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# How Authorship Position, Journal Prestige and Author Processing Charges Impact Inequalities in COVID-19 Research with Authors from Sub-Saharan African Countries

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## Abstract

*COVID-19 has exacerbated research inequality because of the changes in workplace settings. This study presents an insight into the extent of inequalities during the first year of COVID-19 using Sub-Saharan African countries' COVID-19 publication data from Web of Science, MEDLINE and Scopus. The analysis included the publisher's address, CiteScore of the journals and author processing charges (APC) of open access journal articles. Only 13.4% of the journal publishers were in Sub-Saharan African countries, and 21.14% of the articles were published in Sub-Saharan African journals. Publishers from the Netherlands (30.72%), the UK (24.23%) and USA (14.81%) published the highest number of journals. Authors from the Sub-Saharan African region were underrepresented in the first and last author positions. Mega journals published outside Sub-Saharan Africa were twenty-five times more prestigious than those published in the region. Sub-Saharan Africa paid more author processing fees than it received. More equitable global research practices may reduce the imbalances as observed in this study.*

**Keywords:** *COVID-19, Sub-Saharan Africa, Research Collaboration, International Collaboration, Research Funding.*

## Introduction

Sub-Saharan Africa is one of the under-represented regions in the global research community. While Sub-Saharan Africa accounted for 17.5% of the world's population in 2020, it produced only 2.6% of the world's science on COVID-19 (Asubiaro and Shaik, 2021). Though research productivity to the gross domestic product ratio of Africa has continued to increase faster than the world's average since 2003 (Pouris and Ho, 2014; Confraria and Godinho, 2015), there is a continuous dearth of research resources in the region. Researchers in Sub-Saharan Africa collaborate with peers in high-income countries to attract funding, which has led to the dominance of research by foreign authors. For instance, researchers in Ghana were found to be motivated to collaborate with peers outside Africa by the prospect of funding (Owusu-Nimo and Boshoff, 2017). Collaboration with foreign countries usually accounts for about 50% of research in Africa, while less than 5% of the publications are products of collaboration between Sub-Saharan African countries; more emphasis has been placed on collaborating with foreign countries with little intra-Sub-Saharan African collaboration (Asubiaro 2019; Asubiaro and Badmus 2020; Onyancha 2020; Onyancha and Maluleka 2011).

Sub-Saharan African countries rely mainly on funding from foreign countries, with many foreign-funded research projects failing because Sub-Saharan African governments cannot pay counterpart funding which is usually a fraction of the funds provided by funding agencies (Bendana, 2019). Also, international collaboration, which ordinarily is a measure of development, has led to "research neo-colonialism" in Africa because of inequality in authorship positions occupied by foreign and local African authors (Boshoff, 2009; Hedt-Gauthier *et al.*, 2019).

Inequality against African research is amplified by the under-representation of African journals in the most authoritative citation indexes leading to less global visibility. For example, Asubiaro (2022) revealed Scopus, Web of Science, and PubMed covered less than 10% of biomedical journals in Sub-Saharan Africa. Africa. In a follow-up study, Asubiaro and Onaolapo (2022) revealed Web of Science and Scopus covered less than 8% of all the journals that are published in Africa.

The increase in the number of Gold Open Access (OA) articles (Laakso *et al.*, 2011; Philipp *et al.*, 2021) and journals is a good development because it helps build global equality in access to science. The development brought by OA comes at a cost because of the introduction of the authors' processing charge (APC), which is very expensive and not affordable for researchers in developing countries and young researchers. The OA's APC has caused a barrier to entrance into publishing in the elite journals by the young researchers and researchers from poor countries, thereby potentially increasing inequality among researchers

Research has shown that the challenges facing research development in Sub-Saharan Africa subsist in the COVID-19 research from the region. For instance, research in Sub-Saharan Africa is bogged down by poor funding and heavily relies on collaboration with authors outside the region, with little intra-pan-African collaboration before and during (Asubiaro and Badmus, 2020; Asubiaro and Shaik, 2021) the pandemic. Similar to the situation before the pandemic (Tiedeu, Para-Mallam and Nyambi, 2019), gender inequality against women in research was more pronounced in Africa than in other parts of the world during the COVID-19 pandemic (Pinho-Gomes *et al.*, 2020). Similarly, studies have reported the inequality in authorship positions in research from Africa before (Schneider and Maleka, 2018) and during (Hedt-Gauthier *et al.*, 2019) COVID-19, where authors from the region are underrepresented in the prestigious first and last authorship positions. Though inequality in authorship has been explored as a metric for measuring research inequality in Africa before and during the pandemic, factors influencing inequality in the region have not been investigated.

This study investigates the factors influencing inequalities in COVID-19 research focussing on authors from Sub-Saharan Africa and using authorship positions and journal prestige metrics. OA articles' APC were investigated as a factor that could affect the authorship position of researchers from Sub-Saharan Africa in COVID-19 research stemming from the problem of poor research funding, which has led to a heavy reliance on funding from outside the region for COVID-19 research (Asubiaro and Shaik, 2021). Secondly, publishers' location (in and outside Africa) and collaboration types were included as potential factors because previous studies have shown that both factors are important in determining the prestige of articles from the region (Asubiaro, 2019). This study also investigates the representation of authors from Sub-Saharan Africa in the first and last author positions in international collaboration publications that were published in prestigious journals. This study was aimed at answering the following questions:

1. How were authors from Sub-Saharan Africa represented in first and last author positions during international collaboration?
2. Which authorship role did authors from Sub-Saharan Africa play in studies that were published in prestigious journals?
3. What is the difference between the prestige of journals in which intra-African and international collaboration articles were published?

## Significance of the Study

Inequality in science, a growing challenge, has been exacerbated during the COVID-19 pandemic in developing countries, especially in Sub-Saharan Africa, where resources to mount an effective response are limited (Vieira et al., 2020). While there is ample evidence in the literature on gender inequality (Bendels *et al.*, 2017; Broderick and Casadevall, 2019; Huang *et al.*, 2020), there is a dearth of research on inequality against researchers that are affiliated with universities in Sub-Saharan Africa. Understanding inequality against Sub-Saharan African researchers is important to inform decision-making and planning, especially during infectious disease outbreaks when quick and unhindered research dissemination is needed to understand aetiology, epidemiology, diagnosis, treatment,

prevention, and control is important. Inequality in science negatively affects research discovery, dissemination and ownership and hampers accurate evidence gathering to mount robust local and global responses during infectious disease outbreaks. Infectious and neglected diseases continue to affect the Sub-Saharan Africa region. The COVID-19 pandemic and the Ebola Virus Disease (EVD) are infectious disease outbreaks that have significantly affected the Sub-Saharan African region in the last two decades. There are other diseases such as malaria, which is an epidemy affecting the Sub-Saharan Africa region. HIV also continues to take a huge economic toll on the continent since its outbreak in the early 1980s, as Africa accounts for about two-thirds of the global burden of HIV (World Health Organisation, 2018). Understanding the inequality pattern among researchers affiliated with Sub-Saharan African countries is important for health and research policymaking.

## Methodology

COVID-19 research records of all 46 Sub-Saharan African countries were retrieved from Scopus, MEDLINE and Web of Science databases. The search was done on the 1st of January, 2021, to capture publications in 2020, with an update in April 2021, having noticed an increment in the number of publications in 2020. The search query was composed to retrieve publications on COVID-19 that were published by authors who are affiliated with institutions in Sub-Saharan Africa. The search query included the names of all 46 countries in Sub-Saharan Africa. Variants of the Sub-Saharan African countries' names (e.g. Cameroun and Cameroon) were also included so that indexes with their variant names would be captured. All the variant names of COVID-19, as specified in peer-reviewed search strings of the Medical Library Association for bibliographic database retrieval of COVID-19 publications, were also included in the search query (LaLonde, 2020). At the early stage of the COVID-19 pandemic, before the World Health Organisation (WHO) assigned a globally recognized name, COVID-19 disease was called different names such as Wuhan coronavirus, Hubei coronavirus, China coronavirus, 2019 novel coronavirus disease, 2019-nCoV disease and Chinese Coronavirus, these names were included in our search query so that scientific publications that used such names were retrieved. Some of the names that were given to COVID-19 disease were later regarded as unethical because of their discriminatory tendencies. The search query implementation for retrieving Sub-Saharan Africa's publication from Scopus is as follows:

*AFFILCOUNTRY ( "South Africa" OR "Nigeria" OR "Angola" OR "Benin" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cameroun" OR "Canary Islands" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "Comoros" OR "Congo" OR "Democratic Republic of Congo" OR "DR Congo" OR "Cote D'ivoire" OR "ivory coast" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mauritius" OR "Mozambique" OR "Mocambique" OR "Namibia" OR "Niger" OR "Principe" OR "Reunion" OR "Rwanda" OR "Sao Tome" OR "Senegal" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "Sudan" OR "Swaziland" OR "Tanzania" OR "Togo" OR "Uganda" OR "Zaire" OR "Zambia" OR "Zimbabwe" OR "South Sudan" OR "Ghana" OR "Ethiopia" OR "Eritrea" OR "Gambia" OR "Botswana" OR "Guinea" OR "Djibouti" OR "Gabon" OR "Papua and Guinea" OR "Guinea-Bissau" OR "Equatorial Guinea") AND TITLE-ABS-KEY ( "2019 novel coronavirus disease" OR "COVID19" OR "COVID-19 pandemic" OR "SARS-CoV-2 infection" OR "COVID-19 virus disease" OR "2019 novel coronavirus infection" OR "2019-nCoV infection" OR "coronavirus disease 2019" OR "coronavirus disease-19" OR "2019-nCoV disease" OR "COVID-19 virus infection" OR "severe acute*

*respiratory syndrome coronavirus 2" OR "COVID-19" OR "COVID19" OR "COVID2019" OR "SARSCoV2" OR "SARS coronavirus 2" OR "2019-nCoV" OR "2019nCoV" OR "nCoV2019" OR "nCoV-2019" OR "Wuhan coronavirus" OR "Hubei coronavirus" OR "chin* coronavirus")*

A total of 2310 citations were retrieved from MEDLINE, 2400 citations were retrieved from Web of Science core collections, and 2830 citations were retrieved from Scopus. There were 3867 articles after data cleaning -removal of duplicates and errors (records with no Sub-Saharan African author).

## Collaboration Types

Four collaboration types were coded: single author, national, Sub-Saharan African, and international collaborations. Single-author papers were classified as "no collaboration" papers. Papers by multiple authors who were affiliated with one or more institutions in a Sub-Saharan country were classified as *national collaboration.* Papers written by more than one author, affiliated with multiple institutions, where the institutions are located in multiple Sub-Saharan African countries and no author from institutions outside Sub-Saharan Africa were classified as *Sub-Saharan African collaboration.* National and international collaborations were regarded as internal collaborations. Papers that have multiple authors wrote with multiple affiliated institutions, where the institutions are located in at least one country within and one country outside of Sub-Saharan Africa, were classified as *international collaboration.*

## Journal Information

### *Journal CiteScores*

Two types of journals were identified in the collection-ordinary journals (sometimes referred to as journals) and mega journals. Mega journals are different from ordinary journals because they publish "larger than an average journal in a particular field" (Zhang, 2006, p. 68). This study classified journals that published more than 1,000 articles per year as mega journals. In contrast, others with less than 1,000 articles per year were classified as ordinary journals.

