

Impact and adoption of value added innovations in root and tuber crops among farmers in Akwa Ibom State, Nigeria

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ABSTRACT

The National Root Crops Research Institute (NRCRI), Umudike embarked on massive training and extension of technologies of new and improved food forms of root/tuber crops to rural farmers/women groups from 2005 to date in Nigeria generally and in South-eastern and South-south parts in particular. However, the main purpose of this study is to determine the impact and adoption rate of this training and extension activity among farmers in Akwalbom State of Nigeria. A structured interview schedule, administered to 90 farmers in 3 agricultural zones of Uyo, IkotEkpene and Eket was the major instrument used in data collection. The respondents were 30 farmers generated from two training points in each zone. The data were analysed using means, percentages and means scores. The result revealed that although the respondents were mostly women, there were a few number of men who participated in the training and these respondents were reasonably aware of the innovations. The adoption of the innovations (value added products of cassava) by the respondents was far 21.39%, while the adoption rates of value added products of cocoyam, sweetpotato and cultivation technologies were 12.59%, 2.22% and 33.85% respectively. The low adoption rates of these innovations translated into very little impact on the livelihood of the respondents. However, near tangible impact was made on the livelihood of the respondents in areas of paying school fees and acquiring new farmlands. However, the major challenges associated with the adoption were lack of funds, lack of equipment/facilities and no re-training facilities respectively. It is therefore recommended that efforts should be made to alleviate all these challenges in order to enhance the adoption and impact of these technologies among the farmers.

Key words: Adoption, impact, training, value added products, innovations, technologies.

INTRODUCTION

1.1 Value Added Technologies in Root and Tuber Crops

Agricultural produce are known to be highly perishable, hence most rural farmers do not get the desired reward for their work as most of their produce are lost a day or two after harvest. Consequent upon this, the National Root Crops Research Institute (NRCRI), Umudike which had the national mandate to research into root and tuber crops, developed some processing technologies of root and tuber crops in order to curtail their perishability and add value to these crops. Food items such as cassava fufu flour, high quality cassava flour for confectionery production and other products were developed. The essence is to ensure that these crops can be put to wider uses in the home, for income generation and for export purposes. Armed with value added products of the root/tuber crops the NRCRI, Umudike participated in World Food Days in Abuja and other parts of Nigeria and also took part in many other food shows in which NRCRI was adjudged the best food exhibitor. To this effect, groups and individuals all over Nigeria appreciated this development and requested to be trained in those technologies. In Akwalbom State of Nigeria, this training by NRCRI, Umudike was conducted for various farmers' and women groups in the 3 main agricultural zones of the state (Uyo, IkotEkpene and Eket). However, ever since the dissemination of these technologies to farmers/women groups in AkwaIbom State of Nigeria took place in 2008, no data have been collected in order to specify the impact and adoption of these technologies among farmers and women groups trained.

The work of Atala (1990) inferred that the appropriateness of any technology depends on its acceptability by the people. Hence, if an innovation was not acceptable by the people the time, money and efforts spent in developing the innovation and that spent in its disseminations must have been wasted. Also Adams (1985) opined that the appraisal of the impact and adoption rate of an innovation will help to establish strength and weakness of the extension activities in order to modify methodology for more effective extension activities in future, as well as determine the attributes of technologies recommended for adoption.

The adoption of innovation is the last step in a decision process to make full use of an innovation having considered that such will impact positively on the livelihood of the adopter (Adams, 1985, Chambers, 1993). The level of adoption, Roger and Shoemaker, (1971) contended is usually influenced by personal, socio-economic and communication factors. This implies that the individual meant to adopt an innovation must first consider what benefits he/she stands to earn out of the innovation to be substantial above the cost of adoption in order to adopt. In other words, such innovation should possess attributes or characteristics enticing to the farmer that will warrant high adoption rate. Also, Aniedu (2006) indicated that such personal issues such as gender, availability of resources required for the use of innovations, priority and benefits expected to be gained motivate people to adopt innovations. This study is therefore aimed at the determination of the impact and adoption of value added technologies in root and tuber crops disseminated to farmers in Akwalbom State through various training programmes of NRCRI, Umudike which were conducted in the state in 2008.

