

Contributions of Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria to the Dissemination of Agricultural Information: A Bibliometric Analysis

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Publication Date: December 10th 2015

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Abstract

Research output from Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria were analyzed using bibliometric methods to ascertain contributions and the media used for dissemination of agricultural information. The objective is to find out the number of articles the complex has contributed over a period of eleven years (2002 – 2012); determine the research output formats serving as courier for the dispersion of agricultural information; determine the contributions made by each unit of the complex and to see which nature of collaboration dominated the space of contributions. The findings revealed that a total of 1137 articles were published and contributed to different agricultural information domain and journals dominated the research output formats (56.46%). Nature of collaboration in the complex revealed four regimes; however internal collaboration persisted (54.96%). In conclusion, faculty members of the six units contribute to the information base and growth of agriculture, but at varied capacities. The maintenance and sustenance of the numerous couriers were recommended because of the stakeholders they serve and capacities to achieve effective and efficient dispersion of research output. Periodic assessment should be tied to a reward system to boost individuals as well as unit's performance, while at the same time ensuring that a platform is operated to encourage participation in research activities. Though collaboration is internal, it is should be intra- and cross-disciplines to produce specialized information, ensure contributions from diversified opinions, making research visible, reduce duplication of research efforts and waste of scarce resources.

Keywords: agricultural information, bibliometrics analysis, veterinary complex, journals, research output

Introduction

Agricultural institutions are essential for increased agricultural productivity and overall processes of agricultural and economic development (Abalu, 2001; Olufalaji, 2009). According to Abalu (2001) properly functioning agricultural institutions effectively integrate, transfer research-induced technology to farmers and measure agricultural research benefits to society. Therefore to score the benefits of agricultural institutes, it is necessary to evaluate their research contributions.

Agricultural activities in Nigeria are supported by established National Agricultural Research Systems (NARS). NARS mitigates all earlier arrays of agricultural schemes and policies in Nigeria that generally tended to support only increased production of commodities in the country. Recent ones include River Basin Development Authorities (RBDAs) for the purpose of harnessing water resources for farmers throughout the country and Agricultural Development Programs (ADPs) in all states of the federation to help organize farmers into more productive agriculture through the provision of modern inputs. The most recognized NARS are the National Agricultural Research Institutes (NARIs), Faculties of Agriculture and

Veterinary Medicines whose mandates are to undertake novel researches on crops and animals spanning across the different and unique ecological zones of the country. According to Bukar, Adamu and Bakshi (1997) there are about 18 National Agricultural Research Institutes (NARIs) in Nigeria. In addition, there are about twenty three (23) agriculture and veterinary faculties to ensure the survival of science and technology. Evaluating their performance can strengthen agricultural research and development, outcomes can influence effectiveness of disseminated findings by addressing the documented plights of agricultural stakeholders.

Evaluating agricultural research is topical, diversified and relatively perceived because of its attributes and application. Many agreed that evaluation should be done using a veritable tool that is sufficient to record, communicate results and undisputable when used for decision making. For instance, Pendlebury (2009) reported quantitative analysis as a popular tool used for scientific evaluation studies because it supports counting, comparing quantities and analyzing measurements. Specifically for scholarship evaluation, Pendlebury recommended the application of bibliometric analysis to be able to reveal

extent of research output, trends of research activities, preferences and nature of literature produced. This explains why bibliometric principles have become the metric of social, economic and academic relevance, and is universally acceptable metric for university ranking, it results enhances the accessibility and visibility of publications in both content and context and reveals the interoperation ability and relationships of research collaborations.

Background Information on Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria

Ahmadu Bello University, Zaria has one of the largest agricultural programmes in Nigeria. The programmes have been grouped and situated in six different locations. The six combined are referred to as the Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria because of their very close integration, opportunities and the believe that their partnership will lower cost of investments in agriculture, influence policies to bring forth better technological breakthrough and bringing together key players along the value chain (researchers, extension agents, farmers, students, policy makers or the private sector). Three of them assume the status of institutions, one College of Agriculture and

two faculties. These six are: Institute for Agricultural Research (IAR), Division of Agricultural Colleges (DAC), National Animal Production and Research Institute (NAPRI), Faculty of Agriculture (FOA), National Agricultural Extension and Research Liaison Services (NAERLS) and The Faculty of Veterinary Medicine and Teaching Hospital (FVM&TH).

