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ANALYSIS ON EFFECTIVENESS OF TRANSFER AND UTILIZATION OF ODOURLESS CASSAVA FUFU FLOUR PROCESSING TECHNOLOGY AMONG RURAL WOMEN IN IMO STATE, NIGERIA

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ABSTRACT
The study analyzed the effectiveness of transfer and utilization of odourless cassava fufu flour processing technology among rural women in Imo State, Nigeria. Purposive and multistage random sampling technique was used to select a sample of 120 respondents across the State. Data were collected using structured questionnaire and we're analyzed with discriptive and inferential statistics, such percentage, while simple linear and Tobit regression estimates. The result showed that 30% of the rural women involved in the transfer and utilization of odourless cassava fufu flour processing technology were within the age bracket of 41-50 years and with a household size of 7-8 persons. The result further showed that 77.2% of the rural women seek their advice on odourless cassava fufu processing problem extension agents and 81.0% are satisfied with the services of extension agents. still, awareness of the technology (X=3.60), visit of transfer agencies (X=2.87), field meetings (X=3.17) and demonstration (X=3.17) were effective in the transfer of the technology. The result further identified cost of technology (50.0%), literacy level of transfer agent (82.5%), complexity of technology (60.0%) and timely provision of technology module (85.0%) were the various factors that influenced the transfer of odourless cassava fufu processing technology. The simple linear regression result showed that utilization of the odourless cassava fufu flour technology (r=0.388,p=0.05) and contact with transfer agencies are significantly related at $p<0.05$. The tobit regression showed a Chi^2 value of 22.092 which was significant at 5% level of probability indicating goodness of fit of the tobit regression line. The study concluded that transfer and utilization of odourless cassava fufu flour processing technolgy among rural women was effective. The paper recommended that extension transfer agencies should increase their field meetings, demonstration and ensure that research-extension linkage organized by the agencies function effectively.
Keyword: Effectiveness**,** Transfer, Odourless Cassava Fufu and Utilization

INTRODUCTION

Agricultural transformation can be achieved in Nigeria through effective, well-designed and well-executed system of technology development, transfer and utilization among it citizenry *(*Olatunji, Nwakor and Asumugha, 2015). Agriculture occupies a key position in Nigeria's economy judging by its critical roles of enhancing food security, revenue generation, as well as provision of employment and raw materials for industrial development (Mehari, Amsalu and Tewedros, 2015). Cassava plays a particularly important role in agriculture in developing countries, especially in sub-Saharan Africa, because it does well on poor soils and with low rainfall, and because it is a perennial crop that can be harvested as required (Onyenwoke and Simonyan, 2014). Its wide harvesting window allows it to act as a famine reserve and invaluable in managing labor schedules. It offers flexibility to resource-poor farmers because it serves as either subsistence or cash crop.

Cassava (*Manihot esculenta crantz*) is a perennial, vegetative propagated shrub, grown throughout the lowland tropics. Originating in tropical and sub-tropical areas of Central and South America, cassava arrived in Africa at the end of the sixteenth century. In terms of calories consumed, cassava is Africa's second most important staple food after maize (Nweke *et al;* 2004). The production of cassava is relatively easy as it is tolerant to the biotic and edaphic encumbrances that hamper the production of other crops .Nigeria is an agrarian society with

about 70 percent of her over 140 million population engaged in agricultural production (NBS/CBN, 2006). Agriculture is, therefore, the most assured engine of development and a reliable key to industrialization. Agriculture seeks to facilitate industrial use of cassava by-products to diversify the economic base of the nation and promote foreign exchange earning opportunities from the export of high quality odourless cassava fufu products from Nigeria. Food crops travel along the food value chain from input supply to demand and consumption. Value addition to food is an effort to reorient production to meet future challenges from the viewpoint of increase in food production, income of households and national food security (Ifenkwe,2017).For cassava production to be market- driven, value must be added to it, through conversion to other by–products such as garri, odourless cassava fufu, tapioca, starch, chips, flour, and animal feed that are more stable, safer, available and market preferred (Nwosu and Ogbonnaya, 2014; Obinna,2015).

