanding by CPMC, availability of training materials, sequence of delivery and organization of the training processes, none of the trainings conducted in the various observed communities can be adjudged as effective. For example, the training in the various communities (with the exception of Dzurok community of Adamawa State) lasted for a maximum of four hours notwithstanding the wide range of issues expected to be delivered to the trainees and their (trainees') low level of education.

In all the communities, CPMC members were not served with copies of training manuals and or constitution as required. The few documents served in Balaifi community (Adamawa State) during the training were written in English language which was not well understood by majority. Input from the states further showed that the operation officers in Dzurok and Balaifi communities of Adamawa State could not communicate effectively in the local language understood by majority of the community during the training. The language of communication by the OOs was however observed to be audience appropriate in other communities observed.

On the understanding of participants of the training content, the feedback obtained in the form of questions raised by CPMC members after

the training did not indicate that CPMC members adequately grasped the content of the training. This is evident from by the few and irrelevant questions that were raised after the training especially in Balaifi community, and the various shortcomings of CPMCs observed during the actual project implementation which is supposed to be the benchmark for their mastery of the training contents.

Participatory Rural Appraisal (PRA)
Conduct of PRA

The use of PRA tools such as village mapping, transect walk and needs assessment and prioritization cut across all the various communities of study. However, important tool/activity such as institutional analysis which could provide useful information about local organizations and the perceptions that people have about them was not carried out in any of the community.

On the sequence of tools used, inputs from the states revealed that the conduct of the PRA exercise was not guided by any working schedule, and as a result, the process was not sequential. For instance, in all communities of Bauchi state, the group discussion came after the identification and prioritization of needs. Input from Adamawa State further showed that the conduct of PRA in Batum community was not also sequential and as a result, an early exit of most of the community members before the completion of most of the whole appraisal activities.

On the formation of the community into relatively homogenous groups for the PRA, observations showed that there was no division of the community members into working groups in Balaifi and Batum communities of Adamawa state. In the other communities, where participants were grouped, the PRA requirement of minimum of 3 groups was not met as participants were only divided into male and female groups. There was no separate group for the youths. It is important to have separate group for the youths because where youths are grouped together with the adults, their opinion may not be loud enough to be heard due to cultural norms that forbid youths from raising their voice in the domain of the elders.

Finally, qualitative methods such as In-depth Interviews (IDIs) with key informants and Focus Group Discussions (FGD) were not used in most of the observed communities. Only FGD was used in Sabongida community where the only case of use of qualitative method was observed.

Community Development Plan (CDP) Formulation and Appraisal
Roles of CPMC, LGA and SPSU in preparation of CDP

Insights from the states revealed that CPMC of the various communities participated in the formulation of the CDP (except in Tsumba and Gabchiari communities of Bauchi State where the formulation was carried out by the operation officers) by providing information on some of the details necessary for inclusion in the CDP. They also functioned as key decision makers in determining who to consult for help in the CDP formulation activities, in communities where external assistance was sought e.g. in Batum and Sabongida communities of Adamawa and Bauchi States respectively. In addition, the CPMC in Balaifi community mobilized the larger community for certain amendment on the initially prioritized micro-projects to forestall certain implementation problems.

The operation officers from the various SPSUs guided the community through the process of CDP formulation and also assisted to effect necessary corrections on the CDP before submission for appraisals as witnessed in Dzurok community (Adamawa). No observable role was played by the local government during the CDP formulation in all the communities.

Adherence to CDP format as specified by LEEMP

In most of the communities, the CDP was observed to be in compliance with LEEMP specification to a large extent, notwithstanding certain minor deviations in most of the communities. For instance, in Dzurok community, the design for some of the prioritized micro-project was not included in the submitted CDP.

Implementation of Micro Project
Procurement

Funds for projects were disbursed directly to communities by SPSUs and each community was responsible for the procurement, transport and labour/contracting services. In Tsumba and Balaifi communities of Bauchi and Adamawa States respectively, where the micro-projects was the drilling of bore holes, the services of contractor was hired to manage the micro-projects. Inputs from the States showed that the contracting procedures followed due process as advertisement for invitation of bids were posted in public places within the communities, a minimum of 3 bids were received in both communities (4 bids were received in Balaifi and 3 bids in Tsumba), while interviewing and selection of

contractor was conducted by the village heads and community members.

On the other hand, the remaining communities in both states (Dzurok, Batum, Sabongida and Gabchiari) where micro-projects involved construction works hired the services of skilled labour for their projects directly. A foreman was hired in Batum and Dzurok communities of Adamawa State.

On Insurance of assets, there was no record to show that assets in the various communities were insured after completion to cover exigencies such as fire, theft or natural disaster. Also, the CPMCs in the various communities did not provide clear details on the cost expended on administration, travel and subsistence activities.

Financial Management

All the communities studied complied with the requirement to work with a current account, maintain a project cash book and petty cash book although were not properly used in some communities as found in Sabongida where all the records were kept on a loosed sheet of papers and where also cases of arbitrary withdrawal from project fund for individual "self-help" was observed. Transparency of project financial transaction was lacking in most communities (Dzurok, Balaifi, Sabongida, and Gabchiari) where project financial records were not displayed on a notice board for the assessment of the larger community. Though, the financial records were displayed in Tsumba community, but at a wrong location (at CPMC Chairman's house).

Further insights from field observations revealed that there was no auditing of financial records in all the communities either by internal or external auditor. Also, the CPMC of the various communities did not call for community meetings to present its project financial report except in Sabongida community. In addition, most of the communities did not submit report on physical and financial progress of the micro-projects to the LGRC as required.

Involvement of the larger community in project implementation

Involvement of the larger community in project implementation was generally poor. In most communities, except in Batum, only the members of CPMC were present on the project site to lend support for the project.

SUMMARY OF FINDINGS
What Worked?

Community entrance through local leaders: Community entrance and project legitimization through the use of the local leaders proved to be a very effective gateway towards generating the interest of the people in the community development efforts of LEEMP. This is evident by the zero level of resistance to development intervention recorded in all the communities of study and the ease at which community members keyed into the project ideas and also rallied support for the intervention just at the approval of their leaders. It is pertinent to mention that the use of the local leaders was the major entrance strategy utilized by the various SPSUs.

Sensitization through engagement meetings: Community engagement meeting as a means of sensitizing the community on the LEEMP objectives is no doubt the best option of ensuring that development start with the people paying careful attention to their cultural and social norms. Experiences from this study showed that the engagement meetings provided opportunity of a level playing ground for all the community members and also helped to foster cohesion and a common front for the benefiting communities. It also provided a rapid feedback on the readiness of the people to the facilitators and possible potential threats to LEEMP objectives for immediate action of the facilitators/SPSUs. For instance , a revelation of the cold war between the major ethnic groups of Dzurok community of Adamawa State (Highi and Mergi) over the case of overbearing influence of one on the other during the implementation of a past related development assistance helped to ensure that all ethnic groups were given equal representation in the project development.

CPMC steering the project: The community driven development approach of LEEMP through ceding of the steering of Project implementation to the benefiting communities (CPMC) and allowing them to identify and prioritize their needs themselves was observed to be very effective in ensuring community ownership of LEEMP assisted projects. For instance, the decision by the Balaifi community of Adamawa State to convey an independent community engagement meeting to review their earlier prioritized needs to accommodate changes due to certain emerging issues before actual implementation is an important indicator of sense of ownership of the project by the people. The composition of the CPMC to reflect gender and

age-groups balance and the central location of all the community meetings venue are also important strategies that fostered common front for the people and engendered their rapid commitment and support for the project.

Installment fund disbursement Strategy: The installment method of fund disbursement of the LEEMP is a veritable tool for maintaining check and balance of the CPMC as they expend project finance. The experience from Ezelu-okwe community of Imo State where initial disbursement was ostentatiously spent on producing bill of quantities and other minor activities leading to the suspension of subsequent funds by the SPSU pending proper accountability was restored and case of diversion of project fund for personal gains in Sabongida community of Bauchi State provide a strong justification on the need why this strategy of financial control should be continued by the FPSU and SPSUs.

What Did Not Work?

The conduct of the election process by the Community Development Associations (CDAs): The LEEMP requirement that the election of CPMC be coordinated by the CDAs proved to be unrealistic in the view of difficulty of forming members into CDAs (where none exists before) coupled with proper orientation and empowerment programmes within the short time available for the OOs to coordinate such a critical assignment for newly formed CDAs.

Capacity building for the community people through the training of CPMC by the OOs: The various shortcomings observed on the part of the CPMCs of the various communities studied during CDP formulation and the actual implementation of micro-project (which are important benchmark for measuring success of training) suggest that this crucial strategy of LEEMP to build local capacity to a large extent is not been realize. For instance, in most of the communities, the bulk of the work of formulation of CDP was either done by the OOs or by hired hands due to inadequate capability on the part of the CPMC.

Mainstreaming of CDP into LGA development plan: There is no evidence from several observations that this strategy worked out as envisaged. In fact, involvement of the LGA in the LEEMP development process was observed to be poor. For instance, no observable role was played by the local government during the CDP formulation in all the communities, and in addition, the LGRC review of CDP was merely

accomplished by compulsion to fulfill necessary obligation. It must however be stated that efforts were made by the various SPSUs to involve the LGA but the poor response could be attributed to poor organization of LG governance system in Nigeria.

CONCLUSION

The outcome of the study show that with just little amendment, the recommended operational procedures guiding the planning and implementation of LEEMP development intervention is workable in the rural communities of Nigeria. As a matter of fact, the level of LEEMP goal attainment of achieving social inclusiveness and ensuring that projects are driven by the beneficiaries can be adjudged as above average. However, a lot is still required to ensure that the goal of building local capacity in the process of micro-project planning and implementation is enhanced, and also to improve on the level of success attained in other areas. In this vein, the followings are recommended:

▪ The terrain of most of the communities in rural areas is very challenging. Delay in commencement of implementation due to bad roads, for instance in Batum, suggest the need to always ensure that actual implementation of micro-projects in the state are well planned to commence and be completed during the dry season. This will eliminate the problems associated with break in project continuity such as reduced commitment of the community people. It will also guarantee better community participation as the people are likely to be less engaged in farming activities at such period.

▪ The processes of disbursement of fund from the FPSU to the SPSU and finally to communities for micro projects should be reconsidered to ensure uninterrupted operation and to prevent avoidable delay as witnessed in Imo and Adamawa States.

▪ Working with rural people, majority of whom are not well educated can be very challenging and thus requires lot of skills. In this vein, only candidates with background training as change agents (extension workers, rural sociologists or development specialists) who are willing to stay in rural communities should be considered as operation officers when there is need to recruit more hands.

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Impact of World Bank Funding Withdrawal on Activities of Women in Agricultural Programme of Oyo State ADP

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ABSTRACT

The Agricultural Development Project (ADP) has been saddled with agricultural extension services since its inception in Oyo State in 1989. This has been through financial and technical assistance from the World Bank. However, with the withdrawal of funding assistance by the World Bank finally in 1999, the burden of financing agricultural extension services became the responsibility of the state government. This study analyzed the trend of extension activities of the Women-in-agriculture (WIA) programme of the ADP from 1989 to 1999. Areas focused were crop, livestock and fishery production. There was a downward trend of all the activities on crop right from inception of funding (excluding 1991) which was not helped by the funding withdrawal of the World Bank. The picture presented was a gloomy future for WIA in agricultural extension delivery. Also, significant differences existed in the activities (t-value of 2.504 and a p-value of 0.031) between when funding was active (1989-1995) and period of withdrawal and after (1995-2001). The study thus substantiated the importance of funding for agricultural extension activities especially as they are development oriented. It also suggested the need for governments to specifically pay attention to women farmers through intensifying funding for the WIA programmes.

INTRODUCTION

Women are known to play a very significant role in agricultural production in Nigeria, as they are deeply involved throughout the processes of crop production, processing, marketing and final utilization of agricultural products. According to a study financed by the United Nations Development Programme, women constitute 60-80% of the agricultural labour force in Nigeria, and they produce two-third of the food crops depending on the region (Olawoye, 2002; Yahaya, 2002).

Nigerian women combine their roles as wives, mothers, housekeepers and domestic workers with their invaluable tasks as farmers. These women put in long hours of hard work, both at home and on the farm with very few modern conveniences and they have little to show for their efforts. Worse still, they get little or no recognition from their communities or countries (Lopez-Claros and Zahidi, 2004; Nnoyelu, 1996). These contributions by the women had been silently observed until recent years when the Agricultural Development Programmes (ADPs) presented an avenue for a focused attention to women involved in agriculture (Onasoga, 1991). To reach rural women on relevant issues pertaining to their roles, the Women-in-agriculture (WIA) programme was started in 1989

by the ADPs. Initially, the programme was introduced with the aim of complementing the efforts of the village extension agents who were then introducing soybean production to farmers. So, the focus of the programme was reviewed to embrace all facets of agricultural production, processing, utilization, storage and marketing (Ojeniyi, 1991).

The Women in Agriculture (WIA) Programme

The Women in Agriculture (WIA) programme was created in 1989 within the existing state ADPs, in recognition of women's contribution to agriculture. This was as a result of a research study financed by the UNDP, which revealed that in spite of the indispensable roles played by women, in agriculture, agricultural extension services had not targeted them as important clientele, as they receive very little assistance and information from the extension agents who had the notion that their domestic roles was childcare and family nutrition and thus presented information on only these areas, whereas, this is just a part of their roles as Nigerian women and farmers(World Bank, 1989).

Women-in-Agriculture (WIA) has mandate to initiate and conduct programmes that would improve the socio-economic status of rural women and their overall living standards. This is to be achieved by training farmers on proven

technology in food production, processing, preservation and storage. The WIA programme was equally designed to assist women farmers to access credit from commercial banks and other credit sources as well as monitor their activities. WIA was also helpful in forming women groups and co-operatives. The programme complemented greatly the efforts of other women agencies like the Women Commission, Women in Health of all States Ministry of Agriculture and the Family Support Programme (FSP) of the Federal government of Nigeria.

ADP is the most recent intervention programme with Women in Agriculture (WIA) as a major component. The funding of the ADP by design was to be borne by the World Bank (the major contributor), Federal Government and State Government. WIA came into existence in April, 1989 and became functional in September of that year. The main objectives of the WIA unit of the OYSADEP was to improve the living standard of rural women farmers in the areas of increased crop production, introduction of improved technology for food crops processing and utilization and also marketing of farm produce. Other objectives of the WIA unit of OYSADEP include:

i. On-farm activities: crops, livestock, fisheries, and forestry production and environmental activities appropriate to women;

ii. Off-farm activities: processing, storage, preservation, utilization and nutrition activities for the well being of the family.

iii. Food security: access to adequate food, at all times by the majority of the people.

iv. Others: marketing, credit procurement, drudgery reduction and income generating activities. Emphasis is placed on production and related activities in a 70:30 ratio (FACU, 1995).

v. Other field activities embarked upon by the WIA agents include group formation, farm visit and establishment of Small Plot Adoption Techniques (SPAT). SPATs demonstrate the use of new technologies on inputs or farm practices.

A major policy change that affected the structure, services and sustainability of WIA was the withdrawal of the World Bank participation, which started gradually in 1995 and final withdrawal in 1999. This marked a major turning point for state agricultural extension service in Nigeria, with the state becoming the only financier since 1999. An appraisal of the WIA programme before and after the World Bank

funding would reflect the status of activities undertaken during different periods. This will show the pattern of WIA activities, before and after the change in funding status and the effect this has had on the programme.

The main objective of the study is to analyze the trend of WIA activities in Oyo State from 1990 to 2001. This was carried out by specifically examined the activities of WIA over the period of 1989 – 2001, identified the trend of the WIA activities over the years in the study area and forecast the future trend of WIA activities.

METHODOLOGY

The study was conducted through the use of secondary data from the WIA office of the ADP in Oyo State, Nigeria. Data utilized were those relating to activities involving contact with farmer groups and formation of Small Plot Adoption Technique (SPAT) demonstrations covering the study period. The linear progression method of analysis was used to predict future level of activities in the areas considered.

RESULT AND DISCUSSION
Crop activities

The trend of the yearly frequency of the small plot adoption techniques (SPAT) on crop from 1990 to 2001 showed a sharp increase from 1990 to 1991, then a sharp decrease from 1991 to 1992. The highest frequency for crop was, 3739 demonstrations in 1991, while the lowest frequency was 65 demonstrations in 1999 (Table 1).

TABLE 1
SPAT Numbers for WIA Activities between 1990 and 2001

Year	Crop SPAT	Livestock SPAT	Fisheries SPAT	Total SPAT
1990	1872	0	0	1872
1991	3739	0	0	3739
1992	982	18	0	1000
1993	900	252	7	1159
1994	225	380	0	635
1995	252	405	2	659
1996	403	262	0	665
1997	72	108	0	180
1998	214	238	0	452
1999	65	70	0	135
2000	91	10	0	101
2001	125	30	0	155

The trend analysis (figure 1) was carried out using the linear regression line fit model. This predicts that by the year 2010, the number of SPAT demonstrations on crop will be a negative

value, which implies that in reality, all SPAT demonstrations on crop would have gone into extinction based on the present trend of activities.

Livestock activities

The trend of the yearly frequency of the Small Plot Adoption Technique demonstration on livestock started from 1992 and increased gradually for about four years, reaching its peak in 1995, then fell from 1996 to 1997 then picked up again in 1998, but stated declining until 2000.

In 2001, there was a little increase in this trend (fig. 2). The highest frequency for livestock was 405 demonstrations in 1995 and the lowest was 10 in year 2000.

The linear regression line fit model on trend of activities forecasts that by the year 2010, a predicted figure of 140 SPAT demonstrations on livestock will be carried out. This is however based on the recent trend of SPAT demonstrations on livestock.

