DETERMINANTS OF UTILISATION OF UNIVERSITY OF IBADAN AGRICULTURAL RESEARCH OUTPUTS AMONG FARMERS IN OYO AND OSUN STATES, NIGERIA

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ABSTRACT
The study assessed determinants of farmers' utilisation of University of Ibadan (UI) Agricultural Research Outputs (AROs) in Oyo and Osun States, Nigeria. A multi-stage sampling procedure was used to select 176 beneficiaries of AROs in the study area. Focus Group Discussion and interview schedule were used for data collection on respondents' socio-economic characteristics, knowledge, utilisation level and determinants of utilisation of UI AROs. Data was analysed using descriptive and inferential statistics like Chi square, PPMC, and multiple regression. AROs considered for the study were use of neem (*Azadirachta indica*) extract for pest management, rice-fish-poultry integrated farming system, processing of *moringa oleifera* powder and ruminant feed block meal pattern. Results reveal that respondents' mean age household size were 40.05±35.48 years of 4.04±1.25 persons respectively. Respondents had mean farming experience of 7.92±5.26 years. The most utilised source of labour was family (63.0%) with mean farm size of 1.56±0.93 acres. Respondents' knowledge (67.0%), and utilisation (55.7%) of UI AROs were high for innovations disseminated. Respondents' marital status (χ^2=5.99), sex (χ^2=3.92), level of education (χ^2=30.69); age (r=0.23) and income (r=0.79) were significantly related to UI AROs utilisation. Respondents' knowledge (r=0.32) and benefits derived (r=0.80) were significantly related to utilisation of UI AROs. The determinants of utilisation of the AROs included educational qualification (β = 0.462), years of farming or processing experience (β=0.27), scale of production (β=0.33) and knowledge on utilisation (β=0.45). The study recommends that farmers be encouraged to improve on their level of education for better utilisation of disseminated agricultural research outputs.
Keywords: Determinants, University of Ibadan, Utilisation, Agricultural Research Outputs, Beneficiaries

INTRODUCTION

Generally, agricultural research efforts aim at contributing to existing knowledge and improving the quality of life of people through the achievement of food self-sufficiency leading to food security. It was noted by Ekpenyong (2001) that most of the agricultural information and innovations in Nigeria are generated from universities and research institutes. Agricultural innovation generation and dissemination should be the basic component of rural development programmes. Oladele (2011) observed that adequate agricultural information about innovations as a key factor of agricultural advancement in developing countries tends to help inform farmer's decision-making regarding land, labour, livestock, capital and management. Agricultural research has generally assumed a particular causal pathway from research to improved production in order to reduce poverty. The willingness of farmers to make use of recent innovations for their agricultural production will help improve their agricultural production through increased yield, income thereby reducing poverty drastically among them especially rural farmers. (Oladele, 2011).

University, as a research institute, generates a pool of research findings on regular basis. However, the dissemination outlets often employed for disseminating such innovations do not often ensure they are utilised by end users and in some cases where the innovations are adopted, it might not be sustainable for a long period of time due to certain factors. There had been a rise in agricultural research activities in Nigerian universities and agricultural research institutes within the past few decades and this increase has led to a large pool of agricultural innovations, many of which are yet to be effectively utilised by farmers (Akinagbe, 2013). Akinbile, (2007) also affirmed that agricultural research in the form of technology has not performed to satisfaction in the generation of appropriate technology for the farming population. The contribution of higher institutions to the generation of new ideas and knowledge can therefore not be overemphasized.

Despite the numerous innovations generated from various institutes and institutions, there still abounds low agricultural production. Oladele (2011) also affirmed that there has been increasing trend in recent years for research institutions to be directly involved in transfer of technologies generated due to growing dissatisfaction with extension departments. He also identified that most of the research outputs generated often times end in journals and publications just for promotion of researchers, some even lie fallow on researchers' shelf without making desired impact on the end users and the immediate community for necessary development. Odoemenem, (2007) attested to this fact that innovations in agricultural development are of little or no value until they can be put to use for the economic and social well-being of the people involved. King (2004) also ascertained that less than 5% of academic journals published in Africa are utilised by farmers.

