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Factors Influencing Dissemination of Research Outputs to Utilisers among Agricultural Research Institutes in Oyo State Nigeria

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Abstract

The study assessed factors influencing the Dissemination of Research Outputs (DoRO) among agricultural research institutes in Oyo state. Random sampling was used to select 150 respondents from whom data were collected using a structured questionnaire. Data were analysed using percentages, mean and, principal component analysis. Research outputs generated and disseminated include F3 (80.6%) and TC4 (72.2%) cocoa variety (CRIN); Soybean (100.0%), castor seed (90.9%) and rice (63.6%) (NCRI); Vitamin A cassava (100.0%), TMES (100.0%), TMS13F41343P0022 (90.5%) (IITA), rabbit (76.2%), mushroom (71.4%), cane-rat (61.9%) (FRIN). Level of DoRO among researchers was low (53.3%) due to inadequate funding ($\bar{X}$ =1.47), weak linkage among stakeholders ($\bar{X}$ =1.36) and irregular power supply ($\bar{X}$ =1.15). Funding (0.629), weak linkages (0.583), awareness level of end users (0.675) and corrupt practices (0.717) were factors associated with DoRO. Economic, technical, operational, social and external factors were associated with dissemination of research outputs in Oyo state. Transparency in funding and strong linkage between researchers and extension unit of research institutes should be strengthening.
Keywords: *Agricultural research output generation, research output dissemination, agricultural research institute*

Introduction

Globally, agriculture has been identified as a key sector for poverty reduction, and food security and can contribute to mitigating climate change and preserving natural

resources through the adoption of sustainable farming practices (FAO, 2020). However, the role of research institutions in sustainable agricultural production remains very pertinent. Research institutions play a critical role in generating high-quality agricultural output for uptake by farmers to increase agricultural productivity, increase economic growth, combat poverty, and promote food security (Adekoya, 2020; Berhanu, & Debele, 2019). Research is not completed or useful until its outcome is utilised by farmers for increased production, increased income and general standard of living of the farmers as well as economic development.

Gassner et al (2019) stated that the willingness of farmers to make use of recent innovations for their agricultural production will help improve their livelihood through increased yield and income thereby reducing poverty drastically especially among rural farmers. Hence, adequate and reliable innovation that will help to increase agricultural activities in all ramifications becomes imperative. The realisation of that by the Nigeria Government has led to the establishment of many agricultural research institutes such as the Cocoa Research Institute of Nigeria (CRIN), Forest Research Institute of Nigeria (FRIN), International Livestock Research Institute (ILRI), Nigerian Institute for Oil palm Research (NIFOR), National Institute for Horticultural Research (NIHORT), National Cereal Research Institute(NCRI), Rubber Research Institute of Nigeria, International Institute for Tropical Agriculture (IITA).

These research institutes have the common mandate of improving the existing variety of crops and breeds of animals (Takeshima et al., 2022; Yahaya, 2020). It also includes reducing the gestation period, developing new varieties through cross-breeding or creating new ones. For instance, the formal mandate of CRIN is Genetic improvement, production and local utilisation of research on cocoa, cashew, kola, coffee and tea, FRIN researches all aspects of forestry, forest products utilization and wildlife. ILRI focused on sustainably intensifying livestock production systems through innovative livestock practices thereby improving productivity, food security and nutrition. NIFOR researches into genetic improvement, production and processing of oil, coconut, date, raphia and ornamental palms while NCRI's mandate is genetic improvement and production of rice, soybean, benniseed, sugarcane and improvement of productivity of entire farming system to mention few. All research activities are targeted at increasing agricultural production to meet the demand of the populace from agricultural sector (Izuogu et al 2023). Within research institutes are extension units with the responsibility of disseminating the research output to the end users i.e. the farmers and rural dwellers. Furthermore, for the impact of the research to be felt by the farmers, as well as the populace in terms of increasing agricultural production access to agricultural information dissemination is key.

Meanwhile, research institute generates a pool of research outputs on a regular basis and there has been a rise in agricultural research activities in Nigerian universities and agricultural research institutes within the past few decades which are yet to be effectively utilized. Most of the research outputs generated oftentimes end in journals and publications for the promotion of researchers. Some research outputs are even lying fallow on researchers' shelves without making the desired impact on the end-users and the immediate community for necessary development.

Despite the presence of an extension unit within the research institute, the impacts of these research activities are not felt. Some end users are not aware of these research

activities; those that are aware do not have access, including the extension unit of the research institutions that have a mandate to do the dissemination. In addition, there are little or no empirical studies that have documented the research outputs generated and disseminated by these research institutes in Oyo state being a home to some agricultural research institutes, hence, the need to fill this gap. Specifically, the objectives of the study were to: i) identify type of agricultural research outputs being generated and disseminated; ii) ascertain factors limiting research outputs dissemination; and iii) ascertain constraints being faced in the dissemination of the research outputs.