Fig 1: Year Line Fit Plot for crop SPAT

Fig. 2: Year Line Fit Plot for livestock SPAT
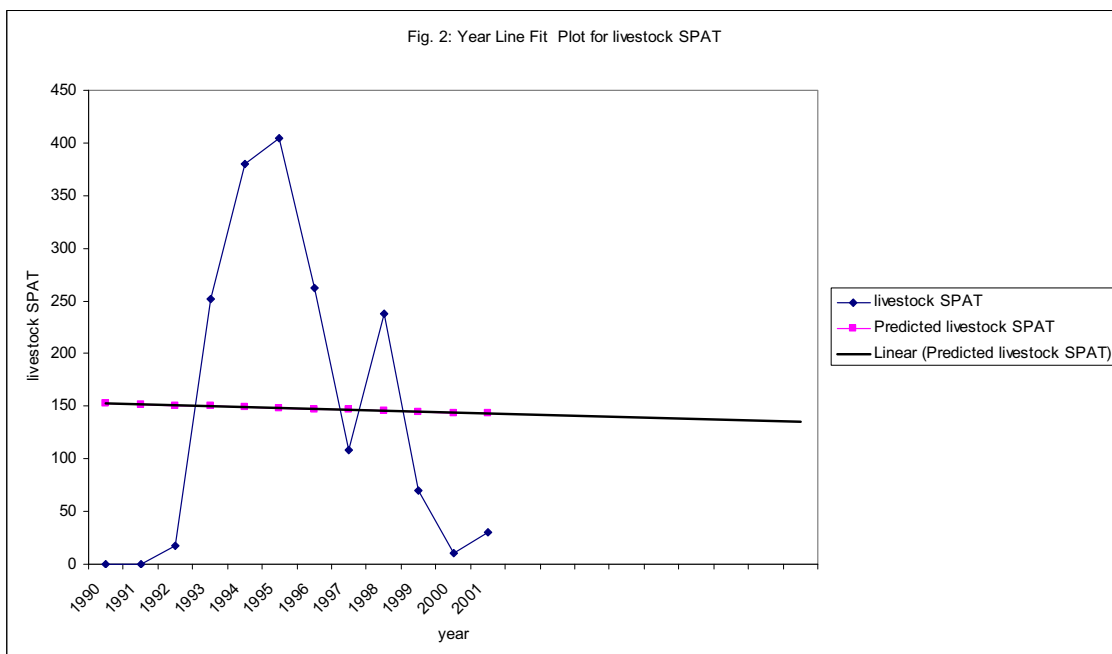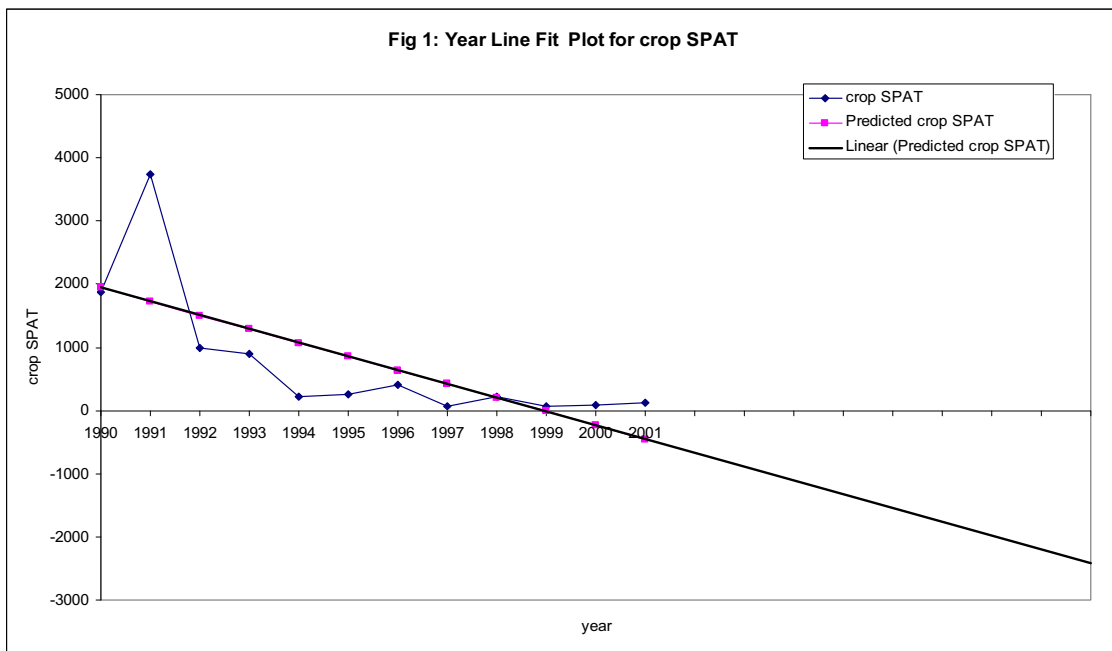
Fisheries activities

The SPAT on fisheries has a very low frequency. It was carried out only twice, the first time in 1993 with a frequency of seven (7) demonstrations and the second time in 1995 with a frequency of two (fig. 3). There was no data for the post-withdrawal period because no activity was carried out on fisheries after the World Bank loan withdrawal.

The linear regression line fit model which was used to carry out the trend analysis predicts a downward trend in the SPAT demonstration on fisheries and that by the year 2010, the number of SPAT demonstration on fisheries will be negative value. This implies that based on the prevailing situation all activities of SPAT on fisheries would have stopped.
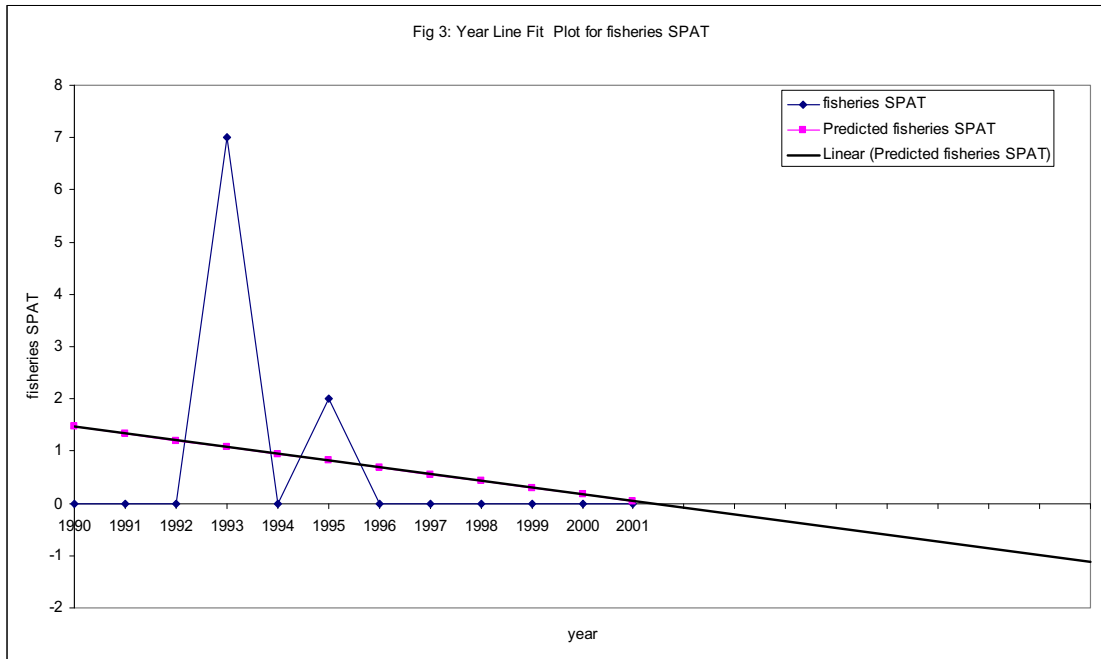

Fig 3: Year Line Fit Plot for fisheries SPAT

Sum of all SPAT activities

The trend of the yearly frequencies for the grand total of the small plot adoption techniques shows an increase at inception from 1990 to 1991. Then, there was a sharp decline from 1991 to 1992. It reveals a gradual decline in activities from 1992 to year 2000. Then in 2001, there was a very small increase in the trend of activities (fig. 4). The highest frequency for the SPAT activities was 3,739 demonstrations in 1991, while the lowest was 101 demonstrations in the year 2000. The standard errors for the pre and post withdrawal period are 482.01 and 92.46 respectively. The standard deviation which shows

the extent of scatter of the frequencies for the two periods (pre and post funding withdrawal) is 1180.90 and 226.49 respectively. This shows a high degree of variability in the frequencies of the SPAT activities.

The linear regression line fit model was used to carry out the predicted trend of activities and it shows a gradual downward trend in the total SPAT activities. It also forecasts that by the year 2010, the total number of SPAT activities will be negative. This implies that by the year 2010, all SPAT activities would have stopped, based on the prevailing trend of activities.

Fig 4: Year Line Fit Plot for total SPAT
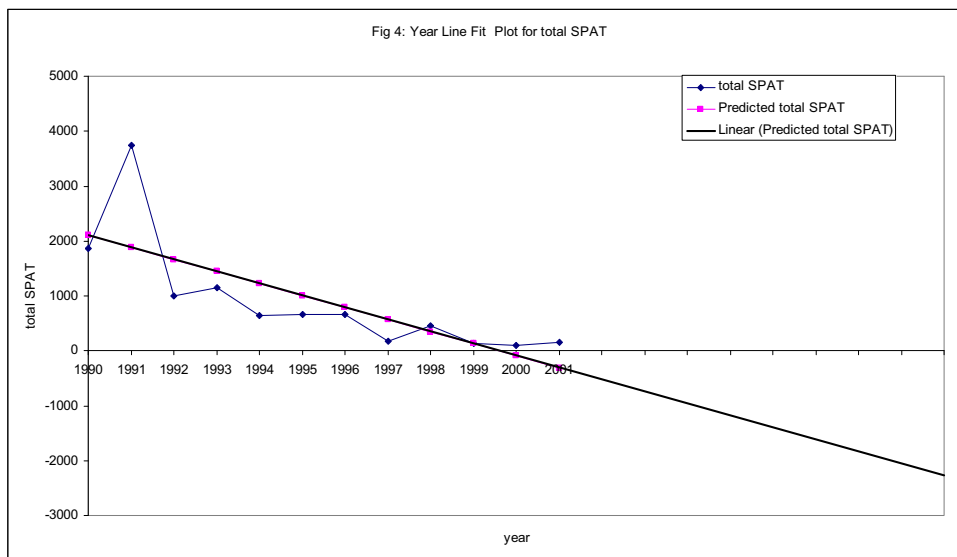
Comparing the Pre and Post World Bank Funding Withdrawal Eras

Comparison of pre and post funding withdrawal of SPAT activities on enterprise basis indicated that there was no significant difference in SPAT demonstrations before and after the loan withdrawal by World Bank. It should be noted that there was no data recorded for fisheries activities in the post-withdrawal periods, and thus, no comparison could be made from pre and post activities.

On the overall aggregate of SPAT activities for all the enterprises both at the pre and post funding withdrawal periods, the result showed a significance difference in the total SPAT activities before and after the World Bank loan withdrawal (t= 0.031 p< 0.05).

CONCLUSION

It is apparent that the attempt to bring women into the fore-front of extension has not met the enthusiasm with which it was initiated. For all the activities, the performance peaked very early only to diminish at a fast rate. This implies a lost of momentum in the interest to reach women farmers specifically. Thus the age long trickling down of information will still be employed to inform women farmers and this has been proved to be not only ineffective, it is also uncertain.

There was an increase in WIA activities at the inception of funding by World Bank though accompanied with a sharp decline. The decline was however worsens by the funding withdrawal. All the trend analysis using linear regression line model predicts that total number of SPAT activities would be negative by the year 2010.

The effect of the withdrawal of the World Bank support is only too glaring in the result of the t-tests. Again it points to the fact that the state government may not be capable of sufficiently funding extension work especially when this affects women farmers. In agreement with the trend analysis, the future for women focused extension is bleak and the major force in agricultural activities may still continue to be abandoned technologically.

Therefore, all the three tiers of government (local, state and federal) need to specifically pay attention to women farmers through intensifying funding for the WIA programmes.

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Cost and Return Analysis of Fresh Fish Marketing in Kebbi State, Nigeria.

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ABSTRACT

Improving the supply of fish protein to teaming population of consumers within and outside Kebbi State requires an understanding of its marketing costs and returns; hence, this study investigated costs and return analysis of fresh fish marketing in Kebbi State. Six fishing communities in Kebbi State were purposively selected while 82 fishermen 68 traders were randomly selected from lists of fishermen and traders' cooperatives. These respondents were interviewed using structured questionnaires in addition to Focus Group Discussions (FGDs) conducted with representatives of the cooperatives. Descriptive statistics and net return model were used to analyse the cost and return data collected on fresh fish marketing. Results obtained revealed that fishermen, wholesalers and retailers make a net return of NGN 58.22, NGN 266.95 and NGN 466.95 per every basin of fresh fish (15Kg) sold respectively. The fishermen could make NGN 208.22 per basin when they sell directly to retailers in the urban market. The difference between marketing cost and revenue were estimated at 7.85%, 25.84% and 30.46% for fishermen, wholesalers and retailers respectively. Transportation charges and cost of cool storage were the principal marketing costs of fishermen and traders respectively. This study concludes that the marketing of fresh fish in Kebbi State was profitable. However, the profit level could be enhanced through economies of scale by engaging in collective marketing to reduce storage and transportation costs. Therefore, the study recommends that the actors in the marketing system of fresh fish should embrace cooperative marketing.

Key words: Artisanal, Fresh Fish, Marketing, Profitability

INTRODUCTION AND BACKGROUND STATEMENT

Fish marketing like the marketing of other agricultural products entails performance of various functions along the distribution chain of the commodity. These include physical functions (processing, assembling, packaging/grading, transportation, storage/preservation,), exchange, facilitating and institutional functions. In performing these functions, the actors involved (fishermen, processors, traders, commission agents, etc) play specific important roles (Suleiman, 2007). The sustainability of such services has relationship with costs and returns involved. In general, components of marketing costs are of interest to policy markers because such knowledge can serve as the basis for reducing inefficiencies or establishing interventions that reduce such costs. A rather simplistic illustration is as follows: where transport is the principal marketing cost, the policy response includes improvement of infrastructure such as roads and rail lines. When labour constitutes the major cost component, the policy response is to induce adoption of labour-saving devices such as machinery (Pomeroy, 1989). In a similar study reported by Torres, et.al (undated), brokers at the Navotas Fish Port located in southern Tagalog, Philippines attribute a major portion of their marketing costs to hired labour, market fees and depreciation. In the small-scale fishery of Matalom in province of Leyte, Philippines; at least 41% of total variable costs are accounted for by transportation (Pomeroy, 1989); this was even higher for villages farther from the major retail market. In the Gulf of Nicoya, Costa Rica, at least 44% of total monthly expenditures by primary buyers are allotted for ice (Scheid and Sutinen 1981). Against this background, the artisanal fishery in Kebbi State became the focus of this study. This study aimed at estimating costs and returns of actors along the

fresh fish marketing channel to unveil areas of intervention by researchers, extensionists and policy markers. This will assist in developing the artisanal fishery and hence improve the supply of fish protein to teaming population of consumers within and outside Kebbi State.

METHODOLOGY

Multistage sampling procedure was employed for selecting samples in this study. The twenty-one local government areas (LGAs) in Kebbi state were considered as a cluster within which, local government areas were purposively selected to cover communities along the important hydrological references of the State namely; Flood Plains of Sokoto Rima River (FPSRR) and river Niger. Two LGAs were purposively selected along the FPSRR namely; Argungu and Birnin Kebbi, while one local government was selected along the river Niger hydrological reference. Selection of these locations was based on their importance in the artisanal fishery industry of the State. Similarly, in each of the LGAs, two fishing communities were purposively selected. In the communities, fishermen and traders' associations were identified and lists of their respective members were used as a guide for random selection of respondents. The number of respondents randomly selected in each location was based on the proportion of fishermen and traders operating in the locations. The exact population figures of these operators were unavailable as at the period of this study. However, information obtained from the fisheries unit of Kebbi State Agricultural Development Project revealed that 50% of fishermen and traders in the State operate in Yauri local government area. Thus, a total of eighty-two fishermen and sixty-eight traders were covered across six fishing communities from three LGAs in Kebbi State. A total of 41.5% of the fishermen involved in this study were covered inYauri LGA, while 29.3% was covered in each of Argungu and Birnin Kebbi LGAs. On the other hand, 47.1% of the interviewed traders were from Yauri and 26.5% were covered in each of Argungu and Birnin Kebbi LGAs. Structured questionnaires were used to interview fishermen and traders individually, while checklists were used as guide to elicit for qualitative information during focus group discussions conducted with representatives of fishermen and traders associations. Data collected include daily catch, market prices, costs and returns components from marketing of fresh fish, etc.

2.1 Analytical Tools
2.1.1 Estimation of Net Return (NR)
$$NR = P - (\sum X_{1....n}) – K \ ……………… \ (1)$$
Where:
NR = Net return from marketing of the product (fresh fish, smoked dried and sun dried fish),
$\sum$ = summation sign
X_1 = local government revenue (₦)
X_2 = Transport charges (₦)
X_3 = cost of loading/unloading (₦)
X_4 = Commission paid to selling agents (₦)
X_5 = Packaging or repackaging cost (₦)
X_6 = Cost of storage using cold facilities (₦)
X_7 = inputted labour cost for catching fish (₦)
X_8 = depreciation on fishing gears (per day) (₦)
P = Selling price of unit quantity of the product (fresh fish, smoked dried or sun dried fish) (₦)
K = Purchase price (from presiding participant in the marketing chain) (₦)

RESULTS AND DISCUSSION

Socio-economic characteristics of artisanal fishermen and traders in the marketing system of fresh fish in Kebbi State.

Both fishermen and traders involved in this study were all male. However, results of qualitative interviews revealed that, both male and female operates as fish traders in the State. On the other hand, only male were known to engage in fishing as a means of livelihood. Age composition of the actors (fishermen and traders) was similar. About 47.0% and 38.0% of fishermen and traders were young and active operators within age brackets 25 to 40 years. Actors above 50 years were minority (14.7% fishermen; 13.9% traders) among those interviewed. Some (17.6%) of the fishermen combined fishing and farming as means of livelihood whereas all the traders devotes their time to only fish trading. Despite this, both actors have many years of experience ranging between 5 to 20 years among 38.3% of fishermen and 75.0% of the traders. This is expected to give them good understanding of the artisanal fish industry in Kebbi State. Majority (52.9%) of the fishermen market their daily catch at watersides close to their communities. Other (35.3%) fishermen market their catches at other locations within the State. Fish traders (75.0%) operate in Yauri market, while 25.0% of them sell at an urban market in the state capital, i.e. Birnin Kebbi market. Fishermen handles mainly fresh fish while 83.3% of the traders handle fresh fish, 69.4% smoked fish and 11.1% sundried fish. Large proportion of fishermen (97.1%) and traders (55.6%) in the study location belongs to

cooperative societies. However, information from the qualitative interview conducted revealed that these fishermen and traders carry out their economic activities such as fishing and marketing individually. Apart from operating individually, results revealed that 88.2% and 66.7% of

fishermen and traders had attended informal Arabic Schools. Only 5.9% of the fishermen and 19.4% of the traders attained primary education. This implies low level of formal education especially among the fishermen (Table 1).

TABLE 1
Socio-economic Characteristics of Artisanal Fishermen and Traders in Marketing System of Fresh Fish in Kebbi State

Variable	Fishermen		Traders	
	Freq.	%	Freq.	%
Gender:				
Male	34	100	36	100
Female	0	0.0	0	0.0
Age (Years):				
25 – 40	16	47.06	14	38.39
41 – 50	13	38.23	17	47.22
Above 50	5	14.71	5	13.89
Marital Status:				
Married	34	100	34	94.40
Single	0	0.0	2	5.60
Major occupation:				
Fishing	28	82.40	0	0.0
Fish Trading	0	0.0	36	100
Farming	6	17.60	0	0.0
Years of Experience:				
5 – 20	13	38.23	27	75.00
21 – 30	15	44.12	6	16.67
31 – 40	5	14.71	2	5.56
Above 40 years	1	2.94	1	2.77
Major Fishing Locations:				
Waterside close to fishermen's village	18	52.94	0	0.0
Other Waterside within the state	12	35.29	0	0.0
Watersides outside the state	4	11.77	0	0.0
Major Trading Locations:				
Yauri market	0	0.0	27	75.00
Birnin Kebbi Market	0	0.0	9	25.00
Forms of Products Traded:				
Fresh Fish	34	100	30	83.30
Smoked dried fish	0	0.0	25	69.40
Sun dried fish	0	0.0	4	11.10
Membership of cooperative society:				
Yes	33	97.10	20	55.60
No	1	2.90	16	44.40
Educational Status:				
Primary School	2	5.90	5	13.89
Secondary school	2	5.90	7	19.44
Arabic Education	30	88.20	24	66.67

Net returns in artisanal fish marketing

The net returns from marketing of the fresh fish were estimated as the difference between participants' selling price and the total marketing costs incurred. The analyses were based on the

same unit of measure of the fresh fish (that is, per small basin of 15kg). Table 2 shows the marketing prices, costs and returns according to participants and market outlets.

