ANALYSIS OF AGRICULTURAL TECHNOLOGY GENERATING PRACTICES IN NORTH CENTRAL NIGERIA: A CASE STUDY OF NIGERIAN STORED PRODUCT RESEARCH INSTITUTE, ILORIN

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Abstract

Nigeria's agricultural research institutes have continued to be the weak link in Nigeria's drive to diversify the economy through the sector and make exponential gains by way of earnings, employment, and other spin-offs. This study therefore analyzed agricultural technology generating practices in Nigerian Stored Production Research Institute (NSPRI), Ilorin, Kwara state. Multistage sampling technique was used to select 57 researchers in NSPRI. Data for the study was collected through a well-structured questionnaire and analyzed with frequency counts, percentage, weighted mean score and ranking as main descriptive statistical tools, while Pearson product moment correlation (PPMC) inferential tool was used to make inference between the variables. The mean age of the researchers was 34 years, both male and female were researchers in NSPRI, all of the researchers were graduates of tertiary schools with a mean of 9 years of working experience. Technology generated based on field problem and participation of extension agents in field research trials were ranked 1st as technology generating practice available in NSPRI; improvement in quality of crop products was a major benefits derived from the technology generating practices; fund from government and grants were the major source of funds for NSPRI while poor funding and unsustainability of research findings were among the severe constraints encountered by researchers of NSPRI. Significant relationship exists between extent of funding research sources from government (r=0.406, p= 0.011); grants (r=0.313, p=0.015) and research institute (r=0.505, p=0.018) and the level of agricultural technology generating practices. This study concluded that NSPRI are generating agricultural technology practices for farmers use; hence it is recommended that sustainable funding should be made available for research institute as this will enhance food security in the country.

1. Introduction

The challenge of agricultural development to a great extent is dependent on the development of agricultural technology system and its subsequent and sustained adoption by the farmers. There is a gap between research findings and what farmers practices. The problem has been linked to: the nature of the technologies, the technological transfer system, socio-economic attributes of the farmers and local differences and peculiarities among others Ohikere and Arudi (2011). Modern farms and agricultural

operations work far differently than those a few decades ago, primarily because of advancements in technology, including sensors, devices, machines, and information technology. National Institute of Food and Agriculture NIFA (2020) revealed several benefits of agricultural technology among which includes: Higher crop productivity; decreased use of water, fertilizer, and pesticides, which in turn keeps food prices down; reduced impact on natural ecosystems; less runoff of chemicals into rivers and groundwater and increased worker safety.

Adesiji *et al.,* (2017) stated that agriculture is the primary occupation of most Nigerians from ancient time. As a main production section for foods and raw materials necessary to enhance other sectors of the nation's economy, research and technological improvements through research institutions are therefore crucial to increase agricultural production and thereby reduce poverty among farming households. The agricultural technology generating sub-system under the national agricultural research system in Nigeria consists of universities of agriculture, faculties of agriculture and veterinary medicine in other universities, international and national agricultural research institutes such as Nigerian Stored Product research Institute (NSPRI) and experimental stations that focus on specific crops (Adesiji *et al.,* 2017).

Nigerian Stored Products Research Institute is one of the Research Institutes under the supervision of Agricultural Research Council of Nigeria (ARCN) in the Federal Ministry of Agriculture and Natural Resources. The Institute was established in 1948 as West African Stored Products Research Unit (WASPRU) during the colonial era of the country to assess the quality of exportable crops from Nigeria, Ghana, Sierra Leone and Gambia to United Kingdom. It became

Nigerian Stored Products Research Institute after the independence in 1960. Since the inception of the Institute, it has been supervised by different Ministries (Nigerian Stored Products Research Institute NSPRI, 2020).

NSPRI (2020) further stated that reducing Postharvest losses by ensuring the quality, safety and availability of Agricultural Produce has been the mission of the Institute. The mandate of Institute stipulates that it shall carry out research into bulk storage problem of export commodities and local food crop and in particular it shall conduct research into: improvement and maintenance of the quality of bulk commodity crops including cocoa, groundnuts, palm produce; improvement and maintenance of the quality of local food crops including cereals, grains, pulses, tubers and any other local commodity under bulk storage; special studies such as stored products pests, pesticide formulations and residue and mycotoxin surveys; provision of advice and training of extension workers in problems associated with stored products and materials in storage structures, new insecticides, new items of equipment and techniques; and any other related matters as may be determined from time to time by the Institute.

