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# Adoption of community-based agricultural development project technologies among smallholder farmers in Kwara State, Nigeria

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## Abstract

The study described socio-economic characteristics of the beneficiaries of the Community Based Agricultural and Rural Development Project (CBARDP), profiled the agricultural technologies disseminated and adopted. The study was carried out in Kwara State, Nigeria among smallholder farmers. A multi-stage sampling procedure was employed to select respondents who participated in CBARDP in Local Government Areas (LGAs). At the first stage, one participating LGA was purposively selected from each of the agricultural zones, making a total of nine LGAs. At the second stage, three rural communities were randomly selected from each of the selected LGAs while the final stage involved a simple random selection of ten participating farmers from the selected rural communities making a total of 270 respondents. Data collected were described with the frequency counts, percentages, means and standard deviations whereas Chi-square and correlation analyses were used for inferential purposes. The results showed that the mean age of farmers was 52.1 ± 6 years, majority (92.2% and 74.1%) were married and male, respectively. The overall results indicated a moderate level of adoption of CBARDP technologies but high adoption in orchard, fishery, poultry and cattle packages while the respondents had low adoption in livestock, processing, crop production and agro-processing packages. The results showed that significant associations existed between sex ($\chi^2 = 23.934$), marital status ($\chi^2 = 34.66$), membership of social organisation ($\chi^2 = 23.43$), compatibility ($\chi^2 = 362.88$, relative advantage ($\chi^2 = 211.69$) and adoption of CBARDP technologies whereas there were significant relationship between household size ($r = 0.201$), farm size ($r = 0.537$), years of experience ($r = -0.375$) and farmers' adoption of CBARDP technologies. The study concluded that adoption of CBARDP technologies was moderate among beneficiaries in the study area. It is therefore recommended that more awareness should be created by relevant stakeholders to encourage especially more women to actively participate in similar projects in the future.

**Keywords:** adoption level; assessment; awareness; beneficiaries; dissemination; socio-economics, technology characteristics

## INTRODUCTION

Agriculture and rural development are crucial to the Nigerian economy because rural areas are centres for agricultural development. About 45% of national GDP is generated from agriculture and almost 70% of the poor live in rural areas and derive their livelihoods primarily from small scale agriculture and rural activities (NBS, 2009). Small scale farmers account for 90% of national food production. Limited accessibility to inputs, equipment, extension services and markets in addition to climate change and price volatility have kept agricultural productivity low in the country (IFAD, 2010).

According to Doss (2006), one way of improving agricultural production and rural livelihood in general is through the introduction of improved agricultural technologies to farmers. Idrisa (2009) reported that the adoption of improved technologies is an important means of increasing the productivity of small holder farmers in Africa, thereby fostering economic growth and improved well-being for millions of the poor households. It is against these existing backgrounds that community-based agriculture and rural development project was set up to provide a policy, institutional and financing framework for demand driven development and has activities related to agriculture and rural infrastructure as well as capacity building (ADF, 2006). According to World Bank description (2012), development objective of the community-based agriculture and rural development project was to improve the living conditions of village communities

in terms of sustainable income increase, access to basic socio-economic services and improved natural resources management practices. The project was expected to achieve this objective through capacity building and investments in economic, social and environmental sub-projects, implemented by these communities. The AfDB-CBARDP was implemented in five states, namely: Adamawa, Bauchi, Gombe, Kaduna and Kwara (KWADP. 2013).

Since inception of AfDB-CBARDP in 2005, different agricultural technologies were introduced and disseminated under eight enterprises such as crop, livestock, poultry, processing, cattle rearing, among others, to the farmers. Amongst the technologies introduced were goat, ram/sheep, pig upgrade, also fattening of goat, ram/sheep and local pigs under livestock while technologies like extra-early maize, cassava and yam varieties with their agronomic practices were introduced under crop enterprise. Other CBARDP packages introduced include artificial insemination, pregnant cow housing and feed ration, value addition on cassava and maize, introduction of agro-processing machines were also disseminated to the farmers. It is in this light that this study sought to assess adoption of the technologies disseminated by AfDB-CBARDP to smallholder farmers that participated in the programme in Kwara State, Nigeria. The study assessed the adoption of the CBARDP-introduced agricultural technologies among smallholder farmers in Kwara State. Specifically, the study:

i) described the socio-economic characteristics of the respondents; and
ii) determined the level of adoption of the agricultural technologies disseminated by CBARDP

