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EFFECTIVENESS OF AGRICULTURAL TECHNOLOGY TRANSFER METHODS AMONG CROP FARMERS IN EDE NORTH LOCAL GOVERNMENT AREA, OSUN STATE, NIGERIA

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ABSTRACT: ***The study focus on effectiveness of agricultural technology transfer methods in Ede North Local Government Area, Osun State. Data was elicited from 79 respondents with the aid of interview schedule. The study established that almost all of the respondents indicated Agricultural Development Programme (ADP) as the main source of agricultural technology. Radio was the most ranked means of agricultural technology transfer methods used with of WMS of 1.87 while extension bulletin was ranked least (WMS=0.27). Herbicide was ranked first as the most utilized agricultural technology transferred while high cost of technology was indicated as a major constraint experienced by the respondents in accessing the technology transferred. The study shows there is significant relationship between the frequency of transfer methods by extension agent(r=0.266, p=0.018), radio(r=0.018, p=0.01), poster(r=0,472, p=0.000), handbill(r=0.283, p=0.012), newspaper(r=0.412, p=0.000), internet(r=0.409, p=0.000), social media (r=0.421, p=0.000) and effectiveness of the methods .The study concluded that radio, extension agent and television are the most effective in disseminating agricultural technologies to crop farmers. The study recommended that farmers should be encouraged to use hybrid seeds. Since it was ranked least by the crop farmers in the study area, this will enhance their productivity.***
Keywords: Effectiveness, Technology, Agricultural Technology, Technology Transfer Methods, Crop farmers

Introduction

Technological change and adoption of improved production techniques are important steps in the development process of every agrarian economy. Agricultural technology transfer methods refer to the techniques used by an extension system as it functions, for example, demonstration, or a visit by an extension agent to a farmer (Azumah *et al.*, 2018). According to Anandajayasekeram *et al.*, (2008), agricultural extension is the delivery of relevant agricultural information and

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technologies to farmers. This results into the technology transfer model of agricultural extension, seen by many as the main purpose of agricultural extension. This is based on the premise that "modern" knowledge and/or information is transferred via extension agents to recipient farmers. Thus, Agricultural extension is essentially a message delivery system organized to convey the latest findings of agricultural; research to farmers. Effective communication is therefore, the prime requirement in extension work (Memon *et al*, 2014).Agricultural extension is also the conscious communication of information to help farmers form sound opinions and make good decisions on farming (Azumah *et al.*, 2018). On the aspect of technology adoption by rural farmers, evidence available also showed that crop farmers are very sensitive and do respond to change, provide that it does not conflict with their honored values and that it pays. On this note, the study generally evaluated the effectiveness of agricultural technology transfer methods among crop farmers while specifically the study identified the sources of agricultural technology transferred to respondents; ascertained the various methods used to transfer agricultural technology and examined the constraints in utilizing those technologies transferred.

Materials and Method

Multistage sampling procedure was used to select 79 out of the 185 registered crop farmers in Ede North Local Government Area, Osun State, Nigeria. A well-structured interview schedule was used to elicit information from the respondents based on the stated objectives of this research work. Descriptive statistics such as freqeuncy counts, percentages and mean was used to analyse the stated objectives while PPMC was used to test the stated hypothesis.

Result and Discussion

Source of agricultural technology transfer methods

Table 1 revealed the distribution of the respondents according to source of agricultural technology transferred. Few(13.9%) claimed research institute, majority (92.4%) claimed Agricultural Development Program, few(19.0%) claimed private organization and some(35.4%) claimed Non-Governmental Organization as source of agricultural technology transferred. Other source of agricultural technology transferred to respondents was market claimed by 15.2%. This implies that all the respondents in the study area had different source of agricultural technology and the major source is Agricultural Development Programme.

Table1: Distribution of respondents according to source of agricultural technology transferred.

*Source of agricultural technology transfer	Frequency	Percentage
Research institute	11	13.9
Agricultural Development Program	73	92.4
Private organization	15	19.0

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Non governmental organization (NGO)	28	35.4
Market	12	15.2

Source: Field, survey (2019)
***Multiple responses**

Methods used to transfer agricultural technology transfer to the respondents

Table 3 revealed that radio is mostly used with WMS of 1.87, followed by television ranked second with WMS of 1.62. However, Declaro-Ruedas and Apple M.Y (2019) established in a study conducted in Philippine that radio broadcasting was "never" utilized, although, radio is a key information source for the most time-sensitive local news and information topics. Furthermore, extension agent was ranked third with WMS of 1.48 followed by newspapers ranked fourth with WMS of 0.92, followed by poster ranked fifth with WMS of 0.63. Moreso, internet was ranked sixth with WMS of 0.42, followed by handbill ranked seventh with WMS of 0.38, followed by social media ranked eighth with WMS of 0.34 while extension bulletin was ranked least with WMS of 0.27. This implies the most frequent agricultural transfer method were radio, television and extension agent.