According to International Food Policy Research Institute IFPRI (2012), development of appropriate technology and knowledge for farmers' application by the research institutes are crucial to bringing about agricultural development and food security. In this regards, research is globally geared towards the development of improved crop cultivars and breeds of livestock, applicable agro management practices and post-harvest handling.

Nigeria smallholder farmers have continued to lag behind its peers' in terms of yield per

hectare and this is owing to the inability of the agricultural research institutes in the country to provide them with the technology that would boost their productivity. Nigeria's agricultural research institutes have continued to be the weak link in Nigeria's drive to diversify the economy through the sector and make exponential gains by way of earnings, employment, and other spin-offs. The agricultural research institutes across the country are however falling grossly short in providing the technologies that would drive growth in the sector and are lagging behind smaller peer nations, where agriculture is less of a priority. Experts have attributed this to poor funding. The dream has become dead, the vision blurred and the mission a mere statement of expression as majority of the institutes are a mere shadow of themselves Okojie (2020). It is on the above premise; this study was embarked upon to analyzed the agricultural technology generating practices in NSPRI. Specifically, this study described the socioeconomic characteristics of the respondents, examined the agricultural technology generating practices in NSPRI, identified the benefits associated with the use of agricultural generating practices and investigated the constraints that hinders the use of agricultural generating practices in NSPRI.

2. Methodology
The study was carried out in Nigerian Stored Products Research Institute (NSPRI). It is located at km 3 Asa Dam road, Ilorin, Kwara State of Nigeria. The institute is comprised of four departments namely Research, Administration, Finance and Accounts, Information and Documentation. Research Department was purposively selected for this study due to the nature of this research work which deals mainly with researchers. The sixty-four (64) researchers in the departments were captured for this research work, though only 57 questionnaires were retrieved from

the respondents, hence, sample size used is 57 respondents. The dependent variable is the extent of agricultural technology generating practices. The study adapted practices used by Adesiji *et al.,* (2017). It was measured on a 3 rating scale of measurement of Always=2, Sometimes=1 and Never=0. The descriptive statistical tools used in the research work includes frequency counts, percentages and mean while Pearson product moment correlation (PPMC) was used to establish the relationship that exist between the variables.

3. Result and Discussion
3.1 Socio Economic Characteristics of the Respondents
Table 1 revealed that the mean age of the respondents was 33.9 years, an indication that researchers at NSPRI are matured and young and this expected to have effect on their versatility and dedication to work due to their agility. The Table further revealed that above average (56.1%) of the respondents were male while 43.9% were female. This result is a clear indication that both male and female worked as researchers in the institute. Majority (78.9%) of the respondents were married while 17.5% and 3.5% indicated that they were single and widowed respectively. Furthermore, the mean working experience of the respondents was revealed to be 8.8years, this is expected to have influence on the agricultural technology practices invented by the researchers.

The mean years spent in school by the researchers was revealed to be 18.7years. This result implies that majority of the respondents bagged a second degree, an indication that the researchers are knowledgeable enough to achieve the set goals of the institute.

In addition, table 1 revealed that 50.9% of the respondents were level 7 officers, 31.6% indicated level 8-10 while 17.5% of the respondent were within level 11-13. This result indicates NSPRI have researchers

across different salary structure, which is expected to contribute positively towards doing their work better. Lastly, the mean number of members in the household was revealed to be 4 members. This means respondents were of low household size.

Table 3.1: Distribution of respondents according to their socio-economic characteristics.

n=57

Socio-economic Characteristics	Frequency	Percentage	Mean
Age (years)			
≤ 30	14	24.6	33.9
31-40.	30	52.8	
41-50.	10	17.7	
51-60.	3	5.4	
Sex			
Male	32	56.1	
Female	25	43.9	
Marital status			
Single	10	17.5	
Married	45	78.9	
Widow	2	3.5	
Working experience (years)			
≤ 5	23	40.3	8.82
6-10	19	33.4	
11-15	12	21.1	
16 above	3	5.4	
Years Spent in Schooling			
≤ 18	34	59.7	18.67
19-22	21	36.9	
23-26	2	3.6	
Salary Grade/Level			
≤ 7	29	50.9	
8-10	18	31.6	
11-13	10	17.5	
Household size (perons)			
≤ 3	21	6.8	4
4-6	34	59.7	
7 above	2	3.6	