Although each member of the complex has its own mandate, their collective mandate include mediating within the regional structures in cooperation with Ministries of Agriculture, agricultural stations within and outside the country aimed at facilitating training of scientists, academics, agriculture and veterinary officers while at the same time undertaking and implementing research programmes under close supervision and collaboration with universities, private, national and international donor agencies.

The complex objectives to farmers remain to educate, sensitize and update them on improved innovations and technologies capable of increasing their income, welfare and productivity levels through reduction of yield loss and realizing the national objective of self-reliance and sufficiency in food and raw materials. Describing the complex characteristic, Ibrahim (1997/98)

reported that the researchers participate in teaching, research and supervision in the Faculties of Agriculture, Veterinary Medicine and the College of Agriculture. The complex offer specialized programmes/services leading to the award of certificates, diplomas and degrees in agriculture and veterinary sciences by the two faculties and a college. The complex staff are either of the agricultural research institutes (institute based), or colleges, Faculties of Agriculture and Veterinary Sciences (university-based). Although funded separately, the six entities function in very close association with each other and share the teaching, supervision, research, extension and community service responsibilities, which is responsible for the efficient use of resources and avoidance of unnecessary staff duplication.

The IAR was established in 1922 as the headquarters of the defunct Department of Agriculture of the Northern Provinces, which was transferred to Ahmadu Bello University in 1962. IAR is mandated to undertake research activities on the genetic improvement of sorghum, groundnut, cowpea, cotton, sunflower, castor and Artemisia. IAR mandated to specifically addresses the problems of their agronomy, adaptation of improved varieties,

development and testing of pest and disease control measures, farming systems into production systems, socio-economic problems of agricultural production, soil fertility and soil stabilization in the broad ecological zone covered by Jigawa, Kaduna, Kano, Katsina, Kebbi and Zamafara States (IAR, 1996; Ado, 2006).

The Division of Agricultural Colleges is an amalgamation of Maigana farm training centre, the Livestock Services Training Centre, Mando Road, Kaduna and the Horticulture School at Kabba. These three centres were in 1968 transferred to Ahmadu Bello University by the Interim Common Services (ICSA) and thereafter governed as a Division by two major policy making bodies; Board of Governors and the Professional and Academic Board. The Board of Governors formulates the overall policy guidelines for the Division while the Professional and Academic Board with the Director serving as its chairman directs the Professional and Academic work of the Division. In 1977, the Division was gazetted as a national middle manpower training institute and incorporated under NUC as an inter-university centre while its Academic programmes are being regulated by National Board for Technical Education (NBTE) with three levels of training offered (Certificate,

the National Diploma (ND) and Higher National Diploma (HND)) (Rabiu, 2012).

The Faculty of Agriculture (FOA) was established in October 1962 as one of the six pioneer faculties of Ahmadu Bello University, Zaria (Anonymous, 1987). Faculty of Veterinary Medicine was established in 1964 to train Veterinary Doctors with the sound knowledge of modern veterinary medicine and capable of teaching, treating and preventing livestock pests and diseases, ascertaining unfit livestock for human consumption with special impacts on the local tropical environmental conditions. The establishment of a veterinary teaching hospital to provide teaching in clinics and also service to the surrounding community was actualized in 1986 (Anonymous, 1987).

National Agricultural Extension and Research Liaison Services (NAERLS) was established in 1975 as a separate organization within the Agricultural complex of Ahmadu Bello University to develop, collate, evaluate, disseminate agricultural technologies and conduct research in agricultural extension methodologies and policy; and provide leadership in capacity building of stakeholders to meet the present and future

agricultural developmental challenges of the country.

However, to effectively discharge its functions of coordinating the overall planning and development of extension liaison activities throughout the country, NAERLS established 5 zonal offices located in each of the five (5) coordinating research institutes that comprise National Root Crop Research Institute, Umudike; Institute of Agricultural Research and Training, Ibadan; National Cereals Research Institute, Badeggi; Lake Chad Research Institute, Maiduguri, and Institute for Agricultural Research, Zaria, divided into extension, monitoring and evaluation. The centre has a total of 42 research/academic staff (Ekoja, 2003, NAERLS, 2011).