Objectives of the Study

The specific objectives of this study were to:

- Establish the socio-economic characteristics of the respondents
- Ascertain that NRCRI, Umudike conducted training on value addition in the area.
- Establish the adoption rate of the innovations of value added products of root/tuber crops extended to farmers through training of farmer/women groups
- Determine the impact of the adoption of the innovations on the farmers
- Identify challenges being experienced by the respondents in their adoption of the innovations

MATERIALS AND METHODS

The population for the study consisted of farmer groups made up of women and a pocket of men farmers who participated in NRCRI, Umudike organized training in value addition to root/tuber crops in Akwalbom State of Nigeria. The state consists of three main agricultural zones of Uyo, IkotEkpene and Eket. The stratified random sampling methods were used to select a farmer group from two communities in each of the 3 zones covered. In Uyo zone, a farmer group each was selected from Uyo and Etinan communities, in IkotEkpene zone a farmer group each was selected from IkotEkpene and Abak communities while in Eket zone a farmer group each was selected from Eket and Oron communities. In all, 6 communities were sampled and in each of these communities 15 farmers were selected giving a total of 90 respondents for the study.

To determine the adoption rate of the selected innovations, the respondents were requested to indicate their levels of adoption on a three-point adoption scale (not aware, aware and adoption). Percentages were used to determine the rate of "not aware, aware and adoption. The technologies were value added products of cassava, sweetpotato, cocoyam and some cultivation technologies. In order to ascertain that the training was actually conducted by NRCRI, Umudike in the areas, the respondents were requested to rate their source of training/extension activities on a three point scale of 1 not a source, 2 a source and 3 an important source. The options given were NRCRI, Umudike, ADP, radio, TV, newspaper, friends/relatives and the result was processed by adding the values (1+2+3=6) and the product was later divided by 3 to get a mean score of 2, which was regarded as the cut-off point. Hence, any source with a mean score of 2 and above was regarded as a major source of training/extension activities in value addition to root/tuber crops. The tangible impact of the technologies was determined by requesting the respondents to rate the impact 1 extremely not important, 2 not important, 3 important and 4 extremely important. The options given were acquired a house, a bicycle, a motor cycle, paid school fees, took new title, married new wife, bought/hired more farmland, bought new TV/radio and paid medical bills. The result was processed by adding the values (1+2+3+4=10) the product was later divided by 4 to get a mean score of 2.5 consequently any mean score of 2.5 and above was regarded as a tangible impact on the respondents. In the same way the problem associated with the impact/adoption of the technologies were determined on a five-point scale of 1 extremely not important, 2 not important, 3 important, 4 very important and 5 extremely important. The values were summed up (1+2+3+4+5 = 15) and the product was in turn divided by 5 to get a mean of 3. The mean scores of 3 and above were adjudged to have tangible impact. However, the rest of the results were presented in means, frequencies and percentages.

RESULTS AND DISCUSSION

3.1 Personal and socio-economic characteristics of the respondents

The result in Table 1 showed that 73.33% and 71.10% the respondents were women and married respectively, also 58.89% and 41.11% were part time and full time farmers respectively. This may be a disadvantage for adoption of innovation since Young (1994) opined that women were the poorest of the poor, hence their ability to take risks involved in adoption of innovation is minimal. The report also stated that women have limited time available to them due to their multiple roles and also have subsistence as their priority as against adoption of innovation for income yielding and marketing opportunities. This result also showed that 87.78% of the respondents acquired education from primary to tertiary education levels, while 60% of the respondents belonged to farmers' association. The age of the respondents showed that majority (64.45%) were between 40 years and 69 years, indicating that the respondents comprised of old people, who did not have the energy to embark on farming. The work of Rogers (1983) stated that education facilitates adoption of innovation and the theory of group dynamics by Child (1986) contended that social interaction and imitation of parents, famous people in a group, etc. encouraged adoption of innovation. In the same way, Voh, (1982) supported the view by stating that education, young age, peer group and availability of resources were some of the factors that influenced adoption and diffusion of innovations positively. However, it is important to deduce that although education and memberships of farmer's association were variables favourable to adoption the rest of the variables in personal characteristics were not favourable to adoption of the innovation.