CiteScores for all the journals were obtained using data from Publish or Perish (PoP) software (Harzing, 2007), while the CiteScores for mega journals were collected from the Scopus Citescore report for 2021. Citescore was the choice for measuring prestige because of its simplicity, and it is an alternative to the journal impact factor. Citescore was calculated as the number of citations received from 2018 to 2020 to publications(articles, reviews, conference papers, and data papers) by a journal in the same period, divided by the number of publications in the journal within the same period[1]. We decided not to use CiteScore from journal websites because many of the journals did not have them, and we could not verify the accuracy of CiteScores for journals that included them on their websites. We also decided not to use CiteScore from Scopus for all the journals because many of the journals were not indexed in Scopus (publication data was collected from Scopus, Web of Science and PubMed). The Crossref database was queried through the PoP interface to obtain the number of articles published in a journal in the years 2018 to 2020 and the number of citations received by the publications in the journal during the 2018 to 2020 period. Crossref was chosen as the source of journal citation information because of its authoritativeness, as it is used by reputable citation data sources such as Scopus and Web of Science for the collection of citation information. A combination of the journal title, years of publication (2018-2020) and ISSN were posed as queries on the PoP software interface. One of the limitations of the PoP is that a maximum of 1000 articles can only be retrieved per journal in a given year. Since 114/121 (94.21%) of all the mega journals were captured in the 2020 Scopus CiteScore report, the CiteScores of the mega journals were obtained from Scopus 2020 Citescore report. We did not compare the CiteScores for the journals and mega journals because they were obtained from different sources.

### *Journal OA Status and Author Processing Charge*

Conference papers, corrections, erratum, book reviews, news and preprints were excluded from the OA data collection. OA status of the retrieved publication took five values: gold, green, hybrid, bronze, and closed. APCs for only gold and hybrid

articles were collected because these OA models require the payment of APCs. APCs for the articles were obtained from available publishers' APC lists for 2020. In cases where such lists are unavailable, Way Back Machine (archive.org/web/) was consulted to retrieve relevant web pages on 2020 APC from the journal websites. Different pricing for different publication types and economic country categories through waivers were considered.

APCs listed in currencies other than the United States dollar were converted using data from www.exchangerates.org.uk/. The cost of APCs was attributed to the corresponding authors' country since the convention in most journals is the payment of APCs by the corresponding author. This method also agrees with Simard, Asubiaro and Mongeon (2021), where APCs costs were attributed to the corresponding authors' institution.

## Results

From the result, a majority (55%) of all Sub-Saharan African publications on COVID-19 were produced through international collaboration. In comparison, there was a negligible research synergy among the Sub-Saharan African countries as publications from intra-Sub-Saharan African collaboration accounted for only 3% of the papers. Single authored papers constituted 13% of all the publications, and 29% of the publications were written through national collaboration. The productivity of Sub-Saharan African countries and the contribution of countries from outside Sub-Saharan Africa to COVID-19 research from the region is presented in Table 1. As usual, South Africa, Nigeria, Kenya, Ghana, Ethiopia and Ghana are the most productive countries in Africa. Usual top collaborating countries (e.g. USA, United Kingdom, Australia, India and Canada) with Sub-Saharan Africa before the pandemic ranked among the countries that contributed most to COVID-19 research in Sub-Saharan Africa.

**Table 1: Productivity of Countries in and Outside Sub-Saharan Africa**

| Sub-Saharan African countries | | | | Countries outside Sub-Saharan African | | |
|---|---|---|---|---|---|---|
| **Rank** | **Country** | **Documents (%)** | **total link strength** | **country** | **Documents (%)** | **total link strength** |
| 1 | South Africa | 1616 (41.79) | 3789 | USA | 879 (22.73) | 4628 |
| 2 | Nigeria | 789 (20.40) | 1867 | United Kingdom | 712 (18.41) | 4011 |
| 3 | Kenya | 284 (7.34) | 1246 | Australia | 272 (7.03) | 2064 |
| 4 | Ghana | 268 (6.93) | 1044 | India | 256 (6.62) | 2241 |
| 5 | Ethiopia | 261 (6.75) | 510 | Canada | 255 (6.59) | 2045 |
| 6 | Uganda | 181 (4.68) | 806 | Italy | 232 (6.00) | 2433 |
| 7 | Cameroon | 156 (4.03) | 535 | Germany | 218 (5.63) | 1967 |
| 8 | Sudan | 125 (3.23) | 524 | China | 209 (5.40) | 1600 |
| 9 | Senegal | 104 (2.69) | 338 | France | 205 (5.30) | 1445 |
| 10 | Zimbabwe | 104 (2.69) | 405 | Switzerland | 181 (4.68) | 1598 |
| 11 | Tanzania | 94 (2.43) | 344 | Brazil | 174 (4.50) | 1936 |
| 12 | Zambia | 72 (1.86) | 379 | Belgium | 169 (4.37) | 1053 |
| 13 | Dem. Rep. of Congo | 59 (1.53) | 187 | Spain | 150 (3.88) | 1608 |
| 14 | Mozambique | 58 (1.50) | 350 | Saudi Arabia | 128 (3.31) | 937 |
| 15 | Malawi | 50 (1.29) | 250 | Netherlands | 121 (3.13) | 1273 |
| 16 | Rwanda | 49 (1.27) | 241 | Sweden | 106 (2.74) | 1068 |
| 17 | Burkina Faso | 44 (1.14) | 146 | Egypt | 102 (2.64) | 1046 |
| 18 | Mali | 41 (1.06) | 139 | Japan | 91 (2.35) | 1164 |
| 19 | Benin | 36 (0.93) | 248 | Iran | 84 (2.17) | 974 |
| 20 | Botswana | 34 (0.88) | 155 | Turkey | 82 (2.12) | 915 |

## Inequality in the Geographical Distribution of Journal Publishers

The 3832 publications appeared in 1263 journals and were published by 308 publishers (after removing preprints, papers in conference proceedings, erratum, corrections and news). Letters and editorials were included in the analysis because of their importance in COVID-19 research (Teixeira da Silva, 2021). The twenty most popular journal publishers and their countries/locations are presented in Table 2. Elsevier and Springer, in the Netherlands, published 30.33% of all the journals and 27.69% of all the articles. Pan African Medical Journal is the most popular journal/ publisher in Sub-Saharan Africa and contains 8.43% of all the articles.

Further analysis shows that only 13.4% of the publishers are in Sub-Saharan African countries. This shows that 21.14% of the articles were published in Sub-Saharan African journals. This suggests that most of the journal articles from Sub-Saharan Africa that are indexed in Scopus and Web of Science are not published in Sub-Saharan Africa. South Africa housed the highest number of publishers, journals and journal articles; 8.16% of the publishers in South Africa published 10.75% of the articles in 4.03% of the journals. USA (20.92%) and the UK (13.73%), and India (6.21%) house the highest number of publishers. Publishers from the Netherlands (30.72%), the UK (24.23%) and USA (14.81%) published the highest number of journals. Similarly, publishers from the Netherlands (28.18%), the UK (20.15%) and USA (13.49%) published the highest number of journal articles.

**Table 2: Journal Publishers' Location/Country**

| | Publisher | Country | No of Journals (%) | No of papers (%) |
|---|---|---|---|---|
| 1 | Elsevier | Netherlands | 243 (19.24) | 720 (18.79) |
| 2 | Springer | Netherlands | 140 (11.09) | 341 (8.90) |
| 3 | Pan African Medical Journal | Kenya/Cameroun | 1 (0.08) | 323 (8.43) |
| 4 | Informa UK | UK | 135 (10.69) | 286 (7.46) |
| 6 | South African Medical Association | South Africa | 7 (0.55) | 199 (5.19) |
| 5 | Wiley | USA | 91 (7.21) | 189 (4.93) |
| 7 | Oxford Academic | UK | 37 (2.93) | 104 (2.71) |
| 8 | AOSIS | South Africa | 17 (1.35) | 101 (2.64) |
| 9 | Sage | Germany | 50 (3.96) | 90 (2.35) |
| 10 | MDPI | Switzerland | 24 (1.90 | 88 (2.30) |
| 11 | British Medical Journals | United Kingdom | 12 (0.95 | 88 (2.30) |
| 12 | Frontiers | Switzerland | 20 (1.58) | 81 (2.11) |
| 13 | American Society of Tropical Medicine and Hygiene | USA | 1 (0.08) | 60 (1.57) |
| 14 | PLOS | USA | 4 (0.32) | 56 (1.46) |
| 15 | Emerald | UK | 28 (2.22) | 54 (1.41) |
| 16 | Wolter Kluwers | India | 30 (2.38) | 53 (1.38) |
| 17 | the International Society of Global Health (ISoGH) | UK | 1 (0.08) | 44 (1.15) |
| 18 | Cambridge University Press | UK | 15 (1.19) | 36 (0.94) |
| 19 | Hindawi | United Kingdom | 20 (1.58) | 35 (0.91) |
| 20 | Academy of Science of South Africa | South Africa | 3 (0.24) | 29 (0.76) |

*Representation of Journal Publishers from Sub-Saharan Africa across Collaboration Types*

The result of the analysis of the addresses of publishers is presented in Table 3. Most of the journals (78.9%) were published outside Sub-Saharan Africa. The proportion of international collaboration articles that were published outside Sub-Saharan Africa is 91.5%. Only 33.3% to 36.3% of papers that were written through single authorship and internal collaboration were published in Sub-Saharan African journals. In contrast, only 8.5% of the articles written through international collaborations were published in journals from Sub-Saharan Africa.