National Animal Production Research Institute (NAPRI) was established in 1927 and called the Shika Ranch as a research station under the Department of Agriculture of the then Northern Province. In 1954, the station became the research base of animal and pasture of the Agriculture Research Division and continued as a Sub-station of IAR until 1975 when it became by Act of law, an autonomous research institute called NAPRI. NAPRI like other institutes consist of researchers from different professional

disciplines all working in programmes to ensure that agriculture is developed and sustained (ABU MIS, 2013).

Statement of Problem

Agriculture depends on shared experiences, documented or passed orally. However, it has become a concern that with the huge spending on agricultural research, the contributions of scholars to the dissemination of agricultural information and development have not been evaluated. This has created an enormous gap that is sufficient to deter the actualization of food security, additional employment opportunities and becoming self-reliant. For instance, the work of Ibrahim (1997/98) focused on quantitative analysis of current scientific research and productivity of IAR and NAPRI, Akobi (2006) studied the importance of the essential electronic agricultural library to researchers of Faculty of Agriculture. Okanlawon (2010) looked at the citation of core agricultural journals. What then are the contributions made to the information base from research undertaken in the fields (farmers' fields) and on-stations, aimed at increasing agricultural productivity and overall processes of agricultural and economic development? This is the crux of this study. This study focused on the research contributions of the

faculty members of the Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria to the development of agriculture.

Objectives

The broad objective of this study was to examine the contributions of Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria to the dissemination of agricultural information. However, the specific objectives of this study comprise:

1. Determine the research output formats serving as courier for information dissemination.
2. Determine the number of articles contributing to the agricultural database in the complex over a period of eleven years (2002 – 2012);
3. Determine the contributions made by each unit of the complex and
4. Determine the dominating number of contributing authors on the articles published by members from 2002 to 2012.

Literature Review

Wardikar and Gudadhe (2013) noted that publications constitute the most important form of communication in nearly all academic research, making scientific information publically available and allow

the rest of the academic audience to evaluate the quality of the research. Through published findings, researchers gain recognition and become identified with scientific results. McBurney and Novak (2002) gave the most popular research output formats to include books, journals, conference papers, newsletters, magazines, bulletins, technical reports and monographs, and others they categorized under miscellaneous papers.

According to Ligthelm and Koekemoer (2009), writing and publishing of research constitute an integral part of academic life and extending the frontier of knowledge and the choice of research output format may be attributable to target audience and message to be disseminated. For instance, newsletters which are normally four to eight pages, present notices of activities, recent publications, opportunities and upcoming events aimed at providing quick access to information resources. On the other hand, journal pages ranges from 30 pages and above, highlight innovative programmes and publications on critical topical issues and trends in a field of knowledge and contains articles that provide syntheses of research works, overview and reviews. Bulletin that is between 4 – 32 pages in length describes statistics, research,

training, technical assistance and also profile model programmes on a field of knowledge, which may be updated annually depending on the subject or as a part of a special series. Reports describe comprehensive research and evaluation findings. They provide detailed descriptions of innovations implemented at local, state and national levels, which can be case studies, field studies and other strategies used for assessing programme success.

Bird and Bird (1999) observed that refereed journals are the foundation of scientific communications, broadening the research base upon which a scientific discipline is built. Similarly, Xiao and Smith (2006) note that academic journals play significant role in academic scholarship and this is why Zhang (2007) revealed that, on the international relevance and relation research, journal has an overwhelming dominance as reference sources. The influence of publications on research output is based on what is core to a subject field and medium of publication. Core publications are perceived by several authors centred on content and audience. According to van Raan and Leeuwen, (2002), core publications play important role in scholarship communication. Commenting on core Nigerian biomedical science

resources, Nwagu (2007) categorically stated that these indices enable the examination of the growth of literature, which is also an indicator of the growth of science in Nigeria.

Author productivity in research as noted by Creswell (1986) connotes the total research output made by an author within a given period of time. Accordingly, Millar and Senker (2000) state that a universal quantification approach to measuring research productivity was to count the number of books, articles, technical reports, bulletins, and books reviews published, as well as presentations given and grants received through reviewing curriculum vitae or other print materials. Oloruntoba and Ajayi (2006) observed that research publication in the university is a major or most significant quantitative indicator of academic staff productivity, and that research attainment is determined by the number of published articles in refereed journals, number of contributors and conference proceedings of repute.