Methodology

The study was carried out in Oyo State, Nigeria. Oyo state lies between latitudes 7^0 31 and 21 north and longitudes 2^0 471 and 4^0 231 east of the meridian. Oyo State is located in the South West geopolitical zone of Nigeria. The study population comprised of all researchers in research institutes in Oyo state. Purposive sampling technique was used to select all agricultural research institutes in Oyo state. The research institutes are: International Institute of Tropical Agriculture (IITA), Cocoa Research Institute (CRIN), Forest Research Institute (FRIN), National Institute of Horticulture (NIHORT) and National Cereal Research Institute (NCRI). Random sampling technique was used to select proportionate to size 30% of researchers (590) (IITA =150 CRIN =135, FRIN =125, NIHORT=137, NCRI= 43) across the selected research institutes which gave a total of 178 (IITA = 45, CRIN = 41, FRIN= 38, NIHORT = 41, NCRI = 13) respondents that made up sample size for the study. However, a total of 150 instruments were retrieved. Data was collected using a structured questionnaire. Principal component analysis model was used in estimating factors associated with research output dissemination. Principal components were selected based on their eigenvalues. The first principal component accounts for the largest variance in the data, followed by the second, and so on. A cutoff point was used to determine the number of principal components to retain. In this study, a cutoff point of 0.5 was applied. This means that components with eigenvalues less than 0.5 were considered to contribute insignificantly to the total variance and were excluded. Factor loadings, which indicate the correlation between the original variables and the principal components, were examined. Variables with high loadings on a principal component were identified as key factors influencing research output dissemination.

Results and Discussion

Types of agricultural research outputs generated and disseminated by research institutes

Table 1 indicates that F3 cocoa variety, (80.6%), CRIN body cream (80.6%), CRIN hair cream (77.8%), TC4 cocoa variety (72.2%) were the major research outputs generated and disseminated by CRIN. The table further reveals that soybean (100.0%), castor seed (90.9%), Benni seed (63.6%) and Rice (63.6%) were prominent research outputs generated and disseminated by NCRI. For IITA, Vitamin A cassava (100.0%), TMES (100.0%), TMS13F41343P0022 (90.5%) cassava varieties and cassava flakes (81.0%) were research output generated. Furthermore, rabbit (76.2%), mushroom (71.4%), cane rat (61.9%) and Shea butter (61.9%) were the agricultural research outputs generated and disseminated by FRIN. Table 1 also shows that ginger

powder (97.5%), turmeric powder (95.0%), citrus hybrids (90.0%) mushroom (65.0%), and pineapple (60.0%) were the major research output generated and disseminated by NIHORT. It can be deduced from the results that the various research institutions have come up with several research outputs based on their mandates. It also suggests that the research institutes are using the resources within their reach to develop and disseminate the respective research outputs to the target groups. This finding agrees with Elebute, Oyewopo, and Afolabi (2019) who stated that agricultural institutes in Nigeria are operating within the scope of their intended mandates, while some have ventured beyond their mandates.

Table 1: Agricultural research output generated and disseminated

Research outputs	Yes (%)
CRIN (n= 36)	
F3	80.6
TC4	72.2
CRIN chocolate	83.3
Cocoa bread	80.6
Cocoa garri	36.1
CRIN body cream	80.6
CRIN hair cream	77.8
Cashew wine	30.6
Cashew juice	33.3
Kola wine	22.2
Green tea	19.4
NCRI (n= 11)	
Acha	36.4
Beeni seed	63.6
Sugar cane	63.6
Soyabean	90.9
Castor seed	100.0
Rice	63.6
Stevia	54.5
IITA (n = 42)	
Vitamin A cassava	100.0
IBA 101797: poundable	57.1
Titbit	59.5
Tapioca	71.4
Cassava flakes	81.0
TME419	100.0
IBA00070	64.3
TMS13F41343P0022	90.5
FRIN (n = 21)	
Cane rat	61.9
Rabbit	76.2
Shea butter	61.9
Mushroom	71.4
NIHORT (n= 40)	
Citrus hybrid	90.0
Mushroom	65.0
Pineapple	60.0
Turmeric powder	95.0
Ginger powder	97.5

Source: Field Survey, 2023

Factors Influencing Agricultural Research Output Dissemination

Table 2 shows the factors militating against agricultural research output dissemination in the study area. Using varimax rotation method, the interrelationships among multiple variables were grouped into five distinct factor loadings (Factor 1= economic, Factor 2= technical, Factor 3= operational, Factor 4= socio-cultural, Factor 5= external) Each factor represents a cluster of related variables that together explain a significant portion of the variance in research output dissemination.

