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# FARMER PARTICIPATION IN ROOT AND TUBER CROPS TECHNOLOGY DEVELOPMENT AND TRANSFER (TDT) IN BENUE STATE NIGERIA

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**ABSTRACT**
The factors influencing farmer participation in Roots and Tuber crops Technology Development and Transfer (TDT) in Benue State were estimated. Sixty (60) extension contact farmers who participated in the TDT activities were purposively sampled from six local Government Areas where the farmer participatory trials and demonstration plots were established. The Local Government Areas include; Kwande and Ushongo from Zone A, Gboko and Buruku from Zone B, and Otukpo and Ohimini from Zone C. Data were collected with the aid of structured questionnaire and analyzed with descriptive statistics (frequency and percentage scores) and multiple regression analysis. Results revealed that majority (67%) of the respondents were males, with 53% married, and 87% full time farmers and had farming experience of 11 – 20 years (57%). Majority (60%) of the respondents had secondary school education. The major constraints to farmer participation in TDT were scarcity of improved varieties (66%), scarcity and high cost of fertilizers (80%), late release of field maintenance fee (66%) and irregular visits by extension agents with (66%) of the respondents respectively. The regression results showed that education and access to extension services were positive and significantly influenced TDT activities at 1% level. Age and household size were also positive and significantly related to participation in TDT activities at 5% level. It was concluded that education level of farmers and access to extension services had a major influence on participation in TDT. It was recommended that extension services be strengthened to facilitate effective farmer participation in TDT activities.

***Keywords: Technology transfer, Development, Farmer participatory, and Demonstration***

## Introduction

The performance of the agricultural sector usually reflects the effectiveness of agricultural research and extension in generating technologies and facilitating appropriate management decision for boosting agricultural production. The aim of agricultural research is to raise the productivity of existing resources by evolving improved methods of production and introducing new inputs. Improved technologies are necessary to help producers respond to changing circumstances and raise productivity and real income Issa (2010). Like the research system, extension systems must be people-centered, demand-driven, relevant and appropriate for poor small producers. Therefore, extension systems must respond to farmers' organizations as well as local government. Farmers' participation in research planning and the creation/identification of innovations generates the potential for their diffusion and is thus an essential component of the diffusion process. The participation of extension agents in agricultural research is equally important for the diffusion of innovations, and is a feature unfortunately lacking in many projects Ewell, (1989). Citizen's participation means active involvement of all citizens (Men, women, youths and children) in the community. Onyenemezu, (2014), Anyanwu, (1992), and Abioma and Bello, (2013), considers participation by citizens as an active process whereby beneficiaries influence the direction and execution of projects and innovations rather than merely receiving a share of the project benefits. FMARD (2013) noted that Agriculture should be taken as a business and not a development programme. Therefore participation in technology development and transfer should be perceived to have long term benefits to farmers who actively participate in the process. Onowu *et al,* (2015) addressed the question of socio economic characteristics of beneficiaries, the level of participation of beneficiaries and what type of productive resources available to beneficiaries, the effects of the programme on the socioeconomic lives of the target population and constraints of participants. Analysis with the farmers of newly-created innovations in their technical and socio-cultural context is the first stage in actual diffusion Séguy, *et al*. (1991). This analysis is used to assemble technological packages

that are tested by farmers to identify the most relevant and to assemble sets of technical references, at this stage, researchers and extension agents should demonstrate the appropriate technological packages to farmers and provide advice Ouedraogo, *et al*. (1991). Finally, partnership between researchers and farmers should not cease with farmers' adoption of an innovation; this simply marks the end of a creation-and-diffusion phase. The innovation must be followed up, after a set period of time, by an impact assessment leading to new planning that starts the next improvement cycle. Unfortunately, few projects illustrate the latter point because auditing with the users is rarely or poorly integrated in projects. Generally, extension systems should become more flexible, at the service of farmers and their specific needs, and not the contrary. The study was aimed at analyzing the factors that influence farmer's participation in root and tuber crops technology development and transfer in Benue state.

**Methodology**

The study was carried out in Benue State. Sixty extension contact farmers that participated in the TDT activities as cluster members were purposively sampled. Each cluster was made up of ten contact farmers selected from each local government area. The six Local Government areas where farmer participatory trials, demonstration plots and farmer field school were established across the three Agricultural Zones of the State were; Kwande and Ushongo from Zone A, Gboko and Buruku from Zone B while Otukpo, and Ohimini were studied in Zone C. The local government areas were randomly sampled from each zone, while willingness to donate land and maintain the demonstration plot from land preparation to harvest was the criteria for farmer selection. Structured questionnaire and focused group discussion were used to elicit responses from the respondents. Data were analyzed with the aid of descriptive statistics (frequency and percentage scores) and multiple regression analysis.