Table 2: Distribution of respondents by methods used to transfer agricultural technologies to the respondents

***Methods**	**Frequency of transfer**				
	Always transfer	**Occasionally transfer**	**Never transfer**	**WMS**	**Rank**
Extension agent	39(49.4)	39(49.4)	1(1.3)	1.48	3rd
Radio	71(89.9)	6(7.6)	2(2.5)	1.87	1st
Television	51(64.6)	26(32.9)	2(2.5)	1.62	2nd
Extension bulletin	2(2.5)	17(21.5)	60(75.9)	0.27	9th
Poster	9(11.4)	32(40.5)	38(48.1)	0.63	5th
Handbill	8(10.1)	14(17.7)	57(72.2)	0.38	7th
Newspaper	19(24.1)	35(44.3)	25(31.6)	0.92	4th
Internet	7(8.9)	19(24.1)	53(67.1)	0.42	6th
Handbill	3(3.8)	21(26.6)	55(69.6)	0.34	8th

Source: Field Survey (2019)
( ) represent percentage
WMS weight mean score
***Multiple responses**

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Utilization of agricultural technology transfer methods

Table 3 revealed the Weighted Mean Score (WMS) of respondents according to the level of utilization of agricultural technology transfer methods and it indicated that extension agent was mostly utilized method with WMS of 2.76, followed by radio ranked second with WMS of 2.75. Furthermore, television was ranked third with WMS of 2.51, followed by newspaper ranked fourth with WMS of 1.16, followed by poster ranked fifth with WMS of 0.87. More so, internet was ranked sixth with WMS of 0.56, followed by extension bulletin ranked seventh with WMS of 0.47, followed by handbill ranked eighth with WMS of 0.44 while social media was ranked least with WMS of 0.34. This implies that the most utilized agricultural technology transfer method were extension agent, radio and television.

Table 3: Distribution of respondents according to the level of utilization of agricultural technology transfer methods

Methods of agricultural technology transfer

*Methods	Level of utilization					
	Always utilized	**Occasionally Utilized**	**Used but discontinuous**	**Never utilized**	**WMS**	**Rank**
Extension agent	65(82.3)	11(13.9)	1(1.3)	2(2.5)	2.76	1st
Radio	64(81.0)	12(15.2)	1(1.3)	2(2.5)	2.75	2nd
Television	49(62.0)	24(30.4)	3(3.8)	3(3.8)	2.51	3rd
Extension bulletin	2(2.5)	11(13.9)	9(11.4)	57(72.2)	0.47	7th
Poster	11(13.9)	10(12.7)	16(20.3)	42(53.2)	0.87	8th
Handbill	4(5.1)	5(6.3)	13(16.5)	57(72.2)	0.44	5th
Newspaper	9(11.4)	25(31.6)	15(19.0)	30(38.0	1.16	4th
Internet	4(5.1)	13(16.5)	6(7.6)	56(70.9)	0.56	6th
Social media	___	11(13.9)	5(6.3)	63(79.7)	0.34	9th

Source : Field Survey (2019)
() represent percentage
WMS weight mean score
***Multiple responses**

Effectiveness of agricultural technology transfer methods

Table 4 revealed the distribution of respondents according to effectiveness of agricultural technology transfer methods and majority (92.4%) of the respondents claimed extension agent to be effective, majority (93.7%) also claimed radio, 94.9% also claimed television to be effective, few (19.0%) claimed extension bulletin to be effective, some (41.8%) claimed posters to be effective, few (22.8%) claimed handbill to be effective, more than half (58.2%) of the respondents claimed newspaper, 27.8% claimed internet while few (17.7) of the respondents claimed internet to be effective. This implies that television, radio and extension agent were the most effective method of technology transfer in the study area. Agricultural technology transfer

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methods such as extension agent, radio and television are most effective in disseminating agricultural technology to crop farmers in the study area.

Table 4: Distribution of respondents according to effectiveness of agricultural technology transfer methods.

*Methods of technology transfer	Effectiveness of technology transfer methods	
	Frequency	Percentage (%)
Extension agent	73	92.4
Radio	74	93.7
Television	75	94.9
Extension bulletin	15	19.0
Poster	33	41.8
Handbill	18	22.8
Newspaper	46	58.2
Internet	22	27.8
Social media	14	17.7

Source: Field Survey (2019)
***Multiple responses**

Constraints in utilizing agricultural technologies transferred.