Although a number of factors have been identified by Aina and Mooko (2007) to be influencing farmers' utilisation of disseminated agricultural technologies, but they vary depending

on the nature of technology disseminated, affordability, and practicability, among others. They observed that many small-scale farmers would have loved to increase their production but the constraint have always been limited access to modern technologies designed to boost their agricultural production. This is because the process of increasing the efficiency of agricultural production through agricultural modernization depends mainly on the extent to which farmers can incorporate improved agricultural technologies into their farming operations. According to Odoemenem and Obinne (2010), small-scale farmers in Nigeria need to transform their agricultural production from solely traditional inputs with low productivity to the one based on modern inputs with higher production.

University of Ibadan, in order to contribute to the transformation of the society through creativity and innovation generated several agricultural research outputs through the faculty of agriculture. Some of the research outputs generated included: Production of neem extract for pest control, processing, and packaging of Moringa Powder (MP), Fish-rice-poultry Integrated farming System (IFS), Ruminant Feed Block Pattern (RFBM), Processing and packaging of sweet potato flour and sweet potato granules. However, it has been observed that many of these outputs had not been effectively utilised by the end users (Development Research Uptake in Sub-Sahara Africa (DRUSSA), 2013). This study therefore investigated determinants of utilisation of University of Ibadan agricultural research outputs by beneficiaries in Oyo and Osun States, Nigeria.

The main objective of the study was to investigate the determinants of beneficiaries'utilisation of agricultural research outputs from University of Ibadan (UI) in Oyo and Osun States, Nigeria. The specific objectives of the study were to:

1. describe the socio-economic characteristics of the beneficiaries in the study area,
2. ascertain the knowledge level of respondents about the disseminated agricultural research outputs from the Institution, and
3. determine the factors affecting the utilisation of UI agricultural research output among beneficiaries in the study area.

The following hypotheses stated in the null form were tested:

$H_0$1: There is no significant relationship between beneficiaries' socio-economic characteristics and utilisation of University of Ibadan agricultural research outputs.

$H_0$2: There is no significant relationship between beneficiaries' knowledge and utilisation of University of Ibadan agricultural research outputs.

$H_0$3: There is no significant difference between beneficiaries' utilisation of University of Ibadan Agricultural research outputs across the agricultural enterprises in the study area.

METHODOLOGY

The study was carried out in Oyo and Osun States of Nigeria. The weather conditions vary between the two distinct seasons in Nigeria: the rainy season (April - October) and the dry season (November - March). Oyo State is an inland state in Southwestern Nigeria, with its capital at Ibadan where University of Ibadan is located. It is bounded in the north by Kwara State, in the east by Osun State, in the South by Ogun State and in the west partly by Ogun State and partly by the Republic of Benin. The climate in the state favours the cultivation of crops like maize, yam, cassava, millet, rice, plantains, cocoa, palm produce, cashew etc. Osun is an inland state with Osogbo as its capital city. Osun has 30 local government areas and is divided into senatorial districts. Crops cultivated in Osun State includes arable and cash crops like maize, cassava, yam, vegetables, pepper, cocoa, kolanut, oil palm, plantain and banana, cashew, and mango plants.

The population of the study comprised all beneficiaries of the University of Ibadan agricultural research outputs in Oyo and Osun States of Nigeria.

The agricultural research outputs considered for the study included the use of neem (*Azadirachta indica*) extract for pest management, Rice-fish-poultry integrated farming system, processing of *moringa oleifera* powder and ruminant feed block meal pattern which were disseminated to beneficiaries by the researchers.