**Table 3: Publishers in and outside Sub-Saharan Africa**

| | Publishers' location | | |
|---|---|---|---|
| **Collaboration Type** | **Outside Sub-Saharan Africa** | **In Sub-Saharan Africa** | **Total** |
| No collaboration | 293 (63.7%) | 167 (36.3%) | 460 |
| National collaboration | 635 (62.6%) | 379 (37.4%) | 1014 |
| Sub-Saharan Africa | 82 (66.7%) | 41 (33.3%) | 123 |
| International collaboration | 1817 (91.5%) | 168 (8.5%) | 1985 |
| **Total** | **2827 (78.9%)** | **755 (21.1%)** | **3582** |

## Inequality in Journals' Prestige (CiteScore) across Collaboration Types and Publishers' Location

The analysis of journal prestige is presented for the two groups of journals-(ordinary and mega journals) in Table 4. Table 4 shows the differences between the CiteScore of journals and mega journals based on publishers' addresses (in and outside Sub-Saharan Africa). The result indicates that the average CiteScore of ordinary journals published outside Sub-Saharan Africa (average cite score=5.75) is five times greater than those published in the Sub-Saharan African region (average cite score-1.11). In comparison, the average CiteScore of the mega journals published outside the Sub-Saharan African region ((average cite score=18.08) is twenty times greater than those published in the region ((average cite score=0.90). This result paints a grim picture of inequality between ordinary journals and mega journals in and outside Sub-Saharan Africa that published COVID-19 articles with authors from Sub-Saharan Africa. The most prestigious ordinary journals from Sub-Saharan Africa received an average CiteScore of 7.52, almost ten times lower than the best journals published outside Sub-Saharan Africa. The gulf widened with mega journals as the most prestigious mega journal from Sub-Saharan Africa received 3.80 CiteScore, 24 times lower than the CiteScore of the most prestigious mega journal from outside Sub-Saharan Africa.

Articles through international collaboration were published in more prestigious journals (Cite score=6.80) and mega journals (Cite score= 16.66) than publications through single-authored papers and internal collaborations. Though mega journals are more prestigious, with a higher average CiteScore of 11.79 compared to ordinary journals with an average CiteScore of 5.01, papers through internal collaboration appeared in mega journals much lower than the average mega journal CiteScores- Sub-Saharan African collaboration-( average cite score=1.85) and national collaboration-( average cite score=3.96). While journal articles from Sub-Saharan Africa collaborations were published in journals with average CiteScores of (5.67), that are high compared to articles from international collaboration with an average Citescore of (6.80), the number of papers through the latter is 17 times higher than the former.

**Table 4: Journals and Mega Journals' CiteScore based on Publishers' location (In or outside Sub-Saharan Africa) and Collaboration Type**

| | | | N | Mean | Std. Deviation | Min | Max |
|---|---|---|---|---|---|---|---|
| Publishers' Location | Ordinary Journals | Outside Sub-Saharan Africa | 2268 | 5.75 | 7.74 | 0.00 | 74.57 |
| | Mega Journals | In Sub-Saharan Africa | 432 | 1.11 | 0.94 | 0.09 | 7.52 |
| | | Outside Sub-Saharan Africa | 559 | 18.08 | 28.19 | 0.21 | 91.50 |
| | | In Sub-Saharan Africa | 323 | 0.90 | 0.49 | 0.80 | 3.80 |
| Collaboration Type | Ordinary Journals | No | 412 | 2.44 | 4.37 | 0.03 | 66.85 |
| | | National | 750 | 2.86 | 4.85 | 0.01 | 74.57 |
| | | Sub-Saharan Africa | 81 | 5.67 | 6.93 | 0.15 | 27.45 |
| | | International | 1457 | 6.80 | 8.45 | 0.00 | 74.57 |
| | | **Total** | **2700** | **5.01** | **7.31** | **0.00** | **74.57** |
| | Mega Journals | No | 49 | 10.14 | 18.46 | 0.80 | 91.50 |
| | | National | 265 | 3.96 | 9.52 | 0.21 | 91.50 |
| | | Sub-Saharan Africa | 41 | 1.85 | 2.32 | 0.80 | 11.60 |
| | | International | 527 | 16.66 | 28.61 | 0.80 | 91.50 |
| | | **Total** | **882** | **11.79** | **23.92** | **0.21** | **91.50** |

## Inequality in Author Processing Charges Paid across Collaboration Types and Publishers' Location

Of the journal publications, 1,979 had gold or gold hybrid OA status. The Author Processing Charges and CiteScores of 1870 articles were available (i.e. the APC and CiteScores of 1422 articles in 443 journals and 448 articles in 95 mega journals. Journals published in Sub-Saharan Africa were three times cheaper ($433.36) than those that were published outside the region. Descriptive statistics of the author processing charges paid for OA journal articles are presented in Table 5. Journals published in Sub-Saharan Africa averagely ($225.73), cost seven times less than those published outside Sub-Saharan Africa ($1557.05). Journals published outside Sub-Saharan Africa cost as much as $8536.45, almost ten times more than the most expensive journal from a Sub-Saharan African publisher.

Though most of the journal articles that were published through single-authorship and internal collaborations were published in journals by foreign publishers (see Table 3), it is interesting that the author processing charges paid were much lower than in international collaboration.

**Table 5: Descriptive Statistics of Author Processing Charge Paid for OA Journals Articles**

| | | N | Mean ($) | Std. Deviation | Min ($) | Max ($) |
|---|---|---|---|---|---|---|
| Publishers' Location | Outside Sub-Saharan Africa | 1354 | 1557.05 | 1421.71 | .00 | 8536.45 |
| | In Sub-Saharan Africa | 516 | 225.73 | 176.14 | .00 | 892.30 |
| | **Total** | **1870** | **1156.03** | **1338.41** | **.00** | **8536.45** |
| Collaboration Types | No collaboration | 231 | 583.96 | 953.68 | .00 | 4052.00 |
| | National collaboration | 594 | 537.04 | 819.94 | .00 | 5380.00 |
| | Sub-Saharan Africa | 56 | 808.70 | 1457.57 | .00 | 8536.45 |
| | International collaboration | 989 | 1744.74 | 1436.11 | .00 | 6000.00 |
| | **Total** | **1870** | **1189.69** | **1351.33** | **.00** | **8536.45** |

## Inequalities in Authorship Role during International Collaboration

The geographical distribution of the first and last authors is presented in Table 6. Though South Africa, a country in Sub-Saharan Africa, contributed to the highest number of publications, the highest number of first authors (in the 1985 articles from international collaboration) came from USA (n=336, 16.92%). Other countries that produced the highest number of first authors are South Africa (n=261, 13.15%), the UK (n=251, 12.65%), Nigeria (n=168, 8.46%), and India (n=71, 3.58%). Similarly, USA (15.42%), followed by South Africa (13.1%), the UK (10.78%), Nigeria (5.09%) and China produced the highest number of last authors. There were only three Sub-Saharan African countries in the first ten countries with the highest number of first (South Africa, Nigeria and Ghana) and last authors (South Africa, Nigeria and Kenya).

Apart from the under-representation of authors from Sub-Saharan Africa as first and last authors, differences in journal CiteScores were also explored. Journal publications with local first authors (average Citescore=5.44) and last authors (Citescore=6.26) received average CiteScores lower than those with foreign first authors (average average Citescore=7.33) and last authors (average Citescore=7.11), mega journal publications with local first authors (average Citescore=10.01) and last authors (average Citescore=10.96) received CiteScores and those with foreign first authors (average Citescore= 21.33) and last authors (average Citescore19.66), respectively.

**Table 6: Top twenty countries of first and last authors in the COVID-19 articles**

| | First authors | | | Last authors | | |
|---|---|---|---|---|---|---|
| **Rank** | **Country** | **Number of papers** | **Percentage** | **Country** | **Number of papers** | **Percentage** |
| 1 | USA | 336 | 16.93 | USA | 306 | 15.42 |
| 2 | South Africa | 261 | 13.15 | South Africa | 260 | 13.10 |
| 3 | UK | 251 | 12.64 | UK | 214 | 10.78 |
| 4 | Nigeria | 168 | 8.46 | Nigeria | 101 | 5.09 |
| 5 | India | 71 | 3.58 | China | 54 | 2.72 |
| 6 | China | 70 | 3.53 | France | 53 | 2.67 |
| 7 | Australia | 61 | 3.07 | Canada | 50 | 2.52 |
| 8 | France | 60 | 3.02 | India | 49 | 2.47 |
| 9 | Canada | 56 | 2.82 | Kenya | 49 | 2.47 |
| 10 | Ghana | 54 | 2.72 | Australia | 44 | 2.22 |
| 11 | Belgium | 50 | 2.52 | Germany | 41 | 2.07 |
| 12 | Italy | 48 | 2.42 | Uganda | 38 | 1.91 |
| 13 | Germany | 45 | 2.27 | Ghana | 37 | 1.86 |
| 14 | Saudi Arabia | 41 | 2.07 | Italy | 36 | 1.81 |
| 15 | Ethiopia | 38 | 1.91 | Cameroon | 35 | 1.76 |
| 16 | Switzerland | 38 | 1.91 | Spain | 28 | 1.41 |
| 17 | Kenya | 37 | 1.86 | Brazil | 25 | 1.26 |
| 18 | Uganda | 36 | 1.81 | Sudan | 24 | 1.21 |
| 19 | Cameroon | 35 | 1.76 | Belgium | 22 | 1.11 |
| 20 | Congo | 32 | 1.61 | Egypt | 22 | 1.11 |
| | **Total** | **1985** | | **Total** | **1985** | |

**Table 7: Differences in the CiteScores based on the location of the First and Last Authors During International Collaboration**

| | | | N | Mean | Std. Deviation | Min | Max |
|---|---|---|---|---|---|---|---|
| Journals | First Authorship | Foreign | | | | | |
| | | author | 858 (58.84%) | 7.33 | 8.65 | .00 | 74.57 |
| | | Local Author | 387 (26.54%) | 5.44 | 7.30 | .06 | 66.85 |
| | | Hybrid | 213 (14.61%) | 7.12 | 9.27 | .00 | 66.85 |
| | | **Total** | **1458** | **6.80** | **8.45** | **.00** | **74.57** |
| | Last Authorship | Foreign author | 926 (63.51%) | 7.11 | 9.01 | .00 | 74.57 |
| | | Local Author | 530 (36.35%) | 6.26 | 7.36 | .00 | 66.85 |
| | | Hybrid | 2 (0.14%) | 4.06 | 3.02 | 1.92 | 6.19 |
| | | **Total** | **1458** | **6.80** | **8.45** | **.00** | **74.57** |
| Mega Journals | First Authorship | Foreign | 272 (51.61%) | 21.33 | 31.08 | .80 | 91.50 |
| | | author | | | | | |
| | | Local Author | 194 (36.81%) | 10.01 | 22.59 | .80 | 91.50 |
| | | Hybrid | 61 (11.58%) | 16.96 | 30.45 | .80 | 91.50 |
| | | **Total** | **527** | **16.66** | **28.61** | **.80** | **91.50** |
| | Last Authorship | Foreign | | | | | |
| | | author | 345 (61.67%) | 19.66 | 30.68 | .80 | 91.50 |
| | | Local Author | 182 (34.54%) | 10.96 | 23.24 | .80 | 91.50 |
| | | **Total** | **527** | **16.66** | **28.61** | **.80** | **91.50** |

## Discussion

### Low Research Integration among Sub-Saharan African countries

Evidence of low research integration among the Sub-Saharan African countries well documented in the literature, before (Asubiaro, 2019; Onyancha and Maluleka, 2011) and during (Asubiaro and Shaik, 2021) the COVID-19 pandemic. Though international collaboration is a positive development, a delineation among in the pan Sub-Saharan African collaboration is a concern. With most publications categorised as international collaboration and only 3% intra-Sub-Saharan African collaboration, it portrays Sub-Saharan African countries on researchers outside the continent. A three-throng collaboration pattern that includes a balanced blend of national, intra-Sub-Saharan African and external collaboration solutions was proffered by Onyancha (2020).