Cassava Fufu is the second major product consumed by households in South-east, Nigeria. It ranks next to garri in importance. It is a fermented wet paste made from cassava roots. Cassava Fufu is very rich in carbohydrate. Traditionally, it is produced in the wet form with moisture content of 40 -50 percent and with characteristic offensive odour. It is widely consumed in the Eastern and South-western Nigeria. The odour in the cassava fufu makes the product highly perishable with a short shelf life, compared with garri. In order to increase its shelf life, quality and quantities supplied,odourless Cassava fufu processing technology was developed by the National Root Crop Research Institute, Umudike some decades ago. Odourless cassava fufu is a white fermented carbohydrate food produced from cassava root, unlike the traditional fufu whichis normally in wet form, and highly perishable. The fufu is presented in dried form, is odourless,inelastic and slightly sour having a low particle size and zero cyanide content (FIIRO,2016).

Odourless cassava fufu processing flour is one of the off-farm activities carried out by the rural women. It is, therefore, necessary to extend and device improved techniques capable of increasing the income-generating capability of rural women and enhancing acceptability of cassava value-added products and widening the market base. Nigeria needs a road map for sustainable food security, as a result it is necessary to encourage increased food production, in the country by increasing the number of producers and the level of productivity mostly at the grassroots level (Umeh and Nwachukwu,2015). Food production in Nigeria seems to be declining over the years, in spite of the fact that technology advancement has been recorded in numerous fields (Olatunji *et al*, 2015). The National Root Crops Research Institute (NRCRI), Umudike had promoted value addition and processing technology for Odourless Cassava fufu (Olatunji and Nwakor, 2015). It is expected that this technology would have been transferred from the research station to the end users (that is, the farmers) via the transfer agencies. The goal of achieving agricultural transformation would be a mirage if developed technologies remain in the research stations.

Against this background, it was pertinent to ascertain the extent to which Odourless Cassava Fufu Flour processing technology, developed by the NRCRI, Umudike, was transferred to women farmers by transfer agencies and utilitized in lmo state, Nigeria.

The specific objectives are to:

i describe the socio- economic characteristics of the transfer agents and women farmers

ii determine the level of transfer agencies contact with the women farmers;

iii determine the level of effectiveness of transfer of odourless cassava fufu flour processing technology

iv determine the factors influencing transfer of odourless cassava fufu flour processing technology

Hypotheses

HO_I There is no significant relationship between method used in transfer of odourless cassava fufu flour technology and utilization of odourless cassava fufu in the study area

HO_2There is no significant relationship between the farmers utilization of odourless cassava fufu flour processing technology and their contacts with transfer agencies.;

METHODOLOGY

The study was carried out in Owerri Agricultural Zone of Imo State, Nigeria. Imo State is located in the Southeast zone of Nigeria and lies between latitude 5°10'N and 6°35' and longitudes 6°35'E and 7°28'E (Ministry of Lands Survey and Urban Planning Owerri, 1992). Owerri Agricultural Zone is one of the three agricultural zones in Imo State. It is located at the south western part of the State. It is bounded on the East by Abia State, on the west by Anambra and Rivers States, on the North by Isu and Isiala Mbano Local Government Area of the State and on the south by Abia and Rivers State (IADP., 2000). Owerri Agricultural zone is made up of eleven Local Government Areas (LGAs) namely; Aboh Mbaise, Ahiazu Mbaise, Ezinihitte Mbaise, Ikeduru, Mbaitoli, Ngor-okpala, Ohaji/Egbema, Oguta, Owerri Municipal, Owerri North and Owerri West. There are two main seasons in the zone-dry and rainy seasons. The mean annual temperature is between 26-28°C with a relative humidity of about 98% during the wet seasons (IADP., 1990). The zone is richly endowed with fertile land suitable for the growth of vegetables like fluted pumpkin, telfera, okra and water leaf. Farmers in the zone are mainly small holders with about 80% of them involved in Arable crops production (IADP., 1990)..

The population of this study was made up of all the rural women involved in improving cassava processing technologies .In drawing the sample, purposive and multistage samplng technique was used. In the first Stage, Imo state was purposively selected because she is the largest producer of cassava in South-East Nigeria.At the second stage, one agricultural zone was randomly selected. In the third stage, two blocks were randomly selected from the zones to give a total of six blocks. In the fourth stage, one cells were randomly selected from each of the blocks to give a total of 6 cells. In the fifth and final stage, twenty farmers were selected from each of the cells, giving a total of onehundred and twenty respondents (120 women farmers) respondents, interview schedule and focus group discussion was used to obtain primary data. Descriptive such as frequency, percentage and mean count and inferiental statistics were used for analysis