Source: Field Survey, 2022

3.2 Agricultural Technology Generating Practices
Table 2 reveals the extent of generating agricultural technology practices by researchers of NSPRI. Technology generation linked to farmers problem and Extension agents participate in field research trials were ranked first with each having weighted mean score (WMS) of 1.5. This result is an indication that agricultural technology generated by NSPRI are result oriented that are based on solving problems

identified by farmers which are the felt needs of farmers that are end users of the technology. Furthermore, participation of farmers in field research trial and technology generating activities keep pace with current field practices were both ranked 3rd with each having a WMS of 1.4. This is an indication that farmers are well carried along when generating technological practices for farmers and this implies that farmers are liable to easily assimilate and adopt the use of NSPRI generated technological practices for farming.

Lastly, distance between technology generation and technology transfer was ranked least (11th) with a WMS of 1.1. This result is an indication that the researchers of NSPRI works in collaboration with extension staff who are in charge of transferring of generated technology practices to get it transferred to the farmers for timely use. Generally, this result is an indication that NSPRI has been working to achieve the aims and objectives for which it was established.

Table 3.2: Distribution of the respondents based on level of generating various agricultural technology practices

Agricultural technology generating practices available	Always F (%)	Sometimes F (%)	Never F (%)	WMS	Rank
Independence in technology Generation	18(31.6)	32(56.1)	7(12.3)	1.2	7th
Technology generation linked to farmer problem	33(57.9)	21(36.8)	3(5.3)	1.5	1st
Farmer participate in field research trial	25(43.9)	27(47.4)	5(8.8)	1.4	3rd
Technology generating activities keep pace with current field practices	2543.9)	28(49.1)	4(7.0)	1.4	3rd
Adaptive research trials are located in farmers field	19(33.3)	34(59.6)	4(7.0)	1.3	5th
Extension agents involvement in field research trials	34(59.6)	18(31.6)	4(7.0)	1.5	1st
Adequate research facilities and incentives to workers	15(26.3)	40(70.2)	2(3.5)	1.2	7th

Distance between technology Generation & technology transfer	16(28.1)	30(52.6)	10(17.5)	1.1	11th
Formulate package of practices for technology generated	16(28.1)	30(52.6)	8(14.0)	1.2	7th
Generate audio visual aids	21(36.8)	31(54.4)	3(5.3)	1.3	5th
Co–finance adaptive research	4(7.0)	38(66.7)	11(19.3)	1.2	7th

Source: Field survey, 2022
WMS: Weighted Mean Score
( ) Percentage   F: Frequency

3.3 Benefits of Agricultural Technologies Generated

Table 3 reveals the benefits to be derived from the agricultural technologies generated by NSPRI in the study area. Almost all (96.5%) of the respondents indicated promotion of quality of crop product as benefit derived from agricultural technologies generated; 94.7% indicated both reduction in harvest/post-harvest loss and create employment opportunity; 93.0% indicated increase in food production; 89.5% indicated both ease of stress and increase in storage life span of farm product while 87.7% and 84.2% indicated increase in yield for farmers and increase on crop production as benefits derived from agricultural technologies generated by NSPRI.

In addition, majority (77.2%) and 47.4% of the respondents indicated farm cost reduction and promote early maturity as benefits derived from agricultural technologies generated while only 1.8% of the respondents indicated increase in food security and promotion of national gross domestic products (GDP). This result is an indication that agricultural generated technologies has contributed to the general well-being of farmers and development of agricultural production in the country.