Multistage sampling procedure was used to select the respondents for the study. The first stage involved the purposive selection of the adopted communities and Local Government Areas LGAs where University of Ibadan agricultural research outputs had been disseminated. The purposively selected LGA and communities were Akinyele LGA (Ajibode, Elekuru communities) and Ibadan North LGA (Mokola community) from Oyo state while Iwo LGA (Iwo community) and Aiyedire LGA (Ile-Ogbo community) from Osun state.

The second stage made use of stratified sampling technique. It involves stratification of respondents from the selected communities into crop and livestock beneficiaries based on their agricultural enterprise. One hundred and eighty (180) vegetable farmers from Akinyele LGA benefitted from neem extract for pest control while 130 fish farmers from Ibadan North LGA benefitted from integrated farming system in Oyo State making a total of 310 beneficiaries from Oyo State. Meanwhile, in Osun State, 50 moringa women processors from Aiyedire LGA and 80 ruminant farmers from Iwo LGA benefitted to give a total of 130 beneficiaries from Osun State.

The third stage involved the use of proportionate sampling technique for selecting 40% of beneficiaries from each agricultural enterprise. Seventy-two vegetable farmers and 52 fish farmers totalling 124 from Oyo State were selected while 20 moringa women processors and 32 ruminant farmers totalling 52 beneficiaries from Osun State giving a grand total of 176 respondents.

Interview schedule and Focus Group Discussion (FGD) were used to collect data from beneficiaries in the study area. The knowledge of respondents on UI Agricultural Research Outputs (AROs) was determined by asking respondents to respond to a 'yes' or 'no' 21 positively and negatively worded knowledge questions on disseminated agricultural innovations related to their enterprise. Knowledge index was computed, and mean was determined. Scores below the mean were categorised as "low knowledge" while scores above the mean were categorised as "high knowledge". Perceived factors affecting utilisation of the disseminated agricultural research outputs were listed for respondents to choose from which certain factors were discovered to determine their utilisation after analysing the data using multiple regression method. Respondents' utilisation of UI AROs was determined by providing list of disseminated agricultural research outputs in each community and their frequency of utilisation was measured using "Always", "Occasionally" and "Never" assigned 2,1 and 0, respectively. The mean scores were used as benchmark to determine the respondents' level of utilisation as high or low

Data were analysed using Chi Square, Pearson Product Moment Correlation (PPMC), and multiple regression analysis. Multiple linear regression method was used to determine the utilisation of UI agricultural research outputs.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Table 1 reveals that majority (62.0%) of the respondents were females. The mean age of the respondents was 40.05±25.48 indicating that the respondents were still in their active and productive age. The mean household size of the beneficiaries was 4.04±1.25which implies that beneficiaries probably had access to family labour for carrying out their agricultural activities. A greater proportion (35.0%) of the beneficiaries had primary education, while just few (4.0%) of them had tertiary education. This implies that many of the respondents could at least read and write which was necessary for their understanding of the disseminated research outputs in their respective agricultural enterprise(s). Ofuoku (2011) claimed that beneficiaries usually have one form of education or the other relative to their agricultural production, be it formal or informal. The mean farm size of the respondents in the study area was 1.6±0.9 acres which also confirmed that most of the respondents were small scale farmers. This finding is in line with that of Ragasa, Babu, Abdullahi and Abubakar (2010) that most rural farmers (crop and livestock) in Nigeria cultivate about one (1) hectare of farmland.

More than half (56.0%) of the respondents practiced their agricultural enterprise on commercial basis with mean years of farming/processing experience of 7.9±5.3 and average monthly income of N32,299.5 ±26.6. This result is in line with Onu (2006) that the majority of small-scale enterprises lack the capacity to meet standards required within the niche markets due to low income. The most utilised source of labor for agricultural production by respondents was family (63.0%). This affirmed the use of family/household members as source of labour for most of their agricultural activities as support received from family members help to reduce labour cost. The majority (91.0%) of the respondents do not have access to extension services because all the research outputs were disseminated directly to the end users by the researchers themselves. Many (41.0%) of the respondents were traders apart from being involved in agricultural production.