### Journals Published in and Outside Sub-Saharan Africa

Foreign publishers are dominant at the expense of local Sub-Saharan African journals as most of the COVID-19 articles with Sub-Saharan African authors were published in foreign journals. This inequality is a result of many years of epistemic bias against the knowledge that is produced in Sub-Saharan Africa as being inferior to those from the West. Only a fraction of research from Africa is indexed in the citation databases because they do not meet the set standard (Nwagwu, 2010). Sub-Saharan Africa's challenges are different from other parts of the world; the same applies to the region's level of development. Researchers from this region, like other regions of the world, work based on this reality. In contrast, the major citation databases only collect data based on the world-view of the researchers from the dominant western countries, thereby favouring knowledge that is produced in the West. Perhaps, the result could have been different

if a fair representation of publications from Sub-Saharan Africa had been indexed in the major citation databases. Because of the bias against publications from indigenous Sub-Saharan African publishers, (Harsh *et al.*, 2021) recommended the inclusion of publications deposited on academic social networking sites of Sub-Suharan Africa's publication data because they contain some of the articles that are not captured in the conventional citation databases.

This study also shows a big inequality in the prestige of journals that are published in and outside Sub-Saharan Africa. This explains why even researchers affiliated with institutions in Sub-Saharan Africa published more than 60% of their journal articles in foreign journals, despite the cheaper author processing charges of journals from publishers in Sub-Saharan Africa. These journals are in a conundrum because while the Sub-Saharan African journals do not have global appeal because they focus on Sub-Saharan African-related themes, researchers from the region want global visibility for their works. Sub-Saharan Africa has an author processing fee deficit because they pay more author processing fees than they receive.

## Deficit in Author Processing Fee

Authors in Sub-Saharan Africa pay more author processing fees than the amount received by the publishers in the region. Therefore, author processing fees paid by researchers in Sub-Saharan Africa mostly go to publishers in the UK, Europe and North America.

Foreign authors hardly publish in Sub-Saharan African journals even when collaborating with researchers from Sub-Saharan African countries. Though the journals that are published in Sub-Saharan Africa are much cheaper in author processing charges, they are also not attractive because they rank low in prestige. Besides, journals in Sub-Saharan do not enjoy the robust infrastructure that is available to journals outside the region; these infrastructures support easy retrieval, fast review, easy dissemination and visibility of manuscripts. For instance, authors prefer to publish in foreign journals with infrastructure that have trackable and fast review process.

## Inequality in Collaboration Patterns

It is very interesting that most of the publications were produced through international collaboration. By the way, the argument in this study is not against international collaboration in Sub-Saharan Africa's research. International collaboration portrays a level of development in science, and previous studies have shown it benefits Sub-Saharan Africa (Frieden and Damon, 2015; Tesema *et al.*, 2020). However, I argue against the dominance of international collaborators and recommend an increase in synergy among the Sub-Saharan African countries for research partnerships. Sub-Saharan Africa, as a social entity in the research world, has the mandate to create its own research agenda. Right now, research stakeholders have not created research frameworks or infrastructure that facilitate health research collaboration and synergy between Sub-Saharan African countries. The progress that is recorded, if any, is from the auto-pilot mechanism that has been in place for pan-Sub-Saharan African research integration that is past over due. Though each country in the region may have its own research agenda/framework, pan-Sub-Saharan Africa research will strengthen the scientific position of the individual countries and the region as a unit in the global scientific system.

## Inequality in Authorship Positions during International Collaboration

It is concerning that foreign authors dominated the first and last author positions. This is a depiction of inequality against authors in Sub-Saharan Africa's COVID-19 research. This result corroborates earlier studies that reported authors from Ghana, a Sub-Saharan African country, participate in international collaboration in fringe roles like data collector (Owusu-Nimo and Boshoff, 2017). Studies have reported that power dynamics shape how authors from low and middle-income countries, like the Sub-Saharan African countries, are represented when they collaborate with authors from high-income countries. Hedt-Gauthier *et al.*, (2019) also revealed that authors from Africa were less likely to feature in the first and last author positions when they engaged in collaboration with foreign authors.

The power dynamics between authors in Sub-Saharan Africa and high-income countries stem from

practices that are associated with epistemic wrongs of pose or positionality and gaze or audience. Epistemic wrongs that are associated with pose or positionality also occur when "knowledge practices limit the extent to which members of marginalised social or epistemic groups have ownership of knowledge production and sensemaking" (Bhakuni and Abimbola, 2021, p. e1466). The power dynamics that relegate Sub-Saharan African authors from the lead authorship position in studies about Sub-Saharan Africa is limiting the extent to which they own knowledge from their locality. Authorship positions mostly reflect the sensemaking or intellectual contribution of authors. It is perceived that the lead and last authorship positions in research are the most prestigious because they mostly theorise, interpret data and lead other researchers on the authorship list, while others that are stuck in the middle may not have contributed in the same magnitude. The practice of not recognising local authors in the lead/last authorship position downplays the sensemaking ability of the local authors, who may better understand the problems because they have first-hand experience and therefore be in the best position to perform the duties of the first and last author.

## Conclusion and Recommendations

This study focused on studying inequality in COVID-19 research from Sub-Saharan Africa. The study found that international collaboration accounted for the majority of the studies. While international collaboration is a good development, the synergy between Sub-Saharan African countries which is negligible, is concerning. This study also found the dominance of advanced countries in prominent authorship positions (first and last author). Articles published through internal Sub-Saharan African collaboration appeared less prestigious journals than the those from international collaborations. This study also found that Sub-Saharan African researchers mostly publish in journals outside the region, though the journals that are published in the region are much cheaper but less prestigious.

This study recommends a scientific partnership between Sub-Saharan Africa and the developed countries, one that eradicates the imbalances between researchers from developed countries and the region. There is a need for a more equitable partnership that encourages publishing important research in journals that are published in Sub-Saharan Africa. One of the selling points of the journals from Sub-Saharan Africa is they are very cheap, and they could become more prestigious if more important articles are published in them. The inclusion of local researchers from Africa as lead authors and not as "ordinary field agents" especially in studies about or in Sub-Saharan Africa, is important for creating equity.

There is a need for research stakeholders in Sub-Saharan Africa to design a roadmap for a stronger research partnership between Sub-Saharan African countries.

### Limitations of the Study

One of the limitations of the study is that the effect of the number of authors on authorship position was not normalised. For instance, the last authors in two-authored papers may be nominal since the second author is automatically the last author. Secondly, we did not collect data before the COVID-19 pandemic so a comparative study could be made.

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# Research Field Specialisation in Selected Universities in Kenya

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## Abstract

*The analysis of the subject representation of research outputs is a common occurrence in bibliometric studies, most probably because subject area analysis forms part of the indicators of ranking universities in some global ranking systems. However, the size, mission and vision of different universities seem to dictate their research niche areas, with some universities focusing on some subject areas or research fields more than others. The purpose of this study was to examine the research field specialisation in selected public universities in Kenya. The study targeted all public universities but only 17 met the threshold of 100 publications each for the period 2011-2020. The relevant data was obtained from the SCIVAL database. The findings show that Kenya produces the greatest number of publications in medicine and agriculture. The selected universities exhibited strong performance in the same fields, with four universities publishing in all research fields. In terms of field specialisation, 16 universities posted more than 10 specialisation fields, whereas only one registered fewer than 10 fields of specialisation, implying diversification of the fields of research across all the universities. Physics was the most common field of specialisation in the selected universities. The least common field of research in the selected universities was dentistry, which yielded papers in only four universities and a specialisation index greater than 1.0 in only two universities. The study makes several conclusions and recommendations for policymakers, university management and other stakeholders.*

**Keywords:** *Research, Policymakers, Universities, Kenya*

## Introduction

In today's society research performance is vital in moving countries towards an international and knowledge-based economy. As Marginson (2013) asserts, research is central to the mission of a university, and research performance is the primary factor that regulates university status and is seen to signify the innovation potency of global competitiveness. For a wide range of stakeholders, including state governments, academic organisations, the university education governance, researchers and students, this has created concerns about the effective judgement of academic research (López-Illescas, De Moya-Anegón and Moed 2011). University efficacy based on research rankings has become a popular way to assess a university's standing and excellence. One of the features used to evaluate institution ratings is the output of research in terms of articles, inventions and intellectual licences (Koto, Syukri and Sofyan Arief 2018). Similarly, prominent research outcomes in the field are articles, citations and, to a lesser degree, trademarks (Pastor and Serrano 2016). As a result, universities everywhere across the world strive for the opportunity to share scientific findings in periodicals, at conventions and elsewhere.

Universities are acknowledged as significant benefactors to the strengthening of a country's knowledge capital, as per Koto, Syukri and Sofyan Arief (2018). They are placing stronger focus on scientific output. University reputation in research excellence is considered one way of ranking excellence. Governments, researchers and the general public have taken a keen interest in university rankings, which are now used as tools in a variety of assessments, including institutional strategic positioning, research strategy development, evaluations of the integrity, applicability and effect of research effort, comparisons with network partners, identifying research partners and career opportunities. Vernon, Balas and Momani (2018) have listed a total of 24 ranking systems in the world with the following being the most visible or dominant:

**Table 1: University ranking systems (Adapted from Vernon, Balas and Momani 2018: 6)**

| Ranking System (abbreviation) | Initial Year | Sponsoring Organisation | Total # of indicators | Website |
|---|---|---|---|---|
| Academic Ranking of World Universities (Shanghai) | 2003 | Shanghai Ranking Consultancy | 6 | http://www.shanghairanking.com/ARWU2016.html |
| Carnegie Classification (Carnegie) | 1973 | Carnegie Commission on Higher Education/ Indiana U. | 8 | http://carnegieclassifications.iu.edu/ |
| Center for World University Ranking (CWUR) | 2012 | Center for World University Rankings | 8 | http://cwur.org/ |
| Leiden Ranking (Leiden) | 2011 | Leiden University, Netherlands | 18 | http://www.leidenranking.com/ |
| QSWorld University Ranking (QSWorld) | 2013 | Quacquarelli SymondsLimited | 6 | https://www.topuniversities.com/university-rankings |
| Round University Ranking (RUR) | 2010 | RUR Ranking Agency | 20 | http://roundranking.com/ |
| SCImago Institutions Rankings World Report (SCImago) | 2009 | SCImago Lab | 12 | http://www.scimagoir.com/ |
| The Times Higher Education World University Rankings (Times) | 2004 | TESGlobal Ltd | 13 | https://www.timeshighereducation.com/world-university-rankings |
| Clarivate Analytics Innovative University Ranking (CA) (formerly Thomson Reuters) | 2015 | Reuters | 10 | http://www.reuters.com/article/amers-reuters-ranking-innovative-univers-idUSL2N1C406D |
| U-Multirank (UMR) | 2014 | European Union and Advisory Board | 30 | http://www.umultirank.org/#!/home?name=nullandtrackType = home |
| USNews and World Report–Global Ranking (USNandW) | 2014 | USNewsand World Report | 12 | https://www.usnews.com/education/best-global-universities/rankings |
| University Ranking by Academic Performance (URAP) | 2010 | Middle East Technical University | 6 | http://www.urapcenter.org/2016/ |
| Webometrics (Web) | 2004 | CybermetricsLab, Spanish National Research Council | 4 | http://www.webometrics.info/en |

Each ranking system uses a variety of indicators to rank universities. The U-Multirank and Round University Ranking use the greatest number of indicators, that is 30 and 20, respectively. The least number of indicators is applied by Webometrics Ranking of World Universities (WRWU). Despite the widespread use of the ranking systems in the higher education sector, the systems have come under scrutiny and criticism for different reasons (see Bornmann, Wohlrabe, and de Moya Anegon 2017; Frenken, Heimeriks, and Hoekman 2017).