TABLE 2
Costs and Returns from Marketing of Fresh Fish among Market Participants in Kebbi State

Variable	Market Prices, Costs Components and Participants	Urban Market		
		Wholesaler	Retailer	% of Total Marketing Cost
	Fishermen (Direct sale to market participants)			
P	Average Selling Price	800	950	
X_1	Local Government Revenue	10	10	6.8
X_2	Transport Charges	68	68	46.0
X_3	Loading/unloading per basket	0	0	0.0
X_4	Commission	20	20	13.5
X_5	Packaging	50	50	33.8
	Total marketing cost	148	148	100.0
X_7	*Labour (based on 10.5hrs of labour = 1.31mandays)	524	524	
X_8	Depreciation on Fishing Gears (per day)	69.78	69.78	
$\sum X_{1....n}$	Total marketing cost +Labour Cost and Depreciation Value	741.78	741.78	
NR	Net Return	58.22	208.22	
	Wholesaler			
P	Average Selling Price	1300		
K	Purchase price	800		
X_1	Local Government Revenue	10		4.3
X_2	Transport Charges	38.55		16.5
X_3	Loading/unloading per basket	14.5		6.2
X_4	Commission	20		8.6
X_5	Re-packaging	50		21.5
X_6	Storage using cool facilities	100		42.9
	Total marketing cost	233.05		100.0
	Total marketing cost + K	1033.05		
	Net Return	266.95		
	Retailer			
P	Average Selling Price (Consumer price)	2000		
K	Purchase price	1300		
X_1	Local Government Revenue	10		4.3
X_2	Transport Charges	38.55		16.5
X_3	Loading/unloading per basket	14.5		6.2
X_4	Commission	20		8.6
X_5	Re-packaging	50		21.5
X_6	Storage using cool facilities	100		42.9
	Total marketing cost	233.05		100.0
	Total marketing cost + K	1533.05		
	Net Return	466.95		
	Consumer			
	Average Purchase Price (Consumer price)	2000.00		
	Total marketing cost along distribution chain	**614.10**		

The findings of this research revealed varied levels of net returns from the marketing of fresh fish among different actors in the study area. The estimation of returns was based on major marketing channels of the commodity. This research observed that fishermen sell fresh fish to wholesalers at rural market as well as transport fresh fish to urban centers where they sell to retailers through commission agents. Therefore fishermen enjoy different prices, incur marketing cost and hence have varied net returns in the marketing system. The lowest net revenue of NGN58.22 per (15kg) basin was made by the fishermen through sales to wholesalers at the rural market. Fishermen could make net returns of up to NGN208.22 in urban markets when they sell fish directly to retailers. Often, sales of fresh fish at the urban centers by the fishermen are targeted at the retailers to maximize returns. Retailers make the highest net returns of NGN466.95 followed by wholesalers who make NGN266.95 per every basin of 15kg. This shows an uneven

distribution of returns among the participants of fresh fish marketing system in the study area. This variation is illustrated in figures 1 and 2. Results show that marketing revenue and cost varies proportionately among the actors. Thus, the higher the marketing cost incur the more the revenue. This could be attributed to increase in value of the fresh along its value starting from fishermen to consumer. As one moves along the chain, marketing services provided varies and so also the costs of such services. This finding is similar to that obtained in a study conducted on structure and performance of wholesale marketing of finfish in Costa Rica (Scheid et.al. 1981). Scheid and Suniten (1981) explained that, the fact that retailers received the highest margin can be attributed to the facts that fish are usually sold by retailers in small quantities; higher operating costs prevailed at the retail level; and greatest spoilage and shrinkage losses are often assumed by retailers. The findings of this work also revealed that the proportionate difference between marketing costs and revenues of actors along the fresh fish value chain were 7.9%, 25.8% and 30.5% for fishermen, wholesalers and retailers respectively. Further analysis of marketing costs revealed that transportation charges constitutes the highest (46.0%) cost component among fishermen, mainly due to poor roads linking rural fishing areas and urban markets where better market prices are obtainable. Water weeds and poor water ways clearing and maintenance also contributes difficulties in water transportation, thereby increasing cost of transport. On the other hand, fish storage accounts for 42.9% of the total marketing cost of wholesalers and retailers. This was attributed to high cost of ice required for storing fresh fish. The energy required for ice production is mainly from electric generators due to erratic electricity supply in the study area (Figure 3).
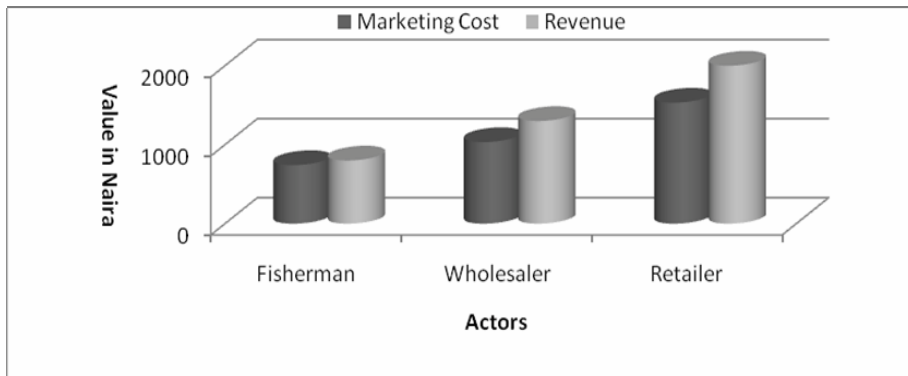

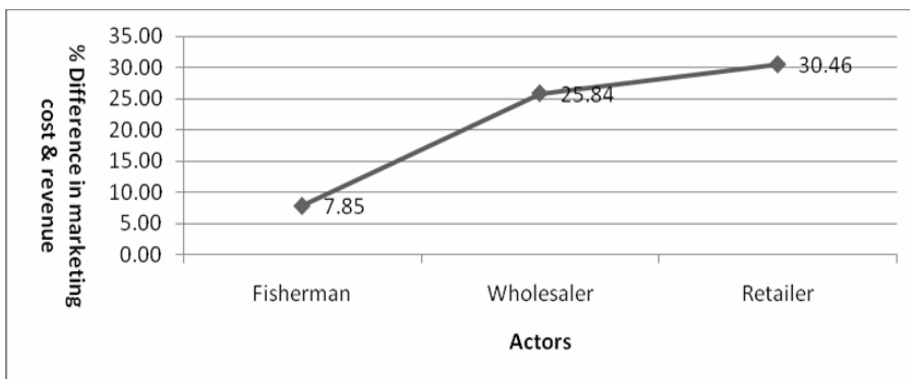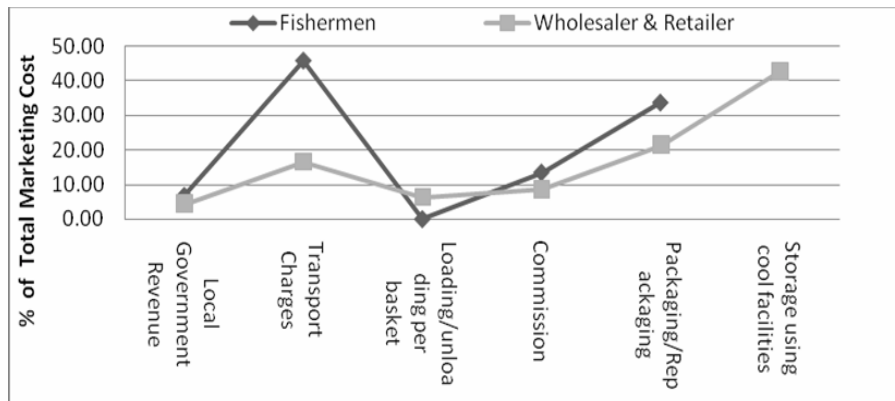**Figure 1**: Variation in Fresh Fish Marketing Cost and Revenue among Actors.

Figure 2: Variation in proportional Difference between Marketing Cost and Revenue of Fishermen, Wholesalers and Retailers in Kebbi State.

Figure 3: Variation in Fresh Fish Marketing Cost among Fishermen, Wholesalers and Retailers in Kebbi State, Nigeria

CONCLUSION AND RECOMMENDATIONS
Conclusion

Fresh fish marketing in Kebbi State was profitable. The marketing cost, revenue and hence profit varies along the commodity marketing channel. Actors namely fishermen, wholesalers and retailers provide services along the marketing chain and differ in their cost and revenue components. Retailers incur more cost followed by wholesalers and then fishermen. However, retailers had the highest level of profit per basin (15kg) of fresh fish sold while fishermen obtained the least profit. Fishermen obtain more profit when they sell directly (reduce the length of chain) to retailers in urban markets. Transportation charges and cost of cool storage were the principal marketing costs of fishermen and traders respectively.

Recommendations

Actors could reduce their costs of marketing services and hence increase profits through economies of scale by marketing the fresh fish collectively (cooperative marketing) rather than the present practice of individual marketing. Thus, the actors need to have functional cooperatives (Fishermen, and traders' cooperatives). In line with this, the Kebbi State Agricultural Development Programme (KADP) should embark on a wide scale group formation and development activities in the fishing communities of the State. The State and Federal Government should improve the networks of roads and water ways as well as electricity supply in the fishing areas and important markets serving the fishing locations. This will reduce inefficiencies associated with excess transportation and cool storage costs associated with fresh fish marketing in Kebbi State.

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Participants Perception of Special Rice Project Activities on Rice Production in Kwara State, Nigeria

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ABSTRACT

The study was undertaken in Edu and Patigi Local Government Areas (LGAs) of Kwara State to characterize activities of Special Rice Project (SRP), socio economic characteristics of the participants in SRP, determine participants' perception of relevance of SRP activities and identified changes in yield of rice due to SRP activities. Through a two - stage random sampling technique, 102 participants in SRP were randomly selected and data collected by means of structured interview schedule. Some of the SRP activities include technology demonstration, inputs supply, financial assistance and provision of information on land preparation. The study showed that 41.1% of the participants were in the age bracket of 31-40 years while 66.7% of them possessed one form of formal education. Participants in SRP cultivated an average farm size of 2.6 hectares and recorded average yield of 3.34 tonnes/hectare. A significant difference exists between average rice yield of participants before and after the introduction of SRP (3.843, $P \leq 0.05$). Participants recorded income of N338, 700.00 per annum or N28, 225.00 per month. Based on the empirical evidence of this study, the Special Rice Project activities increased the rice yield of the beneficiaries; therefore, scope of SRP should be expanded to cut across all rice farmers in the country.

BACKGROUND TO THE STUDY

Nigeria's food habit has changed in favour of rice consumption. Consequently, Nigeria pays a soaring foreign exchange bill on rice importation. This trend is not sustainable and cannot continue because Nigeria is well endowed in rice production. The national target for rice production is 3.5 million tonnes of milled rice per annum; this will require production of 6.3 million tonnes of paddy rice (Ingawa, 2008). However records of rice output (Federal Department of Agriculture, 2004) showed a national rice production of 2.96 million tonnes of paddy rice cultivated on an area of 1,595,840 hectares This gave a yield of 1.82 tonnes per hectare with a total milled rice of 1,480, 168 tonnes or a recovery rate of 51 percent. In the same year, the national demand for milled rice was estimated at 3.0 million tonnes per annum . There was therefore a deficit of 1,519,812 tonnes of milled rice required to meet local demand. The National Bureau of Statistics (2004) reports that the national average yield of rice is 1.3 tonnes/hectare. This output is far below the realizable output of 5.4 tonnes per hectare if research recommendations, especially planting of quality seeds and other agronomical practices are judiciously and orderly followed (USAID, 2005).

According to Fajana (2002) a total of 66.25 tonnes of improved rice seeds were available in the whole country. Eco-Systems Development Organization (EDO, 2003) reports that only 3.96% of the farmers were satisfied with the government seed source, while 96.34% of farmers rely on other farmers for seed. This is due to the fact that high quality seeds were inadequate and very expensive. Incidentally most of local varieties of rice exhibit poor tillering which affects yield tremendously. The lowland varieties are easily affected by lodging which in turn led to low yield. Furthermore, ECO (2003) revealed that participants in SRP reported cases of seed admixture and fertilizer debagging.

Globally. the average arable land per farmer is 1.28 hectares. In Nigeria the average is about 1.08 hectares (NEST, 1991, World bank, 1996). However, Ingawa (2005) reports that average farm size per farmer in Nigeria is 0.57 hectares (Nigerian's 70million farmers operating 40 million hectares) which shows a decline of average farm size per farmer by about 50% within a period of about ten years. Low productivity of farmers may arise from small farm size; inadequate use of farm inputs etc, it is also expected that with the evidence of achievement of the National

Agricultural Research Institutes in developing high yielding, early maturing, and disease resistant varieties of rice, locally produced rice should satisfy the demand for local rice consumption. More so that Nigeria is capable of producing 10 million tonnes of paddy rice annually but production level is about 5 million tonnes per annum (Nwanze,2010).

The sub-Saharan African, (SSA) where Nigeria belongs is the only developing region in the world where hunger is worsening. The absolute number of hungry Africans has increased substantially with population growth, with 88 million in 1970 and 200 million in 1999-2001 (Sarah, 2005). Even with this established under nourishment, the nation's population is increasing at 3.6% while food production growth rate is 2.4% annually. This established a 40% gap between population growth and food production growth rate. Consequently, FAO (2001) reported grain output has to be increased by 40% to meet local requirement estimated at about 2440 kilo calories per person per day. . However, rice farmers in Nigeria are generally poor primarily because the production resources are inadequate to support rice production in commercial quantity. This created a gap between local demand (3.5 million tonnes in 2005) and local supply (500.000 tonnes) per annum with the effect that enormous resources had to be expended on importation at the detriment of locally produced rice (Ingawa, 2005).

Nigeria thus become a major rice importer in the world market. Value of rice imports rose steadily from N187.7, N203, N305 and N900 billion in 2001, 2002, 2003 and 2004 respectively (Adamu, 2005) while a total of N1.3 trillion was expended to import close to 2.5 million tonnes of rice in 2007 alone (Sayyaid, 2008).). Rice importation bill represents 25% of the nations import bills.. Nwanze (2005) reports that Nigeria has the potential to reduce import bills to 5 percent. Ingawa (2008) reports that the increase in the world price of rice is a blessing to Nigeria rice farmers, hoping that the farmers will take advantage of the price to increase rice production when all resource for its production abound in the country. Kwara State alone has about 400,000 hectares of land suitable for rice production out of which 50,050 hectares (highest to date) were cultivated in 2006 (Kwara ADP, CAYS, 2008). Even with imported rice, plus the efforts of the local rice farmers, there is a big shortfall in the amount required for sustenance of life in the country. This provides opportunity for local rice

production, more so that rice importation in banned. However the ban is loosely enforced.

The Federal and State Governments implemented the Special Rice Project(2000 – 2008).The general objectives of SRP include the promotion of the cultivation of improved upland and lowland varieties of rice, attainment of food security, reduce poverty, create wealth and generate employment. The specific objectives were to exhibit the potentials of improved seed utilization, expose farmers to seed production techniques, encourage use of herbicide in order to reduce drudgery and facilitate expansion of farm land, increase rice yield and farmers income, encourage fertilizer application, expose farmers to pest and diseases management techniques, expose farmers to processing and storage techniques, teach farmers cultural practices especially attainment of optimum plant population. The SRP activities include technology demonstration using Small Plot Adoption Techniques (SPAT), Management Training Plot (MTP) and On Farm Adaptive Research (OFAR). Exposure of farmers to methods of land preparation, herbicide and pesticide use and economic returns on rice production. The SRP also provided price information, linked farmers with market (buyers) and provided the participants with financial assistance. Participants also were exposed to seed production technology, processing and storage techniques, training and farm visit. It is therefore desirable to assess the relevance of SRP activities to boost the production of rice in the country in order to satisfy SRP objectives.

OBJECTIVES OF THE STUDY

The general objective of the study was to assess participants perception of Special Rice Project activities on rice production in Kwara State.

The specific objectives were to:

- describe socio economic characteristics of participants in SRP
- determine perception of participants on relevance of SRP activities
- determine effects of SRP activities on yield of rice

METHODOLOGY

Kwara State is naturally endowed for rice production. It falls within North Latitude $11^0 \, 2^1$ and $11^0 \, 45^1$ and sandwiched between Longitude $2^0 \, 45^1$ and $6^0 \, 40^1$ east of Greenwich Meridian. Rice production is the major means of livelihood

of the people in the North East axis of Kwara State, which comprised Edu and Patigi Local Government Areas, inhabited by Nupe tribe. Rice production in large quantity is much favoured in the North Eastern part of the state as a result of the naturally fertile land on the flood plains of River Niger and its tributaries. Edu and Patigi LGAs were chosen for this study because the two LGAs are responsible for the cultivation of over 90% of the rice produced in Kwara State. The study area is also responsible for about 11% of the nation's total rice output (FDA, 2004).

The target population for the study were the participating farmers in Special Rice Project (SRP) in the two Local Government Areas (LGAs). The study used a two stage random sampling technique. Stage one involved a random sampling of circles in each local government area. Out of the 15 circles in Patigi LGA, six circles were randomly selected while 3 circles were randomly selected out of the 9 circles in Edu LGA. Second stage involved the random selection of farmers from each circle based on the number of participating farmers. Seventy participating farmers were therefore randomly selected from Patigi LGA.While 32 participating farmers were randomly selected from Edu LGA. A total of 102 participants were used for the study. Data were collected by means of structured interview schedule and analysed with percentages, frequencies and t-test statistics.

RESULT AND DISCUSSION
Socio-economic characteristics of the participants

The result of the study as indicated in Table 1 shows that 16.7% of the participants were less than thirty years of age. Furthermore, 41.1% of the participants were in the age bracket of 31 – 40 years. In addition, the table also indicates that 66.7% of the participants possessed one form of formal education. Age is a determinant of venturesome. This influenced involvement of participants in government programmes such as Special Rice Project. While higher level of educational attainment by the participants gave them the advantage of awareness of innovations on agriculture via communication channels (radio, television or print media (Tiwari, 2005). Furthermore, 85.3% of participants were married and 52.90% of them had 2 wives each. However, 36.3% of participants had 6-10 children. The polygamous lifestyle in the study area is understood since farming is the primary occupation of the people in the study area, the wives and the children serve as a cheap source of labour for rice production. However 94.1% of participants in SRP

were males while 5.9% of the participants were females. This indicates that females were inadequately involved in SRP.

TABLE 1
Socio- economic characteristics of rice farmers in Kwara state

Characteristics	Participants	
	Frequency	Percentage
Age (in years) < 30	17	16.7
31 – 40	42	41.1
41 – 50	28	27.5
Above 50	15	14.7
Gender Male	96	94.1
Female	6	5.9
Marital Status		
Single	12	11.8
Divorced/separated	-	-
Widowed	3	2.9
Married	87	85.3
Number of wives: 1	19	18.7
2	54	52.9
3	28	27.5
4	1	0.9
Number of children		
1 – 5	32	31.4
6 – 10	37	36.3
11 – 15	30	29.4
16 and above	3	2.9
No formal education	10	9.8
Adult education	4	3.9
Quranic education	20	19.6
Primary sch. Education	27	26.5
Junior secondary sch.	23	22.5
Senior secondary sch.	13	12.8
Post secondary school	5	4.9
Years in rice production:		
2 – 10	24	23.5
11 – 20	26	25.5
21 – 30	35	34.3
31 – 40	11	10.8
41 and above	6	5.9

Respondents' perception on the relevancy of SRP activities

In order to ascertain the importance or relevance of SRP activities to rice production, the participants (only) in SRP were requested to score the activities as highly relevant, moderately relevant and less relevant. The result of the study as indicated in Table 2 shows that 67.6% and 70.5% of the participants rated the use of Small Plot Adoption Techniques for result demonstration on optimum plant population and varietal trials (improved rice seed and local (unimproved rice seed) as less relevant. While 36.3% and 33.3% rated Management Training Plot (MTP) as highly relevant for result demonstration of technical messages. The preference of the use of MTP to SPAT might be due to the fact that MTP is larger than SPAT (5 square metres) and thus made the messages

passed to be seen and appreciated by the farmers. The percentage relevance score for On Farm Adaptive Research (OFAR) was 68.3%. Participants rated OFAR as highly relevant. OFAR is essentially a stage in technological development. The implication is that the involvement of farmers at this stage made it easy for them to identify and select appropriate varieties of rice that meet their needs and that of the consumers. About one-half (49.1%) of the participants rated use of herbicide as highly relevant while 43.1% of participants rated pesticide use as moderately relevant. In addition 54.9% of the participants rated information on economic returns on rice production as highly relevant.

The results also indicate that participants rated SRP activities on land preparation (73.85%), herbicide application (76.79%), pesticide application (67.9%) and provision of information on economic return on rice production (70.26%) as highly relevant. Furthermore 60.8% of participants rated linkage with buyers as highly relevant and more than one–half of the participants (52.9%) acknowledged price information on rice as highly relevant. These activities assisted farmers to dispose their produce. In addition, 54.9% of the participants valued their exposure to seed production techniques as highly relevant. Direct seed production by farmers will minimize scarcity of good quality seeds and accelerate diffusion of good quality seed in the country. Fajana (2002) reported inadequate supply of good quality seeds in Nigeria. In addition participants rated the use of extension leaflets as moderately relevant. However, 67.6% of participants rated the pest and disease control techniques in the leaflets as highly relevant. Pest and disease are some of the problems of rice production. All participants (100%) rated financial assistance offered by SRP as highly relevant. The implication is that SRP should continue to assist farmers to access credit facilities to enable them carry out their farm operations as at when due. On the whole, 38.56% participants rated all the SRP activities as highly relevant, 34.12% as moderately and 27.32% of the activities as less relevant. The implication is that SRP activities are relevant to rice production.