Two hypotheses set in a null form were tested in this study at the 0.05 level of significance. They are as follows:

i) There is no significant relationship between the adoption of CBARDP technologies and socio-economic characteristics of farmers; and
ii) There is no significant relationship between technology characteristics and adoption of CBARDP technologies in the study area.

## MATERIALS AND METHODS

The study was carried out between February and August 2017 in Kwara State, Nigeria. Correlational survey research design was adopted for the study. Kwara State has 16 Local Government Areas (LGAs) with four Agricultural Development Programme (ADP) agricultural zones, namely: zone A which has Baruteen and Kaima LGAs; zone B consist of Edu and Patigi LGAs; zone C consist of Asa, Ilorin East, Ilorin South, Ilorin West and Moro LGAs while zone D has Ekiti, Ifelodun, Offa, Oyun, Isin and Oke-Ero LGAs. Multistage sampling procedure was used to select respondents from the nine participating LGAs within the four ADP agricultural zones in the State. The participating LGAs in each zone are Baruteen and Kaima LGAs from zone A, Edu and Patigi LGAs from zone B, Moro LGA from zone C, and Ekiti, Ifelodun, Oyun and Is in LGAs from zone D. At the first stage, one LGA participating in CBARDP was purposively selected from each of the ADP agricultural zones; these are Kaima, Edu, Moro and Ifelodun LGAs from zone A, B, C, and D, respectively. At the second stage, three rural communities were randomly selected from each of the selected LGAs. These communities are Adena, Bani and Gwaria from Kaima LGA; Tsonga, Tsaragi and Bacita from Edu LGA; Lanwa, Bode Saadu and Okutala from Moro LGA while Idofin, Iba and Ekoende were from Ifelodun LGA. The final stage involved simple random selection of ten participating farmers from the selected rural communities, and a total of 270 respondents were selected and interviewed for the study. The dependent variable of the study is adoption of CBARDP technologies disseminated among the farmers. This was operationalised by using adoption index of respondents calculated from CBARDP technologies disseminated to the farmers. In developing the adoption score, respondents were asked to indicate their stages on five of adoption process for the various agricultural technologies as developed by Rogers (1995) and used by Agwu (2000) and Mbanaso et al. (2012) which in this study were modified into four stages. The response categories and the corresponding weighted values were as follows: "heard about with few details" scored one point, "heard and being taught with full details" scored two points, "tried out and decided to use" scored three points and "adopted and still using on my farm" scored four points. Total adoption score for each farmer was calculated by adding up the adoption scores for the various technologies. The total scores of all the respondents were calculated as adoption score. The values were added (4 + 3 + 2 + 1) to obtain a value of 10 which was divided by 4 to get a benchmark of 2.5. Variables with mean score $\geq 2.5$ were regarded as technologies that were adopted whereas variables with mean score $< 2.5$ was regarded as technologies that were not adopted. It could be observed that the 2.5 is between respondent who heard about the technologies and those that tried the technologies and adopted.

## RESULTS AND DISCUSSION

### Socio-economic characteristics of respondents

Results in Table 1 show that the mean age of the farmers was $52.1 \pm 6.9$ years, implying that majority of the farmers are getting old which could have a negative implication on adoption of these technologies because