Creswell (1986) argue that quantitative research productivity includes number of research publications in professional journals and in conference proceedings, number of books or chapters in books, gathering and analyzing original

evidence, working with postgraduate students on dissertations and class projects, number of patents and licenses, monographs, technical reports, number of developed experimental designs, engaging in public debates and commentaries by scholars. The pivotal role of author productivity and research output of the Faculties of Agriculture, Veterinary Medicine and College of Agriculture in Nigeria was reported by Ibrahim (1997/98) to include teaching and supervision both essential activities in the conduct of research and training. Fairweather (1999) gave elements that influence research productivity to include socio-demographic characteristics, environmental conditions, social knowledge, self-knowledge, career and social contingencies for the understanding of faculty productivity. Middaugh (2001) measured faculty research activities and attributed quantitative measures to number of refereed publications, number of text books, externally funded grants, professional conference papers, seminars, etc.

Aliyu (2011) accorded significance to quantitative research productivity of authors. He revealed the role quantitative analysis played in information of author productivity, dissemination, communication

activities and contribution to the field of knowledge, which exist in different patterns such as single, joint and multiple authorships. Because of the important role quantitative analysis of author productivity play, Solu *et al.* (2012) revealed that, often, departments evaluate their faculty members on their “publication count”, a measure of quantity.

Publication trends and authors collaboration are relevant to knowledge generation studies. Mengxiong (1993) notes that, scientist are not only expected to develop knowledge; they are also required to share the knowledge they develop with other members through formal sources in order to be considered to have contributed to knowledge. According to Harande (2001), collaboration is the act of writing/publishing article by two or more authors.

Nwagu (2007) reported that authorship is tied with reputation, career success, remuneration and also held accountable for the claims made in the write up. That is why the appropriation of credit and the allocation of responsibility thus go hand in hand, and this makes for a fairly straight forward social accounting. Earlier, Brodkey (1987) attributed fear, complexes and self-acclamation to influence the “lone scholar” consistency as observed in some

fields. Kassierer and Angel (1995) observed that since the middle of the twentieth century, changes in the scientific arena have adjusted the nature and structure of scientific communication practices so that authorship has become almost a collective responsibility and therefore affects contribution to research productivity. Reporting on collective authorship, Cronin (2001) revealed that it could be as a result of trans-disciplinary, trans-institutional and trans-national collaboration among scientists who are aware that collaboration across national, disciplinary and boundaries could lead to path-breaking research output.

Research findings on author productivity and collaboration have been documented by Subramanyam (2007) who reported that collaborative work affects the visibility and productivity of scientists. He gave different forms of which authorship collaboration can exist: collaboration among colleagues, collaboration between organizations, collaboration between teacher and pupil, collaboration between supervisor and assistant, researcher – consultant collaboration, and international collaboration. Arya and Sharma (2011) stipulated that today research has become interdisciplinary and scientists in one area have to collaborate with scientist in other

areas in order to fulfill the goals of research objectives thereby increasing working in collaboration and to gain expertise in areas of specialization.

Research Methods

The research materials used for the study were the bound copies of research output of faculty members of the Agriculture and Veterinary Complex. These materials are the research output that has been physically verified and certified by academics and professionals who are the members of the University's Central Committee charged with the appointments and promotions of staff. The research method adopted was bibliometrics because it facilitates quantitative evaluation of research output (the use of count) of sampled associate professors and professors appointed or promoted to the rank between 2002 - 2012.

The complex has a population of 545 faculty members and of these, 124 (23%) represents the total of professors and associated professor add together; however, 38 were found to be eligible for the study because their appointments and promotions fell within the scope of the study period of

2002 – 2012 (ABU MIS, 2013). The 38 faculty members were automatically constituted the subject of study. These faculty members constituted 30% of the 124 qualified professors and associated professors in the complex. Their use for generalization was justified by Afolabi (1993) who reported that a sample size of 30% is sufficient for generalization and a good representation of a target population.