RESULTS AND DISCUSSION

The socio-economic characteristics of the respondents are presented on Table 1. Majority of the respondents were within the age bracket , 31 – 40 years in 45.7% .Majority of the respondents (65.8%) were married .on Table 1.1 reveals that women farmers 34.2% had secondary and 30.4% had primary education and about 8.9% tertiary education in the respective States. The Table showed that, 91.2% of the farmers in were Christians, while 8.80% were traditionalists. The result also showed that majority of the respondents (70%) were farmers in the States. This result corroborates the findings of Ravillion *et al.,* (2007) that majority of the ruralites engaged in farming activities and other related activities to earn a living.The mean household size is 7 persons per household. This indicate that the beneficiaries' have large household size. Similarly Onumadu and Olatunji (2014) stated that large household size enhances family labour in farm operations. 43% had 3 hactares of farmland. These results implies that most of the rural women farmers still operate at a subsistence level, despite the level of the technology The majority of the respondents (82.05%) belonged to cooperative societies. This implies that rural women farmers were aware of the cooperative groups as easy sources of farm credit. Membership of cooperative also accelerates the adoption of improved technologies (Salau, *et al*, 2015).

These indicated that the average population of the respondents can therefore be described as middle aged women who can be therefore be regarded as active, agile and physically disposed to pursue economic ventures. The findings corroborates with the earlier findings of Okwoche *et al;* (2010) that respondents within the age range of 31 – 60 years i.e within their middle age range are the work force of the community. These results also revealed that odourless cassava fufu processors are within their prime and productive working age ,This result is in tanderm with the findings of Ifenkwe and Umeh (2014) and Eze (2002) that active age of farmers is a very positive and significant factor to sustainable tool for food production and poverty alleviation among farmers in the study area .They will also support

other improved agricultural technologies dissemination, utilization and food security alleviation programmes in lmo state, Nigeria . Focus Group Discussion also revealed that the discussants were in their prime years of life.

Table 1: The Socio-economic Characteristics of Respondents

Variables	Frequency	Percentage
Age		
31 – 40	27	22.5
41 – 50	36	30
51 – 60	25	20.8
61 – 70	20	16.6
Religion		
Christianity	120	100.0
Marital status		
Single	28	23.3
Married	58	48.3
Diviorced	14	11.7
Widower/widows	20	16.7
Household size		
1 – 3	22	18.3
3 – 4	16	13.3
5 – 6	20	16.7
7 – 8	52	43.3
Level of education		
No formal education	35	29.2
Primary	45	37.5
Secondary	32	26.7
Higher education	8	6.2
Farm size (hectares)		
1 – 3 hectares	30	25.0
4 - 6 hectares	60	50.0
7 - 9 hectares	20	16.7
10 -12	10	8.3
Farm size (hectares)		
1 – 3 hectares	30	25.0
4 - 6 hectares	60	50.0
7 - 9 hectares	20	16.7
10 -12	10	8.3
Farm size (hectares)		
1 – 3 hectares	30	25.0
4 - 6 hectares	60	50.0
7 - 9 hectares	20	16.7
10 -12	10	8.3
Membership of cooperative society		
Yes	87	72.5
No	33	27.5
Income (~~N~~)		
1,000 – 20, 000	53	44.2
21,000 – 40,000	29	24.2
41,000 – 60,000	21	17.5
61,000 – 80,000	17	14.2
Cassava output (kg)		
101 - 200kg	17	14.2
201 - 300kg	15	12.5
301 - 400kg	30	25.0
501 - 1000kg	58	48.3

Source: Field survey, 2018

Level of Extension Agents Contact with the Women Farmers

The level of transfer agencies contact with the women farmers through the extension agents was based on indicator s of the contract variables, the result in Table 2 show that majority of the respondents (82%) in Imo State attested that they knew the name of the village transfer agents, (83%) in Imo State. Also most of the respondents also indicated that they knew the location and addresses of the agents. respectively, (77%) said that they sought the advice of the transfer agents at times in matters relating to odourless cassava fufu processing issues. and (81%) in Imo State the respondents indicated that they were not very satisfied with the services given to them by the transfer agencies in due to non-regularity of the visit in the study area Consequently, these insufficiently trained numbers of transfer agencies and the issue of poor funding across the ADP in the States also affect the quality of transfer since the number of resource person/subject matter specialist across the Region were inadequate due to Nigeria logistics issue, Agwu et al (2016). The disproportionate transfer agencies to farm families ratio prevalent in the region may lead to a situation in which many women farmers do not actually benefit enough from the services of Agricultural transfer agencies, Ekumankama, and Onuekwesi, (2008).