Therefore the activities should be strengthened if rice production is to be increased in the country.

Effects of SRP activities on participants' rice yield

The result of the study as shown in Table 3 indicates the rice produced by the participants in SRP. The highest proportion of participants (88.3%) produced 3 - 4 tonnes of paddy rice per hectare as opposed to 19.6% who were able to produce 3-4 tonnes before they joined SRP On the whole participants produced an average rice yield of 3.34 tonnes per hectare as against 2.24 tonnes of paddy rice prior to joining SRP. The yield per hectare of 3.34 tonnes of paddy rice is low as

production level of 5.4 tonnes per hectare is attainable if agronomical practices (planting of improved seeds, optimum application of fertilizer (200 kilograms per hectare) and other production recommendations) are judiciously followed (USAID, 2005 and Nwaze, 2005). However, the level of output is an improvement over the participants average yield of 2.24 tonnes as well as Kwara State local farmers' harvest of 1.62, 1.84 and 2.3 tonnes/hectare for 1997, 1998 and 1999 respectively (Kwara ADP, CAYS report, 2008) prior to the introduction of Special Rice Project (SRP). This shows that the activities of SRP influenced increased rice production of the participants by 31.13% using year 1999 as base year. Or an increase of 61.7% over the national average yield of 1.3 tonnes/hectare reported by Federal Department of Agriculture (FDA,2004) or 32.9% increase in yield of participants prior to the introduction of SRP.

The result of study as indicated in Table 3 also reveals that participants' overall average income from rice was ₦338, 700.00 per annum or 61.5% above participant income of N129,410 before the introduction of SRP. Thus, participants were able to earn N28, 225.00/month or N10, 225 above the proposed minimum wage of N18,000 per month for Nigerian workers. USAID(2005) reported that N44,000 is required to cultivate one hectare of rice farm .It is obvious that participants level of income placed them in a better position to increase farm size, procure and use optimally, farm inputs as at when due.

TABLE 2
Summary of relevance of SRP activities to participating farmers

Activities	Frequency %						
	Highly Relevant (3) Freq (%)	Moderately Relevant (2) Freq (%)	Less relevant (1) Freq (%)	Total relevance	Maximum relevance	% relevance	Level of relevance
SPAT							
-Optimum plant population	13(12.1)*	20(19.6)	69(67.6)	148	306	48.36	Less relevant
- Varietal trials (local and improved)	10(9.8)	20(19.6)	72(70.58)	142	306	46.4	Less relevant
OFAR							
- Variety trials Faro 43, 44, 52	34(33.3)	39(38.2)	29(28.4)	205	306	68.3	High
MTP							
- Optimum plant population	37(36.3)	42(41.2)	23(22.5)	216	306	71.24	High
-Variety trials (local and improved)	34(33.3)	48(47.1)	20(19.6)	216	306	71.24	
Farmers Field Days Demonstration on use of:							
- Herbicide	35(34.3)	50(49)	17(16.7)	226	306	72.5	High
- Pesticide	32(31.4)	50(49)	20(19.6)	218	306	71.9	High
- Rice processing techniques	16(15.7)	43(42.1)	43(42.1)	175	306	57.8	Moderate
- Storage techniques	6(5.8)	16(15.7)	80(78.4)	130	306	42.5	less relevant
-Exhibition of impr rice seeds	64(62.7)	36(35.3)	2(1.9)	266	306	87.6	High
- Feed back from famers	18(17.6)	39(38.3)	45(44.1)	177	306	57.6	Moderate
Radio Topics:							
- Land preparation	40(39.2)	44(43.1)	18(17.6)	226	306	73.85	High
- Herbicide	50(50)	33(32.3)	19(18.6)	235	306	76.79	High
- Pesticide application	31(30.4)	44(43.1)	27(26.5)	206	306	67.9	Very relevant
- Economic returns on rice production	37(36.3)	39(38.2)	26(25.5)	215	306	70.26	High
Television Programme:							
- Land preparation	30(29.4)	44(43.1)	28(27.4)	206	306	67.32	High
- Herbicide application	33(32.3)	46(45)	23(22.5)	214	306	69.9	High
- Pesticide application	20(19.6)	28(27.4)	54(52.9)	230	306	75.2	High
- Econ. returns on rice production	56(54.9)	2524.5)	21(20.6)	133	306	44.3	Less relevant
Linkage With Buyers	62(60.8)	36(35.3)	4(3.9)	200	306	66.66	High
Price Information	54(52.9)	25(24.5)	23(22.5	181	306	59.1	Moderate
- Exposure to seed production technologies	56(54.9)	37(36.3)	9(8.8)	195	306	63.7	Moderate.
Extension Leaflets on:							
- Rice production tech.	47(46.1)	32(31.4)	23(22.5)	195	306	59.15	Moderate
- Processing techniques	46(45)	33(32.3)	23(22.5)	181	306	59.15	Moderate
-Pests and disease control	69(67.6)	20(19.6)	13(12.7)	191	306	62.4	Moderate
- Storage techniques	32(31.4)	51(50)	19(18.6)	185	306	60.45	Moderate
Financial Assistance:							
- Provision of credit	102(100)	-	-	306	306	100	High
Total relevance score	**1062**	**940**	**752**				
Maximum score	**2754**	**2754**	**2754**				
Percentage score	**38.56**	**34.12**	**27.32**				

KEY
35% – 49% = Less Relevant
50% – 65 = Moderate
66% and above = High

TABLE 3
Yield of rice and income from participants rice farms.

Characteristics	After introduction of SRP		Before introduction of SRP	
Farm size (Hectares)	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
1 – 2	61	59.8	80	78.5
3 – 4	7	6.9	20	19.6
5 – 6	30	29.4	2	1.9
7 – 8	4	3.9	-	-
Average	2.6		1.8	
Yield in tonnes/ Hectare	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
1 – 2	10	9.3	77	75.5
3 – 4	90	88.2	20	19.6
5 – 6	2	1.9	5	4.9
Average yield (tones)	**3.34**		**2.24**	
Income (N'000)	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
100	-	-	30	29.4
101-200	-	-	62	60.8
201– 300	50	49.1	10	9.8
301– 400	23	22.9	-	-
Above 400	29	28	-	-
Average Income (N'000)	**338.7**		**129.41**	

TABLE 4
t-test analysis for significance difference between participants rice yield before and after the introduction of SRP.

Variable	Df	t	Level of significance	Remarks
Yield of Rice	2	3.843	000	Significant difference exists

p<0.05 level

Result of Hypothesis

The result of the hypothesis shown on Table 4 (above) revealed that there is a significant difference between rice yield of SRP participants before and after SRP was introduced(t = 3.843, P≤0.05). This might be due to the fact that SRP participants were able to access production resources which enable them to operate larger farm size. They were exposed to improved agronomic practices..

CONCLUSION

The study has shown that Special Rice Project initiative has led to the operation of large farms, higher yield and income to participating farmers. The study also showed that most of the activities of SRP were provision of credit, price information, linkage with market outlet, land preparation, seed production technique, processing techniques, On Farm Adaptive Research, Management Training Plot (MTP) for result demonstration, exhibition of improve rice seeds, herbicide, pesticide, fertilizer supply and information on economic returns on rice production were found to be relevant to rice production by the participating farmers.

RECOMMENDATION

SRP activities should be strengthened as the activities showed potential to increase rice yield and generate better income for the participants. In addition the scope of the SRP activities has to be expanded to cover all categories of farmers if the nation's rice requirement is to be met.

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Assessment of Agricultural Practical Year Training Programmes of Nigeria Universities in The South Western States

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ABSTRACT

The study evaluates practical year training programmes in selected Universities in Southwest, Nigeria. Two hundred and twelve students (212) were randomly selected from three stratified universities based on types I, II and III. Chi-square, Pearson Product Moment Correlation and Analysis of Variance were used in analyzing the data.

The results showed that majority of the students were within the age range of 24-25 years (31.6%) with a mean age of 25 years. More than half of the students (58.5%) were males. Most of the students were involved in crop and animal production activities (98.1%) and (93.4%) respectively. Students reported inadequate transport facilities, lack of storage facilities, poor funding of the programme and inadequate farm equipment as some of the problems faced during the programme. However, most (58.5%) of the respondents agreed that the programme is effective. There was no significant relationship between students' assessment of practical year training programme and age, sex (χ^2=2.97, p>O.05) and marital status (χ^2=0.20, p>0.05). There was a significant difference in students' assessment of the programme across the selected universities for livestock production (F=4.01, p<0.05), marketing activities (F=14.51, p<0.05), processing activities (F=16.86, p<0.05), extension services (F=9.91, p<0.05), but there was no significant difference for crop production (F=0.54, p>0.05).

Key Words: Assessment, Practical, Training, Programme

BACKGROUND INFORMATION TO THE STUDY

The farm practical programme is a training programme incorporated into the curriculum of agricultural students in the Nigerian Universities. The primary purpose is to expose students to practical knowledge of what they learnt in the classroom and to apply such on the farm. Although, the farm practical programme is being addressed differently in many of these universities, the aims, objectives and activities that are being carried out in the training programme are virtually the same. In the University of Ibadan, the training programme is popularly referred to as practical year training programme (PYTP), while at the Obafemi Awolowo University, Ile-Ife, it is being referred to as internship training programme (ITP). However, there is little variation in the duration expended by students in the different universities.

Farm practical programme was introduced as a result of the significant role that adequate training of the active labour force in agricultural production can achieve in transforming the agricultural sector. With the direct and indirect impact of the importance of the role of agriculture to the development of the economy of any nation, Ojo and Ajibefun (2000) pointed out that the role of improved technology is only considered higher when labour force is more educated.

Lack of skilled and knowledgeable agricultural workers to play the role of a catalyst in the agricultural development process in the rural areas is one of the main problems for agricultural development in Nigeria. It is essential to transfer new agricultural know how to rural

farmers to accelerate the agricultural production. New agricultural technology transfer is one of the major variables for the enhancement of agricultural production. It is essential for any agricultural worker to have the capacity for technology transfer. Similarly, he or she should have the capacity of coordinating the other services such as input supply, credits, marketing, farmer training etc. Demonstration of practical agricultural activities therefore, is one of the key strategies to ensure sustainable agricultural development and this is only possible when proper attention is given to knowledge and skills required to impact training to farmers who are the end-users. According to Breth and Dowswell (2004), many useful technologies have been generated by national and international agricultural research institutes in collaboration with the universities. Within the last decade, serious efforts had been made to make Nigeria self-sufficient in food production by organizations and institutions within the nation of which the Universities are not left out (Ajayi and Anyanwu, 1999).

In Nigeria, the importance of highly trained manpower has long been recognized and this has formed a significance part of the agricultural development policies and strategies since independence (Omotayo and Arokoyo, 1992). Human resources development in agriculture started at Moor Plantation Ibadan in 1921 and Sumaru in 1931, while others were later established at Akure, Umudike and Kabba by the former western, eastern and northern regional governments respectively. These schools were mainly concerned with the training of agricultural assistants and superintendents for the extension services and for the few research institutes in the country. A lot of achievements have since been recorded in the area of agricultural manpower training especially since independence (Omotayo and Arokoyo, 1992).

The Student's Industrial Work Experience Scheme (SIWES) is one of the ways of training agricultural students that will eventually teach farmers improved practical agricultural activities. The SIWES is the accepted skill training programme that forms part of the approved minimum academic standard in agricultural sciences for all Nigerian Universities. The specific objectives of the SIWES as enshrined in the job specification for agriculture in all Nigerian Universities are to provide students the opportunity to apply their theoretical knowledge in real work situation by bridging the gap between University work and actual practice and provide an avenue for students to acquire skills and experience in their course of study. It is through the scheme that agricultural students derive occupational skills required for the volume of work in agriculture. Educational intervention strategies that will encourage university students to make agricultural based jobs their professional fields should be put in place.

Despite these opportunities given to the young undergraduates in the nation's Universities to become self-reliant, employers of labour and contributing positively towards agricultural development, an increase in food production in the country has not been achieved. Most of the graduates of agriculture seek employment in other areas of the economy like banks, oil companies, insurance, etc. also, Soladoye (2000) and Okeleye (2002) found out that most of the graduates of agriculture have sought employment in other areas where they are not professionally trained and thus less productive.

The difference in pattern of farm practical programme in the nation's universities requires the need to assess the perception or opinion of the students about the programme, whether the farm practical programme is effective in bringing about the desired change which was reason for its inclusion in the curricula of the nation's universities and faculties of agriculture.

i. What are the students' perceptions about the duration of the programme?
ii. What are the students' perceptions about the theoretical component of the programme?
iii. What are the students' perceptions about the practical component of the programme?
iv. Do the students derive any benefits from the farm practical programme?

OBJECTIVES OF THE STUDY

The general objective of the study was to evaluate university students' participation in practical year training programme in South Western Nigeria.

Specific objectives

The study was specifically designed to:
(i) describe the demographic characteristics of the students;
(ii) ascertain students perception about the theoretical component of the programme.
(iii) determine students perception about the practical component of the programme;
(iv) ascertain the benefits that students derive from the programme;

METHODOLOGY

Area of study

The study was carried out in the South Western area of Nigeria, which has eight states namely Delta, Edo, Ekiti, Ogun, Ondo, Osun, Oyo and Lagos. The study area lies between latitudes 5^0 and 9^0 North and longitudes 2^0 and 8^0 East. It is bounded by the Atlantic Ocean in the south, Kwara and Kogi States in the north, Eastern Nigeria in the east and Republic of Benin in the west. It has a land area of 114,271 square kilometers. The vegetation ranges from the swamp forest in the southern coast to Derived Savannah in the north. The rain and deciduous forest lies between the two vegetation belts. Rainfall ranges from 300mm in the coastal area to 200mm in the extreme northern parts. The population of the area according to 2006 census is 22,330,670. In this area 65% of the people live in the rural area (FDA, 1997) with agriculture as their main source of livelihood.

Study population

The study population consists of 500 level students of the faculties of agriculture who had gone through the farm practical year programme in the selected universities.

Sampling procedure and sample size

A multi-stage random sampling procedure was used for this study. The steps involved are:
1) Stratification of the university(s) based on the faculty of Agriculture.
2) Random selection of universities from each stratum and
3) Random selection of respondents (500L students) from the selected universities.

The summary of the selection procedure is represented on the table below.

Stratum	University(s) with faculty of Agriculture.	Type	Selected Universities	Students enrolment	25% of the enrolment
1	U.I LAUTECH, & UNAD	Type I	U. I.	185	46
2	OAU & OOU	Type II	O. A. U	149	37
3	UNAAB	Type III	UNNAB	536	129
Total				**870**	**212**

UI- University of Ibadan
LAUTECH- Ladoke Akintola University
UNAD- University of Ado-Ekiti
OAU- Obafemi Awolowo University
OOU- Olabisi Onabanjo University
UNAAB- University of Agriculture, Abeokuta

RESULTS AND DISCUSSION

Demographic Characteristics of the Respondents

TABLE 1
Distribution of respondents according to age

Age (years)	U. I. (%)	UNAAB (%)	O. A. U (%)
20-21	3(6.5)	10(7.8)	10(27.03)
22-23	23(50.0)	13(10.0)	13(35.14)
24-25	4(8.7)	57(44.2)	6(16.22)
26-27	7(15.2)	19(14.7)	6(16.22)
28-29	9(19.6)	21(16.3)	2(5.40)
30-31	-	7(5.4)	-
32-33	-	2(1.6)	-

TABLE 2
Respondents' distribution according to sex

Sex	U. I (%)	UNAAB (%)	O. A. U (%)	Total (%)
Male	22(47.8)	82(63.7)	20(54.1)	124(58.49)
Female	24(52.2)	43(33.3)	17(45.9)	84(39.62)

Result of analysis on Table 1 shows that the mean age of the respondents was 25 years. This means that majority (31.6%) of the respondents were in the age range of between 24-25 years. This is true for U.I., UNAAB and O.A.U. The reason could be due to the fact that agricultural science courses in Nigerian Universities spans 5 years and respondents are not admitted until they are 18 years of age.

In Table 2, 58.5% of respondents were male while 39.6% were females. Across universities, the ratio of male to female respondents is higher. This corroborates the findings of Agbebaku (2004) and the reason for this could be as a result of the drudgery associated with agriculture which male alone can cope with and the psychological belief that agriculture is for males.

TABLE 4
Distribution of respondents according to first choice of course of study

First choice of course of study	U. I. (%)	UNAAB (%)	O. A. U (%)	Total (%)
Medical science	21(45.7)	30(23.3)	31(83.8)	82(38.68)
Engineering	4(8.7)	30(23.3)	-	34(16.04)
Pharmacy	9(19.6)	-	2(5.4)	11(5.19)
Agriculture	9(19.6)	64(49.6)	4(10.8)	77(30.32)

Table 4 above reveals that 38.6% of the respondents had medical sciences as their first choice of course of study. These include courses like human medicine, veterinary medicine, biochemistry and microbiology, while 16.0% of the respondents had engineering courses like civil engineering, chemical engineering, etc, as the first choice of course of study. About 5.2% of the respondents had pharmacy as their first choice of course of study. This means that 59.9% of the respondents did not choose agriculture as their first choice of career. Only 30.3% of the respondents choose agriculture as their first choice of course of

study. This is also in agreement with the findings of Bosoro (2003), that young people (youths) aspire to pursue courses like medicine and engineering than agriculture. This implies that majority (59.9%) of new entrants into the universities in the country do not have interest in agriculture, because of the perceived negative thought that agriculture is punishment for offenders as reported by Zhiri (1998) and Ogunrinde (2002). This could have an adverse effect on the development of agricultural sector and its contribution to the nation's economy.

TABLE 5
Distribution of respondents according to the activities involved in during Practical Year Training Programme.

Activities	U. I (%)	UNAAB (%)	O. A. U (%)	Total (%)
Crop production	43(93.5)	128(99.2)	37(100)	208(98.1)
Livestock production	32(69.5)	129(100)	37(100)	198(93.4)
Processing activities	29(63.0)	107(82.9)	37(100)	171(80.7)
Marketing activities	43(93.5)	46(35.7)	37(100)	126(59.4)
Extension services	17(37.0)	124(96.1)	31(83.8)	172(81.1)

Table 5 shows that 98.1% of the respondents were involved in crop production, 93.39% in livestock production, 80.7% in processing activities, while 81.1% and 59.43% were involved in

extension services and marketing activities respectively. This implies that majority 98.1% and 93.3% of the respondents were involved in crop production and livestock production, while 80.66% and 81.13%

were involved in processing and extension service respectively. The implication of this is that students were mostly introduced to crop and livestock production in the course of their practical year training programme.