Table 5 revealed distribution of respondents according to the constraints in utilizing agricultural technologies transferred and indicated that the major constraints in utilizing the agricultural technology transfer was high cost of technology ranked first with weighted mean score (WMS) of 1.77, followed by lack of credit facilities ranked second with WMS of 1.3. Furthermore, poor training about technology was ranked third with WMS of 1.08, followed by level of illiteracy of respondents ranked fourth with WMS of 1.06, followed by conservativeness of the farmer ranked fifth with WMS of 0.90. More so, late input delivery was ranked sixth with WMS of 0.58 while marketing was ranked least with a weight mean score of 0.16. This implies that the major constraints in utilizing technologies were high cost of technology and lack of credit facility.

Table 5: Distribution of respondents according to the constraints in utilizing agricultural technologies transferred

Constraints in utilizing agricultural technology	Severe	Mild	Not constraint	WMS	Rank
High cost of technology	64(81.0)	12(15.2)	3(3.8)	1.77	1st
Lack of credit facility	39(49.4)	29(36.7)	11(13.9)	1.35	2nd
Poor training about technology	25(31.6)	35(44.3)	19(24.1)	1.08	3rd

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Level of illiteracy	28(34.4)	28(35.4)	23(29.1)	1.06	4th
Late input delivery	12(15.2)	26(32.9)	41(51.9)	0.63	6th
Conservativeness of farmer	15(19.7)	41(51.9)	23(29.1)	0.90	5th
Lack of awareness about technology	10(12.7)	26(32.9)	43(54.4)	0.587	7th
Marketing	___	14(16.5)	66(83.5)	0.16	8th

Source: Field Survey (2019)
( ) represent percentage
WMS weight mean score
***Multiple response**

Availability of agricultural technologies

Table 6 revealed the distribution of respondents according to availability of agricultural technologies in the study area and it indicated that majority (82.0%) of the respondents claimed high yielding crop to be available, almost half (51.9) claimed disease resistant varieties, majority (83.5%) claimed organic fertilizer availability, 83.5% claimed inorganic fertilizer, 89.9% claimed conventional pesticide availability, 84.9% claimed availability of pesticide plant extract, almost all (98.7%) the respondents claimed availability of herbicides, majority (89.9%) claimed availability of tractor, 92.4% claimed availability of ridger while almost all(97.5%) claimed availability of sprayer in the study area. This implies various agricultural technology were available to the respondents in the study area.

Table 6: Distribution of respondents according to availability of agricultural technologies

*Agricultural technologies	Availability	
	Frequency	**Percentage (%)**
High yielding crop	65	82.3
Disease resistant crop	41	51.9
Organic fertilizer	66	83.5
Inorganic fertilizer	66	83.5
Conventional pesticide	71	89.9
Plant extract pesticide	67	84.8
Herbicide	78	98.7
Tractor	71	89.9
Ridger	73	92 4
Sprayer	77	97.5

Source: Field Survey (2019)
***Multiple response**

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Agricultural technology transferred to respondents.

Table 7 revealed the distribution of respondents according to agricultural technologies transferred and this indicated herbicide is the most transferred with weighted mean score (WMS) of 1.76, followed by conventional pesticide ranked second with WMS of 1.71. Furthermore, organic fertilizer was ranked third with WMS of 1.57, followed by Inorganic fertilizer ranked fourth with WMS of 1.49, followed by sprayer ranked fifth with a WMS of 1.42. Moreso, tractor was ranked seventh with WMS of 1.28, followed by ridger and high yielding crop ranked eighth with WMS of 1.25 while disease resistant is ranked least with WMS of 0.78. This implies that various agricultural technology were transferred to the respondents.

Table 7: Distribution of respondents according to agricultural technology transfer

*Agricultural technology	Frequency of transfer				
	Always transfer	Occasionally transfer	Never transfer	WMS	Rank
High yielding crop	33(41.8)	33(41.8)	13(16.5)	1.25	8th
Disease resistant crops	11(13.9)	40(50.6)	28(35.4)	0.78	9th
Organic fertilizer	53(67.1)	18(22.8)	8(10.1)	1.57	3rd
Inorganic fertilizer	41(51.9)	35(44.3)	3(3.8)	1.49	4th
Conventional pesticide	57(79.2)	20(25.3)	2(2.5)	1.71	2nd
Plant extract pesticide	35(44.3)	37(46.8)	7(8.9)	1.35	6th
Herbicide	61(76.2)	16(20.3)	2(2.5)	1.76	1st
Tractor	31(39.2)	39(49.4)	9(11.4)	1.28	7th
Ridger	29(36.7)	41(51.9)	9(11.4)	1.25	8th
Sprayer	37(46.8)	38(48.1)	4(5.1)	1.42	5th