The log-linear model derived from the Cobb Douglas functional form was the econometric model specified for explaining estimates following Ukoha (2000) in cocoyam production. This functional form is the most popular in applied research because it is easiest to handle mathematically (Koutsoyiannis, 1979). Evidence from most studies depicts that the Cobb-Douglas functional form gives the best results than other functional forms. It is only when satisfactory results are not obtained from this model that other forms will be tried out, following Ukoha, (2000) and Okoye et al., (2008). The model is described thus:

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9) + e \quad (1)$$

Where,

Y = Number of improved root and tuber crops varieties adopted

$X_1$ = Sex (Male = 1, Female = 0)

$X_2$ = Age in years

$X_3$ = Marital Status (Married = 1, Otherwise = 0)

$X_4$ = Household Size (Number of family members)

$X_5$ = Farming experience in years

$X_6$ = Education level (Number of years spent in school)

$X_7$ = Access to Extension (no of contacts annually)

$X_8$ = Membership of farmer cooperatives (Member = 1, Non-member = 0)

$X_9$ = Access to fertilizer (quantity applied in kg)

$X_{10}$ = Farm size (Size of farmers farmland devoted to improved root and tuber crops production in ha)

e = Error term

**Results and Discussion**

The Results in Table 1 revealed that majority 67% of the respondents were males, majority (67%) of who were within the age range of 41-50 years. On the basis of marital status, majority of the respondents (53%) were married, and 67% had large household size of 6-10 members, 87% were full time farmers and had farming experience of 11 – 20 years (57%). On the basis of formal education, majority (60%) of the respondents had secondary school education with farm sizes of 1 – 4 ha (55%). Results in Table 2 revealed that the major constraints to farmer participation in TDT as indicated by the respondents were scarcity of improved varieties (66%), scarcity and high cost of fertilizers (80%), late release of field maintenance fee (66%) and irregular visits by extension agents (66%). Fig. 1 showed that majority (90%) of the respondents participated in the farmer field days, followed by 80% participation in establishment of field Demonstration plots, while 55% took part in the Farmer field school. The regression results in Table 3 showed that education and access to extension services were positive and significantly related to farmers' participation in TDT activities at 1% level. This implied that there is a direct relationship between farmers' participation in TDT activities and increase in education and contact with extension agents. According to Adebayo (2008) Education is essential for boosting understanding, dynamism and reception / acceptance to change. There is a close link between educational level and participation in technology development and transfer and agrees with the views of Udensi *et al* (2015) that Education exposes one to better ways of managing resources and doing things. Educated farmers are expected to be more receptive to improved farming techniques, while farmers with a low level or without education would be less receptive (Okoye et al., 2004 and Ajibefun et al., 2004). Information in Table 3 further revealed that age and farming experience were also positive and significantly related to farmer's participation in TDT activities at 10% level and household size at 5% level. This implies that any increase in farming experience, age and household size

will lead to a corresponding increase in participation in TDT activities among the farmers. For age the effect is thought to stem from accumulated knowledge and experience of farming systems obtained from years of observation and experimenting with various technologies. In addition, since adoption pay-offs occur over a long period of time, while costs occur in the earlier phases, age (time) of the farmer can have a profound effect on technology adoption (Bonabana-Wabbi, 2002). For household size, larger households are more likely to provide the labor that might be required for participation in TDT, a larger household size would be expected to increase participation. Effiong (2005) reported that a relatively large household size enhance the availability of labour. Marital status and gender was however negative and significantly related to farmers participation in TDT activities at 10% level. This implies that female farmers who were single participated more in TDT activities than their counterparts who were males and married. This result is not consistent with *a priori* expectation, as it is the view of some scholars that spouses with large household sizes find it more difficult to meet the basic requirements of the household members (Ukoha *et al*, 2007). The R2 value of 0.753 indicates 75.3% variability in participation in TDT activities explained by the independent factors. The F value was also highly significant at 1% level indicating that the model was good.

**Conclusion**

The study estimated the factors influencing farmer participation in Roots and Tuber crops Technology Development and Transfer (TDT) in Benue State. Important factors influencing participation were; sex, age, marital status, farming experience, education, and access to extension. The results therefore call for policies aimed at provision of free and affordable education especially targeted at women to enable them access and process information from extension for effective farmer participation in TDT activities.

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**Table 1: Distribution of the respondents according to Demographic Characteristics**

| Variable | Frequency | Percentage |
|---|---|---|
| **Sex** | | |
| Male | 40 | 67 |
| Female | 20 | 33 |
| Total | 60 | 100 |
| **Age** | | |
| 21 - 30 | 2 | 3 |
| 31 – 40 | 14 | 23 |
| 41 – 50 | 40 | 67 |
| 51 – 60 | - | - |
| 61 and above | 4 | 7 |
| Total | 60 | 100 |
| **Marital Status** | | |
| Single | 18 | 30 |
| Married | 32 | 53 |
| Widow | 10 | 17 |
| Total | 60 | 100 |
| **Household size** | | |
| 1 – 5 | 12 | 20 |
| 6 –10 | 40 | 67 |
| >10 | 8 | 14 |
| Total | 60 | 100 |
| **Occupation** | | |
| Farming | 52 | 87 |
| Civil service | 5 | 8 |
| Artisan | 3 | 5 |
| Total | 60 | 100 |
| **Farming Experience(years)** | | |
| 1-10 | 7 | 12 |
| 11-20 | 34 | 57 |
| 21-30 | 5 | 8 |
| 31-40 | 8 | 13 |
| 41-50 | 6 | 20 |
| Total | 60 | 100 |
| **Education level** | | |
| Primary school | 14 | 23 |
| Secondary school | 36 | 60 |
| Tertiary level | 10 | 17 |
| Total | 60 | 100 |
| **Farm sizes** | | |
| <1ha | 10 | 17 |
| 1-4ha | 33 | 55 |
| 5-10ha | 17 | 28 |
| Total | 60 | 100 |