TABLE 6
Distribution of respondents according to benefits derived from Practical Year Training Programme

Benefit derived	U. I.	UNAAB	O. A. U.	Total
Skill in animal production				
Great benefit	7(15.2)	96(74.5)	6(16.2)	109(51.42)
Average benefit	34(73.9)	23(17.8)	24(64.8)	81(38.21)
Low benefit	5(10.9)	8(6.2)	5(13.5)	18(8.49)
No benefit	-	2(1.6)	2(5.4)	4(1.89)
Skill in crop production				
Great benefit	33(71.7)	35(27.1)	6(16.2)	74(34.90)
Average benefit	11(23.9)	87(67.5)	27(73.4)	125(58.96)
Low benefit	1(2.2)	5(3.9)	4(10.8)	10(4.72)
No benefit	1(2.2)	2(1.6)		3(1.42
Skill in marketing activities				
Great benefit	12(26.1)	21(16.3)	8(21.6)	41(19.34)
Average benefit	29(63.0)	87(67.5)	25(67.5)	141(66.51)
Low benefit	4(8.7)	11(8.5)	2(5.4)	17(8.02)
No benefit	1(2.2)	10(7.8)	2(5.4)	13(6.13)
Skill in processing activities				
Great benefit	5(10.9)	84(65.1)	11(29.7)	100(47.17)
Average benefit	30(65.3)	24(18.6)	26(70.3)	80(37.74)
Low benefit	4(8.7)	17(13.2)	-	21(9.91)
No benefit	7(15.2)	4(3.1)	-	5.19(18.3)
Skill in extension services				
Great benefit	6(13.0)	27(20.9)	11(29.7)	44(20.75)
Average benefit	32(69.6)	91(70.6)	20(54.0)	143(67.45)
Low benefit	2(4.3)	9(7.0)	6(16.2)	17(8.02)
No benefit	6(13.0)	2(1.6)	-	8(3.77)

Table 6 above shows that majority of the respondents derived benefits from crop production (98.6%) of livestock (98.12%) production as well as extension service (96.2%) and processing activities (94.8%). This could be because the students were mostly exposed to crop and livestock production activities as well as processing and extension services. About 94.0% derived benefit in terms of skill acquisition and knowledge from marketing activities (93.9%)

TABLE 7
Distribution of respondents according to problems faced during practical Year Training Programme

Problems	U.I (%)	UNAAB (%)	O.A.U (%)	Total (%)
Lack of fund	42(91.)	108(83.7)	35(94.6)	185(87.26)
Inadequate experience instructors	2(4.3)	18(14.0)	13(35.1)	33(15.57)
Shortage of farm space	6(13.0)	26(20.2)	2(5.4)	34(16.4)
Poor yield	32(69.6)	35(27.1)	31(83.8)	98(46.23)
Transportation problem	41(89.2)	115(89.2)	35(94.6)	181(90.09)
Lack of storage facilities	41(89.1)	103(79.9)	24(64.8)	168(79.25)
Inadequate farm equipment	30(65.3)	109(79.9)	29(78.4)	168(79.25)
Infection among farm animals	6(13.0)	33(25.6)	10(27.0)	49(23.11)

TABLE 8
Analysis of variance of the benefits derived by the students in three selected Universities Practical Year Training

		Sum of square	df	F	Sig.	Decision
Crop benefit	Between Groups	21.611	2	0.542	0.582	NS
	Within Groups	4167.634	209			
	Total	4189.245	211			
Livestock benefit	Between Groups	151.581	2	4.013	0.019	Sig.
	Within Groups	1946.886	209			
	Total	4098.467	211			
Marketing benefit	Between Groups	497.930	2	14.510	0.000	Sig.
	Within Groups	3585.933	209			
	Total	4083.863	211			
Processing benefit	Between Groups	595.082	2	16.863	0.000	Sig.
	Within Groups	3687.649	209			
	Total	4282.731	211			
Extension benefit	Between Groups	363.853	2	9.914	0.000	Sig.
	Within Groups	3835.368	209			
	Total	4199.222	211			
Total benefit score	Between Groups	5217.032	2	7.399	0.001	Sig.
	Within Groups	73678.156	209			
	Total	78895.189	211			

Problems Encountered in Practical Year Training Programme

Problems encountered by respondents as shown in Table 7 range from transportation (90.09%), lack of fund (87.26%) and lack of storage facilities (79.25%) poor yield (46.23%) and inadequate farm equipment (79.25%). Other problems include infection among farm animals (23.11%), shortage of space (16.04%) and inadequate experienced instructors (15.57%). This may leave a negative thought on students taking up agriculture as a career, therefore, cause a decline in the development of agriculture and decrease in food production when the active labour force are not engaging in agriculture production.

Table 8 shows that there is a significant difference in the benefit derived from crop production activities in the three selected universities practical year training programme, however, there is significant difference in the benefits derived from livestock activities, marketing activities, processing activities and extension activities across the three selected universities practical year training programme.

This could be as a result of the difference in pattern and duration of the practical year training programme in the three selected universities. Some universities allow the students to spend the whole academic session for the practical programme while some spend only six months for the practical year training programme. In some of the universities, the students are allowed to spend part of the practical year programme in related agriculture firms while in some the students work on the university farm for whole duration of the programme. This may account for the difference in the benefit derived by the students in the three selected universities practical year training programme.

CONCLUSIONS

Based on the empirical findings from the study the following conclusions can be drawn.

- Major activities involved in by students during practical year training programme were crop and livestock production.
- Constraints faced include transportation, lack of storage facilities, inadequate farm equipment to work within the farm, poor yield and infection among farm animals.
- Students derived benefits from the practical year training programme, more of these benefits is derived from crop and livestock

RECOMMENDATIONS

To make the practical year training programme to be more effective, the following recommendations should be adopted by the stakeholders involved in the training.

- Proper orientation and planning of the practical year training programme activities with provision for flexibility in the outlined programme to be drawn before commencement of the programme.
- Proper funding of all areas in practical year training programme.

- Establishment of standard mechanized farms in various universities with in faculty of agriculture.
- Government should professionalize agriculture like other courses such as engineering, veterinary medicine, accountancy etc.

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Resource Use Efficiency in Cassava Production in Ogo-Oluwa Local Government Area of Oyo State, Nigeria.

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ABSTRACT

This study analyzed the resource use efficiency of cassava production in Ogo-Oluwa local government area of Oyo state, Nigeria. Primary data were collected from a total of 80 cassava farmers using multistage sampling procedure. Data were collected on input-output activities for 2003 cassava farming season. The data were analyses using regression analysis. The study revealed that, land and hired labour were the significant factors influencing the output of cassava. Out of all the inputs of production only land was over utilized

Key words: Cassava production, resource use, efficiency

INTRODUCTION

Cassava (*Manihot sp*) is very important. It provides the staple food stuff for many people in the tropical and subtropical countries. Cassava is cultivated in many parts of Nigeria and ranks first among root crops produced in the country. Cassava was brought from Brazil and was first introduced to West Africa and the Congo basin. It was later introduced to East (Carter, 1995). Cassava is today grown to some extent in all the countries. It is the most widely distributed an10ng tropical tuber crops. Cassava is one of most popular Nigerian staple food crops. Beside the local use as food, it also serves as an industrial use and assumes world importance in international trade. Cassava serves as source of employment for farmers and those that goes into processing, also serves as source of income to poor farmers as well as prosperous ones. Both rich and poor farmers often sell a higher proportion of cassava than other crops and derive more income from cassava (Berry, 1993).

The measurement of efficiency has remained an area of important research both in the developed and developing countries, especially in developing agricultural economics, where resources are meager and opportunities for developing and adopting better technologies are dwindling (Ali and Chaudry, 1990). Measurement of efficiency is very important because it helps to determine productivity growth by improving the neglected resources. (Taddese and Kristinarmoorthy, 1997). Efficiency can be

considered in terms of the optimal combination of inputs to achieve a given level of output (an input-orientation), or the optimal output that could be produced given a set of inputs (an output orientation)(Farrell ,1957). Amaza and Olayemi (2001) reported that 5% increase in cultivated land area, Ceteris paribus, would lead to an increase in 1.53% in the farm gross margin and vice versa, suggested that land is a major factor that is associated with change in output.

A lot of factors have been identified to explain the causes of food insecurity in the country. Factors such as stagnant technology in peasant agriculture, the effect of storage, processing and marketing facilities on the production of cassava causes glut in the market which invariably reduces and affect all year round supply of cassava in the market. These have greater impact on the farmers' income. The unstable price over the year is another problem causing loss to the farmer. Inadequate credit and capital which have a positive function with the scale of production force farmers to offer their produce at a give away prices whether at profit or at loss.

Land ownership and size of holdings known as tenure system is such as to encourage scattered and small holdings. Yet land is a basic of production. This fragmentation often resulted into low output. Cassava production is subject to uncontrollable and unpredictable factors such as weather and diseases, which affect the yield of cassava which invariably affect the income to

farmers. The bulkiness of cassava, high level of perishability makes application of uniform standard for efficient marketing difficult (David 1995).

The choice of cassava was informed based on the fact that, it is one of the very few crops that hold the key to ending hunger in Africa. Cassava has been recognized as Africa's food security crop because of its adaptability to marginal soils and erratic rainfall conditions. In this regards, this paper estimate the resource use efficiency in cassava production in Ogo-Oluwa local government area of Oyo State, Nigeria.

METHODOLOGY
Study Area and Method of Data Collection:

The study was carried out *in* Ogo-Oluwa local government area of Oyo State, Nigeria. Ogo-Oluwa local government area is approximately on 4°15' East longitude and 8°07' North latitude. Four villages covered in the local government area were Ajaawa, Idewure, Lagbedu and Otamokun. The respondents were cassava farmers *in* Ogo-Oluwa local government area of Oyo State. Primary data were collected through administration of structured interview schedule. Multistage sampling technique was employed in data collection. In this regard, local government area was stratified into four zones of North, West, East and South. The number of villages in the four zones ranges from 3 to 4. From each of these zones, one village was selected from which 20 farmers were randomly selected with the aid of Oyo State Agricultural Development programme (OYSADEP) farm household listing. The number of households, in each village was secured in the four villages. In each household cassava farmers were selected for interview. In all, 80 cassava farmers were interviewed.

Method of Analysis

The data collected for this study were analyzed using multiple regression analysis. The analytical framework is briefly discussed below.
The implicit function for the regression analysis is presented in equation (i)

$$Y = f(x_1, x_2, x_3, x_4, x_5 \quad e \quad) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots (i)$$

Y = Output (kg),
x_1= Land (ha),
X_2= Hired labour (mandays),
X_3= Input cost   (N),
x_4= Family labour (mandays),
x_5 = Fertilizer (kg),
e = error term.

Functional Specification

The relationships between the endogenous and each of the exogenous variables were examined using four functional forms: Linear, Semi-log, Exponential and Double-log.
The models were expressed as follows:

Linear
$$Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 + e \quad \dots\dots\dots\dots\dots\dots\dots\dots (ii)$$

Semi log
$$Y = b_0 + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + \log e \quad \dots\dots\dots\dots (iii)$$

Exponential
$$\log Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e \quad \dots\dots\dots\dots\dots\dots (iv)$$

Double log
$$\log Y = b_0 + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + \log e \quad \dots\dots\dots\dots (v)$$

The lead equation called the best linear unbiased estimate (BLUE) functional form was then chosen based on statistical significance, the economic theory that support production concept and the a priori expectation of the variables.

A priori Expectation

All the variables arc expected to positively influence output from cassava production except cost of input (x_3) which should be negative. Though, double logarithmic functional form was finally chosen on the basis of the a priori expectation viz signs and magnitude of the independent variables, economic considerations, the coefficient of determination and the magnitude of the error term as well as statistical significance of the coefficient of independent variables (Olayemi and Olayide 1981).
The final equation is therefore presented in equation (vi).

$$\log Y = b_0 + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + \log e \dots\dots\dots\dots\dots\dots (vi)$$

The efficiency of resource use was obtained from the estimated equation by comparing the marginal value product (MVP) of a particular input with the marginal factor cost (MFC) of that input. The MVP of an input was obtained through:

$$MVPX = \frac{biY}{X_1}$$

Where, Y is computed from the regression equation when all factors are fixed at their geometric mean.

bi represent the coefficient of X_1

X_I indicates input at geometric mean levels.

$MVPX_1$ indicates marginal value productivities of the inputs. (Amao et al., 2002).

The MFC for an input is defined as:
$MFCX_i = MPPX_i \ rxi.$

Where;
rxi is the unit price of input X_i

The regression coefficients which are equal to the elasticity coefficients in Cobb-Douglas Production function have implications on food security status. When $b_1 + b_2 + ... + b_5$ equal one, there is constant returns to scales, above one indicate increasing returns to scale and less than one indicate decreasing returns to scale. Constant, increasing and decreasing returns to scale exist if as all inputs are raised by 100 percent. Output is

increased by exactly 100, above 100 and below 100 percent respectively.

As regards the resource use efficiency, whenever, $MVPXi > MFCXi$, there is under utilization of resource Xi

$MVPXi < MFCXi$ there is over utilization of resource Xi and,

$MVPXi = MFCXi$, there is optimum/efficient utilization of resource Xi (Omonona, 2003).

RESULTS AND DISCUSSION

This section presents the results and discussion of the study. The study examines the resource use efficiency of cassava farmers in the study area. Olayemi and Olayide (1981) indicated that choice of appropriate functional forms may be based on apriori expectation which is in turn guided by economic theory. In this regard polynomials and double logarithmic functions are most common for production studies.

Based on the statistical significance of the coefficients and economic production function concept, the double logarithmic function was chosen as the lead equation. The result is presented in table 1.

The regression equation is:

$$Log \ Y = 9.14 + 0.6410gx_1 + 3.1210gx_2 - 1.291ogx_3 + 1.1210gx_4 + 6.15 \ logx_5$$
$$\quad (16.62) \quad (50.00) \quad (180) \quad (11.73) \quad (10.40) \quad (9.92) \quad (Table \ 1)$$

Figures in parentheses represent the standard error.

The coefficient of multiple determination (R^2) was found to be 92%. This implies that 92% of the total variation in the value of total output of cassava produced is explained by the explanatory variable: land (ha), hired labour (mandays), input cost (N), family labour (mandays) and fertilizer (kg). The remaining 8% not explained is attributed to other variables not included in the model.

From the regression result in table 1, all regression coefficients are positively signed except input cost (x_3) which is in conformity with, apriori expectation. The regression coefficient with respect to land and hired labour (X_I and X_2) were statistically significant at 1% level. This implies that, the amount invested on land and hired labour had a significant influence on the output of cassava produced.

From positive signed coefficient, it implies that the variables had direct relationship with total output while the negative signed coefficient had an indirect relationship with output. An increase

in the level of (x_1) land, (x_2) hired labour (x_4) family labour (x_5) fertilizer will lead to an increase in the output of cassava produced while an increase in (x) cost of input will lead to decrease in the output of cassava produced in the study area. The production elasticities generally represent the percentage increase in the output of cassava (Y), for each 1 percentage increase in the input of respective resources (Ogunfowora et al 1974). However, the most critical variables are the amount on land and hired labour. It was revealed that a one percent change in land and hired labour and by implication by number of land and hired labour used for production will lead to ₦ 0.64 and ₦312 percent change in income from cassava output respectively. In essence, output generated from cassava production is inelastic in response to the amount spent on land but elastic with respect to hired labour.

Given the levels of technology and prices of both input and output the marginal value

productivity is the yardstick for judging the efficiency of resource use (table 2). A given resources is optimally allocated when there is no divergence between its MVP and its acquisition price, hence, the marginal value productivities of individual resources provide a frame work for policy decision on resource adjustment and the deferential between the MVP and acquisition cost indicate the cost indicate the scope of resource adjustment necessary to attain economic optimum. As shown in table 2 with the input and output at their geometric mean. From table 3, it is observed that land (the only natural resource of all the resources) used in cassava' production was over-utilized, as the MFC was greater than the MVP. This means that for every naira of extra cost of land incurred, about 32 kobo is realized as an addition to the returns. Hence, there is the need to look for ways of reducing the land area cultivated so as to be able to reach a point of exacts utilization when MVP = MFC. As the area cultivated is reduced, it should be replaced with modern agricultural practices involving the use of improved techniques of production that will lead to an increase in yield of cassava. Land in the study area is over utilized because of the effect of deforestation being experienced in the area. This makes people, especially, the farmer to resort to continuous production of cassava on marginal lands thereby causing lost of nutrients and soil degradation. This result is in line with the findings of Omonona (2003).

The marginal value productivity (MVP) of hired labour was N450.00 und was found to be positive while its acquisition cost was ₦ *200.00* from this, it could be seen that MVP was higher than the acquisition cost of hired labour. This implies that the labour is adding to amount derivable than the total cost by ₦2.25.

Marginal value productivity (MVP) of input cost was ₦3000 and was found to be negative while its acquisition cost also found to be ₦1800 (table 2). From the table it could be seen that MVP is higher than the acquisition cost of input cost. The implication of this is that the producers are under utilizing cost of inputs and an increase in the level of input cost used by the farmers will contribute more to the output than to the total cost by ₦1.67.

The marginal value productivity of family labour was ₦650.25 while its acquisition cost was ₦289.00. The MVP of family labour is higher than its acquisition cost. The implication of this is that, the producers are under-utilizing family labour and an increase the amount of family labour used will contribute more to the output than to the total cost by ₦2.25.

Marginal value productivity (MVP) of fertilizer was ₦ 3000 and was also found to be positive while its acquisition cost also found to be ₦ 500 (table 2), from the table it could be seen that MVP is higher than the acquisition cost of fertilizer. The implication of this is that the producers are under utilizing the fertilizer available to them and that an increase in the level of fertilizer used by the farmer will contribute more to the output than to the total cost by ₦ 2.00. This findings is in line with the findings of Amao et al., (2002).

CONCLUSION AND RECOMMENDATION

The recent emphasis on the awareness programme on food security in Nigeria made the study of the efficiency of resource use to be very necessary. The study utilized a random sample of 80 cassava fanners in Ogo-Oluwa local government area of Oyo State.

The study indicate that, cassava farmers were resource use inefficient as there were greater divergence between the marginal value productivities (MVP) and the marginal factor cost (MFC) of the resources employed in the production of cassava in the study area. In addition, all the production inputs except land are under utilized, meaning that opportunities still exist to increase output by increasing the level of those inputs.

Based on the findings of the study, it is recommended that, the extension agents of the Oyo State Agricultural Development Programmc (OYSADEP) should organize a training workshop for farmers on the need to avoid the use of marginal land and use more of other inputs in the production of cassava in the study area.

Secondly, agricultural extension officers and agents in the study area should develop cassava production packages for small scale farmers to boost food production and encourage other people who are not farmers to engage in cassava production for their domestic consumption.

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TABLE 1
Regression Result of Cobb-Douglas Production Function for Cassava Farmers in Ogo-Oluwa Local Government Area of Oyo State.

Variables	Co-efficient	t-ratios
Intercept	9.14	0.55
Land (X_1)	0.64	0.01*
Hired labour (X_2)	3.12	0.02*
Input cost (X_3)	-1.29	0.11
Family labour (X_4)	1.12	0.11
Fertilizer (X_5)	6.15	0.62

* t- Value significant at 1%
$R^2 = 0.92$

TABLE 2
Marginal value product and Marginal factor cost (in Naira) Production inputs in cassava production in Ogo-Oluwa Local Government Area of Oyo State.

Input	Geometric mean (X_1)	Log of geometric mean	Regression coefficient	MVP X_1(₦)	MFC X_1(₦)	MVP/MFC
X_1	2.48	0.40	0.64	160.00	500	0.32
X_2	6.21	0.79	3.12	450.00	200	2.25
X_3	6.85	0.84	-1.29	3000.00	289	1.67
X_4	1.88	0.27	1.12	650.25	289	2.25
X_5	1332.4	3.13	6.15	3000.00	1500	2.25

Information Needs of Oil Palm Farmers in Esan Central Local Government Area of Edo State, Nigeria

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ABSTRACT

The study assessed the information needs of oil palm farmers in Esan Central Local Government Area of Edo State, Nigeria. Through the use of structured interview schedule, 90 randomly selected oil palm farmers were surveyed. Findings showed that 73.3 percent of the respondents were males, 80 percent were between 31 and 50 years old, 73.3 percent were married, 70 percent had both primary and secondary education, 68.9 percent had farming experience of 11 years and above and 93.4 percent had between1 and 4 ha of farm size. Respondents obtained information mostly from radio ($\bar{x}$ = 2.60) and fellow farmers ($\bar{x}$ = 2.57). Perceived areas of information need include nursery practices ($\bar{x}$ =4.86), improved processing methods ($\bar{x}$ = 4.84), improved varieties ($\bar{x}$= 4.67) and fertilizer application ($\bar{x}$= 4.36). Perceived effects of lack of information on respondents' production were low income ($\bar{x}$ = 4.88), low yield ($\bar{x}$ = 4.86), continuous use of local technologies ($\bar{x}$ = 4.82), and non-awareness of improved processing methods ($\bar{x}$ = 4.67). Respondents' sex (χ^2 = 8.489: P < 0.05) and educational background (χ^2 = ˉ10.460: P<0.05) had significant association with their perception of information needs. The need for new strategies for information dissemination, use of mass media and farmer training were recommended.

KEYWORDS: Information needs, oil palm farmers, Edo State.

INTRODUCTION

Information is one of the basic human needs after air, water, food and shelter and could be said to be one of the basic necessities of life (Stanley 1990). Also, Camble (1992) posited that man require information to be able to manipulate factors of production such as land, labour and capital resources into meaningful and productive use. Adedoyin (1990) noted that a steady flow of accurate, understandable and factual information links the scientist with farmers, in which for any true agricultural progress, farmers must know, understand, and act on this information. Therefore, how far people progress in whatever they are doing depends largely upon the availability and access to accurate and reliable information.