Table 1: Socio-economic characteristics of beneficiaries

Variables	Percent	Mean
Sex		
Male	38.0	
Female	62.0	
Age (in years)		40.05±25.48
< 30 years	12.5	
30-39	29.9	
40-49	39.2	
50-59	15.9	
60 and above	2.6	
Household size		4.04±1.25
1-3 persons	3.1	
4-6 persons	71.1	
above 6 persons	25.8	
Education level		
Adult Education	22.7	
Primary Education	34.5	
Secondary Education	28.9	
Tertiary Education	13.9	
Farm size (acres)		1.6±0.9
<1	10.2	
1-2	57.9	
3-4	19.9	
> 4	11.9	
Farming experience		7.9±5.3
1-5 years	46.6	
6-10 years	24.4	
11-15 years	16.5	
> 15 years	12.5	
Monthly income		32299.5±26.6
<10,000	10.2	
10,001-30,000	41.5	
30,001-50,000	36.9	
>50,000	11.4	
Source of labour		
Family	63.1	
Hired	30.1	
Communal	6.8	
Other income generating activities		
Civil service	19.7	
Trading	40.9	
Artisan	20.5	
Agro-processing	18.8	

Source: Field Survey 2018

Respondents' knowledge on UI AROs

Table 2 reveals that majority (67.6%) of the beneficiaries had high knowledge about the disseminated research outputs. This further confirmed that the beneficiaries had a good understanding of the various research outputs disseminated about their various agricultural enterprises in their communities as some of them were already involved in similar agricultural enterprise before the innovation dissemination. Their education background also influenced their high knowledge status. Sadati, Hosain and Ali (2010) corroborates this finding that farmers' knowledge about a particular production system helps to simplify their understandings of the production process and gives them more insight on how to improve on their agricultural production.

Table 2: Respondents' knowledge category on utilisation of UI AROs (N=176)

UI ARO categories	Percent	Mean	S. D
Neem Knowledge category (n=72)			
Low	36.5	14.05	3.023
High	63.5		
Integrated Farming System category (n=52)			
Low	39.5	16.84	1.68
High	60.5		
M.P Knowledge category (n=20)			
Low	29.4	13.18	1.33
High	70.6		
Ruminant feed block meal knowledge category (n=32)			
Low	44.4	9.67	1.98
High	55.6		
Overall knowledge category (N=176)			
Low	32.4	13.54	2.90
High	67.6		

Field survey, 2018

Utilisation of University of Ibadan agricultural research outputs

Data on Table 3 revealed that a little above average (55.8%) of neem extract beneficiaries had high utilisation of the research output in the study area. This is not far from the fact that beneficiaries had high knowledge and favourable attitude towards the research outputs which influenced their level of utilisation.

About 56.0% of IFS beneficiaries had high utilisation of the research output in the study area. This implies that the benefits derived from the research output influenced the level of utilisation by beneficiaries.

Also, 52.9% of MP beneficiaries had high utilisation of the agricultural research output. The plausible reason for this could be attributed to respondents' knowledge of moringa powder processing, their favourable attitude and benefits derived from the disseminated innovation.

It was further shown on Table 3 that 55.6% of the ruminant feed block beneficiaries utilised the research output in study area. This is also because they had been involved in similar agricultural enterprise before the dissemination of the research output which also influenced their utilisation in addition to the benefits derived from the research outputs. This was also confirmed by the increased number of beneficiaries trained during the dissemination of the agricultural research output.