One of the areas of interest in bibliometric studies of university performance for purposes of ranking the universities is subject/research specialisation. It is therefore not surprising to note that universities are obliged to set up conducive infrastructure and environments to nurture and encourage researchers to be creative as they play a vital role in the establishment of niche areas of research (Yang, Morris and Barden 2009). According to Yang, Morris and Barden (2009: 421), ''research specialty is a self-organised social organisation, which is delineated by different facets namely, research paradigm, knowledge structure, personnel, institutions, specialised vocabulary, collaboration structure, research output, and domain journals''. In a university environment, field specialisation can refer to a course of study or major in an academic institution, as well as a body of knowledge that leads to a practice specialty. In this study, we have borrowed heavily from this definition. Research field specialisation is thus an organised body of knowledge delineated by and consisting of many factors, such as, but not confined to, research discourse, knowledge structure, personnel, institutions, thesaurus, collaboration structure, research output and domain journal commonality, that bring affiliated academics, practitioners and researchers together through research, technology, innovations and practices.

Casadevall and Fang (2014) have argued that specialisation in scientific fields advances and increases efficiency in prescriptive standards as well as scientific rigour, whereby scientists may, for example, form configuration groups and associations through which they define themselves as well as imitate practices and expectations of the groups. The positive side of specialisation is its aiding of individual scientists' proficiency in a subset of knowledge attainment and progression in competitive spheres. Knowledge specialisation in universities can produce pace setters in knowledge base/field specialisation, technological dexterity and research excellence, which imbues individuals with a sense of pride and self-distinctness as specialists. In the opinion of Small (1977), as it becomes obvious that specialist is the primary method of rational formation in modern science, field research specialisation is gaining popularity. According to Yang, Morris and Barden (2009), visualising institutional activities in a specialty is beneficial to policymakers and research funding organisations in creating resolutions.

According to Carnabuci and Jeroen (2009), field specialisation aids knowledge growth by boosting the efficiency of the knowledge generation process. As a result, as the study progresses, more research fields become specialised.

## Kenya's Research Performance: A Brief Overview

Kenya is sub-Saharan Africa's second research engine, trailing only South Africa, according to the World Bank (2019). Kenya tops the category both in terms of statistical production, but also in terms of qualitative output. The study by Onyancha, Mwai and Kwanya (2021), who assessed the top papers produced in Kenya to gauge the country's research engine, reveals an increase in the publication of the top papers, largely in the form of journal articles; a heavy co-authorship of the papers; a favourable performance by Kenya when compared to the rest of the African countries; and the publication of the country's top papers in prestigious international journals. Kenya's research performance is partly dependent on the dissemination of its research in high-impact factor journals. In addition, the country's performance in research is heavily dependent on the performance of science fields such as internal medicine, environmental sciences and ecology, and public health and agriculture. In another study by Onyancha (2020) on the knowledge specialisation of the countries in sub-Saharan African countries, Kenya was found to specialise in 10 out of the Web

of Science's 22 knowledge fields, including immunology, multidisciplinary, environment/ ecology and agriculture. An examination of the published literature reveals that studies on the assessment of subject area specialisation within public universities are uncommon, even though public-financed universities contribute considerably to a country's economic growth and the world's research output. In Kenya, no study has looked at the specialised research index of state-funded universities. As a consequence, this study makes a significant contribution by examining field research specialisation at Kenyan public institutions.

### Purpose and Objectives of the Study

The study aimed to investigate research field specialisation at selected Kenyan universities to create a knowledge specialisation index for the country. Specifically, the study sought to:

- Assess the trend and patterns of research outputs per university in different research fields
- Determine the public universities' research outputs contribution to the national research grid
- Examine the coverage and intensity of each public university's research in different research fields
- Determine the subject area of specialisation in each selected university

## Research Methodology

Data for this study was obtained from the SCIVAL database, a tool that is used to assess the research performance of researchers, institutions and countries. The SCIVAL database draws its metrics from Scopus, one of the largest bibliographic and citation databases (Bar-Ilan 2007; Onyancha 2017). A basic search using the names of the universities, and limiting the year of publication to 2011-2020, yielded the relevant data that was needed for the study to achieve its objectives. The extracted data included:

1. Total number of papers published by Kenya
2. Total number of papers published by Kenya per subject area
3. Total number of papers published by each university
4. Total number of papers published by each university per subject area

The data was extracted for 17 out of the 29 universities that were targeted in the study. Twelve universities were excluded from the study because they yielded less than 100 papers each for the entire 10 years of the study, a criterion that was deemed to be sufficient for the computation of the specialisation index. The excluded universities and their corresponding number of papers indexed as reflected in SCIVAL are as follows: Kirinyaga University College (0), Rongo University College (0), Taita Taveta University College (0), Chuka University (95), Kibabii University (30), Laikipia University (37), Maasai Mara University (89), Machakos University (71), University of Kabianga (89), Murang'a University of Technology (0), Multimedia University of Kenya (0) and Cooperative University College of Kenya (0). The list of universities that were eventually included in the study, and their name abbreviations, are reflected in Table 2.

**Table 2: Universities that were selected for study**

| No. | University | Abbreviation |
|---|---|---|
| 1 | Dedan Kimathi University of Technology | DU |
| 2 | Egerton University | EU |
| 3 | Jaramogi Oginga Odinga University of Science and Technology | JU |
| 4 | Jomo Kenyatta University of Agriculture and Technology | JKU |
| 5 | Karatina University | KAR |
| 6 | Kenyatta University | KU |
| 7 | Kisii University | KIS |
| 8 | Maseno University | MAS |
| 9 | Masinde Muliro University of Science and Technology | MUL |
| 10 | Meru University of Science and Technology | MER |
| 11 | Moi University | MU |
| 12 | Pwani University | PU |
| 13 | South Eastern Kenya University | SEK |
| 14 | Technical University of Kenya | TK |
| 15 | Technical University of Mombasa | TM |
| 16 | University of Eldoret | UE |
| 17 | University of Nairobi | UN |

The data was extracted from SCIVAL so as to strategically align with the objectives and thematic areas of the study. The institutional and national outputs per subject area were critical in the generation of coefficients that could explain the subject specialisation, as well as the percentage contribution of each university to the national research output per subject area. Table 3 provides the total number of research papers per subject area, which is an indicator of the volume of research in Kenya per subject area.

**Table 3: Distribution of publications according to subject areas**

| No. | Subject Area | Abbreviation | Papers | % of N |
|---|---|---|---|---|
| 1 | Agricultural and biological sciences | AGRI | 8 066 | 16,52 |
| 2 | Arts and humanities | ARTS | 840 | 1,72 |
| 3 | Biochemistry, genetics and molecular biology | BIOC | 3 262 | 6,68 |
| 4 | Business, management and accounting | BUSI | 814 | 1,67 |
| 5 | Chemical engineering | CENG | 308 | 0,63 |
| 6 | Chemistry | CHEM | 587 | 1,20 |
| 7 | Computer science | COMP | 1 088 | 2,23 |
| 8 | Decision sciences | DECI | 263 | 0,54 |
| 9 | Dentistry | DENT | 55 | 0,11 |
| 10 | Earth and planetary sciences | EART | 1 280 | 2,62 |
| 11 | Economics, econometrics and finance | ECON | 959 | 1,96 |
| 12 | Energy | ENER | 692 | 1,42 |
| 13 | Engineering | ENGI | 1 521 | 3,11 |
| 14 | Environmental science | ENVI | 4 135 | 8,47 |
| 15 | Health professions | HEAL | 278 | 0,57 |
| 16 | Immunology and microbiology | IMMU | 2 722 | 5,57 |
| 17 | Materials science | MATE | 416 | 0,85 |
| 18 | Mathematics | MATH | 431 | 0,88 |
| 19 | Medicine | MEDI | 11 284 | 23,10 |
| 20 | Multidisciplinary | MULT | 1 734 | 3,55 |
| 21 | Neuroscience | NEUR | 283 | 0,58 |
| 22 | Nursing | NURS | 698 | 1,43 |
| 23 | Pharmacology, toxicology and pharmaceutics | PHAR | 538 | 1,10 |
| 24 | Physics and astronomy | PHYS | 508 | 1,04 |
| 25 | Psychology | PSYC | 588 | 1,20 |
| 26 | Social sciences | SOCI | 4 712 | 9,65 |
| 27 | Veterinary | VETE | 778 | 1,59 |

The following formula was used to compute the specialisation index for each university in each subject area:

$$SI = \frac{Us/Ut}{Ks/Kt}$$ or simply expressed as $$SI = \frac{Us \times Kt}{Ut \times Ks}$$

Where

- *Us* = Number of papers from University X in a given subject area (s) (e.g. publications on *Medicine* published by *University of Nairobi*)
- *Ut* = Total number of papers produced by a given university in time t (e.g. all University of Nairobi papers during 2011-2020 period)

- *Ks* = All papers published in a given subject area (corresponding to the *Us*) in the country, Kenya (e.g. all papers published in Kenya on *Medicine*)
- *Kt* = Total number of papers produced in Kenya in the period 2011-2020

For purposes of calculating the specialisation coefficient as outlined above, a whole count technique was used to assign a research publication to an individual institution or subject area. In his attempt to contrast adjusted count and whole/ complete count, Diodato (1994) explains that whereas in the adjusted count approach, every author is allotted an equal fraction of a unit, a complete (whole) count approach ensures that each author is fully counted wherever he/she appears in a publication, whether or not there is multiple authorship. Consequently, the aggregated number of publications for Kenya (Kt) was 48 840 (sum of the papers by subject area) instead of the actual 29 574 publications that Kenya published between 2011 and 2020. The same approach was used to determine the Ut (institutional output – sum of papers by subject area) figure for each university. The Ut and Kt aggregated outputs were deemed appropriate as an article could be classified in multiple subject areas in SCIVAL. This approach explains the percentage contribution of each subject area to the national outputs per subject in Table 3.