**Table 1.** Distribution of respondents based on their socio-economic characteristics (n = 270)

| Variables | Frequency | % | Mean | S.D. |
|---|---|---|---|---|
| **Age** | | | | |
| ≤ 35.00 | 3 | 1.1 | | |
| 36.00–50.00 | 122 | 45.2 | 52.1 | 6.93 |
| 51.00–65 | 135 | 50 | | |
| ≥66.00 | 10 | 3.7 | | |
| **Sex** | | | | |
| Male | 200 | 74.1 | | |
| Female | 70 | 25.9 | | |
| **Marital status** | | | | |
| Single | 3 | 1.1 | | |
| Married | 249 | 92.2 | | |
| Divorce/separated | 7 | 2.6 | | |
| Widow/widower | 11 | 4.1 | | |
| **Types of farming enterprises** | | | | |
| Fishery | 56 | 20.7 | | |
| Poultry | 32 | 11.8 | | |
| Crop | 59 | 21.9 | | |
| Livestock | 69 | 25.6 | | |
| Others | 54 | 20.0 | | |
| **Membership of social organisation** | | | | |
| Member | 261 | 96.7 | | |
| Not a member | 9 | 3.3 | | |
| **Educational level** | | | | |
| No formal education | 79 | 29.3 | | |
| Adult education | 55 | 20.5 | | |
| Primary education | 94 | 34.8 | | |
| Secondary education | 28 | 10.4 | | |
| Tertiary education | 14 | 5.2 | | |
| **Farm size (Ha)** | | | | |
| ≤2.00 | 225 | 83.3 | | |
| 2.10–4.00 | 33 | 12.2 | 1.4 | 0.9 |
| ≥4.1 | 12 | 4.5 | | |
| **Years of experience** | | | | |
| <15 | 78 | 28.9 | | |
| 16–30 | 78 | 28.9 | 26.4 | 12.8 |
| 31–45 | 104 | 38.5 | | |
| 46 | 10 | 3.7 | | |
| **Information channel**** | | | | |
| Public awareness/sensitisation | 172 | 61.7 | | |
| Radio/television | 215 | 79.6 | | |
| Poster and handbills | 138 | 51.1 | | |
| Capacity building lecture | 72 | 26.7 | | |
| Advisory service workshop | 187 | 69.3 | | |
| Individual contact with facilitators | 40 | 14.3 | | |

in most cases older farmers are not willing to try new technologies as they are afraid of risk. The majority (74.1%) of the CBARDP farmers were male, indicating male famers have hijacked the programme from women who were the original focus of the programme probably because of prevailing culture and norms of the people in the study area restricting women. Also, the majority (92.2%) were married; married people are expected to be responsible because their spouses and children depend on them. Marital status has implication for adoption of agricultural innovations and technologies as supported by the findings of Idrisa (2009) and Mohammad (2014) who reported that married people have more responsibilities and hence enter any enterprise with higher levels of seriousness. This makes them frequently seek information about improved agricultural innovations/technologies so as to enhance the welfare of their families. About 29.0% of the respondents had no formal education, whereas others (70.8%) had one form of education ranging from adult education to tertiary education. This implies that the majority of the respondents were literate, which could assist them to be more enlightened in adopting innovations than illiterates. This result, however, is in tandem with the assertions of Jibowo (2000) and Brunello (2004) that education and training improves the skill, attitude and knowledge of an individual thus sharpening their ability to comprehend and apply innovations with ease. Therefore, since the majority of the respondents were educated, it is expected that they would adopt and utilise more agricultural technologies than those who had no formal education. About 96.7% of the farmers belonged to one agricultural group or the other. Since the majority of the respondents belonged to an agricultural organisation, they are likely to be exposed to discussions on new ideas, technologies or innovations related to agriculture that could improve their economic status and standard of living. This is advantageous to farming according to Agwu (2000) who documented that farmers' social organisations offer an effective channel for extension contact with large numbers of farmers, as well as opportunities for participatory interaction with extension organisations. This is consistent with the findings of Mbanaso et al. (2012) who reported that the majority of farmers belong to social organisations. This would enhance farmers' uptake of new agricultural practices. The mean years of experience of the respondents in farming is 26.4 ± 12.6 years. This implies that the farmers had enough experience and good knowledge of farming. These characteristics may affect the farmers in their willingness to adopt CBARDP technologies; this is because experience in agricultural activities is very important as it influences adoption of farming technologies. This submission was supported by Idrisa et al. (2014) who reported that experience depicts a good signal for adoption since experience helps to convince the farmer of the importance of innovations. Results also show that the mean farm size of the respondents was 1.4 ± 0.9 hectares. This confirms that majority of the respondents were smallholder farmers.