Source: Field survey 2016

**Table 2: Distribution of respondents according to Farmers constraints to participation in TDT in Benue State**

| Constraints | Frequency | Percentage |
|---|---|---|
| Low Knowledge of the technology | 27 | 45 |
| Scarcity of improved varieties | 40 | 66 |
| No access to extension bulletins | 32 | 53 |
| Scarcity/high cost of fertilizers | 48 | 80 |
| High post harvest loss of cassava stem | 22 | 37 |
| Scarcity of Labor | 12 | 20 |
| High cost of labour | 28 | 47 |
| High cost of Transport to zonal office | 24 | 40 |
| Pilfering of experiments | 32 | 53 |
| Storage losses of improved yam varieties | 35 | 58 |
| Late release of maintenance fee | 40 | 66 |
| Irregular supervision by Extension Agents | 40 | 66 |

Source: Field survey 2016. Multiple responses recorded

**Table 3: Regression Estimates of Determinants of Participation in Root and Tuber Crops Technology Development and Transfer**

| Variables | Cobb-Douglas Functional Form |
|---|---|
| Constant | .775(.906) |
| Sex ($X_1$) | -.341(-1.901)* |
| Age ($X_2$) | .016(2.107)* |
| Marital Status ($X_3$) | -.709(-2.356)* |
| Household Size ($X_4$) | .060(3.072)** |
| Farming Experience ($X_5$) | .012(1.858)* |
| Education Level ($X_6$) | .099(6.892)*** |
| Access to extension ($X_7$) | .272(5.150)*** |
| Membership of cooperatives ($X_8$) | .114(.980) |
| Access to fertilizer ($X_9$) | .025(.221) |
| Farm size ($X_{10}$) | .018(.251) |
| $R^2$ | .753 |
| $R^{2\ adjusted}$ | .591 |
| F-value | 10.630*** |

Source: Field survey, 2016. * Significant at 10%, **Significant at 5%, ***Significant at 1%. t- ratios are in parentheses

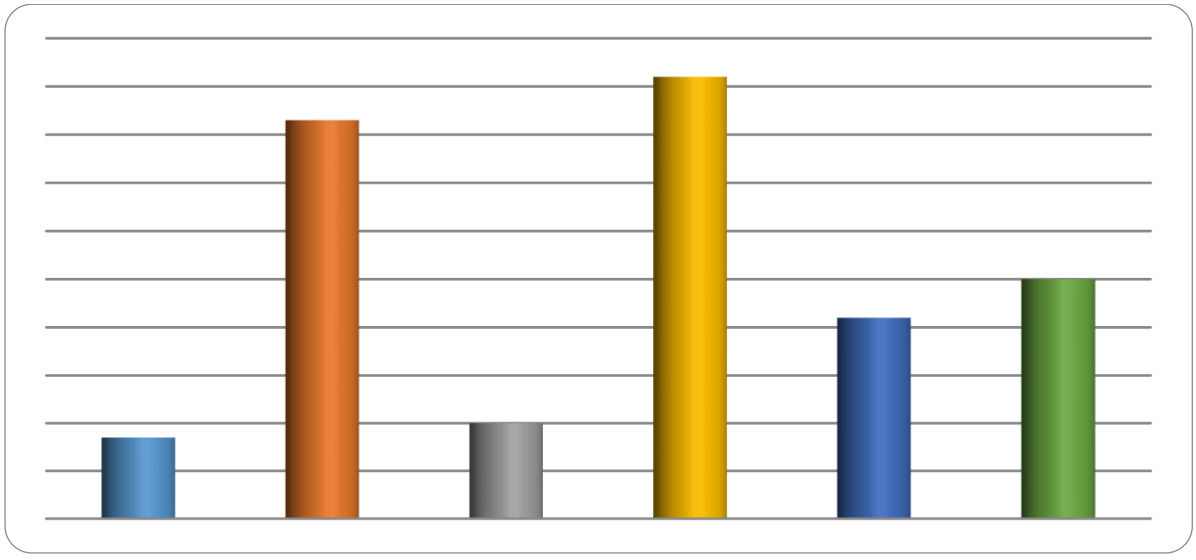

Fig. 1: Distribution of Contact farmers according to involvement in Extension activities