It was also revealed on Table 3 that 55.7% of the beneficiaries had high overall utilisation while 44.3% of the beneficiaries had low overall utilisation of the disseminated research outputs from University of Ibadan. It could be deduced from the finding that most of the respondents made use of the disseminated research outputs. Beneficiaries' high level of knowledge and benefits derived from the disseminated research outputs contributed to their utilisation of U.I agricultural research outputs. This was confirmed by one of the beneficiaries during one of the FGDs that '*What motivated my utilisation of the disseminated research outputs was that it helped to generate more income, better products and had increased my skill in the agricultural enterprise as well"* (A male fish farmer from Ibadan North LGA, Oyo State).

It was evident from the result that beneficiaries' high knowledge (due to their education background), favourable attitude and benefits derived from the disseminated research outputs influenced their high utilisation of the various disseminated agricultural research outputs. This was corroborated by Saka and Lawal (2009) that farmers' level of education enhances the utilisation of improved technology as well as their innovativeness and the benefits derived from such innovation.

Table 3: Categorisation of respondents' utilisation of UI AROs

UI AROs Utilisation	F	%	Min.	Max.	Mean	SD
Neem extract utilisation category						
Low	23	44.2	5.00	32.00	13.46	4.38
High (13.46-32.0)	29	55.8				
IFS utilisation category						
Low (21.0-26.52)	19	44.2	21.00	33.00	26.53	3.21
High (26.53-33.0)	24	55.8				
MP utilisation category						
Low (15.0-18.81)	8	47.1	15.00	24.00	18.82	2.48
High (18.82-24.0)	9	52.9				
RBM utilisation category						
Low (14.0-19.51)	12	44.4	14.00	24.00	19.52	2.53
High (19.52-24.0)	15	55.6				
Overall utilisation category						
Low (5.0-20.63)	86	44.3	5.00	33.00	20.63	6.039
High (20.64-33.0)	108	55.7				

Determinants of utilisation of University of Ibadan agricultural research outputs

Multiple regression analysis (Table 4) determined the factors influencing the utilisation of University of Ibadan research outputs in the study area. The coefficient of determination, R^2 values of 0.536 indicated that 53.6% of the variations in the utilisation of University of Ibadan research outputs were explained by the independent variables included in the model. The result further reveals that utilisation of University of Ibadan research output is significantly determined by respondents' educational qualification (β=0.462), knowledge of UI research outputs (β=0.446) and scale of production (β=0.325). The significant relationship between respondents' educational qualification and utilisation of UI research outputs suggests that their educational qualification influenced their level of utilisation of UI research outputs positively. Similarly, the relationship between respondents' knowledge of UI research outputs and utilisation of UI research output implies that high knowledge of disseminated UI research outputs improved their utilisation. Likewise, the significant contribution of scale of production connotes that small scale respondents were able to utilise the disseminated research outputs than those on large scale due to utilisation of more resources.

Table 4: Determinants of UI agricultural research outputs

Factors	β	SE	Sig.	Inference
(Constant)		0.410	0.000	
Age	0.073	0.048	0.329	NS
Sex	0.123	0.772	0.061	NS
Marital status	0.103	0.501	0.830	NS
Religion	0.065	0.766	0.218	NS
Education level	0.462	1.055	0.024*	S
Household size	0.047	0.358	0.541	NS
Group participation	0.136	0.967	.607	NS
Years of experience	0.271	0.722	0.013*	S
Scale of production	0.325	0.687	0.015*	S
Extension services	0.139	2.330	0.718	NS
Access to credit facilities	0.354	0.832	.254	NS
Knowledge	0.446	0.129	0.012*	S
$R = 0.732$ $R^2=0.536$				

*= Significant at 0.05 level of significance
Field survey, 2018

Relationship between respondents' socio-economic characteristics and level of utilisation of University of Ibadan agricultural research outputs

Results in Table 5 indicated that there was a significant relationship between utilisation of University of Ibadan agricultural research outputs and the following variables at 0.05 level of significance; marital status (p=0.019); education (p=0.000), age (p=0.001); and income (r=0.019). This finding suggests that the higher the educational qualification, the more a respondent is likely to utilise the innovation output due to increase in knowledge level. Sunding and Zilberman (2001) also confirmed in a similar study that education enhances the utilisation of improved technology by

the farmers as well as their innovativeness. The finding is also in line with that of Sadati *et al,* (2009) who found out in a similar study that young beneficiaries adopt new technology faster than older ones because of their level of exposure and education which usually eventually results into improved agricultural production.