The results further show that respondents mostly received training/information on the projects through radio and television (79.6%), followed by attending advisory service training and workshop (69.3%), public awareness/sensitisation campaign (63.7%) in that order. The results indicate that most of the respondents had multiple training channels with electronic media ranking highest among the other channels. The implication of this is that when farmers have a multiple training channel, there is a possibility of having more understanding and knowledge of the technology, thereby influencing their decision to adopt (Adebo and Adesoji, 2010).

**Adoption level of the agricultural technologies disseminated by CBARDP**

The results in Tables 2 and 3 show the adoption level of technologies introduced to farmers in the study area. The results show that overall level of adoption of farmers in CBARDP technologies is moderate with adoption scores of technologies ranging between 0.11 and 10.00 and grand mean score of 4.46. However, the results show that the respondents had better adoption in orchard technology packages (mean = 8.38), poultry technology package (mean = 7.74), cattle technology package (mean = 6.40) and fishery technology packages (mean = 4.98) when the mean score of each of the technologies was compared with the grand mean score of all the introduced CBARDP technologies. This could be attributed to high level of farmers' awareness of the mentioned technologies disseminated to the farmers. It is known that awareness precedes adoption of a particular technology. Awareness of agricultural technology is very important since it stimulate farmers' interest in the innovations. This finding conforms to the report of Abubakar et al. (2009) who reported that creating awareness on new technologies in agriculture to rural farmers remains a promising strategy for increasing agricultural production. However, respondents had a low level of adoption in processing enterprises (mean = 4.00), crop enterprises (mean = 3.87), agro-processing machine enterprises (mean = 2.97) and livestock enterprises (mean = 2.39). Specifically, the results in Table 2 show that all the poultry technologies disseminated including poultry upgrade, production and medication were adopted by the farmers with the mean score greater than the cut-off point of 2.50. The results also revealed that the respondents in fishery enterprise adopted all the fishery technologies disseminated to them with the exception of production of fish feed which could be as a result of high complexity and

**Table 2.** Adoption of the agricultural technologies disseminated by CBARDP on poultry, processing, fishery and livestock (n = 270)

| Technologies | Heard about (Freq) | Heard & taught (Freq) | Tried (Freq) | Adopted and using (Freq) | Mean score | Remark |
|---|---|---|---|---|---|---|
| **Poultry (n =32)** | | | | | | |
| Poultry upgrade | 32 | 32 | 31 | 31 | 9.78 | Adopted |
| Poultry production | 32 | 32 | 30 | 30 | 9.56 | Adopted |
| Artificial brooding &hatching using kerosene powered incubator | 27 | 25 | 25 | 25 | 7.88 | Adopted |
| Vaccination of Local fowls | 21 | 20 | 20 | 20 | 6.28 | Adopted |
| Quail Production & Management | 20 | 18 | 18 | 18 | 5.68 | Adopted |
| Medications | 18 | 17 | 17 | 17 | 5.34 | Adopted |
| **Fishery (n = 56)** | | | | | | |
| Improved chorkor technology | 52 | 49 | 49 | 32 | 8.26 | Adopted |
| Management of fish chorkor | 49 | 46 | 46 | 32 | 7.25 | Adopted |
| Management of juveniles into maturity | 42 | 39 | 40 | 28 | 5.79 | Adopted |
| Fish float feeds | 35 | 34 | 34 | 24 | 5.38 | Adopted |
| Management & handling of pellet machine | 22 | 20 | 21 | 20 | 3.67 | Adopted |
| Fish feedstuff ingredients | 10 | 10 | 10 | 9 | 1.68 | Not adopt |
| **Livestock (n = 69)** | | | | | | |
| Ram/sheep upgrade and fattening | 42 | 39 | 39 | 22 | 4.71 | Adopted |
| Goat upgrade and fattening | 24 | 22 | 22 | 22 | 3.22 | Adopted |
| Pig upgrade | 13 | 12 | 11 | 7 | 1.39 | Not adopt |
| Pig fattening | 12 | 11 | 10 | 7 | 1.33 | Not adopt |
| Goat breeding | 12 | 10 | 10 | 7 | 1.30 | Not adopt |
| **Cattle/Artificial Insemination (n = 5)** | | | | | | |
| Management before and after | 5 | 5 | 5 | 4 | 9.20 | Adopted |
| Cattle housing | 3 | 2 | 2 | 3 | 5.00 | Adopted |
| Cattle feed ration | 3 | 2 | 2 | 3 | 5.00 | Adopted |