Information need identification is the first step in the development of any information activity and provides many things for the farmer. The analysis determines the information contents and how deficient farmers are in these contents and the sequence of tasks provides the sequence of information activity. Morris and Stilwell (2003) suggested that farmers are in the best position to determine whether any information is of greater value to meet their needs. Information is one of the most valuable resources in rural development (Morrow, et al.2002), and can assist small scale farmers take informed decisions and appropriate action (Harris, et al. 2001).

The Oil palm of commerce (*Elaeis guineensis)* is indigenous to West Africa (Hartley, 1988). The main oil palm growing area in Nigeria is the tropical rain forest and derived savannah portion. Domestic annual production of palm oil stands at about 785, 000 metric tonnes from about 2.5 million hectares of wild grove of small holdings and large estate plantations (Raw Materials Research and Development Council (RMRDC), 2004). However, the current annual demand is in excess of one million metric tonnes of palm oil and thus clearly shows a deficit. The supply gap, high returns' on investment and bright external trade opportunities in the oil palm business makes investment in the oil palm sector a safe and profitable venture (RMRDC, 2004). Areas of possible investment in the oil palm industry includes, seedling production, primary processing of fresh fruit bunches to produce palm oil, kernel oil, kernel cake, refining of the crude palm oil, production of Oleo chemicals and other downstream products like margarine, soaps and creams (RMRDC, 2004). However, oil palm production poses many challenges for small scale farmers (Kotschi, 2003) who require assistance to secure access to land, financial assistance and access to input and output markets (Viljoen et al. 2002). Aina (2004) also observed that the poor access to information and training by these categories of farmers was due to the initial policy formulation of Agricultural Development Programme (ADP) which was mainly directed at arable crops. Even when exposed to information, cursory observation revealed that most information disseminated by ADPs, Nigerian Institute for Oil palm Research (NIFOR) and other related institutions are usually given without needs identification and this has implication for capacity building. Similarly, according to Ozowa, (2004), "no one can categorically claim to know all the information needs of farmers especially in an information dependent sector like agriculture where there are new and rather complex problems facing farmers every day." Identifying information needs of oil palm farmers could stimulate research activities aimed at solving farmers' problems as well as assisting agencies involved in extension services to disseminate and design appropriate information programme for farmers. This is because competency in the various aspect of cultivation of the crop considering its huge potential could contribute to the poverty alleviation policy of government through improved income of rural farmers. This study therefore aimed to determine the information needs of oil palm farmers in Esan Central Local Government Area of Edo State with the ultimate objective of improving oil palm production as well as enhancing the standard of living of the farmers. Specific objectives were to:

- ascertain the socio – economic characteristics of the respondents;
- ascertain the sources of information for the respondents;
- identify the level of respondents' awareness of recommended technologies;
- identify the specific information needs of respondents;
- ascertain respondents' perception on the effect of lack of information on oil palm production and;
- determine the relationship between socio-economic characteristics of respondents and their information needs.

METHODOLOGY

The study was carried out in Esan Central Local Government Area of Edo State, Nigeria in 2006. The area lies between latitudes 6.636^{o}N – 6.909^{o}N of the equator and between longitudes 6.182^{o}E – 6.364^{o}E of the Greenwich meridian. It is situated in a rainforest zone with temperature ranging between 25°C in the rainy season and 28°C in the dry season. The major agricultural crops grown in the area are yam, tomatoes, rice, and Pineapple, Kola nut, Rubber, Cassava, Oranges and oil palm.

The target population for the study was the oil palm farmers in Esan Central local Government Area of Edo State. A two-stage sampling technique was used to select the respondents for the study. A simple random sampling technique was first used in the selection of six villages in the Local Government Area. Through the assistance of the ADP staff, contact farmers in each of the 6 villages were identified and a total of 90 respondents were randomly selected from this category of farmers.

A structured interview schedule was used for data collection. The instrument contained a 5–point Likert-type scale of Strongly agree (5), Agree (4), Undecided (3), Disagree (2), Strongly disagree (1) in determining respondents' perceived effects of lack of information on oil palm production and very important (5), important (4), undecided (3), not important (2), not very important (1), for respondents' perceived information needs. The instrument also contained a 3- point Likert-type scale of Always (3), Sometimes (2), Never (1) for determining respondents sources of information and Fully

aware (3), Partially aware (2), Not aware (1) for respondents' level of awareness of oil palm production technologies. The reliability of the instrument was determined using the test–retest method by administering it to 20 farmers from communities that were outside the 6 villages surveyed with a reliability coefficient of 0.85 obtained.

Data were analyzed using descriptive statistics such as frequency counts, percentages, means and standard deviation and chi-square was used to find the level of association between variables.

RESULTS AND DISCUSSION.

Socio-economic characteristics of respondents.

Table1 shows the socio-economic characteristics of the respondents. The result shows that majority (73.3%) of the respondents were males, which is an indication that majority of oil palm farmers are males. The result agrees with that of Hartley (1988) and Solomon (1995) that oil palm is a male crop. The reason for this could be that male farmers have easy access to land than their female counterparts (Oladeji and Oyesola, 2000). Result in Table 1 also indicates that majority of the respondents (80.0%) were between 31-50 years old with 73.3 percent of them been married. Majority of the respondents (70%) had both primary and secondary education. This result agrees with the view of Quisumbing and Meinzen – Dick (2001) "that many countries in sub-Saharan African have low level of education and that improving their education would probably increase agricultural productivity and reduce poverty." As regards years of experience, majority of the respondents (68.9%) had farming experience of 11 years and above. Most (93.4%) of the respondents had between1and 4 ha with about 1-2 plots. This indicates that oil palm farmers in the study area are small scale farmers, which is in line with the view of Erie (1996) that small farm holdings constitute more than 70% of all farming activities in Nigeria.

TABLE 1
Socio-economic characteristics of respondents (n=90)

Socio-economic characteristics	Frequencies	Percentages (%)
Sex		
Male	66	73.3
Female	24	26.7
Age		
21-30 years	4	4.4
31-40 years	42	46.7
41-50 years	30	33.3
50 years and above	14	15.6
Marital status		
Single	9	10.0
Married	66	73.3
Divorced	14	15.6
Widowed	1	1.1
Educational Background		
No Formal Education	13	14.4
Primary School	28	31.1
Secondary School	35	38.9
OND/NCE	14	15.6
Farming Experience		
6-10 years	28	31.1
11-15 years	29	32.2
16-20 years	28	31.1
21 years and above	5	5.6
Farm Size		
1-2	41	45.6
3-4 ha	43	47.8
5-6 ha	5	5.6
7 ha and above	1	1.1
No of Plots		
1-2	52	57.8
3-4	33	36.7
5 and above	5	5.6

Respondents' sources of information on oil palm production

Table 2 shows the respondents' sources of information on oil palm production. The result indicates that respondents obtained their information always from radio ($\bar{x}$ = 2.60) and fellow farmers ($\bar{x}$ = 2.57). The result on the use of radio as source of information agrees with the finding of Ajayi (2003) who found the use of radio as the most popular source of information in South-West Nigeria. Similarly, Antholt (1994) attributed the rise in farmers preferring fellow farmers' as a first hand information source to the apparent ineffectiveness in the public extension services in developing countries. The respondents also sometimes got information from the

extension agents of ADP ($\bar{x}$ = 2.12). It is surprising that the respondents were not getting information from the Nigerian Institute for Oil Palm Research ($\bar{x}$ = 1.32) which is the institute responsible for oil palm research in Nigeria and has an extension division.

TABLE 2

Respondents Sources of Information on Oil Palm Production.

Sources	Mean ($\bar{x}$)	Standard deviation
Radio	2.60	0.64
Fellow farmers (Contact farmers)	2.57	0.52
Television	2.13	0.74
Extension agent from (ADP)	2.12	0.98
Neighbor and friends	2.00	0.71
NGOs	1.52	0.86
Bulletin and posters	1.44	0.63
Extension agent from (NIFOR)	1.32	0.75

Likert- type scale: Always (3), Sometimes (2), Never (1).

Respondents' level of awareness of recommended oil palm technologies.

Table 3 shows the respondents' level of awareness of oil palm production technologies. Results indicate that respondents were fully aware of some oil palm practices such as use of chisel ($\bar{x}$ = 2.80), use of knife ($\bar{x}$ = 2.74), fertilizer application ($\bar{x}$ = 2.70), use of herbicides ($\bar{x}$ = 2.54) and were partially aware of nursery management ($\bar{x}$ = 1.52). However, the respondents were not aware of some important technologies such as mulching ($\bar{x}$ = 1.45) and improved processing methods ($\bar{x}$ = 1.37). According to Oladeji and Oyesola (2000), farmers may be aware of certain farm practices, but may

not know how to carry out such operations if there is no further information on the practices.

TABLE 3

Respondents level of awareness of oil palm production technologies.

Recommended practice	Mean ($\bar{x}$)	Std. Deviation
Use of chisel for harvesting	2.80	0.73
Use of knife for harvesting	2.74	0.96
Fertilizer application	2.70	0.80
Use of herbicide	2.54	0.86
Nursery management	1.52	0.98
Mulching	1.45	0.74
Oil palm hybrid	1.42	0.94
Improved processing method	1.37	0.75
Chemical method on pest disease	1.34	0.89

Likert-type scale: Fully aware (3), Partially aware (2), Not aware (1).

Respondents' information needs on oil palm production and processing

Table 4 shows the information needs of the respondents as regards oil palm production and processing. The result shows that respondents perceived that information needs on nursery practices ($\bar{x}$ = 4.86), improved processing method ($\bar{x}$ = 4.84), improved varieties ($\bar{x}$ = 4.67) and fertilizer application ($\bar{x}$ = 4.36) as very important. Some of the results in Table 4 are expected because when farmers are not aware of certain technologies as reflected in Table 3, it is logical that they will definitely need information on such technologies so as to get better productivity from their farms. The result also shows that respondents perceived information needs on some technologies as important such as Chemical weed control ($\bar{x}$ = 3.82), improved cultural practices ($\bar{x}$ = 3.64), oil palm storage ($\bar{x}$ = 3.54) and palm oil marketing ($\bar{x}$ = 3.52).

TABLE 4
Respondents' perceived information needs on oil palm technologies.

Information needs	Mean ($\bar{x}$)	Std. deviation
Improved nursery practice	4.86	0.57
Improved oil palm processing	4..84	0.87
Improved varieties of oil palm	4.67	0.88
Fertilizer application	4.36	0.76
Chemical weed control	3.82	0.82
Improved oil palm cultural practices	3.64	0.98
Oil palm storage	3.54	0.89
Palm oil marketing	3.52	0.94
Oil palm harvesting	3.02	0.99
Credit facilities	2.02	0.92

TABLE 5
Respondents' perceived effects of lack of information on oil palm production.

Effects of lack of information	Mean ($\bar{x}$)	Std. deviation
Low income from palm produce	4.88	0.84
Low yield from farm	4.86	
Continuous use of local technologies	4..82	0.81
Non awareness of processing methods	4.67	0.68
Marketing of palm produce is affected	4.54	0.86
Getting credit from Banks is affected	1.82	0.87

Respondents' perception on effects of lack of information on their oil palm production

Table 5 shows the respondents' perception on the effect of lack of information on their oil palm production. The result shows that respondents strongly agreed with some of the statements that the effects of lack of information on their oil palm production were low income ($\bar{x}$ = 4.88), low yield ($\bar{x}$ = 4.86), continuous use of local technologies ($\bar{x}$ = 4.82), non awareness of improved processing methods ($\bar{x}$ = 4.67). They also agreed that lack of information will affect the marketing of palm produce ($\bar{x}$ = 4.54). They however disagreed that lack of information will affect their getting credit from banks. These results agreed with the views of Morris and Stilwell (2003) that farmers are in the best position to determine whether any information is of greater value to meet their needs.

Relationship between respondents' socio-economic characteristics and their information needs.

Table 6 shows the relationship between respondents' socio-economic characteristics and their information needs. The result shows that there was a significant association between the respondents' sex (χ^2 = 8.489: P < 0.05) and their information needs on oil palm production. The significant association of respondents' sex with their information needs might be due to the fact that more males are involved in oil palm production than the female farmers in the study area. Similarly, there was a significant association between the respondents' educational qualification (χ^2 =10.46: P<0.05) and their information needs. This result is not unexpected as people with good educational background are expected to be conversant with their information needs than those with low education. This view is supported by Yahaya (2003) who posited that people with better education take more advantage of new sources of information than those less educated.

TABLE 6
Relationship between respondents' socio-economic characteristics and information needs.

Socio-economic characteristics	Chi-square (χ^2)	Degree of freedom	P-level
Sex	8.489*	1	0.001
Educational qualification	10.460*	3	0.012
Marital status	1.796	3	0.850
Farming experience	5.088	3	0.165
Farm size	3.633	3	0.899
No of plots	2.711	2	0.258

* Significant at 5% level.

CONCLUSIONS AND RECOMMENDATIONS

Contrary to the view of Burton (2002) that most farmers in developing countries do not know what information they need, this study has established that farmers are aware of the importance of information in agricultural production as they were able to highlight the effect of lack of information on their production in this study. The study also established the vital areas of oil palm production that information is needed which include nursery practices, improved processing methods, improved varieties and fertilizer application. The study has also shown that the extension services has not been effective in disseminating information to oil palm farmers as farmers relied on radio and fellow farmers as sources of information which probably resulted in not being aware of major improved oil palm production and processing technologies.

Based on the findings, the following recommendations are made:

i.   There is a need for the extension section of both NIFOR and the ADP to work together on how to disseminate adequate information to oil palm farmers as they do to crop farmers using extension methods such as field days, demonstrations and posters.

ii. There is a need to create more awareness on new technologies developed by NIFOR through more radio programmes aired at appropriate time and the use of leaflets produced both in English and local languages.

iii There is a need to conduct regular short training courses for farmers on oil palm production and processing.

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Gender Analysis of Allocative Efficiency in Small Scale Maize Production in Kogi State, Nigeria.

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Abstract

   The study examined gender analysis of allocative efficiency in small scale maize production in Kogi State, Nigeria. The primary data for the study were obtained using structured questionnaire administered to one hundred randomly sampled male and female maize farmers from two Local Government Areas. Descriptive statistics, gross margin, net farm income, gross ratio, operation ratio, return on capital investment and production function using regression model were used to analyze the data. The study showed that female farmers were more profitable and efficient in maize production than their male counterpart with operating ratio, gross ratio return on capital investment of 0.23. 0.30 and 3.36 respectively. The result from the production function analysis revealed that the R^2 value for men were 54.9% while that of women were 57.1%. Variable inputs such as farm size, seed and fertilizer were found to be significant at 1%, 5% and 5% level of probability respectively for male farmers while seed, fertilizer and agrochemical were found to be significant at 5% and labour at 10% level of probability for female farmers. Elasticity of production (return to scale)for both male and female farmers showed an increasing return to scale and that maize production was in stage I of the production region in the study area. Estimated efficiency ratio(r) shows that the resources used were not efficiently utilized. It is recommended that the present level of allocative efficiency of maize production in the study area should be increased by using more of these productive resources. Farmers should also be encouraged to take into the advice of the adequately trained extension advisers on improved techniques of maize production such that there will be increase in yield per hectare.

Keywords: Gender, allocative efficiency and maize production

INTRODUCTION

   Maize is one of the main cereal staples in Nigeria. It originated from a directed domestication of a Mexican annual grass known as *Zea mays*. Maize is widely cultivated throughout the South, West, East and Middle Belt of Nigeria (Ojo, 2004). Maize is also a staple food of great socio-economic importance in the Sub-Saharan Africa of which Nigeria is inclusive with per capita kg production per year of 40 (FAO, 2003). In Nigeria, it is the third most important cereal crop after sorghum and millet (Ojo, 2000). The total land area planted to maize in Nigeria is above 2.5 million hectares with an estimated yield of about 1.4 metric tones per hectares (Agboola and Tijani, 1991). Ironically, the demand for maize as a result of the various domestic uses shows that a domestic demand of 3.5millon metric tons outweighs supply of 2million metric tonnes (Akande, 1994). However, the unfolding performance of maize can be attributed to the fact that over 90% is dependent on subsistence agriculture (small holder farmers) with rudimentary farm system, low capitalization and low yield per hectare(Olayemi,1994).

   Moreover, price fluctuation, diseases and pest outbreaks, poor storage facilities and inefficient resources utilization were identified as problems of low maize production in Nigeria (Ojo, 2000). In view of this, production efficiency of smallholder farms has important implications for development strategies adopted in most developing countries, especially Nigeria where the primary sector is still dominant. An improvement in the understanding of the levels of production efficiency and its relationship with a host of farm level can greatly aid policy makers in creating efficiency enhancing policies as well as in judging the efficacy of present and past reforms. One of the objectives of any production unit is to utilize factors of production efficiently in order to earn high profit. The importance of

maize production to Nigerians economy is already well known and therefore need not to be over-emphasized. Based on socio-economic points of view, maize makes significant contribution to economy in terms of employment and income generation to various people. However, many factors have been militating against the efficiency of resource use in maize farming which may lead to a reduction or fluctuation of its production output. This fluctuation in production output can have a serious implication not only on the maize farmers' incomes but also on their abilities to use the available resources efficiently. In trying to compare the resources use efficiency of male and female maize farmers, problems also arise because of inequality in the use of certain resources. Therefore, this study is set to determine gender allocative efficiency of maize farmers in Kogi State.

The specific objectives are to:

(i). describe the socio-economic characteristics of male and female maize farmers in Kogi State.

(ii). determine input and output levels in maize production among the male and female maize farmers.

(iii). determine the profitability in maize production among men and women maize farmers and

(iv). determine gender resource use efficiency in maize production in the study area

METHODOLOGY

Study Area: This study was carried out in Kogi State. The state lies between latitude 06º 30´N and longitude 08º 51´N. with land area of 29,833km² and population of 2,009,046 (Wikipedia, 2008). Kogi State is known to be very productive in agriculture. The main crops grown are maize, coffee, cocoa, and palm oil, cashew, cassava, peanuts, melon and rice among others. The state is also known to be rich in mineral resources like coal, limestone, iron, petroleum and tin.

Sampling Techniques: The data mainly from primary sources were collected from two Local Government Areas (LGAs) which were purposively selected because of the prevalence of the crop in the area using multistage sampling technique. The LGAs include Yagba East and Mopa Amuro LGAs. The second stage involved a simple random selection of 50 farmers (25 men and 25 women) out of the maize farmers from each of the two LGAs, thus, making 100 respondents. The data were collected with the use of structured questionnaire designed in line with objectives of the study. The information collected from the farmers include demographic characteristics of maize farmers and resources used in the production of maize e.g. labour (mandays), agro-chemicals (litres), variable and capital inputs costs (naira), land (ha) and fertilizer (kg).

DATA ANALYSIS

Descriptive Statistics: The method employs arithmetic mean, frequency distribution and percentage. The technique was used to group and summarize the data obtained from the field.

Gross margin: This is the difference between the Gross Farm Income (GFI) and the Total Variable Cost (TVC). It is a useful planning tool in situations where fixed capital is negligible portion of the farming enterprises in the case of small scale subsistence agriculture (Olukosi and Erhabor, 1988).

GM = GFI – TVC   (1)

Where GM = Gross Margin, GFI = Gross Farm Income, TVC = Total Variable Cost.

Gross margin analysis is one method of calculating profitability of small scale cropping enterprises (Olukosi *et-al*, 2006).

Net Farm Income (NFI) = Gross Margin (GM) – Total Fixed Cost (TFC)

Gross ratio: This is a profitability ratio that measures the overall success of the farm. The lower the ratio, the higher the return per naira.

$$GR = \frac{TFE}{GI}$$

          (2)

Where GR = Gross Ratio, TFE = Total Farm Expenses and GI = Gross Income.

Operating Ratio: The operating ratio is directly related to the farm variable input usage. The lower the ratio, the higher the profitability of the farm business.

$$OR = \frac{TOC}{GI}$$

          (3)

Where OR = Operating Ratio, TOC = Total Operating Cost and GI = Gross Income.