Results and Discussion

Number of articles

Table 1 presents the total number of articles published to be 1137 during the period of investigation. The data revealed the most contributing unit of the complex to be Institute for Agricultural Research (IAR) where its faculty members contributed 361 articles. The investigation has been able to also reveal number of articles per year and its distribution across the units. This is in line with Ibrahim and Abubakar (2001) who reported that quantitative representation of data show the nature and volume of information traffic.

Table 1: Frequency distribution of the number of article to the agricultural database of the Agriculture and Veterinary complex of Ahmadu Bello University, Zaria from 2002- 2012.

Year	Units of the complex						Total	% score
	DAC	FOA	IAR	NAERLS	NAPRI	VET		
2002	4	32	51	6	8	21	122	10.73
2003	2	22	32	14	6	17	93	8.18
2004	3	31	52	13	15	16	130	11.43
2005	4	38	32	18	10	17	119	10.47
2006	4	45	48	5	26	31	159	13.98
2007	11	30	31	11	17	20	122	10.73
2008	3	35	30	4	8	22	102	8.97
2009	9	17	33	2	4	38	103	9.06
2010	12	17	15	10	4	15	76	6.68
2011	10	11	19	1	4	11	56	4.93
2012	5	17	18	0	0	15	55	4.84
Total	72	295	361	84	102	223	1137	100

Research output formats

Table 2 presents the research output media that serve as the major courier for the dissemination of agricultural information to stakeholders. The essence is to investigate if this agrees with other literature and to be able to see the numerous media utilized by faculty members of the complex for the dissemination and contribution of agricultural research information to knowledge. It is clear that journals recorded the highest scores of 642 (56.46%) making it the most preferred media for the

dissemination of information. This corroborates with reports by Thanuskodi (2010), Fagbola and Adejoro (2012) and Wardika and Gudadhe (2013) who reported that journals are the most patronized medium for sharing of research findings by academics and regarded as the most recognized and highly scored media for promotions, gratifications and publicity of faculty members. Faculty members like their counterparts in the other fields of applied sciences utilize other couriers like seminars

and conferences, in this study, 338(29.73%) utilized seminars and conferences to communicate their research findings. It is understandable that books/chapters in books came last with 31 (2.73%) because as indicated in many literature, scientists prefer journals to books. However, it is surprising

that technical report and bulletin/guides also recorded very low. The reason for their low patronage could be attributable to what Jacobs (2001) reported that any formats that do not attract promotion or add prestige to a faculty member suffer low patronage.

Table 2: Distributions of recorded research output formats of faculty members of the Agriculture and Veterinary complex of Ahmadu Bello University, Zaria from 2002- 2012.

Research output formats	Total number of articles	% score
Journals	642	56.46
Books/chapters in books	31	2.73
Seminar/ conference proceedings	338	29.73
Technical report/ workshop/ training	90	7.92
Bulletins/ Guides/ magazines	36	3.16
Total	1137	100

Contribution made by units of the complex

The contribution made by each unit of the complex is presented graphically in Fig. 1. The figure shows that all units have made contributions in various capacities; for instance, IAR contributed more than others with 361 (31.75%) publications, closely following is FOA with 295 (25.95%) publications. The least contributing unit with the lowest research publications was DAC with 72(6.33%). This may be blamed on

failure to understand researcher behavior, attitudes to communicate research outputs, failing to interact, motivate and gaining institutional/organizational support. This may not be very far from the problems facing NAPRI and DAC during the period of research investigation. The significance of research contributions by IFPRI (2002) include facilitation to the expansion of employment opportunities and providing

essential indices that can speed up industrialization.