Table 3.3: Distribution of the respondents by the benefits associated with the use of Agriculture Generating Practice

Benefits of Agricultural Technologies Practices*	Frequency	Percentage
Increase yield for farmers	50	87.7
Reduction in harvest/post-harvest loss	54	94.7
Increase crop production	48	84.2

Promote early maturity	27	47.4
Ease stress	51	89.5
Increase in food production	53	93.0
Create employment opportunity	54	94.7
Farm cost reduction benefit	44	77.2
Increase storage life span	51	89.5
Promote quality of crop product	55	96.5
Increase food security	1	1.8
Promote national GDP	1	1.8

Source: Field survey, 2022.
*: Multiple response

3.4 Constraints hindering agricultural technology generating practices

Result in table 5 reveals the constraints hindering agricultural technology generating practices in NSPRI. The result reveals that poor funding and sustainability of research were ranked 1st and 2nd with each having a weighted mean score (WMS) of 1.6 and 1.5 respectively while inadequate equipment laboratory facilities and poor training opportunities were both ranked 3rd with a WMS of 1.4. This result is an indication that NSPRI as a research institute does not have adequate financial capability to optimally achieve the set goals and objectives.

Furthermore, poor motivation by the university/agency and inefficient standardization by standard organization of Nigeria were ranked 5th and 6th with weighted mean score of 1.3 and 1.0 respectively while lack of staff commitment, inadequate skilled personnel and unclear outline of researchers function were all ranked 7th with each having a WMS of 0.7. This is an indication that efficient collaboration is lacking in NSPRI and fellow research institute, agency and the tertiary education community, though they were regarded as mild constraints

Lastly, overlapping mandate/objective was ranked least (10th) with a WMS of 0.6. This result implies that NSPRI have its clearly stated objective which does not pose serious threat to the smooth running of the institute in conjunction with other research institute in the country.

Table3.4:   **Distribution of respondent according to the constraints hindering Agricultural Technology generating practices**

Constraints hindering agricultural technology generating practice	Severe F (%)	Mild F (%)	Not a constraint F (%)	WMS	Rank
Poor funding	40(70.2)	13(22.8)	4(7.0)	1.6	1st
Inadequate equipment laboratory facilities	22(38.6)	34(59.6)	1(1.8)	1.4	3rd
Lack of staff commitment	6(10.5)	30(52.6)	21(36.8)	0.7	7th
Over lapping mandate/objective	4(7.0)	25(43.9)	28(49.1)	0.6	10th
Inadequate skilled personnel or work force	5(8.8)	29(50.9)	23(40.4)	0.7	7th
Unclear outline of researchers function	5(8.8)	30(52.6)	22(38.6)	0.7	7th
Poor training opportunities	27(47.4)	23(40.4)	7(12.3)	1.4	3rd
Poor motivation by the University/agency	23(40.4)	29(50.9)	5(8.8)	1.3	5th
Inefficient standardization by standard organization of Nigeria	11(19.3)	37(64.9)	9(15.8)	1.0	6th
Sustainability of technology	33(57.9)	22(38.6)	2(3.5)	1.5	2nd

Source: Field survey, 2022
WMS: Weighted Mean Score
F: Frequency

%: Percentage

3.5 Pearson correlation analysis showing the relationship between extent of funding research sources and level of agricultural technology generating practices.

Pearson's Product Moment Correlation analysis revealed that there is significant relationship between extent of funding research sources from government (r=0.406, p= 0.011); grants (r=0.313, p=0.015) and research institute (r=0.505, p=0.018) and the level of agricultural technology generating practices. This implies that availability of funds from government and non-government organizations influenced the researchers to explore more towards increasing generation of agricultural technology practices which consequently tends to improve agricultural productivity.

Table 3.5:   Pearson correlation analysis showing the correlation between extent of source of funding and level of technology generating practices.

Variables	r(Correlation co-efficient)	P-value	Remarks
Government	0.407 *	0.011	Significant
Grant	0.313*	0.015	Significant
Loan	-0.077	0.557	Not significant
Support from farmers	-0.039	0.770	Not significant
Personal funding	-0.126	0.336	Not significant
Research institute	0.505*	0.018	Significant

Source: Computed data, 2022

Significant level: Correlation is significant at the 0.05 level (2-tailed)

Conclusion and Recommendations

This study analysed the agricultural technology generating practices of NSPRI and it was revealed that technology were generated based on field problem and participation of extension agents on field research trials with promotion of quality of crop produce widely indicated by the researchers as benefit derived from the agricultural generating technology practices. Poor funding was indicated as the most severe constraints encountered by researchers of NSPRI, hence the study recommended that sustainable funding should be make available for research institute with worthy remuneration for researchers to keep them motivated at work for the demanding job they do.

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