The same approach used in Table 3 was applied to calculate the percentage contributions of each field to the national research output in each subject area.

## Results

This section presents the findings under five subheadings, namely:

- Research outputs per university in different research fields
- Public universities' research outputs contribution to the national research grid
- Coverage and intensity of each public university's research in different research fields
- Subject area of specialisation in each selected university

### Research Outputs Per University in Different Research Fields

The total number of papers that each university produced between 2011 and 2020 per field is depicted in Table 4. The table reveals that UN yielded the most papers in all the fields except HEAL; there MU produced more papers (i.e. 49) than UN, which produced 44 papers. A summary of the two best performances for each university in terms of the highest number of papers produced in a field is as follows: DU (ENGI = 72; COMP = 37); EU (AGRI = 502; ENVI = 190); JU (AGRI = 60; MEDI = 57); JKU (AGRI = 569; MEDI = 505); KAR (AGRI = 57; ENVI = 42); KU (MEDI = 454; AGRI = 391); KIS (SOCI = 41; MEDI = 26); MAS (MEDI = 259; ENVI = 199); MUL (MEDI = 89; ENVI = 58); MER (AGRI = 29; IMMU = 24); MU (MEDI = 1 000; SOCI = 250); PU (MEDI = 110; AGRI = 84); SEK (AGRI = 95; ENVI = 57; TK (SOCI = 68; ENVI = 62); TM (MEDI = 56; ENGI = 24); UE (AGRI = 124; ENVI = 90) and UN (MEDI = 2 562; AGRI = 1 188). It follows therefore that AGRI and MEDI topped the list of the most researched fields in 7 universities each. The above indication of the most researched fields reveals that only 8 fields were the top 2 researched, with a total of 18 fields not featuring among the top 2 fields in each of the selected universities. The 8 fields are AGRI, COMP, EART, ENGI, ENVI, IMMU, MEDI and SOCI.

**Table 4: University research output per field, 2011-2020**

| | DU | EU | JU | JKU | KAR | KU | KIS | MAS | MUL | MER | MU | PU | SEK | TK | TM | UE | UN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRI | 19 | 502 | 60 | 569 | 57 | 391 | 23 | 139 | 49 | 29 | 143 | 84 | 95 | 48 | 23 | 124 | 1 188 |
| ARTS | 2 | 23 | 22 | 6 | 3 | 71 | 10 | 33 | 8 | 0 | 58 | 9 | 2 | 25 | 0 | 5 | 123 |
| BIOC | 10 | 106 | 45 | 233 | 8 | 172 | 16 | 70 | 40 | 8 | 125 | 68 | 22 | 24 | 11 | 33 | 571 |
| BUSI | 16 | 11 | 6 | 51 | 9 | 62 | 19 | 13 | 10 | 0 | 66 | 9 | 8 | 19 | 4 | 4 | 133 |
| CENG | 19 | 21 | 13 | 44 | 4 | 16 | 2 | 11 | 3 | 2 | 26 | 3 | 9 | 19 | 12 | 8 | 44 |
| CHEM | 8 | 60 | 16 | 38 | 0 | 45 | 4 | 50 | 12 | 5 | 27 | 4 | 9 | 32 | 2 | 18 | 121 |
| COMP | 37 | 17 | 16 | 117 | 2 | 69 | 15 | 102 | 23 | 5 | 60 | 10 | 11 | 46 | 14 | 18 | 266 |
| DECI | 14 | 4 | 1 | 17 | 5 | 21 | 11 | 3 | 6 | 1 | 13 | 2 | 3 | 13 | 2 | 6 | 53 |
| DENT | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 37 |
| EART | 15 | 34 | 15 | 76 | 8 | 59 | 3 | 20 | 12 | 17 | 25 | 30 | 46 | 25 | 11 | 10 | 194 |
| ECON | 6 | 37 | 21 | 24 | 4 | 49 | 8 | 20 | 8 | 0 | 21 | 7 | 5 | 6 | 2 | 2 | 151 |
| ENER | 20 | 23 | 4 | 78 | 1 | 31 | 0 | 9 | 8 | 0 | 14 | 7 | 7 | 14 | 10 | 10 | 123 |
| ENGI | 72 | 55 | 15 | 212 | 6 | 95 | 14 | 29 | 24 | 10 | 102 | 24 | 22 | 56 | 24 | 24 | 303 |
| ENVI | 23 | 190 | 41 | 200 | 42 | 205 | 12 | 199 | 58 | 14 | 95 | 40 | 57 | 62 | 23 | 90 | 608 |
| HEAL | 0 | 1 | 0 | 8 | 2 | 38 | 1 | 1 | 2 | 0 | 49 | 0 | 3 | 0 | 0 | 0 | 44 |
| IMMU | 0 | 65 | 23 | 195 | 7 | 115 | 7 | 83 | 40 | 24 | 106 | 48 | 9 | 22 | 20 | 12 | 536 |
| MATE | 29 | 21 | 7 | 53 | 7 | 41 | 3 | 22 | 17 | 7 | 53 | 2 | 18 | 29 | 1 | 21 | 75 |
| MATH | 22 | 14 | 6 | 53 | 0 | 30 | 2 | 39 | 28 | 2 | 27 | 2 | 1 | 6 | 4 | 3 | 67 |
| MEDI | 10 | 184 | 57 | 505 | 14 | 454 | 26 | 259 | 89 | 21 | 1 000 | 110 | 25 | 49 | 56 | 35 | 2 562 |
| MULT | 7 | 27 | 10 | 81 | 2 | 60 | 6 | 31 | 13 | 8 | 69 | 17 | 12 | 17 | 10 | 9 | 273 |
| NEUR | 3 | 5 | 3 | 7 | 1 | 13 | 2 | 11 | 3 | 0 | 13 | 5 | 2 | 3 | 2 | 0 | 71 |
| NURS | 9 | 20 | 1 | 28 | 1 | 64 | 2 | 20 | 8 | 2 | 66 | 3 | 0 | 5 | 2 | 4 | 117 |
| PHAR | 0 | 41 | 6 | 39 | 1 | 31 | 3 | 36 | 14 | 2 | 37 | 4 | 9 | 11 | 1 | 10 | 194 |
| PHYS | 13 | 18 | 8 | 45 | 6 | 46 | 8 | 16 | 25 | 4 | 31 | 26 | 12 | 30 | 2 | 24 | 109 |
| PSYC | 0 | 8 | 1 | 15 | 1 | 30 | 2 | 46 | 5 | 0 | 51 | 13 | 1 | 1 | 2 | 0 | 98 |
| SOCI | 20 | 143 | 50 | 134 | 22 | 280 | 41 | 110 | 42 | 2 | 250 | 29 | 25 | 68 | 15 | 34 | 859 |
| VETE | 0 | 67 | 2 | 42 | 3 | 24 | 1 | 12 | 2 | 7 | 6 | 20 | 3 | 2 | 2 | 2 | 228 |

## Public Universities' Research Outputs Contribution to the National Research Grid

In terms of the percentage contribution of each university to the national output in each field, Table 5 shows that UN contributed the most papers. The university's contribution surpasses 15% per field, with the highest contribution being in the field of DENT wherein the university contributed 67.3% of the nation's 55 papers that were published during the period under investigation. It is worth noting, however, that only four universities (JKU, KU, MU and UN) published papers in this subject area. The other fields in which UN contributed a substantial number of papers include PHAR (36.1%), VETE (29.3%) and NEUR (25.1%). Most of the universities' contributions to the national outputs accounted for less than 10% each per field. Besides UN, only the following universities contributed more than 10% to the national tally's output per field and only in a few fields each: EU (CHEM = 10.2%), JKU (CENG = 14.3%; COMP = 10.8%; ENER = 11.3%; ENGI = 13.9%; MATE = 12.7%; MATH = 12.3%), KU (HEAL = 13.7%) and MU (DENT = 12.7%; HEAL = 17.6%; MATE = 12.7%). Overall, UN contributed 20.9% to each field, and JKU occupies a distant second position with an average contribution of 6.6%, followed by KU (6.1%) and MU (6.2%), just to name the universities with an average contribution of 5% or above. The lowest average percentage contribution was registered by MER (0.4%), KAR (0.5%), TM (0.6%) and KIS (0.8%). These universities contributed an average of less than 1% to each field. In terms of the average contribution per university in each field, the mean of the 'means' in the last row in Table 5 would be $x$ = 3.5%, implying that the selected universities' average percentage contribution per field is 3.5%. If this percentage contribution per the selected universities could be taken as the universities' benchmark, it

would imply that the selected universities' percentage contribution surpassed the overall contribution in 10 out of 27 fields. The 10 instances where the means, for each field, surpassed the 3.5% are CENG ($x$ = 4.9%), CHEM ($x$ = 4.5%), COMP ($x$ = 4.5%), DECI ($x$ = 3.9%), DENT ($x$ = 4.9%), ENGI ($x$ = 4.2%), MATE ($x$ = 5.7%), MATH ($x$ = 4.2%), PHAR ($x$ = 4.8%) and PHYS ($x$ = 4.9%).