Overall grand mean score = 4.46, grand mean for poultry = 7.74, grand mean score for fishery = 4.98, grand mean score for livestock = 2.39, grand mean score for cattle = 6.40.
Cut off point ≥2.5 were regarded as adopted, cut off point ≤2.50 were regarded as not adopted.

technicalities involved in its production. Only fattening and upgrading of sheep /ram and goat with mean score 4.71 and 3.22, respectively, were adopted by the farmers in livestock enterprise. This result may be connected to the fact that fattening of rams and goats is associated with celebrations, when farmers make more money.

Results in Table 3 show that all the crop technologies, including fertiliser application technologies were adopted but mother and baby trial of maize as well as the trial of yam were not adopted. It could be discussed that babies were already used to feed containing maize, in form of a pap. This technology might not be new to the respondents. In the case of yam, babies in general do not take yam at a tender age. This might be due to the hard nature of boiled yam and this could lead to non-adoption as observed. Other crop technologies not adopted include: crop production under zero tillage, which might be due to various disadvantages including early pest infestation introduction to basic agronomic practices which might not be new to the farmers; dry season mulching, this might not be applicable to all crops. This is because it is compulsory to mulch late yam when planted. Resupplying of planting materials might not be adopted due to procrastination. Table 3 also shows that all the technology packages under orchard enterprise were adopted. This might be because the technologies were new to the respondents and they saw them as a quick way of making money with less energy and investment. In case of processing technology packages, it was observed that all the technologies involving soy bean were not adopted. This might be due to low awareness in the use of soy bean. However, cassava technologies were adopted, this include the use of improved dryer and frying pan and modern garri processing methods. These are technologies believed to reduce drudgery in processing of cassava. In the case of agro-processing

**Table 3.** Adoption of the agricultural technologies disseminated by CBARDP on crop, orchard, cattle and agro-processing (n = 270)