Specific factors associated with research output dissemination as economic factor includes funding (0.629), cost of technology (0.536) and staff remuneration (0.518). Funding has the highest loading among the economic factors which suggests that funding plays a significant impact on the dissemination of research outputs by agricultural research institutes. With additional funding, researchers in the institutes may release the output to the extension unit for onward dissemination and also increase the number of staff dedicated to research dissemination. Additionally, funding could be used to provide more support in networking with external partners, such as universities and other research institutes, to support collaboration and knowledge sharing. Furthermore, funding could be used to cover the costs of publishing research findings, hire communication specialists, and support public engagement activities. On the other hand, limited funding may affect the availability and efficiency of the communication channels required for disseminating research outputs. As a result, research output dissemination may become limited or inefficient, making it difficult to share with the end users. This result corroborates the findings of Ohaeri, et al. (2023) that funding is the primary factor which holds back research development and its implementation in Nigeria. The authors further posited that lack of funding has impeded the renovation of infrastructure, the acquisition of equipment and machines, and the recruitment of qualified personnel, ultimately rendering research work less meaningful relative to the needs of research institutes.

The cost of technology also ranks high among the economic factors associated with research output dissemination. The high cost of technology could pose an obstacle to research output dissemination, as agricultural research institutes may be unable to afford the necessary equipment or services. In this case, the research output may not be as widely disseminated, which could hinder the impact of the research.

Staff remuneration also constitutes one of the economic factors associated with research output dissemination. This suggests that a low salary could also create a feeling of dissatisfaction among the staff leading to low motivation and discouragement to do their job and hence reduced research output dissemination.

Factors that loaded high as technical factors were research extension linkage (0.583) and technical know-how (0.551). Analysis of the responses indicated that research-extension-farmer linkage ranks first among the technical factors. Without proper linkage between research and extension, advancements in agricultural research may not be effectively disseminated to the farming community, which can lead to an inadequate understanding of new technologies and crop management practices. This may have a negative impact on farm output and profitability. It may also limit the uptake of technologies developed by the research institutes, reducing the potential to increase the agricultural productivity of farmers. This in turn could lead to decreased food security, lower incomes for farmers, and increased poverty. Mapiye, et al (2021) noted that without proper linkage with agricultural extension professionals to bridge the gap

between the research institutes and farmers, the access and use of research outputs remains difficult. The issue of technical- know-how as identified by the respondents suggests that it could be used to build and implement searchable databases for agricultural research as well as create platforms for researchers to collaborate and share their research outputs with each other.

Communication channels (0.621), organizational mandates/goal (0.557) and availability of researchers (0.550) loaded on operational factors. Communication channels play an important role in the dissemination of agricultural research outputs in research institutes. Usman, Samaila, Binyamin, Abdullahi, Esther & Mustafa (2021) observed that effective communication allows researchers to spread their research results, discuss new ideas, and distribute their research achievements in a manner that fits their target group and yields a beneficial result for society. When research institutes effectively use various communication channels, including traditional methods such as print materials, conferences and webinars, and modern media such as social media, they could expand the reach of their research outputs and inform decision-makers more quickly and effectively about potential policy implications or solutions. This could help to drive progress in the field and promote the development of the agricultural sector. This corroborates Gunn, Amerson, Adkisson & Haxel (2022) who stated that researchers often synthesize information and communicate findings through multiple channels such as publications, webinars, presentations, and social media, which provides an opportunity to increase the reach of the research in an effective manner. On the other hand, the availability of researchers plays important role in the dissemination of agricultural research outputs. When researchers are available, they may actively engage with collaborators and stakeholders, both within and outside the research institutes.

Table 2 shows that the social-cultural factors militating against agricultural research output dissemination include: the awareness level of end users (0.675), cultural factors (0.670), acceptability of research output (0.636), and accessibility of research outputs (0.558). It can be inferred that sociocultural factors play a significant role in the dissemination of agricultural research outputs in agricultural research institutes. High scores on awareness level of end users, cultural factors, acceptability of research output, and accessibility of research outputs suggest that these considerations must be taken into account to facilitate the effective dissemination of agricultural research outputs. Cultural factors must also be taken into account, as research findings that are not accepted by the end-users culture will unlikely to be successfully disseminated and utilised. This finding is in agreement with the findings of Gunn, et al. (2022) that sociocultural considerations can impede or hinder the adoption and acceptance of innovation diffusion.

The Table further reveals corruption (0.717), timeliness (0.578) and environmental factors (0.516) as external factors militating against agricultural research output dissemination. The timeliness of the research results and the potential applications of the results may affect how quickly the research is disseminated. Corruption creates an environment that may make it difficult for research institutes to adequately get their research to the public. Finally, environmental factors can be an important factor in economic activities related to agriculture, such as crop production, and these climatic and environmental conditions can influence how widely available and effective agricultural research outputs or innovations can be disseminated.