Table 5: Relationship between respondents selected socioeconomic characteristics and utilisation of agricultural research output

Socio-economic characteristics	χ^2	Df	R
Sex	3.924	1	
Marital status	5.998*	1	
Religion	5.062	2	
Education	30.693*	3	
Age			0.227*
Household size			0.102
Income			0.791*

Source: Field survey, 2018

Relationship between respondents' knowledge and utilisation of University of Ibadan agricultural research outputs

Results in Table 6 shows a significant relationship between respondents' knowledge and the utilisation of University of Ibadan research outputs ($r = 0.315$, $p < 0.05$). This result implies that respondents were quite knowledgeable of their respective agricultural enterprises before the dissemination of UI agricultural research outputs which enhanced their understanding of the research output and eventually their utilisation. Ogunsumi (2011) in a similar study affirmed that educated beneficiaries had more leverage to adoption or utilisation of new technologies due to their level of knowledge and skill acquired.

Table 6: Relationship between respondents' knowledge and utilisation of University of Ibadan agricultural research output

Variable	r-value	p-value
Knowledge vs. utilisation	0.315	0.000

Field survey, 2018

Difference between respondents' utilisation level across agricultural enterprise

Results in Table 7 reveals that there was a significant difference in the utilisation of disseminated University of Ibadan agricultural research outputs. This suggests that the level of utilisation of University of Ibadan innovation output differs across the enterprise ($F = 88.14$, $p \leq 0.05$). This is due to fact that agricultural research outputs disseminated was based on the beneficiaries' agricultural enterprise. This result is also in line with Sunding and Zilberman (2001) that farmers' utilisation of a technology differs based on their years of experience in their different agricultural enterprise, innovativeness and the benefits derived from such innovation. Howley, Donoghue and Heanue (2012) also affirmed that agricultural innovation utilisation by farmers varies depending on their understanding of the new technology and access to market.

The Duncan Multiple Range Test (DMRT) (Table 8) further revealed that the mean score of integrated farming system was statistically greater than the mean scores of other enterprises while the use of neem extract has the least mean score. This implies that respondents involved in integrated farming system utilised more of the university of Ibadan research outputs than those involved in ruminant feed block, moringa powder and the use of neem extract in the study area. High knowledge and benefits derived from the utilisation of IFS is likely responsible for its higher utilisation than other UI AROs while low utilisation of neem extract for pest control compared to others could be attributed to resistance of certain insects to neem extract application.

Table 7: Summary of analysis of variance on difference in the utilisation of University of Ibadan agricultural research outputs

Utilisation	Sum of square	Df	Mean square	F	p-value
Between group	485.19	6	808.65	88.14	0.000
Within group	2187.11	187	11.70		

Field survey, 2018

Table 8: Duncan Multiple Range Test (DMRT) showing utilisation of UI AROs

Group	1	2	3
Neem Extract	13.46		
Moringa powder		18.82	
Feed block meal		19.52	
IFS			26.53

Source: Field survey, 2018

CONCLUSION AND RECOMMENDATIONS

The study concluded that majority of the respondents were in their productive age and practiced on small scale level with low income. The most utilised source of labour was family to reduce cost of labour and they all had some years of farming and processing experience on their respective agricultural enterprises. Respondents' level of knowledge on the disseminated innovations was high which eventually influenced their utilisation level. Utilisation of agricultural research outputs were influenced by beneficiaries' level of education, knowledge and farming/processing experience. The study therefore recommends that farmers should be encouraged to improve on their level of education since it was discovered as factor to high knowledge and utilisation of disseminated agricultural technologies.

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