| Technologies | Heard about (Freq) | Taught (Freq) | Tried (Freq) | Adopted & still using (Freq) | Mean scores | Remarks |
|---|---|---|---|---|---|---|
| **Crop (n = 59)** | | | | | | |
| Fertiliser Application | 55 | 52 | 52 | 15 | 8.31 | Adopted |
| Spacing | 55 | 39 | 37 | 14 | 5.08 | Adopted |
| Extra-early maize variety | 52 | 39 | 26 | 14 | 4.74 | Adopted |
| Improve land preparation for cultivation | 52 | 39 | 26 | 10 | 4.20 | Adopted |
| Herbicide application | 40 | 39 | 26 | 5 | 3.66 | Adopted |
| Pesticide Application | 40 | 37 | 26 | 5 | 3.59 | Adopted |
| Mother & baby trial on cassava | 39 | 20 | 20 | 5 | 2.69 | Adopted |
| Mother &baby trial on maize | 28 | 17 | 16 | 4 | 2.13 | Not adopt |
| Crop production under zero tillage | 20 | 20 | 16 | 4 | 2.06 | Not adopt |
| Introduction to basic agronomic practices | 32 | 19 | 8 | 1 | 1.66 | Not adopt |
| Mother & baby trial on yam | 5 | 2 | 5 | 0 | 0.41 | Not adopt |
| Dry season mulching | 7 | 3 | 3 | 0 | 0.37 | Not adopt |
| Resupplying of Plant material | 1 | 1 | 1 | 0 | 0.11 | Not adopt |
| **Orchard (n = 14)** | | | | | | |
| Maintenance of orchard | 14 | 14 | 14 | 14 | 10.0 | Adopted |
| Oil palm production | 14 | 14 | 14 | 13 | 9.71 | Adopted |
| Banana/Plantain production | 14 | 14 | 14 | 12 | 9.43 | Adopted |
| Orchard seedling distributions | 14 | 14 | 14 | 10 | 8.85 | Adopted |
| Citrus production | 10 | 10 | 10 | 10 | 7.14 | Adopted |
| Cashew production | 10 | 10 | 10 | 10 | 7.14 | Adopted |
| Mango production | 9 | 9 | 9 | 9 | 6.42 | Adopted |
| **Processing (n = 25)** | | | | | | |
| Cassava processing using improved dryer and frying pan | 23 | 23 | 23 | 21 | 8.88 | Adopted |
| Modern garri processing Method | 23 | 21 | 21 | 21 | 8.48 | Adopted |
| Processing of Soy beans into Iru | 7 | 5 | 7 | 6 | 2.48 | Not Adopted |
| Processing of soybeans into cheese | 5 | 4 | 5 | 5 | 1.92 | Not adopt |
| Soybeans fortified meal | 4 | 4 | 4 | 4 | 1.60 | Not adopt |
| Agro-processing machine Rice Harvest, processing &Storage | 2 | 2 | 2 | 2 | 0.60 | Not adopt |
| Rice dehauler | 5 | 5 | 5 | 5 | 5.00 | Adopted |
| Hammer mill | 2 | 2 | 2 | 2 | 2.00 | Not adopt |
| Groundnut decorticator | 2 | 2 | 2 | 1 | 1.60 | Not adopt |
| Shea butter processor | 2 | 2 | 1 | 1 | 1.30 | Not adopt |
| Pellet machine | 2 | 1 | 1 | 1 | 1.10 | Not adopt |
| Maize sheller | 1 | 1 | 1 | 1 | 1.00 | Not adopt |

Overall grand mean score = 4.46, grand mean for crop = 3.87, grand mean score for orchard = 8.38, grand mean score for agro-processing machines = 2.97, grand mean score for processing = 4.00.

**Table 4.** Chi-square analysis showing the relationship between some socio-economic characteristics and adoption of CBARDP technologies disseminated to farmers (n = 270)

| socio-economic characteristics | $\chi^2$ | DF | *P*-value |
|---|---|---|---|
| **Sex** | 23.934** | 2 | 0.000 |
| **Marital status** | 34.666** | 4 | 0.000 |
| **Membership of organization** | 24.429** | 2 | 0.001 |
| **Years joined CBARDP** | 26.122* | 4 | 0.000 |
| **Type of farming enterprise** | 13.594* | 2 | 0.001 |

**Significant at $P \leq 0.01$; * Significant at $P \leq 0.05$

**Table 5.** Correlation analysis between some socio-economic characteristics and adoption of CBARDP technologies (n = 270)

| Variables | Correlation coefficient (r) | Coefficient of determination ($r^2$) | *P*-value |
|---|---|---|---|
| **Household size** | 0.201** | 0.04 | 0.001 |
| **Farm size** | 0.537** | 0.29 | 0.003 |
| **Age** | 0.074 | 0.01 | 0.067 |
| **Years of experience** | –0.375** | 0.14 | 0.003 |

**Significant at $P \leq 0.01$

**Table 6.** Results of the Chi-square analysis showing the relationship between CBARDP-introduced technology characteristics and farmers' adoption (n = 270)

| Variable | $\chi^2$ | D.F | *P*-value | Decision |
|---|---|---|---|---|
| **Compatibility** | 362.883** | 14 | 0.000 | Significant |
| **Relative advantages** | 211.669** | 6 | 0.000 | Significant |
| **Affordability** | 302.230 | 4 | 0.167 | Not significant |
| **Complexity** | 42.101 | 4 | 0.289 | Not significant |

**Significant at $P \leq 0.01$

machine technologies, only rice dehauler machine was adopted. This might be because it will enhance quick production of rice.