**Table 5: Institutional contribution to national research output per subject area**

| | DU | EU | JU | JKU | KAR | KU | KIS | MAS | MMU | MER | MU | PU | SEK | TK | TM | UE | UN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRI | 0.2 | 6.2 | 0.7 | 7.1 | 0.7 | 4.8 | 0.3 | 1.7 | 0.6 | 0.4 | 1.8 | 1.0 | 1.2 | 0.6 | 0.3 | 1.5 | 14.7 |
| ARTS | 0.2 | 2.7 | 2.6 | 0.7 | 0.4 | 8.5 | 1.2 | 3.9 | 1.0 | 0.0 | 6.9 | 1.1 | 0.2 | 3.0 | 0.0 | 0.6 | 14.6 |
| BIOC | 0.3 | 3.2 | 1.4 | 7.1 | 0.2 | 5.3 | 0.5 | 2.1 | 1.2 | 0.2 | 3.8 | 2.1 | 0.7 | 0.7 | 0.3 | 1.0 | 17.5 |
| BUSI | 2.0 | 1.4 | 0.7 | 6.3 | 1.1 | 7.6 | 2.3 | 1.6 | 1.2 | 0.0 | 8.1 | 1.1 | 1.0 | 2.3 | 0.5 | 0.5 | 16.3 |
| CENG | 6.2 | 6.8 | 4.2 | 14.3 | 1.3 | 5.2 | 0.6 | 3.6 | 1.0 | 0.6 | 8.4 | 1.0 | 2.9 | 6.2 | 3.9 | 2.6 | 14.3 |
| CHEM | 1.4 | 10.2 | 2.7 | 6.5 | 0.0 | 7.7 | 0.7 | 8.5 | 2.0 | 0.9 | 4.6 | 0.7 | 1.5 | 5.5 | 0.3 | 3.1 | 20.6 |
| COMP | 3.4 | 1.6 | 1.5 | 10.8 | 0.2 | 6.3 | 1.4 | 9.4 | 2.1 | 0.5 | 5.5 | 0.9 | 1.0 | 4.2 | 1.3 | 1.7 | 24.4 |
| DECI | 5.3 | 1.5 | 0.4 | 6.5 | 1.9 | 8.0 | 4.2 | 1.1 | 2.3 | 0.4 | 4.9 | 0.8 | 1.1 | 4.9 | 0.8 | 2.3 | 20.2 |
| DENT | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 12.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 67.3 |
| EART | 1.2 | 2.7 | 1.2 | 5.9 | 0.6 | 4.6 | 0.2 | 1.6 | 0.9 | 1.3 | 2.0 | 2.3 | 3.6 | 2.0 | 0.9 | 0.8 | 15.2 |
| ECON | 0.6 | 3.9 | 2.2 | 2.5 | 0.4 | 5.1 | 0.8 | 2.1 | 0.8 | 0.0 | 2.2 | 0.7 | 0.5 | 0.6 | 0.2 | 0.2 | 15.7 |
| ENER | 2.9 | 3.3 | 0.6 | 11.3 | 0.1 | 4.5 | 0.0 | 1.3 | 1.2 | 0.0 | 2.0 | 1.0 | 1.0 | 2.0 | 1.4 | 1.4 | 17.8 |
| ENGI | 4.7 | 3.6 | 1.0 | 13.9 | 0.4 | 6.2 | 0.9 | 1.9 | 1.6 | 0.7 | 6.7 | 1.6 | 1.4 | 3.7 | 1.6 | 1.6 | 19.9 |
| ENVI | 0.6 | 4.6 | 1.0 | 4.8 | 1.0 | 5.0 | 0.3 | 4.8 | 1.4 | 0.3 | 2.3 | 1.0 | 1.4 | 1.5 | 0.6 | 2.2 | 14.7 |
| HEAL | 0.0 | 0.4 | 0.0 | 2.9 | 0.7 | 13.7 | 0.4 | 0.4 | 0.7 | 0.0 | 17.6 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | 15.8 |
| IMMU | 0.0 | 2.4 | 0.8 | 7.2 | 0.3 | 4.2 | 0.3 | 3.0 | 1.5 | 0.9 | 3.9 | 1.8 | 0.3 | 0.8 | 0.7 | 0.4 | 19.7 |
| MATE | 7.0 | 5.0 | 1.7 | 12.7 | 1.7 | 9.9 | 0.7 | 5.3 | 4.1 | 1.7 | 12.7 | 0.5 | 4.3 | 7.0 | 0.2 | 5.0 | 18.0 |
| MATH | 5.1 | 3.2 | 1.4 | 12.3 | 0.0 | 7.0 | 0.5 | 9.0 | 6.5 | 0.5 | 6.3 | 0.5 | 0.2 | 1.4 | 0.9 | 0.7 | 15.5 |
| MEDI | 0.1 | 1.6 | 0.5 | 4.5 | 0.1 | 4.0 | 0.2 | 2.3 | 0.8 | 0.2 | 8.9 | 1.0 | 0.2 | 0.4 | 0.5 | 0.3 | 22.7 |
| MULT | 0.4 | 1.6 | 0.6 | 4.7 | 0.1 | 3.5 | 0.3 | 1.8 | 0.7 | 0.5 | 4.0 | 1.0 | 0.7 | 1.0 | 0.6 | 0.5 | 15.7 |
| NEUR | 1.1 | 1.8 | 1.1 | 2.5 | 0.4 | 4.6 | 0.7 | 3.9 | 1.1 | 0.0 | 4.6 | 1.8 | 0.7 | 1.1 | 0.7 | 0.0 | 25.1 |
| NURS | 1.3 | 2.9 | 0.1 | 4.0 | 0.1 | 9.2 | 0.3 | 2.9 | 1.1 | 0.3 | 9.5 | 0.4 | 0.0 | 0.7 | 0.3 | 0.6 | 16.8 |
| PHAR | 0.0 | 7.6 | 1.1 | 7.2 | 0.2 | 5.8 | 0.6 | 6.7 | 2.6 | 0.4 | 6.9 | 0.7 | 1.7 | 2.0 | 0.2 | 1.9 | 36.1 |
| PHYS | 2.6 | 3.5 | 1.6 | 8.9 | 1.2 | 9.1 | 1.6 | 3.1 | 4.9 | 0.8 | 6.1 | 5.1 | 2.4 | 5.9 | 0.4 | 4.7 | 21.5 |
| PSYC | 0.0 | 1.4 | 0.2 | 2.6 | 0.2 | 5.1 | 0.3 | 7.8 | 0.9 | 0.0 | 8.7 | 2.2 | 0.2 | 0.2 | 0.3 | 0.0 | 16.7 |
| SOCI | 0.4 | 3.0 | 1.1 | 2.8 | 0.5 | 5.9 | 0.9 | 2.3 | 0.9 | 0.0 | 5.3 | 0.6 | 0.5 | 1.4 | 0.3 | 0.7 | 18.2 |
| VETE | 0.0 | 8.6 | 0.3 | 5.4 | 0.4 | 3.1 | 0.1 | 1.5 | 0.3 | 0.9 | 0.8 | 2.6 | 0.4 | 0.3 | 0.3 | 0.3 | 29.3 |
| **MEAN** | **1.7** | **3.5** | **1.1** | **6.6** | **0.5** | **6.1** | **0.8** | **3.5** | **1.6** | **0.4** | **6.2** | **1.2** | **1.1** | **2.2** | **0.6** | **1.3** | **20.9** |

## Coverage and Intensity of each Public University's Research in Different Research Fields

Figure 1 provides the total number of fields in which each university published at least one paper (Total fields), the number of papers that the institution produced between 2011 and 2020 (Total papers_1 = $x$) and the subject-aggregated sum of all the papers for each university (Total papers_2 = $y$). For example, whereas DU (Dedan Kimathi University) produced a total of 170 papers between 2011 and 2020, its aggregate when each subject area's papers are added together was 374. The latter figure constitutes papers that were counted multiple times despite belonging to multiple subject areas. Figure 1 shows that only four universities, namely JKU, KU, MU and UN, published papers in all the Scopus subject areas; the university with the least number of subject areas was MER, which registered 19 research fields. A similar pattern is replicated in terms of the number of papers for each university, where UN tops the list with x = 5 757 and y = 9 148, accounting for 19.5% and 18.7% of the national output (x = 29 574; y = 48 840). In the second and distant position is JKU (x = 5.8%; y = 5.9%), followed by MU (x = 5.6%; y = 5.2%), KU (x = 5.0%; y = 5.1%) and EU (x = 3.4%; y = 3.5%), just to name the universities with 1 000 or more publications in the first counting category.

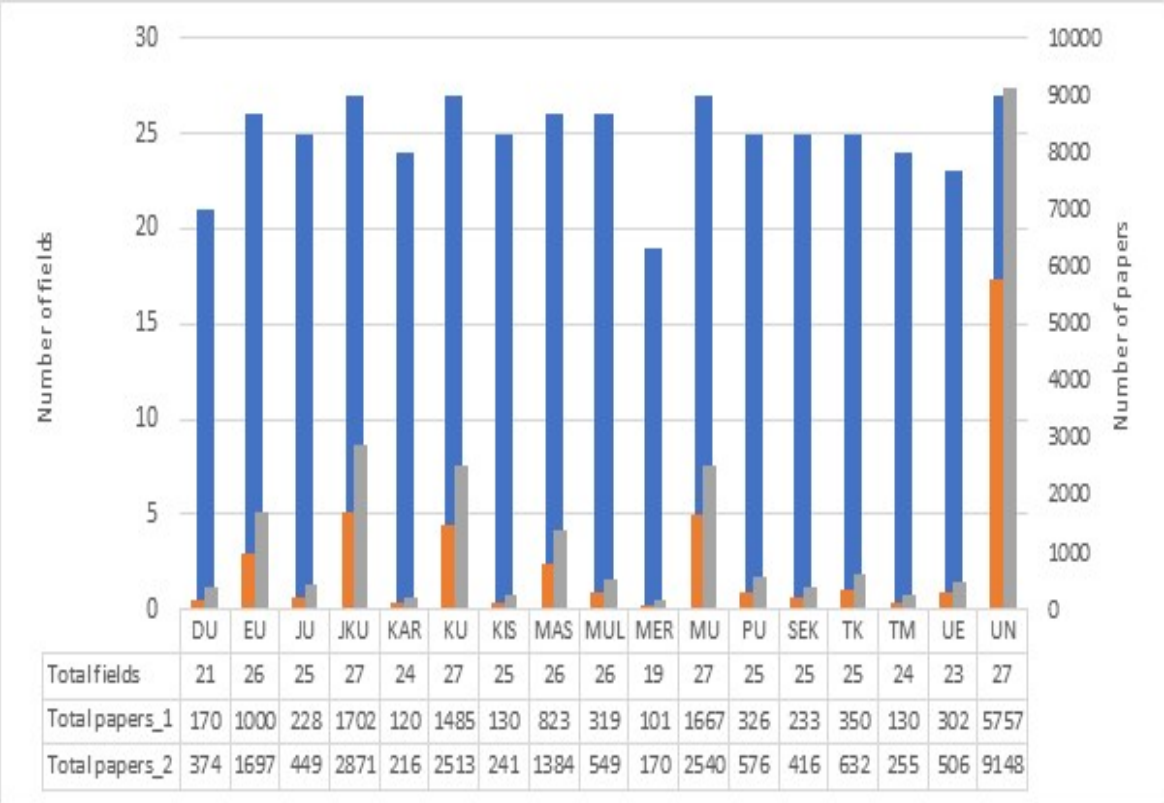


**Figure 1: Number of research fields and papers per public university**

**Table 6: Number of papers per field in each university**

| | FIELDS | | TOTAL PAPERS_1 | | TOTAL PAPERS_2 | |
|---|---|---|---|---|---|---|
| | n | % of 27 | n | Papers per field | n | Papers per field |
| DU | 21 | 77.78 | 170 | 8.10 | 374 | 17.81 |
| EU | 26 | 96.30 | 1 000 | 38.46 | 1 697 | 65.27 |
| JU | 25 | 92.59 | 228 | 9.12 | 449 | 17.96 |
| JKU | 27 | 100.00 | 1 702 | 63.04 | 2 871 | 106.33 |
| KAR | 24 | 88.89 | 120 | 5.00 | 216 | 9.00 |
| KU | 27 | 100.00 | 1 485 | 55.00 | 2 513 | 93.07 |
| KIS | 25 | 92.59 | 130 | 5.20 | 241 | 9.64 |
| MAS | 26 | 96.30 | 823 | 31.65 | 1 384 | 53.23 |
| MUL | 26 | 96.30 | 319 | 12.27 | 549 | 21.12 |
| MER | 19 | 70.37 | 101 | 5.32 | 170 | 8.95 |
| MU | 27 | 100.00 | 1 667 | 61.74 | 2 540 | 94.07 |
| PU | 25 | 92.59 | 326 | 13.04 | 576 | 23.04 |
| SEK | 25 | 92.59 | 233 | 9.32 | 416 | 16.64 |
| TK | 25 | 92.59 | 350 | 14.00 | 632 | 25.28 |
| TM | 24 | 88.89 | 130 | 5.42 | 255 | 10.63 |
| UE | 23 | 85.19 | 302 | 13.13 | 506 | 22.00 |
| UN | 27 | 100.00 | 5 757 | 213.22 | 9 148 | 338.81 |