Return on Capital Invested*:* This is defined as gross margin divided by total variable cost.

$$RI = \frac{GM}{TVC}$$ (4)

Where RI = Return on Capital Invested, GM = Gross Margin and TVC = Total Variable Cost

Production Function Analysis: Regression model was used to examine input-output relationship and the implicit form of the model is given by:

$$Y = f(X_1, X_2, X_3, X_4, X_5 U_i)$$ (5)

Where
Y = Output from maize production (kg)
X_1 = Farm size (ha)
X_2 = Quantity of seeds (kg)
X_3 = Quantity of fertilizer (kg)
X_4 = Labour input (manday)
X_5 = Agrochemical (liters)
U_i = Error term.
The explicit form of this function takes the following forms:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + U_i (linear)$$ (6)

$$Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + U_i (semilog)$$ (7)

$$\ln Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + U_i (doublelog)$$ (8)

$$\ln Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + U_i (exponential)$$ (9)

Efficiency of Resource-use*:* This was determined by the ratio of marginal value product (MVP) to marginal factor cost (MFC) of inputs based on the estimated regression coefficients. Following Rahman and Lawal (2003) efficiency of resource (r) is given as

$$r = \frac{MVP}{MFC}$$ (10)

The rule provides that when r = 1, there is efficient use of resource; r > 1 and r < 1 indicate underutilization and overutilization of a resource respectively. The values of MVP and MFC were estimated as follows:

$$MVP = MPP \cdot P_Y$$

$$MFC = Px_i$$

Where
MVP = Marginal Value Product of variable input;
MPP = Marginal Physical Product;
Py = Unit Price of output;
Px_i = Unit Price of input Xi
r = Efficiency ratio.

Economies of Scale: This is the measure of farm's success in producing maximum output from a given set of inputs. The return to scale (RTS) was estimated using the formula

$$\sum{}^k Epx_i = RTS$$

Where Epx_i refers to the elasticity of production derived from the regression results.

RESULTS AND DISCUSSION

Socio-economic characteristics of sampled farmers: Some socio-economic characteristics of farmers influenced maize production in the study area. The variables considered include marital status, age, education, household size and years of farming experience.

Table 1 (below) shows that majority of the maize farmer were married men (76%) and women (50%). It is also shown in the table that

the mean ages of male and female maize farmers were 47 and 48 years respectively. This implies that majority of the sampled farmers were at their middle ages and were economically active. The modal class of educational level of men and women were secondary and primary schools respectively.

It is also shown that men had the highest household size of 74% while that of women were 70%.

TABLE 1
Socio- economic characteristics of men and women maize farmers in the study area

Variables	Male farmers			Female farmers		
	Freq	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**
Marital Status						
Married	38	76		25	50	
Single	7	14		2	4	
Widow(er)	3	6		21	42	
Divorced	2	4		2	4	
Age (years)						
Less than 21	0	0		0	0	
21-30	8	16	47	1	2	48
31-40	7	14		11	22	
41-50	13	26		18	36	
51-60	20	40		18	36	
Above 60	2	4		2	4	
Highest educational attainment						
Primary	18	36		19	38	
Secondary	19	38		13	26	
Tertiary	2	4		1	2	
Informal adult education	4	8		1	2	
Quranic education	7	14		16	32	
Household size						
1-5	3	6		7	14	
6-10	12	24	4	18	36	5
11-15	10	20		15	30	
16-20	14	28		6	12	
Above 20	11	22		4	8	
Years of farming experience						
1-5	11	22		15	30	
6-10	9	18		6	12	
11-15	13	26	25	9	18	20
16-20	7	14		11	22	
Above20	10	20		9	18	

Gross Margin Analysis of Male and Female Maize Farmer

The estimated gross margin analysis for both male and female maize farmers is shown in Table 2. The table shows that total variable costs constituted 55.53% and 58.99% of the total cost of production for male and female maize farmers respectively, while the total fixed cost constituted 44.47% and 41,01% for both male and female maize farmers respectively. The confirmation of profitability of maize for both male and female farmers is shown by the net farm income of N11,714.27/ha and N12,755.84/ha respectively.

TABLE 2
Estimated gross margin analysis for maize production in Kogi State

Cost Items and Revenue	Male farmers		Female farmers	
	Cost (N /ha)	% of Total cost	Cost (N /ha)	% of Total cost
Variable Cost				
Hired labour cost	1150.53	10.44	1236.11	15.24
Fertilizer cost	2975.53	26.99	2132.41	26.28
Herbicide cost	858.77	7.79	496.30	6.12
Seed cost	476.32	4.32	437.96	5.40
Insecticide cost	659.65	5.98	482.41	5.95
Total variable cost	**6120.80**	**55.53**	**4785.19**	**58.99**
Fixed cost				
Farm tools	2182.54	19.80	1578.27	19.45
(Depreciation)	220.09	1.20	0.00	0.00
Interest on loan	2,500.00	22.68	1750.00	21.56
Land rent	**4,902.63**	**44.47**	**3,328.27**	**41.01**
Total fixed cost	**11,023.43**	**100.00**	**8,113.46**	**100.00**
Total Cost				
Returns	**22,737.70**		**20,869.30**	
Gross income	**16,616.90**		**16,084.11**	
Gross margin	**11,714.27**		**12,755.84**	
Net farm income	**2.71**		**3.36**	
Return on naira invested	**0.27**		**0.23**	
	0.37		**0.30**	
Operating ratio				
Gross ratio				

Also the return on a Naira invested is N2.71 for men and N3.36 for women, while the gross and operating ratios for men were 0.37 and 0.27 respectively, and that of their women counterpart were 0.30 and 0.23 respectively. This showed that women were more profitable and successful in maize production than their men counterparts. The profitability ratio for women was less than that of their men counterpart, indicating that women return per naira was higher than that of their men counterpart.

Production analysis

The summary statistics of the variables for the allocative efficiency estimation is presented in Table3. They include the sample mean and the standard deviation for each of the variables. The average output of maize for men farmers was 1041.40 kg obtained from about 1ha while their female counterparts recorded an average output of 586kg from about 1ha which suggested that the study covered small-scale family managed farm units. The average labour for both male and female farmers were 41.88 and 31.10 man- days respectively showing that maize farmers relied heavily on human labour to do most of the farming operations in the study area. All these findings exemplified the nature of subsistence farming which dominates agricultural production in Nigeria. The minimum and maximum ages of men farmers were 25 and 58 years respectively while the minimum and maximum ages of their women counterparts were 30 and 60 years respectively. Also, Table 3 showed that men farmers were relatively younger in age (mean age of about 47 years) when compared with their women counterparts mean age of about 48 years).

TABLE 3
Summary statistics of the variables for maize farmers in Kogi State.

Variables	MEN				WOMEN			
	Mean	S.D	Min.	Max.	Mean	S.D	Min	Max
Output (kg)	1041.40	1068.0	100.00	6000.00	586.40	260.50	100.00	1800.00
Farm size (ha)	1.14	0.53	0.50	2.00	1.10	0.90	0.50	7.00
Seed (kg)	11.10	4.17	8.00	18.00	9.60	3.20	8.00	16.00
Fertilizer (kg)	124.92	72.36	50.00	550.00	93.1	24.10	50.00	150.00
Labour (ha)	41.88	1.18	20.10	109.50	31.10	13.80	16.30	104.40
Agrochemical (litres)	2.29	0.93	1.00	7.00	1.70	0.70	1.00	3.00
Age (years)	46.98	11.38	25.00	58.00	47.9	8.40	30.00	63.00
Years spent in school	7.68	4.44	0.00	16.00	5.3	4.70	0.00	13.00
Farming experience (yrs)	25.16	12.78	6.00	50.00	19.7	9.50	7.00	50.00
Household size	4.36	1.76	2.00	9.00	4.9	1.70	2.00	9.00

S.D = Standard Deviation, MIN = Minimum, MAX = Maximum

TABLE 4
Estimated Double-log production function (lead equation)

Variables	MEN		WOMEN	
	Regression coefficients	t-values	Regression coefficients	t-values
Constant	-4735.02	-1.975*	-2468.352	-3.121***
Farm size (X_1)	308.42	2.798***	-74.416	-0.955[N.S]
Seed(X_2)	176.45	2.357**	281.460	2.099**
Fertilizer (X_3)	102.49	2.348**	330.735	2.249**
Labour (X_4)	216.71	0.630[N.S]	235.849	1.990*
Agrochemical (X_5)	-375.26	-0.917[N.S]	182.981	2.144**
R^2	0.549		0.571	
F-ratio	2.918***		3.274***	

*** = Significant at 1% level of probability, ** = Significant at 5% level of probability
* = Significant at 10% level of probability and NS: Not significant.

The production function that was used to determined the nature of input –output relationship in maize production is shown in the table 4 (double-log production function as the lead equations). The values of coefficients of determination (R^2) for men and women were 0.549 and 0.571 indicating that 54.90% and 57.10% variation in the outputs of men and women maize farmers respectively were explained by the inputs indicated in the regression model (Table 4). The F-ratio for men was 2.918 and significant at 1% level of probability while that of women was 3.274 and significant at 1% level of probability, implying that the variables

significantly explained variations in the gross output. The table also shows that farm size (X_1), seed(X_2), fertilizer (X_3) were significant in men farmers regression model while seed (X_2) fertilizer (X_3), labour (X_4) and agro-chemicals (X_5) were significant in their women counterpart.

Allocative Efficiency: The efficiency indicator in Table 5 revealed that all the significant variables in the regression models for both male and female farmers were under-utilized. Efficiency and productivity could be improved if the farmers use more of these resources.

TABLE 5
Estimated efficiency ratio

VARIABLES	MEN			WOMEN		
	MVP	MFC	r	MVP	MFC	r
Farm size	281744	7500	37.56			
Seed	16554	110	150.49	17192	110	156.29
Fertilizer	8544	110	77.67	2083	110	18.94
Labour				4447	350	12.71
Agrochemical				63117	950	66.44

NA= Not Applicable (i.e. the variables are not significant)

Elasticity of production inputs and returns to scale: Findings in Table 6 showed that the estimated elasticity of land was positive which implies that the use and allocation of land by male farmers was in the stage of economic relevance of the production function (that is stage 1). However, the estimated elasticity of land for women farmers was negative, indicating over-utilization and in stage III. The summation of the elasticities of 428.84 and 956.61 for men and women respectively obtained showed an increasing return to scale and that maize production was in stage I of the production region in the study area.

TABLE 6
Elasticity of production resources and return to scale for men and women maize farmers in the study area.

Input	MEN Elasticity	WOMEN Elasticity
Farm size	308.45	-74.42
Seed	176.45	281.46
Fertilizer	102.49	330.735
Labour	216.71	235.85
Agrochemical	-375.26	182.98
Return to scale	**428.84**	**956.61**

CONCLUSION AND RECOMMENDATIONS

This study examined allocative efficiency of men and women maize farmers in Kogi State, Nigeria. The profitability analysis revealed that women farmers were more profitable in maize production than their male counterpart. The study also showed that farm size (X_1), seed(X_2), fertilizer (X_3) were significant in male farmers' regression model while seed (X_2) fertilizer (X_3), labour (X_4) and agro-chemicals (X_5) were significant in their women counterpart. The study also revealed that all the significant variables in the regression models for both male and female farmers were under-utilized. The return to scale values showed that that maize production was in stage I of the production region in the study area.

It is recommended that the present level of allocative efficiency of maize production in the study area should be increased by using more of these productive resources. Farmers should also be encouraged to take into the advice of the adequately trained extension advisers on improved techniques of maize production such that there will be increase in yield per hectare.

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Perceived Effectiveness of Conflict Resolution Methods for improved Farmer-Pastoralist Relationship in Chikun Local Government Area of Kaduna State, Nigeria.

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ABSTRACT

This study investigated the effectiveness the conflict resolution methods to improve farmer-pastoralist relationship in Chikun Local Government Area of Kaduna State, Nigeria. Purposive sampling technique was used to select 5 villages that were prone to farmer-pastoralist conflicts. Random sampling technique was used to select 75 farmers and 75 pastoralists from the sampled villages to give a sample size of 150 respondents. Primary data were collected using Interview Schedule. Crops damage (100%) and competition for land/water (96.7%) were the predominant factors causing farmer-herder conflict in the study area. The various conflict resolution methods include intervention of traditional leaders, payment of compensation to affected persons, dialogue, court judgment, establishment of grazing routes and Miyetti Allah breeders' association intervention. Intervention by traditional leaders (52.7%) and payment of compensations (44.7%) were perceived very effective. Age, education and experience of the respondents had significant relationships with the perceived effectiveness of farmer-pastoralist conflict resolution methods. It is recommended that the local institutions and judiciary should be strengthened especially, the political empowerment of local leaders.

INTRODUCTION

Agriculture and pastoral-related conflicts have been a recurring experience for several years in many parts of Nigeria, including Kaduna State. The conflicts often occur between farmers and herdsmen because of competitive access to land and water resources. Limited availability of farm land, population growth and climate change pose a great challenge to agriculture and possibly contribute to the conflict between pastoralists and farmers as they struggled to have access to or control over these resources. Scarcity of renewable resources such as farmland, forests and water can produce socio-economic effects which can lead to conflict and instability. Both growth in population and increasing commodity production have led to the expansion of agriculture on formerly shared grazing lands thereby increasing farmer-pastoralist conflicts (Franklin, 2000). The movement of pastoralists from one area of the country to another is usually caused by the increasing demand for fresh grazing grounds especially during draught period, when the pastoralists move south wards because of the availability of pasture. In most cases, the pastoralists did encounter problems with the local people because farmers' crops were being destroyed by their cattle.

Although, farmer-pastoralist conflicts across West Africa manifest themselves as competition over natural resources, the underlying variables may not be about resource scarcity alone. There were also cases of environmental degradation and criminal activities by some pastoralists. Hussein, *et al.* (2000) stated that relations and conflicts between farmers and herders were diverse and complex than is generally assumed. Also, scholars in the field of environmental security observed casual links between environmental scarcity and violence (Beeler 2006; Homer-Dixon, 2000). Conversely, the political ecologists like Peluso and Watts (2001) viewed the environment as a "theater in which conflicts or claims over property, assets, labour and the politics of recognition play themselves out".

Efforts in preventing herder- farmer conflicts in Nigeria must address all factors that are likely to engender conflicts between these groups. A number of factors have been identified as sources of conflicts between farmers and pastoralists. Scarcity of land and competition has been recognized as one of the main causes of conflict

(Bassett and Crummey, 2003). Also included are clash of economic interest (Turner,2003), crop damage and harassment of women as reported by Ofuoku, (2002) that the Fulani herders had several times harassed women on their farms, especially when such farms are close to their grazing areas. Other factors include blockage of water points, contamination of streams and cattle rustling. Cases of cattle theft and the slaughtering of strayed cattle by miscreants or rustlers has continued to generate problems between farmers and pastoralists as the nomadic herders did not always think about the value of damaged crops but their cattle (Mkutu, 2004). According to Diallo,(2001), contamination of the stream is regarded as a source of conflict because it is usually the source of domestic water supply for most rural farming communities. The community members believe that the contamination can lead to water related diseases such as cholera, liver fluke and typhoid fever. Tonah,(2006) also reported that the use of residual plains of the various rivers by farmers for dry season farming and the utilization of the plains for fish pond construction by small scale fish farmers has consistently been depriving the herders of dry season pastures and made it difficult for livestock to have access to water. A critical look at the pastoralist and crop farmers has revealed that in addition to competition for land, the competition for resource that are essential for sustainable development of herders and farmers production system are also contributing factors. Many methods have been evolved to resolve these conflicts in all its ramifications. However, there is the need to assess the effectiveness of each of these conflict resolution methods so that acceptable strategies by both parties could be worked out.

OBJECTIVES

The broad objective of the study was to determine the effectiveness of conflict resolution methods for improved farmer-pastoralist relationship in Chikun Local Government Area of Kaduna State, Nigeria.
The specific objectives were to;
i. describe the socio-economic and demographic characteristics of the farmers and herders in the study area,
ii. identify the various factors responsible for farmer-pastoralist conflicts,
iii. ascertain frequency of occurrence of conflicts over the last two years and the extent of losses suffered by the respondents and

iv. determine the effectiveness of the adopted conflict resolution methods for improved relationships between farmers and pastoralists in the study area.

METHODOLOGY

Kaduna State is in the Northwest of Nigeria, created on May, 1976 and has 23 Local Government Areas (LGAs) including Chikun LGA. Chikun LGA has a population size of 368, 250 (FGN, 2006) with its headquarters in Kujama. The sampling technique include purposive selection of 5 villages that are prone to farmer-pastoralist conflicts in Chikun LGA. Random sampling technique was used to select 75 farmers and 75 pastoralists from the sampled villages to give a sample size of 150 respondents. The primary source of data includes use of Interview Schedule. The Instrument for data collection was validated and subjected to reliability test using test re-test method (r = 0.83).

Measurement of variables

Age and experience were measured in actual years, while education was based on years of schooling. Frequency of occurrence of farmer-pastoralist conflict was measured on the basis of total number of times that the respondent witnessed or actively involved over the last two years. Perceived effectiveness of identified conflict resolution methods was measured on 3-point Likert rating scale and scored as 2 for Very Effective, 1 for Effective and 0 for Not Effective for each of the eight identified methods. The maximum and minimum scores are 16 and 0 respectively. The effectiveness scores were subsequently categorized as low for between 0 -5, high for 6-10 and very high for 11-16.

Data analysis

Data collected were analyzed using descriptive statistics (frequency, percentages and mean) and Inferential Statistics (Chi- Square and Analysis of Variance, ANOVA) at 5% significance level

RESULTS AND DISCUSSION
Socio-economic and demographic characteristics of the respondents

The variables considered include age, gender, marital status, educational attainment, years of farming / herding experience and membership of associations). Findings in Table 1 show that respondents were mostly males (84.7%) and majority of them were between 21 and 50 years of

age (84.6%). Also, 71.3% sampled respondents were married while about 51% did not have formal education. However, majority of them (85.0%) had not less than six years of farming / herding experience.

Membership of associations

Local associations play an important role in conflict resolutions as identified in this study. Table 2 shows the distribution of the respondents in the existing local associations. More than half of the respondents (66.0%) did not belong to any associations. This may pose a serious challenge in the use associations in resolving farmer-pastoralist conflicts among majority.

TABLE 1
Socio-economic and demographic characteristics of respondents

Variable	Frequency	Percentage
Gender		
Male	127	84.7
Female	23	15.3
Age (Years)		
Less than 21	4	2.7
21-30	41	27.3
31-40	48	32.0
41-50	38	25.3
Above 50	19	12.7
Education		
Primary	12	8.0
Secondary	49	32.7
Tertiary	13	8.7
No formal education	76	50.6
Farming / Pastoral experience (Years)		
Less than 6	22	14.7
6-10	21	14.0
11-15	24	16.0
16-20	21	14.0
Above 20	62	41.3

TABLE 2
Membership of associations

Membership	Frequency	Percentage
Local Community Farmers Association	19	12.7
Miyetti Allah Cattle Association	29	19.3
Community Development Association	3	2.0
Not a member	99	66.0
Total	150	100.0

Factors responsible for farmer-pastoralist conflicts
The various causes of farmer-pastoralist conflicts in the study area are presented in Table 3.

TABLE 3
Major factors causing conflicts

Factors	Frequency	Percentage
Crop damage	150	100.0
Competition for land / Water	145	96.7
Land encroachment	47	31.3
Stealing of crops	45	30.0
Ethnic rivalry	38	25.3
Disregard to traditional authority	14	9,3
Stealing of cattle	2	1.3
Indiscriminate defecation on land / Water pollution	1	0.7

Crops damage (100%) and competition for land/water (96.7%) were the predominant factors causing farmer-herder conflict in the study area. During periods of cropping, pastoralists move through farmlands to grazing areas and as such, crops are prone to trampling by cattle. Also, before harvesting, cattle may feed on crops as they are being led from grazing areas to settlement areas. Other factors as accounted for by respondents include land encroachment (31.3%), theft of harvested crops (30.0%) and ethnic rivalry (25.3%).