## Testing of hypotheses

The first hypothesis tested relationship between selected socio-economic characteristics and adoption of CBARDP technologies among farmers. Results in Table 4 show that there were significant associations between sex ($\chi^2 = 23.934$; $P \leq 0.01$), marital status ($\chi^2 = 34.666$; $P \leq 0.01$), type of farming enterprise ($\chi^2 = 13.594$; $P \leq 0.05$), membership of social organisation ($\chi^2 = 23.429$; $P \leq 0.01$), and adoption of CBARDP technologies disseminated to farmers. This implies that these variables are important to adoption CBARDP technologies disseminated to the farmers in the study area. Further results in Table 5 reveal that household size ($r = 0.201$; $P \leq 0.05$) and farm size ($r = 0.537$; $P \leq 0.05$) had a positive and significant relationship with adoption of CBARDP technologies disseminated to the farmers. The null hypothesis is thus rejected and the alternate accepted, indicating a significant relationship between adoption of technologies and socio-economic characteristics of farmers. Experience in farming had negative but significant relationship with adoption of CBARDP technologies disseminated to the farmers in the study area. This implies that the larger the household size of the respondents, the higher the adoption of CBARDP agricultural technologies, this might be connected to the fact that most of the respondents with large household size would have more responsibilities and more labour assistance from members of their households, thereby high willingness to adopt the technologies. This confirms to the findings of Okoedo-Okojie and Onemolease (2009) and Giroh et al. (2011). Also, the larger the farm-size, the higher the adoption of CBARDP agricultural technologies, this is due to the fact that farmers with large farm size would have enough farm land to experiment with the technologies. This also supports the assertions of Bamire and Manyong (2003); Surri (2005) and Mignouna et al. (2011). Also, the negative correlation between the years of experience of respondents and adoption implies that the more respondent's experience in farming, the lower the farmers' adoption of CBARBP technologies. This might be due to the fact that the farmers believe so much in themselves and might not take the technologies very seriously. This finding contradicts the report of Otunaiya and Akinleye (2008) who reported that

experience of farmers positively influence the adoption of improved maize technologies.

The results of the second hypothesis in Table 6 show that compatibility ($\chi^2 = 362.883$; $P \leq 0.01$) and relative advantage ($\chi^2 = 211.699$; $P \leq 0.01$) have significant association with adoption of CBARBP technologies. The null hypothesis is thus rejected and the alternate accepted. This finding implies that all the technologies introduced to the farmers were compatible and favourable to the respondents' culture and religion, thereby influence their adoption. Besides, these technologies have relative advantage over the indigenous technologies the farmers have been using before the introduction of CBARDP technologies to them. This finding is similar to that of Mignouna et al. (2011) who stated that the characteristic of the technology play a critical role in adoption decision process. They argued that farmers who perceive the technology being consistent with their needs and compatible to their environment are likely to adopt since they find it as a positive investment.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, it can be concluded that there is dominance of men in CBARDP in the study area, despite the fact that the programme was meant to focus on women and youths. Also, adoption of CBARDP technologies was generally moderate in the study area. Also, some socio-economic characteristics found to be associated with the adoption of CBARDP technologies were household size, farming experience and farm size of the respondents. It is also revealed that these technologies were compatible with farmer's culture and had relative advantages over the traditional technologies which might influence adoption.

It is therefore recommended that men farmers should be sensitised to release their wives and more awareness should be created to encourage more women to actively participate in similar projects in the future. In the like manner awareness of should be created to encourage adoption of those technologies that witnessed low adoption. Processing machines/ equipment should be available to the farmers at subsidised price. Also all variables significant to CBARDP technologies should be taken into consideration when planning adoption technology programmes in future.

## REFERENCES

Abubakar B. Z., Anyo A. K., Buhari U. (2009): The roles of mass media in disseminating agricultural information to farmers in Birnin Kebbi Local Government area of Kebbi State. A case study of state Fadama II Development Project. Journal of Agricultural Extension 13: 95–110.

Adebo G. M., Adesoji S. A. (2010): Educational Psychology and Extension Services Teaching Methods. Bosem Publishers Nig. Ltd. Akure, Nigeria.