Source: Field Survey (2019)
() represent percentage
WMS weight mean score
***Multiple responses**

Agricultural technologies utilization

Table 8 revealed the distribution of respondents according to utilization of agricultural technologies received and it indicated herbicide is mostly utilized, ranked first with weighted mean score (WMS) of 2.65, followed by pesticide plant extract ranked second with WMS of 2.57, followed by Inorganic fertilizer ranked third WMS of 2.42. Furthermore Organic fertilizer was ranked fourth with WMS of 2.41, followed by conventional pesticide ranked fifth with WMS of 2.39, followed by sprayer ranked sixth with WMS of 2.24. More so, high yielding crop was ranked seventh with WMS of 2.05, followed by tractor ranked eighth with WMS of 1.82, followed by ridger ranked ninth with a weight mean score of 1.80 while disease resistant crop was ranked least with WMS of 1.54. This implies that herbicides were majorly used by the respondents in the study area.

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Table 8: Distribution of respondents according to utilization of agricultural technology transferred

Agricultural technology	Level of utilization					
	Always utilized	Occasionally utilized	Used but discontinuous	Never utilized	WMS	Rank
High yielding crops	37(46.8)	24(30.4)	3(3.8)	15(19.0)	2.05	7th
Disease resistant crops	21(26.6)	26(32.9)	7(8.9)	25(31.6)	1.54	10th
Organic fertilizer	47(59.5)	22(27.8)	5(6.3)	5(6.3)	2.41	4th
Inorganic fertilizer	41(51.9)	32(40.5)	4(5.1)	2(2.5)	2.42	3rd
Conventional pesticide	36(45.6)	40(50.6)	1(1.3)	2(2.5)	2.39	5th
Plant extract pesticide	59(74.7)	12(15.2)	2(2.5)	6(7.6)	2.57	2nd
Herbicide	59(74.7)	15(19.0)	2(2.5)	3(3.8)	2.65	1st
Tractor	21(26.6)	35(44.3)	11(13.9)	12(15.2)	1.82	8th
Ridger	20(25.5)	35(44.3)	12(15.2)	12(15.2)	1.80	9th
Sprayer	34(43.0)	36(45.6)	3(3.8)	6(7.6)	2.24	6th

Source: Field Survey (2019)
() represent percentage
WMS weight mean score
***Multiple responses**

Pearson correlation analysis showing the relationship between the frequency of technology transfer methods and effectiveness of the methods.

Pearson's Product Moment Correlation analysis revealed that there is significant relationship between the frequency of transfer method by extension agent(r=0.266, p=0.018), radio(r=0.018, p=0.01), poster(r=0,472, p=0.000), handbill(r=0.283, p=0.012), newspaper(r=0.412, p=0.000), internet(r=0.409, p=0.000), social media (r=0.421, p=0.000) and effectiveness of the methods. The result implies that the more the frequency of technology transfers by extension agent, radio, posters, handbill, newspaper, internet, social media, the higher the effectiveness methods.

Table 9: Pearson correlation analysis showing the correlation between frequency of agricultural technology transfer methods and effectiveness of the methods

Effectiveness of transfer methods	Correlation coefficient (r)	Significant value	Remark
Extension agent	0.266	0.018	Significant
Radio	-0.3	0.087	Significant
Television	-0.41	0.723	Insignificant

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Extension bulletin	-0.026	0.857	Insignificant
Posters	0.472**	0.000	Significant
Handbill	0.283	0.012	Significant
Newspaper	0.412**	0.000	Significant
Internet	0.409**	0.000	Significant
Social media	0.421**	0.000	Significant

Source : Field Survey, 2019
***** Correlation is significant at the 0.05 level (2-tailed)
**correlation is significant at the l0.001level (2-tailed)

Conclusion and Recommendations

The study concluded that radio, extension agent and television are the most effective in disseminating agricultural technologies to crop farmers. High cost of agricultural technology was the main constraints in accessing the technology transferred. In addition, herbicide was mostly available and mostly utilized by respondents. Based on the findings of this study, the following recommendations were made:

- Farmers should be encouraged to use hybrid seeds. Since it was ranked least by the crop farmers in the study area, this will enhance their productivity.
- Government should provide farm inputs at subsidy rate to farmers to encourage the adoption of agricultural technologies available to them. Agricultural input subsidies aim to make input available to farmers at below market costs as a way of incentivizing adoption, increasing agricultural productivity and profitability, increasing food availability and access and ultimately reducing poverty and stimulating economic growth.

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