Table 2. Level of Extension Agents Contact with the Women Farmers

Indicator s of contact with extension agents	Frequency	Percentage
Do you know the name of the village worker?	65	82.3
Have you ever meet the worker before?	66	83.5
Do you know the days on which he/she regularly visits your village?	56	70.9
Do you know their address?	49	62.0
Do you seek his/her advice on any of your odourless cassava fufu processing problem?	61	77.2
How many times did you seek his/her advice?	61	77.2
Did he/she do anything about the problem?	62	78.5
Are you satisfied with their services ?	64	81.0

Source: *Field Survey, 2018*
* **Multiple responses recorded**

Effectiveness of the Technology Transfer Agencies

The result in Table 3. Shows the effectiveness of transfer of odourless cassava fufu processing technology. The transfer of odourless cassava fufu processing technology was effective in six technologies, with the following means: awareness of the technology by transfer agencies mean scores ($\bar{X}$ =3.60), visit of transfer agencies (X=2.87), field meetings (X=3.17), field days organized by the transfer agencies (X=3.22), demonstration (X=3.17) and research-extension linkage organized by the agencies (X=2.26). This is contrary to the findings of Agbarevo (2013) ,who in a similar study reported that extension delivery in Cross River was very poor.

Table 3: Distribution of Respondents Based on the Effectiveness of Transfer of Odourless Cassava Fufu Processing Technology.

Indicators of Effectiveness	$\sum fx$	$\bar{x}$	SD
Awareness of the technology	144	3.60	0.6324
Visit of transfer agencies	155	2.87	0.6864
Field meetings	124	3.17	0.5559
Regularities of meetings by the transfer agencies	84	2.10	0.8412
Field days organized by the transfer agencies	129	3.22	0.8619
Demonstration	127	3.17	0.8439
Supervision by transfer agencies	73.	1.82	0.8129
Research-extension linkage organized by the agencies	105	2.62	1.0300
Grand mean		**2.82**	

Source**:** Field Survey, 2018, Decision: $\bar{x}$ ≥ 3.0 indicates effective transfer; $\bar{x}$ ≤ 2.9 indicates not effective.

Factors Influencing Transfer of Odourless Cassava Fufu Processing Technology by Transfer Agencies

The factors affecting or militating against transfer of odourless cassava fufu processing technology were determined on the basis of level of severity of all the results presented in Table 4. The study revealed that most of these factors influenced effective transfer of odourless fufu processing technology in lmo State, Nigeria. ln Imo State, timely provision of technology module (85%), literacy level of transfer agencies (82%), cosmopolitness (65%) and complexity of technology (60%) were the factors that severely influenced the transfer of the technology and the following factors such as socio-cultural factors (37.5%), felt needs of the women farmers, (40%) socio-economic characteristics of the farmers (42.5%) and the cost of the technology were least factors influencing transfer in Imo State. The findings of Olatunji *et al* (2015) also support this study by stating that the percentage of transfer agencies to the farm families is affecting the effectiveness of transfer in Imo State, Nigeria. These results is in tanderm with Agbarevo (2014) which stated that Extension delivery were not very effective in service delivery in Cross River State of Nigeria.

Table 4: Factors Influencing Transfer of Odourless Cassava Fufu Processing Technology by transfer Agents

Factors militating against transfer frequency	Frequency	Percentage
Cost of technology	20	50.0
Literacy level of transfer agent	33	82.5
Complexity of technology	24	60.0
Socio-economic characteristics of the farmer	17	42.5
Timely provision of technology module	34	85.0
Cosmopolitans	26	65.0
Socio-cultural factors	15	37.5
Felt needs of the women farmer	16	40.0

Source**:** Field Survey, 2018

Hypothesis 1

HO_3: There is no significant relationship between the farmer's utilization of odourless cassava fufu processing technology and their contact with transfer agencies.

The results of analysis of the Simple linear regression estimate of the significant relationship between farmer's utilization of odourless cassava fufu flour processing technology and their contact with transfer agencies. The result in Table 5 revealed that utilization of the odourless cassava fufu flour technology ($r = 0.388$, $p= 0.05$) and contact with transfer agencies are significantly related at $p<0.05$. This implies that contact with transfer agencies is determinant to the utilization of the odourless cassava fufu technology. This indicates that the more the contact or visit by the transfer agencies, the more the farmers tend to utilize the technology. This result is in tanderm with the findings of Okoroafor and Nwaobiala (2014), which states that processors effectively utilized cassava value added technologies in Abia State, Nigeria. Also, Agbarevo, (2013) support this study by stating that farmers were unanimous that extension delivery process was not very effective as the study found no significant difference between the population and mean at 95 % confidence level in Cross River State, Nigeria.