Table 1: Percentage Distribution of Respondents by Socio-economic Characteristics (n = 90)

Characteristics	Frequency	Percentages
AGE		
20 – 29 years	11	12.22
30 - 39 years	21	23.33
40 – 49 years	35	38.89
50 – 59 years	18	20.00
60 – 69 years	5	5.56
Above 69	0	0.00
TOTAL	90	100.00
MARITAL STATUS		
Married	64	71.10
Single	14	15.56
Divorced	5	5.56
Widowed	7	7.78
TOTAL	90	100.00
EDUCATION		
No education	11	12.22
Primary educ	24	26.67
Secondary educ	33	36.67
Tertiary Educ	22	24.44
TOTAL	90	100.00
OCCUPATION		
Full-time	37	41.11
Part-time	53	58.89
TOTAL	90	100.00
GENDER		
Male	24	26.67
Female	66	73.33
TOTAL	90	100.00
MEMBERSHIP OF FARMERS' ASSO.		
Yes	54	60.00
No	36	40.00
TOTAL	90	100.00

3.2 Adoption of the value added products of root and tuber crops

The result in Table 2 indicated that cassava value-added products had very low mean adoption rate of 21.9%. However, the cassava value added products of doughnuts and high quality cassava flour, recorded the highest adoption rates of 45.56% and 33.33% respectively while cassava *chin-chin*, cassava croquette, cassava *fufu* flour, cassava bread, cassava cake and cassava strips recorded adoption rates of 25.56% , 17.78%, 15.56%, 12.22%, 11.11% and 10% respectively. The cocoyam value-added products recorded a lower mean adoption rate of 12.59% with its component parts of crisps, flour and *fufu* flour having adoption rates of 12.22%, 7.78% and 17.78% respectively. The result also showed that the sweetpotato value added products recorded the lowest mean adoption rate of % with its component parts of *fufu* flour, flour and cakes recording adoption rates of 3.33%, 2.22% and 1.11% respectively. The result also indicated that the mean adoption rate of the production technologies was

31.85%, with its component parts recording 46.67%, 41.11% and 7.78% for cassava 1m planting distance, 4-node cutting and sweetpotato planting respectively. It was pertinent to note that the value added innovations recorded very low adoption rates with sweetpotato having the lowest rate of 2.22%. This therefore calls for reinforcement the training or further promotion of the training improved adoption rates of the innovations.

Table 2: Percentage Distribution of Respondents based on Adoption Status (N = 90)

Innovations	Unaware (%)	Aware (%)	Adopted (%)	Total (%)
(Cassava)				
i. High Quality Cassava Flour	11.11	45.56	33.33	100
ii. Cassava chin-chin	20.00	54.44	25.56	100
iii. ,, cakes	16.67	72.22	11.11	100
iv. ,, strips	15.56	74.44	10.00	100
v. ,, bread	16.67	71.16	12.22	100
vi. ,, croquette	16.67	65.55	17.78	100
vii. ,, doughnuts	10.00	54.44	45.56	100
viii. ,, fufu flour	23.33	61.11	15.56	100
MEAN			21.39	
(Cocoyam)				
i. Cocoyam crisps	36.67	51.11	12.22	100
ii. ,, flour	30.00	62.22	7.78	100
lii cocoyam fufu	31.11	51.11	17.78	100
MEAN			12.59	
(Sweetpotato)				
i. Sweetpotatofufu flour	58.89	37.78	3.33	100
ii. ,, flour	72.22	25.56	2.22	100
iii. ,, cakes	60.00	38.89	1.11	100
MEAN			2.22	
Production Technologies				
i. 1m apart cassava planting distance	8.89	44.44	46.67	100
ii. 4-node cassava cuttings	3.33	55.56	41.11	100
iii. Planting of sweetpotato	32.22	60.00	7.78	100
MEAN			31.85	

3.3 Sources of Training/Extension Activities

Although the researchers were aware that NRCRI, Umudike conducted the training in value added innovations of root and tuber crops in the 3 main zones of Akwalbom State, the respondents were made to indicate their sources of training and extension activities. The result in Table 3 revealed that the respondents obtained their training and extension activities from Akwalbom state ADP and NRCRI predominantly. This could be explained by the fact that NRCRI did the training in conjunction with the state ADP.