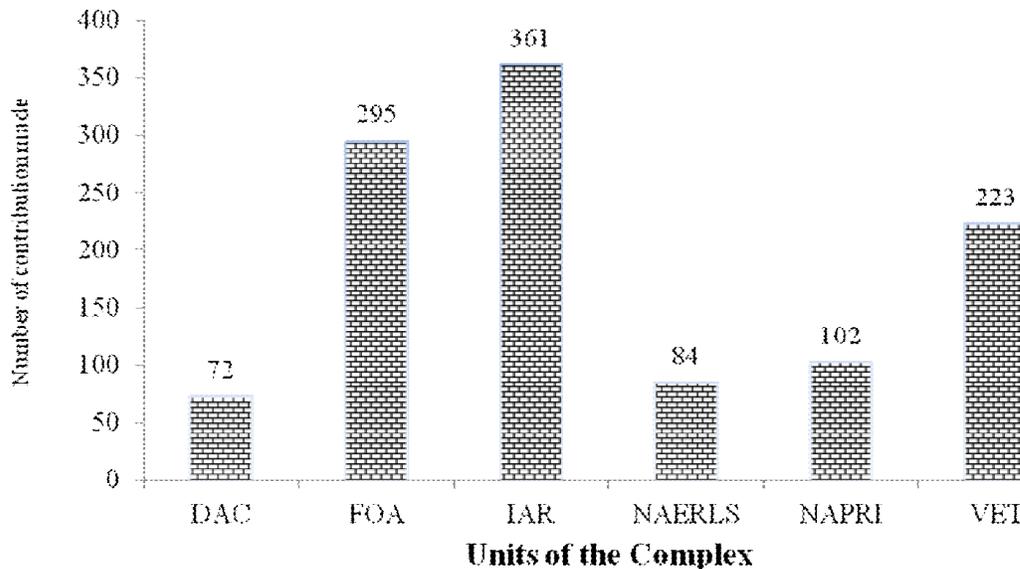


Fig. 1: Contributions made by unit of the Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria from 2002 – 2012

Nature of collaboration dominating the research output at complex

Table 3 reveals the nature of collaboration dominating in the published research output of the Agriculture and Veterinary Complex staff of Ahmadu Bello University from 2002 to 2012. Collaboration has been reported as a very significant component that influences research output

and its contributions. This investigation is necessary for logical and justifiable reporting. To score this variable effectively, a scoring measure that comprise of four collaboration regimes were developed and adopted.

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Table 3: Nature of collaboration

Collaboration regimes	Units of the complex						Total	% scored
	DAC	FOA	IAR	NAERLS	NAPRI	VET		
With members of the same unit	14	154	131	32	30	165	526	54.96
With members from other units of the complex	4	81	35	12	23	35	190	19.85
With members outside the complex within Nigeria	11	62	55	6	7	27	168	17.56
With members outside Nigeria (international)	3	12	22	4	3	29	73	7.63
Total	32	302	243	54	63	256	957	100

The nature of collaboration revealed that 526 (54.96%) of the faculty members of the Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria engage in collaboration within the same unit and collaboration with others from outside the complex scored 168(17.56%); this is a strong indication that collaboration remain internal. Zaki (2011) attribute collaboration within the same unit to be as a result of two factors, the first being interdisciplinary and mutual relationship that easily exist among and between faculty members, while the second as a way to avoid scrutiny and the practice of gift authorship.

VET unit scored the highest frequency of international collaboration,

29(39.72%), next was IAR with 22(30.14%) scores. The high nature of collaboration in the complex of over 50% conformed with the describe characters of effective collaboration by Brodkey (1987); Kassierer and Angel (1995) whose attributes comprise consistencies, adjusted nature and possessing structure of scientific communication practices.

Conclusion

The research findings reveal that the Agriculture and Veterinary Complex of Ahmadu Bello University, Zaria contributed agricultural information resources in numerous formats that serve wide range of audiences in its quest to disseminate

agricultural stakeholders in order to attain economic and social goals as they participate in agricultural activities.

Recommendations

Based on the findings and conclusion, the following recommendations were made:

1. The numbers of articles published are tied to recognized media especially those considered for the promotions of staff of the complex; it is recommended therefore that other media should be included considering the diversified stakeholders who rely on agricultural information to improve their trade.
2. The formats used for the dissemination of agricultural information should include simplified platforms such as posters, short notes/communication, lead papers, newspaper presentation, translations and reviews.
3. The contribution made by individual unit of the complex in terms of numbers is not uniform; it is expected to be so. The disposition, mandate and qualifications of personnel should be harnessed to include researchers.
4. The nature of collaboration was mostly internal, the complex should

re-strategize all its research activities and reporting patterns to conform with international standards to attract more foreign interest and support, especially with consultative groups of international agricultural research (CGIAR), the World Health Organization, World Bank, Public and Private institutions within and outside Africa as well.

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