The researcher, therefore, rejects the null hypothesis and accepts the alternative hypothesis which states that there is a significant relationship between transfer agents contact and utilization of the odourless cassava Fufu flour technology at 5 % level of probability in lmo state, Nigeria.

Table 5: Simple Linear Regression Estimate of Significant Relationship between Farmer's Utilization of Odourless Cassava Fufu Flour Processing Technology and their Contact with Transfer Agencies.

Parameter	Estimate (B)	STD Error	T-value
Constant	-6.234	0.125	2.96 **
Transfer agencies contacts	0.388	0.092	4.43**
R^2	0.718		
R^{-2}	0.679		
F-ratio	12.911**		

Source;Field survey,2018, ** Regression estimate significant 5 % level of probability.
HO; Rejected at 5% level of probability

HO_2: There is no significant relationship between method of transfer and utilization of odourless cassava fufu flour processing technology in the study area.

Table 6. Shows the Tobit regression analysis of relationship between methods used by transfer agents and utilization of odourless cassava fufu flour processing technology. The results revealed that there was a strong significant and positive relationship between method of transfer and utilization of the technology and was significant at 0.05 level of significance. The result implies that methods of technology transfer to a great extent influences the rate of odourless cassava fufu flour processing technology utilization, The result implies that a unit increase in the method of transfer of odourless cassava fufu processing technology in lmo state, Nigeria would ultimately increase the rate of utilization of the technology (Ajala *et al*, 2013), which state that group training will increase the utilization of odourless cassava fufu flour processing technology in the study area ,this might be due to the facts as farmers grow older ,they usually prefare to work in group, than when they were younger. These result is in tanderm with (Obioma,2015) which states that group training of farmers is among one of the methods used by transfer agencies to enhance utilization of agricultural technologies in Abia and Kaduna states, Nigeria.

Coefficient of Agricultural bulletin was positively correlated to the method used in transfer of odourless cassava fufu flour processing technology at 5 % level of probability in lmo state, Nigeria Demonstration of odourless cassava fufu flour processing technology was positive and significantly related at 5% level of probability in the utilization of the technology in lmo state. The coefficient of Television was also significant at 1% level of probability. This result implies that a unit increase in the in the above variables in the form of Television viewing the more the utilization. coefficient on conferences and workshop organized by the transfer agencies as one of the method of transfer was positively and significantly related at 5 % level of probability in the study area.

The researcher, therefore, accepts the alternative hypothesis which states that there is a significant relationship between method used in transfer of odourless cassava fufu flour processing technology and the utilization of the technology in lmo state, Nigeria at 5% level of probability and rejects the null hypothesis which states that there is no Significant relationship between method used in transfer and the utilization of the technology in the study area.

Table 6: Tobit Regression Estimate of the Influence of Methods Used in transfer and the Utilization of Odourless Cassava Fufu Flour in the Study Area

Variable	Coefficient
Group training	0.144
	(1.037)
Agricultural Bulletin	0.001
	(.144)
Demonstration method	0.091
	(1.956)*
Mobile phone	-0.021
	(1.691)
1Newspaper	``
Agricultural magazines	0.003
	(0.373)
Television	.100
	(0.879)
Radio	0.078
	(0.788)
Conferences/workshop	1.024
	(0.317)
Psuedo R^2	0.554
Log likelihood	19.821
Chi-square	22.092

Source: Field Survey 2018
Key: Significant at 5% respectively; Figures in brackets () are T Values
HO_1 is rejected at 5%

CONCLUSION

The study concluded tha transfer and Utilization of Odourless Cassava Fufu Flour Processing Technology among rural women was effective. Literacy level of transfer agent, complexity of technology, socio-economics characteristics of farmers, timely provision of technology modules and felt need of women farmers were factors that influenced the transfer of odourless Cassava Fufu Processing Technology by transfer Agents and women farmers were satisfied with the services provided by extension agents.

RECOMMENDATIONS

i. Extension transfer agencies should increase their field meetings, demonstration and ensure that research-extension linkage organized by the agencies function effectively.
ii. There is need to create more awareness on odorless cassava fufu processing technolgy by extension agents.

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