Table 3: Mean Distribution of Source of Training and Extension Activities

SOURCE OF TRAINING/EXTENSION ACTIVITIES	MEAN SCORE
NRCRI, Umudike	2.80*
State ADP	3.03*
Radio	1.13
TV.	1.00
Newspapers/books/etc	1.07
Friends/relatives	1.47

*Major sources of training and extension influencing adoption

3.4 Impact of adoption of value added products on Respondents

The result of the usefulness of the training in value added innovations of root and tuber crops on the respondents in Table 4a showed that 76.67% claimed they used theirs to feed their families and in receiving visitors, 31.11% earned income from the use of the technology they learned during the training while 81.11% claimed they simply acquired information from the training. The adoption of the value-added products did not make tangible impact on the livelihood of the respondents. However, Table 4b showed that the use of the technologies impacted minimally on the respondents in areas of payment school fees (with a mean score of 2.40) and to buy or hire farmlands (which with a mean score of 2.20). The impact is not tangible enough but since the respondents have acquired the knowledge, a re-training of the groups could lead to further improvement on the rate of adoption and subsequent impact on the respondents.

Table 4a: Usefulness of the Training on the Respondents (N = 90)

Factors	Percentage
Usefulness	
Feeding my family/Receiving visitors	76.67
Acquired more information	81.11
Earned more income	31.11

Multiple Responses

Table 4b: Mean Distribution of Tangible Impact of the Technologies on the Livelihood of Respondents

Tangible Impact	Mean Score
1. Built a house	1.23
2. Bought a bicycle	1.10
3. Bought motor cycle	1.23
4. Paid school fees	2.40
5. Took a new title	1.30
6. Married a new wife	1.27
7. Bought/hired more farmland	2.20
8. Bought new TV/radio	1.37
9. Paid medical bills	1.03

**Perceived major impact of the innovations on farmers*

3.5 Challenges associated with the adoption of value added products

The result in Table 5 revealed that challenges such as lack of market facilities (mean score 2.90) and inadequate knowledge of the innovations were some sort of challenges experienced by the respondents, but lack of funds with a mean score of 4.43, lack of equipment/facilities with a mean score of 3.73 and no re-training facilities with a mean score 3.7 were the major challenges associated with adoption of value added innovations of root and tuber crops. This is in line with the earlier report of Young (1994) which claimed that women were mostly poor resource farmers and in addition have the multiple roles. Hence, to enable the women adopt any innovation funds should be provided and the provision of energy and time saving equipment and facilities to reduce drudgery should be made. Otherwise, any innovation that will add more work to the women will not be readily acceptable by the women. Also there is need to have re-training facilities to be available as an incentive for those who adopt these innovations so that there will not be discontinued adoption.

Table 5: Mean Distribution of challenges Associated with the Adoption of the Technologies

Factors	Mean Scores
Lack of market	2.90
Inadequate knowledge of innovation	2.60
Lack of funds	4.43*
No-retraining facilities	3.73*
Lack of equipment/facilities	3.73*
No extension agents to answer questions	1.83

**Perceived major challenges associated with adoption*

CONCLUSION

The studies revealed that the root and tuber crops value added innovations recorded very low adoption rates in AkwaIbomState even after over 5 years of the introduction of the innovations. This is not in line with the argument of Rogers and Shoemaker (1971) which stated that time is a necessary factor in dissemination of any extension activity in a given culture. It is important to note that the respondents were mostly women, who were seen to have multiple roles in the society – production roles, reproduction roles, community and family care roles, among others (Young, 1994). The report further stated that adoption and diffusion of innovation among women will be greatly improved if resources such as funds, market, equipment and facilities were provided in order to reduce drudgery and make the burden of their multiple roles lighter on them and also create much needed income. Efforts therefore should be made to ensure that the women farmers would be provided with the necessary resources and facilities to ensure enhanced adoption and subsequent tangible impact of the training on the livelihood of the people in future dates.

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