African Development Fund ADF (2006): Federal Republic of Nigeria, Community Based Agriculture and Rural Development Project Appraisal Report, Agriculture and Rural Development Department Central and Western Regions.

Bamire A. S., Manyong B. (2003): Profitability of Intensification Technologies Among Small-holder Maize Farmers in the Forest-savannah Transition Zone of Nigeria. Agriculture, Ecosystem and Environment 100: 111–118.

Brunello G. (2004): Labour Market Institutions and the Complementarity between Education and Training in Europe, Education, Training and Labour Market Outcomes in Europe, Checchi D., Lucifora C. (Eds), Palgrave, pp. 188–209.

Doss C. R. (2006): Understanding farm level technology adoption: Lessons learnt from CIMMYT Economic working paper No. 30–07, Mexico, D.F.

Giroh J. D. Y., Abubakar M., Balogun F. E., Wuranti V., Ogbebor O. J. (2011): Adoption of rubber quality innovations among smallholder rubber farmers in Iwo Farm settlements of Delta State, Nigeria. Accessed 12th November 2018 from http://ww.verypdf.com/

Idrisa Y. L. (2009): Analysis of Determinants of soya bean production technology adoption by farmers in Southern Borno, Nigeria. PhD thesis submitted to the Department of Agricultural Economics and Extension Services, University of Maiduguri, Nigeria, pp. 1–4.

Idrisa Y. I., Ogunbameru B. O., Madukwe M. C. (2014): Logit and tobit analyses of the determinants of likelihood of adoption and extent of adoption of improved soybean seed in Borno State, Nigeria. Greener Journal of Agricultural Sciences 2: 37–45.

IFAD (2010): Country Strategic Opportunities Programme: Federal Republic of Nigeria ROME:

IFA. President's Report: Proposed Loan to United Republic of Tanzania for Marketing Infrastructure, value Addition and Rural Finance Support Programme EB 2010/101/R24/Dev.

Jibowo A. A. (2000): Essentials of Rural Sociology (2nded). Gbemi Sodipo Press Ltd, Abeokuta, 67 p.

KWADP(2013): A progressive Report of CBARDP presented to AfDB Supervision Mission.

Mbanaso E. O., Agwu A. E., Anyanwu A. C., Asumugha G. N. (2012): Assessment of the Extent of adoption of sweet potato production technology by farmers in the Southeast agro-ecological zone of Nigeria. Journal of Agriculture and Social Research 12: 124–136.

Mignouna B., Manyong M., Rusike J., Metabasin S., Senkondo M. (2011): Determinants of Adopting Imazapyr-Resistant Maize Technology and its

Impact on Household Income in Western Kenya: Ag Bioforum 14: 158–163.

Mohammad B. T., Achem B. A., Abdulquadri A. F. (2014): Factors influencing adoption of agricultural processing technologies developed by National Centre for Agricultural Mechanization (NCAM) in Ifelodun Local Government Area, Ilorin Kwara State. International Journal of Science and Research 3: 413–417.

NBS (2009): National Bureau of Statistics Report: Annual abstract of Statistics, 2009, Federal Government of Nigeria.

Okoedo-Okojie D. U., Onemolease E. A. (2009): Factors affecting the adoption of yam storage technologies in the Northern Ecological Zone of Edo State, Nigeria. Journal of Human Ecology 27: 155–160.

Otunaiya A. O., Akinleye S. O. (2008): Adoption of improved maize production technologies in Yewa North LGA of Ogun State, Nigeria. Proceedings of 10th Annual National conference of Nigeria Association of Agricultural Economists (NAAE) held at the University of Abuja, 7th–10th October. 2008; pp. 395–403.

Rogers E. M. (1995): Diffusion of Innovations. 4th Edition. The Free Press, New York, USA, 519 p.

Surri T. (2005): Selection and Comparative Advantage in Technology Adoption. World Bank Research Observer 12: 183–201.

World Bank (2012): Agricultural Development Projects in Nigeria. The World Bank Group Available online at http:/inweb90.worldbank.org/ oed/ oeddoclib.nsf/ DocUNID ViewforJavasearch IFETBA13642E3EOD 7852567F5005D85CF

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