This result is consistent with Ogunode & Ade (2023), who stated that corruption can negatively influence the quality and quantity of research produced, as well as limit access to updated equipment, infrastructure, and facilities for conducting research in public research institutes.

Table 2: Factors influencing agricultural research output dissemination by respondents

	(1)	(2)	(3)	(4)	(5)
Research, extension and farmer linkage	0.067	**0.583**	0.134	0.338	0.409
Accessibility of research output	0.394	0.107	0.022	**0.558**	0.067
Timeliness	0.335	0.245	0.051	0.251	**0.578**
Funding	**0.629**	0.299	0.364	0.151	0.008
Communication channels	0.433	0.382	**0.557**	0.188	0.143
Corrupt government	0.316	0.401	0.231	0.061	**0.717**
Availability of researchers	0.415	0.326	**0.550**	0.153	0.252
Planning	0.171	0.338	**0.511**	0.357	0.285
Cost of technology	**0.536**	0.324	0.088	0.308	0.403
Staff remuneration	**0.518**	0.037	0.164	0.210	0.288
Acceptability of research output	0.364	0.034	0.007	**0.636**	0.338
Technical know-how	0.294	**0.551**	0.255	0.058	0.433
Organizational goals	0.321	0.208	**0.621**	0.330	0.429
Environmental factors	0.115	0.435	0.169	0.148	**0.516**
Cultural factors	0.401	0.370	0.068	**0.670**	0.216
Awareness level of end users	0.378	0.010	*0.*277	**0.675**	0.058

KMO index = 0.873; Bartletts Sphericity =0.0001 Source: Field Survey, 2023

Constraints faced in the dissemination of research output

The results in Table 3 show that the constraints faced in the dissemination of research output include: inadequate funding with a mean score of 1.47, weak linkage between research institutes, extension agents, industries and farmers ($\bar{x}$ =1.36) and irregular power supply ($\bar{X}$ =1.15). Other constraints faced by researchers in the dissemination of research outputs include incessant strikes in research institutes ($\bar{X}$ =1.01), poor infrastructural development ($\bar{x}$ =1.00) and poor motivation ($\bar{X}$ =0.77). It can be inferred that inadequate funding may make it difficult to carry out research, as there may be insufficient resources to pay staff, fund research trips and purchase necessary equipment. Furthermore, poor infrastructure may be a greater issue due to lack of sufficient funding to improve roads, power supply and other necessary structures. In addition, inadequate funding will likely lead to lower motivation among researchers, as there will be less incentive to be involved in research projects without financial gain. Ohaeri, et al. (2023) had earlier observed agricultural research institutes in Nigeria are bedevilled with the challenge of inadequate funding as it affects the amount and quality of research conducted.

Also, the weak linkage between research institutes, extension agents, industries and farmers may affect the dissemination of research outputs. Extension agents are

responsible for bridging the gap between research and farmers. They act as a conduit for transferring the knowledge and expertise of research institutions and industries to the farmers. Without the help of extension agents, valuable research outputs would not reach the end users. Lack of connection between research institutes, extension agents, industries and farmers can also lead to missed opportunities for farmers, as they are not receiving the information and advice they need to succeed. It can also lead to inefficiencies in the agricultural sector as the latest knowledge and technology will not be available to all actors. This result corroborates Voh Jr (2017) who stated that weak linkage between research institutes, extension agents, industries and farmers hamper the dissemination of research outputs and poses a negative impact on the agricultural sector.

Table 3: Constraints faced by respondents in dissemination of research output

Constraints faced in dissemination of the research output	Mean	SD
Poor access to internet connectivity	0.37	0.59
Inadequate remuneration	0.58	0.74
Poor motivation	0.77	0.79
Inadequate funding	1.47	0.61
Incessant strikes in research institute	1.01	0.68
Poor infrastructural development	1.00	0.73
Weak linkage between research institutes, extension agents, industries and farmers	1.36	0.60
Irregular power supply	1.15	0.75
inadequate communication channels	0.55	0.66
Conflicting expectations from research by various end-users group	0.49	0.53
Lack of knowledge management policies	0.61	0.67

Source: Field Survey, 2023

Conclusion and Recommendations

Economic, technical, operational, social and external factors were factors influencing dissemination of agricultural research outputs in the research institutes. Specifically, funding, research- extension-farmers linkage, communication channels and awareness of end users, cultural factors, acceptability and accessibility of research outputs were the primary influencing factors. Researchers were also faced with challenges such as inadequate funding, weak linkage between research institutes, extension agents, industries and farmers and irregular power supply which will make the dissemination of research outputs very difficult to be effectively communicated to the intended target audience.

Government should ensure greater transparency in the funding of research institutes. This would help to eliminate funds diversion or embezzlement for non-research purposes. Research institutes should utilize and support extension personnel, and leverage on the various communication channels available. This would ensure that research outputs are disseminated effectively.

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