Frequency of occurrence of conflicts and the extent of losses suffered over the last two years

The frequency of occurrence was based on being an eye witness and active involvement of the respondents, while losses were based on cash and estimated monetary values of properties lost including animals and crops. According to findings in Table 4, almost two-thirds of the respondents witnessed the conflict once (59.3%), while others witnessed the scenarios between two to four times over the last two years. Also, between 4 and 26.7 percent of the respondents were physically involved in the conflicts at least once over the same period. These farmer-pastoralist conflicts were not without losses in cash and or kinds but the study presented the losses suffered by the respondents based on estimated monetary values as shown in Table 4. More than half of the respondents lost more than N50, 000 at least, during any of the conflicts. The mean lost was put at N58, 280 per person over the last two years.

TABLE 4
Frequency of conflict and loss suffered over the last two years

Variable	Personal Witness		Active Involvement		No response	
Occurrence	Freq. (%)		Freq. (%)		Freq. (%)	Total
Once	89	(59.3)	40	(26.7)	21 (14.0)	150
Twice	24	(16.3)	27	(18.0)	99 (66.0)	150
Thrice	3	(2.0)	13	(8.7)	134 (89.3)	150
Four Times	1	(0.7)	6	(4.0)	143 (95.3)	150
Loss suffered (N)	**Frequency**		**Percentage**			
Less than 50,000:00	72		48.0			
50, 001 – 100,000:00	56		37.3			
100, 001 – 150,000:00	14		9.3			
150,001 – 200,000: 00	5		3.4			
Above 200,000:00	3		2.0			
Total	150		100.0			

* Mean loss = N58,520:00

Perceived Effectiveness of farmer-pastoralist conflict resolution methods adopted

A total of eight farmer-pastoralist conflicts resolution methods were identified in the study area but their perceived effectiveness varied considerably based on the respondents' perception of the compliance levels. The various conflict resolution methods include intervention of traditional leaders, payment of compensation to affected persons, dialogue, court judgment, establishment of grazing routes and Miyetti Allah breeders' association intervention. Others were local community crop farmers / herders association and farmers and herders education by person or bodies responsible for conflict resolution. Table 5 revealed that intervention by traditional leaders (52.7%) , payment of compensations (44.7%) and court verdicts (28.0%) were adjudged to be very effective by the sampled respondents. Only few of the respondents considered dialogue (18.7%) and interventions of Myetti Allah Breeders' Association (7.3%) very effective. Diallo,(2001) reported that herders would pay up if they were responsible for the damage and the farmers demand were reasonable, but not otherwise. If the parties could not reach a consensus, one of them, often the farmer usually solicit the interventions of local chiefs, local council, gendarmes or the court.

TABLE 5
Perceived effectiveness of conflict resolution strategies

Adopted strategy	Not Effective Freq. (%)	Effective Freq. (%)	Very Effective Freq. (%)	No response Freq. (%)	Total
1.Intervention by traditional leaders	20 (13.3)	51 (34.0)	79 (52.7)	-	150
2.Payment of compensation to victims	17 (11.3)	66 (44.0)	67 (44.7)	-	150
3. Court verdicts	7 (4.7)	61 (40.7)	42 (28.0)	40 (26.7)	150
4.Dialogue between parties involved	52 (34.7)	70 (46.7)	28 (18.7)	-	150
5.Intervention of Myetti Allah Cattle Association	-	26 (17.3)	11 (7.3)	113 (75.3)	150
6.Local community crop farmers / herders intervention	4 (2.7)	21 (14.0)	-	125 (83.3)	150
7.Establishment of grazing routes	15 (10.0)	14 (9.3)	2 (1.3)	119 (79.3)	150
8.Educating farmers and herders by person or bodies responsible for conflict resolution	15 (10.0)	14 (9.3)	2 (1.3)	119 (79.3)	150

Relationship between respondent's socio-economic characteristics (age, education and experience) and perceived effectiveness of conflict resolution methods.

Chi- Square results in Table 6 show significant relationships between the selected socio- economic characteristics and perceived effectiveness of farmer-pastoralist conflict resolution methods at 5% significant level. Results show that age, education and experience had significant relationships with the perceived effectiveness of conflict resolution methods. These imply that the higher the age, education and experience of the respondents, the higher the perceived effectiveness of the conflict resolution methods adopted in the study area.

TABLE 6
Chi- Square Results

Variable	X^2 value	df	P value	Decision
Age	27.46	8	$P<0.05$	Significant
Education	42.10	6	$P<0.05$	Significant
Experience	35.47	8	$P<0.05$	Significant

CONCLUSIONS

It can be concluded that damage to farmers' crops and competition for land and water were mostly responsible for farmer- herder conflicts. Also, intervention by local leaders and payment of compensation were considered very effective in resolving conflicts between the groups. It is recommended that the local institutions and judiciary should be strengthened especially, the political empowerment of local leaders. Also, payments of compensations to affected victims should be improved upon by the stakeholders.

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Storage of Sweet Potato Toasted Granules and Shelf Life Under Ambient Condition

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ABSTRACT

The highly perishable nature of sweet potato tubers has caused severe limitations to the commercial exploitation of the crop. Processing involves peeling, grating, fermentation, dewatering and toasting, resulting in a granular product. It is a shelf stable food consumed as processed or cooked. When kept, it is subject to post-process contamination. Investigations were carried out to establish the storability of processed sweet potato toasted granules under ambient condition over a period of 1 month, 1 year, 6years and 7 years. The processed sweet potato toasted granules were packed in sealed cellophanes and kept under ambient condition. Only the toasted granules that are one month showed low load of bacterial count which could be of public health importance in toxin production. However, those processed and stored up to a year and above did not show any bacterial count which could be as a result of less moisture content. Location and storage at ambient temperature did not mar the qualities of the toasted samples, because the sensory evaluation showed high acceptability (78%) of the product. Estimated shelf-lives of sweet potato toasted granules were determined for nothing less than seven years. Recommendations for its packaging and storage conditions were given. This will lead to more market for sweet potato farmers and for establishment of cottage industry.

Keywords: Sweet potato, toasted, granules, microorganism, ambient temperature, shelf life,

INTRODUCTION

The sweet potato (*Ipomoea batatas*) is a dicotyledonous plant which belongs to the family Convolvulaceae. Amongst the approximately 50 genera and more than 1,000 species of this family, only *I. batatas* is a crop whose large, starchy, sweet tasting tuberous roots are an important root vegetable (Alvarez, 1987; Woolfe, 1992). Sweet potato plays a major role as a famine reserve for many rural and urban households. This is because of its tolerance to drought, short growth period and high yield with limited inputs on relatively marginal soils (Bashaasha *et al*., 1995). Sweet potato tubers are consumed by both human and livestock (Silva, 1990; Onwueme and Sinha, 1991; Otoo *et al*., 2001, Oyeniyi *et al.,2004)*. Sweet potatoes (*Ipomoea batatas*) are about 7th most produced food crop in the world, when compared with wheat, rice, corn, potato, barley, and cassava (FAO, 1990; Meludu, *et al.,* 2003, Meludu and Ayobami, 2005). The reasons that sweet potato is a great crop include that it is

relatively easy to grow, relatively free of pests and diseases, has relatively high productivity, and is food with principally starch, some protein and vitamin C, an excellent source of Vitamin A (especially in orange varieties) and small amount of other Vitamins such as Vitamins B (Ndolo *et al,* 2001) the young leaves are rich in protein.

Its ability to produce in poor soils makes the sweet potato an especially good crop for poor tropical soils where fertilizer is not available (Bashaasha *et al*., 1995). If the leaves are also used as food, sweet potato will probably produce more nutrients per acre than almost any other crop under those conditions (Meludu and Ayobami, 2005). Depending upon variety, sweet potatoes may be ready for harvest after 10 weeks or may require up to 9 months in the field. Majority of the varieties can be harvested after 4½ months in the field. Cool conditions such as found in tropical highlands can often extend the needed growth period of normal varieties to 8-9 months. Meludu and Ayobami, (2005) emphasized that sweet potatoes produce best in a well-aerated soil with

medium texture. In such soils they need not be planted on ridges. Also, they can be produced in heavy soils formed into ridges for drainage and increased aeration. Sweet potatoes are often grown in sandy soils. The requirements for soil fertility are fairly low, moderate nitrogen, low phosphorous and high potassium. Too much nitrogen often results in abundant foliage and low and /or late yields. However, the rate in copious yield could also depend on the variety. It would be difficult to try to describe all the sweet potato varieties that exist or even the best varieties in the world. There are too many even on country bases and they are not freely moved from one place to another. The specific needs of each area, including human preferences, mean that local variety trials and preference tests are always desirable. Some of the varieties found in Nigeria include Kayode, Shaba, Alphonso, GR-3-25, TIS 80/004, department wall, butter and others based on local names (Meludu *et al.*, 2003). The focus of this research is on the storability of the processed sweet potato, which might not depend on the variety.

Harvest and storage

There is no perfect time for the harvest of sweet potato. Early harvest often results in fewer yields, smaller roots, less insect damage, less cracking, milder flavors, and poor storability. Late harvest results in the reverse. Cut away the vines before harvest. These can be fed to animals, composted, or buried (Oyeniyi, *et al.,* 2004). The storage roots can be dug by hand with spades or forks, or by plow, especially a "middle buster". As soon as possible after digging, remove the sweet potatoes from the sun, in boxes, bags, or baskets. Sweet potatoes may have to be cleaned, depending on the soil where produced. A minimum task to perform on the farm is to brush off the soil. After washing, the roots should be drained and dried, but not in the sun. The roots should be sorted for storage. Damaged roots can be used immediately or processed (Meludu *et al*, 2003). Quality roots without blemish can be stored at cool temperatures (minimum 55F, 13C) for 2-8 weeks. Rot of roots in storage is reduced by curing at high (80-90%) humidity and high (90-95 degrees F) temperature for 4-5 days Otoo *et al*., 2001. Cured roots can be stored at the recommended temperature for up to one year. This does not reduce high rate of damages/waste in sweet potato production. It is on this platform that Meludu *et al.*, (2003), Meludu, (2009), Meludu, (2010), processed and recommended for

the processing of sweet potato into toasted granules for different uses.

Principle uses of sweet potatoes

The sweet potato plant can be harvested for leaves during the 2nd and 3rd months of production. Only the tender stem and young not fully developed leaves, which constitute the distal 2-4 inches of the growing stem, should be taken. The sweet potato can then be served as is, mashed, or combined in many dishes (casseroles). The mashed pulp can be used as a partial substitute for wheat flour in baked products such as pancakes, cakes, flat breads, cookies, fritters, or even bread. The entire sweet potato could be wrapped in foil and then baked in an oven one hour at 350 degrees Centigrade. Sweet potato can also be processed into flour for confectionary and home uses in baking (Meludu 2009). Peeled sweet potato can be shredded, and the shreds immersed in water for two hours. This process works better if the water is changed 2-3 times. The shreds are drained and then dried, first in the shade (with air movement or wind) and later in the sun (in some cases, drying over the stove or in an oven will be necessary). The brittle shreds are easily crushed to flour, or this can be done rapidly in a household blender. The flour can be stored for six months or more in sealed containers. Starch can be recovered from sweet potato; the peeled sweet potato is ground in a mill or blender as finely as possible, and mixed with 5-10 times its weight in water. The starch settles out, and the water is carefully poured away. The starch is then mixed with water 1-3 times more and the process is repeated. After the last settling the water is carefully drained and the starch is dried on a metal surface in the sun. It can be used, as is any starch, such as corn starch, and can be stored in sealed containers for a year or more. A breakfast food similar to "cereal" can be made from any sweet potato. The sweet potato is grated (not as finely ground as for starch), suspended in water, and filtered through a cloth. The liquid is saved for starch, the residue is suspended 1-3 times more in water, and filtering is repeated. The portion of the sweet potato that does not pass through the filter is then dried and lightly toasted on a hot plate (over the fire) with carefulness. The toasted product can be stored in sealed containers and eaten with milk without further cooking, or can be used much like starch or flour, imparting its characteristic flavor. Meludu, (2010) described how sweet potato can be toasted into granules and its potential as famine food and dietary supplement for the Diabetics.

Problem focused in the study

Almost 800 million people in the developing countries do not have enough to eat, while another 34 million people in the industrialized countries also suffer from chronic food insecurity (Arcan, 2000). In Nigeria, the food situation had led to a tremendous increase in the prices of food over the years and deterioration in the living conditions of many families. In order to enable consumers have another food to supplement with, as the price of cassava product is getting high, sweet potato diversification and value addition emerged. This technology/technique was developed by some researchers from the Faculty of Agriculture and Forestry, University of Ibadan since 2001 and with an in-depth assessment to other uses of sweet potato through 2006. In this study, the technology was transferred to only two regions in Nigeria- Aguleri in Anambra State and Ogbomosho in Oyo State (Two major sweet potato producing areas in Nigeria). The result determined that 99 percent of the women were not aware that sweet potato could be toasted into granules. Less than half (40%) of the respondents had an idea of the protein and carotene content of sweet potato. Majority (98 percent and 60 percent) of the respondents were aware of the sugar and carbohydrate content of sweet potato. The women were educated on the economic and nutrition importance of sweet potato. The women were recommended and encouraged to process and sensitize other communities not included in the project to cultivate and process sweet potato into toasted granules not only for the fact that the sugar content was reduced but that it was a way of diversification for income generation and sustainable livelihoods. However, the women were skeptical about the storability and shelf life of sweet potato toasted granules especially in the tropics.

MAIN OBJECTIVE OF THE STUDY

The research determined storability and shelf life of sweet potato toasted granules under ambient condition. These will open market for sweet potato and less importation of some other related products.

MATERIALS AND METHODS
Experimental Site for the production of the tubers and processing into toasted granules.

1. The experiment was conducted in an experimental field located at Parry Road, University of Ibadan, Ibadan from April to August 2002. The location is on longitude 3^0 54"E and latitude 7^0 27" N; altitude 250mm above sea level. The total land area was $453m^2$. The bush was cleared manually and land ploughed before ridges made with hoes. Soil Status showed that the land used for the experiment was a level terrain. Soil samples were collected from the farm and analyzed for the physiochemical characteristics. The soil samples were air dried for a week, crushed and sieved with a 2mm sieve and 0.5 mm sieve before taking to the laboratory for analysis. Vines planted were obtained from existing field close to the experimental field. Vines of some other cultivars were obtained from the Department of Agronomy, University of Ibadan. Clones of 12 varieties were planted in all and 30cm long vine was planted per hill, Meludu and Ayobami, (2005).

2. **Processing of the roots**: Processing of sweet potato into toasted granules.

The harvested roots were from the project experiment site in the University of Ibadan

I. On the same day that the sweet potato was harvested, it was washed and peeled.

II. It was Grated/ground after peeling roots and put in an empty rice bag to ferment for about 2-3 days (Optional).

III. Water was pressed out from the bagged pulp. This must be done on the day the pulp will be toasted.

IV. The chaff was sifted out and then toasted little quantity at a time and quickly using a dry toasting pan with a special spatula, until the moisture is completely dried out.

V. After toasting the granules could be sifted again to have a fine texture (Meludu *et al.*, 2003, Meludu 2010).

3. **Packing and Storage:** Locally available packaging methods for long-term storage of processed cassava products roots was adopted for storing sweet potato toasted granules. Storage is very important to keep the produce for a long time. Ensure that the product to be packaged is dried to safe moisture content. The amount of moisture in an agricultural crop or product is the most important factor determining its storability. The moisture content was determined by hand touch and the texture showed significantly dried particles. Allow the product to cool sufficiently before packing it. Latent heat that is not released will later condense inside the sealed container, resulting in bacteria growth and insect development. The toasted granules was packed

into smaller packages (in quantities of 250g), in thick polythene bags and was sealed for different duration (6 month to 7 years). It is important to note that no preservative or fumigant was used in keeping the product.

DATA ANALYSIS

The samples were taken to the department of microbiology, University of Ibadan for analysis. The samples include the sealed toasted granule processed in 2002, 2003, 2008 and 2009. They were of the same sweet potato variety. The samples were submitted for analysis in June and were analyzed in July 2009.

An informal sensory evaluation was conducted to determine sweet potato toasted granule acceptability after storage under ambient condition for period of seven years. The sensory evaluation was done on the purposively 60 randomly selected sweet potato marketing rural women in Otuocha market Aguleri local government in Anambra State. The reason being that Otuocha market is the main major whole market where sweet potato roots are sold.

Limitation of the study: The amount of moisture in a sample of produce which does not decompose when the produce is heated can be determined by weighing some of the ground produce and then drying it in a forced draft air oven at a given temperature for a predetermined length of time. The drop in the weight of the produce is measured according to its initial weight (wet basis). However, this product did not follow this procedure because of lack of this special weighing equipment at the point of storage but that did not affect the storability and shelf life. Also the temperature of the storage compartment was not determined.

RESULTS AND DISCUSSION

TABLE 1
Microbial count analysis of the sweet potato toasted granules

Sample code	Sample title	Date of processing	Total bacteria count cfu/g	Total fungal count	Remark
A	Local variety	October 2003	Non-growth	Non-growth	
B		July 2008	Non-growth	Non-growth	
C		June 2009	35	Non-growth	*B. cereus, B subtolis*
D		October 2002	Non-growth	Non-growth	

Table 1 shows the total viable counts and average total viable counts of the bacteria in samples of sweet potato toasted granules over the periods of one month, one year, six years and seven years. The result in table 1 also shows that older samples did not show growth of any microorganism, which demonstrates good processing, packaging and storage. This also, excludes any moisture content of the toasted granules and the product was well dried before packaging. It is also important that moisture content could lead to growth of microorganisms. This is probably the reason why the fresh sample just under one month could contain 35cfu/g of bacteria, specifically the *B. cereus* and *B subtolis*. Even though, the count is still tolerable by human, however, the presence of *B. cereus* could be of public health concern in toxin production. Therefore, samples A, B and C are very suitable for human consumption. Which means that sweet potato toasted granule could be stable in packing and storage under ambient condition. Storage of sweet potato at ambient temperature did not mar the qualities of the toasted samples therefore, estimated shelf-lives of sweet potato toasted granules is nothing less than seven years.
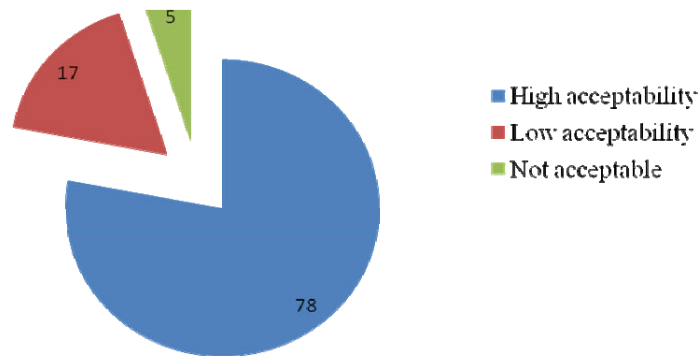
Figure 1: Sensory evalution of sweet potato toasted granules stored under ambient condition for seven years

However, an informal sensory evaluation was conducted to determine sweet potato toasted granules acceptability after storage under ambient condition for period of seven years. The result in figure 1 shows that majority (78 %) of the respondents accepted the taste of the sweet potato toasted granules, while few (17%) of the respondents showed low acceptability and only minority (7 %) did not accept the taste. This means that storage of sweet potato at ambient temperature did not tarnish the taste qualities of the toasted samples, an evidence of high economic value. At this point it has become evident that sweet potato toasted granules has high competitive characteristic as food. This agrees with the initial percentage of the rate of acceptability when it was original processed (Meludu *et. al.,* 2003). It was also observed that the colour, texture and odor of the stored toasted granules did not change

CONCLUSION

Storage of sweet potato at ambient temperature did not mar the qualities of the toasted samples, because the sensory evaluation showed high acceptability of the product. It is important to note that no preservative or fumigant was used in keeping the product. Estimated shelf-lives of sweet potato toasted granules are nothing less than seven years. This will lead to more market for sweet potato farmers and for establishment of cottage industry. It is recommended that if the moisture content of toasted granule is not sufficiently low it cannot store for a long time. So if the product is intended for long-term storage, it must be well toasted to exclude moisture and then sealed in polythene to provide better conditions. These will open market for sweet potato roots and less importation of some other related products and the establishment of sweet potato toasted granules cottage industry in Nigeria.

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