Another indicator used to assess the universities' research intensity per field was the average number of papers per field. Table 6 reveals that the performance of the universities according to the number of papers per field followed a similar pattern as that reflected in Figure 1, albeit with minor variations. The UN yielded the highest average number of papers per field, followed by JKU, MU, KU and EU. The universities with the least number of papers per field were KAR (5.00; 9.00), KIS (5.20; 9.64), MER (5.32; 8.95) and TM (5.42; 10.63). These universities are among the youngest in the country, having been established and chartered after 2010. Not only did this category of universities produce the least number of papers, but also the least average number of papers per field. A relational comparison of the average number of papers per field for each institution against the national average indicates that each of the universities performed dismally. The national average number of papers per field between 2011 and 2020 is 1 095 (single counts) and 1 808 (multiple counts). It follows therefore that none of the universities' average was anywhere close, with the most productive university's averages accounting for approximately 19% of the national average.

## Subject Area of Specialisation in Each Selected University

Table 7 provides the specialisation coefficients for each university per field as well as the number of fields in which each university is said to exhibit specialisation. Many universities registered coefficients that were equal to or higher than 1.0, thus exhibiting subject specialisation. The highest coefficient was registered by DU in MATE (*SI* = 9.1), followed by KIS in DECI (*SI* = 8.5), TM in CENG (*SI* = 7.5), MUL in MATE (*SI* = 5.8), TK in MATE (*SI* = 5.4) and SEK in MATE (*SI* = 5.1). An examination of the top two coefficients in each university identified the following subjects as the ones with the highest coefficients: DU (MATE, CENG), EU (CHEM, VETE), JU (CENG, CHEM), JKU (CENG, ENGI), KAR (DECI, MATE), KU (HEAL, MATE), KIS (DECI, BUSI), MAS (COMP, MATE), MUL (MATE, PHYS), MER (MATE, EART), MU (HEAL, MATE), PU (PHYS, VETE), SEK (MATE, EART), TK (MATE, CENG), TM (CENG, ENGI), UE (MATE, PHYS) and UN (DENT, PHAR). In terms of the number of subject areas that registered $SI \geq 1.0$, 5 universities posted 15 fields each. All the universities except PU posted a score of  in 10 or more subject areas. An examination of the subject areas that scored values equal to or greater than 1.0 shows that PHYS posted the highest occurrences (16), followed by ENGI and MATE (15 each) and COMP (14), whereas CENG, CHEM, DECI and PHAR posted 13 scores that were equal to or above 1.0. ENVI (11) and MATH (10) rounded up the subject fields that posted a score of  in 10 or more universities. The subject areas that scored a coefficient of  but in the least number of universities included MULT (2), DENT (2), MEDI (3) and VETE, PSYC, HEAL and ECON which yielded a score of  in 4 universities each.

**Table 7: Subject specialisation index for the selected universities**

| | DU | EU | JU | JKU | KAR | KU | KIS | MAS | MUL | MER | MU | PU | SEK | TK | TM | UE | UN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRI | 0.3 | 1.8 | 0.8 | 1.2 | 1.6 | 0.9 | 0.6 | 0.6 | 0.5 | 1.0 | 0.3 | 0.9 | 1.4 | 0.5 | 0.5 | 1.5 | 0.8 |
| ARTS | 0.3 | 0.8 | 2.8 | 0.1 | 0.8 | 1.6 | 2.4 | 1.4 | 0.8 | 0.0 | 1.3 | 0.9 | 0.3 | 2.3 | 0.0 | 0.6 | 0.8 |
| BIOC | 0.4 | 0.9 | 1.5 | 1.2 | 0.6 | 1.0 | 1.0 | 0.8 | 1.1 | 0.7 | 0.7 | 1.8 | 0.8 | 0.6 | 0.6 | 1.0 | 0.9 |
| BUSI | 2.6 | 0.4 | 0.8 | 1.1 | 2.5 | 1.5 | 4.7 | 0.6 | 1.1 | 0.0 | 1.6 | 0.9 | 1.2 | 1.8 | 0.9 | 0.5 | 0.9 |
| CENG | 8.1 | 2.0 | 4.6 | 2.4 | 2.9 | 1.0 | 1.3 | 1.3 | 0.9 | 1.9 | 1.6 | 0.8 | 3.4 | 4.8 | 7.5 | 2.5 | 0.8 |
| CHEM | 1.8 | 2.9 | 3.0 | 1.1 | 0.0 | 1.5 | 1.4 | 3.0 | 1.8 | 2.4 | 0.9 | 0.6 | 1.8 | 4.2 | 0.7 | 3.0 | 1.1 |
| COMP | 4.4 | 0.4 | 1.6 | 1.8 | 0.4 | 1.2 | 2.8 | 3.3 | 1.9 | 1.3 | 1.1 | 0.8 | 1.2 | 3.3 | 2.5 | 1.6 | 1.3 |
| DECI | 7.0 | 0.4 | 0.4 | 1.1 | 4.3 | 1.6 | 8.5 | 0.4 | 2.0 | 1.1 | 1.0 | 0.6 | 1.3 | 3.8 | 1.5 | 2.2 | 1.1 |
| DENT | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 |
| EART | 1.5 | 0.8 | 1.3 | 1.0 | 1.4 | 0.9 | 0.5 | 0.6 | 0.8 | 3.8 | 0.4 | 2.0 | 4.2 | 1.5 | 1.6 | 0.8 | 0.8 |
| ECON | 0.8 | 1.1 | 2.4 | 0.4 | 0.9 | 1.0 | 1.7 | 0.7 | 0.7 | 0.0 | 0.4 | 0.6 | 0.6 | 0.5 | 0.4 | 0.2 | 0.8 |
| ENER | 3.8 | 1.0 | 0.6 | 1.9 | 0.3 | 0.9 | 0.0 | 0.5 | 1.0 | 0.0 | 0.4 | 0.9 | 1.2 | 1.6 | 2.8 | 1.4 | 0.9 |
| ENGI | 6.2 | 1.0 | 1.1 | 2.4 | 0.9 | 1.2 | 1.9 | 0.7 | 1.4 | 1.9 | 1.3 | 1.3 | 1.7 | 2.8 | 3.0 | 1.5 | 1.1 |
| ENVI | 0.7 | 1.3 | 1.1 | 0.8 | 2.3 | 1.0 | 0.6 | 1.7 | 1.2 | 1.0 | 0.4 | 0.8 | 1.6 | 1.2 | 1.1 | 2.1 | 0.8 |
| HEAL | 0.0 | 0.1 | 0.0 | 0.5 | 1.6 | 2.7 | 0.7 | 0.1 | 0.6 | 0.0 | 3.4 | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.8 |
| IMMU | 0.0 | 0.7 | 0.9 | 1.2 | 0.6 | 0.8 | 0.5 | 1.1 | 1.3 | 2.5 | 0.7 | 1.5 | 0.4 | 0.6 | 1.4 | 0.4 | 1.1 |
| MATE | 9.1 | 1.5 | 1.8 | 2.2 | 3.8 | 1.9 | 1.5 | 1.9 | 3.6 | 4.8 | 2.4 | 0.4 | 5.1 | 5.4 | 0.5 | 4.9 | 1.0 |
| MATH | 6.7 | 0.9 | 1.5 | 2.1 | 0.0 | 1.4 | 0.9 | 3.2 | 5.8 | 1.3 | 1.2 | 0.4 | 0.3 | 1.1 | 1.8 | 0.7 | 0.8 |
| MEDI | 0.1 | 0.5 | 0.5 | 0.8 | 0.3 | 0.8 | 0.5 | 0.8 | 0.7 | 0.5 | 1.7 | 0.8 | 0.3 | 0.3 | 1.0 | 0.3 | 1.2 |
| MULT | 0.5 | 0.4 | 0.6 | 0.8 | 0.3 | 0.7 | 0.7 | 0.6 | 0.7 | 1.3 | 0.8 | 0.8 | 0.8 | 0.8 | 1.1 | 0.5 | 0.8 |
| NEUR | 1.4 | 0.5 | 1.2 | 0.4 | 0.8 | 0.9 | 1.4 | 1.4 | 0.9 | 0.0 | 0.9 | 1.5 | 0.8 | 0.8 | 1.4 | 0.0 | 1.3 |
| NURS | 1.7 | 0.8 | 0.2 | 0.7 | 0.3 | 1.8 | 0.6 | 1.0 | 1.0 | 0.8 | 1.8 | 0.4 | 0.0 | 0.6 | 0.5 | 0.6 | 0.9 |
| PHAR | 0.0 | 2.2 | 1.2 | 1.2 | 0.4 | 1.1 | 1.1 | 2.4 | 2.3 | 1.1 | 1.3 | 0.6 | 2.0 | 1.6 | 0.4 | 1.8 | 1.9 |
| PHYS | 3.3 | 1.0 | 1.7 | 1.5 | 2.7 | 1.8 | 3.2 | 1.1 | 4.4 | 2.3 | 1.2 | 4.3 | 2.8 | 4.6 | 0.8 | 4.6 | 1.1 |
| PSYC | 0.0 | 0.4 | 0.2 | 0.4 | 0.4 | 1.0 | 0.7 | 2.8 | 0.8 | 0.0 | 1.7 | 1.9 | 0.2 | 0.1 | 0.7 | 0.0 | 0.9 |
| SOCI | 0.6 | 0.9 | 1.2 | 0.5 | 1.1 | 1.2 | 1.8 | 0.8 | 0.8 | 0.1 | 1.0 | 0.5 | 0.6 | 1.1 | 0.6 | 0.7 | 1.0 |
| VETE | 0.0 | 2.5 | 0.3 | 0.9 | 0.9 | 0.6 | 0.3 | 0.5 | 0.2 | 2.6 | 0.1 | 2.2 | 0.5 | 0.2 | 0.5 | 0.2 | 1.6 |
| **SI > 1** | **13** | **10** | **15** | **15** | **10** | **15** | **13** | **12** | **14** | **14** | **15** | **8** | **14** | **15** | **11** | **11** | **11** |
| **% of 27** | **48.1** | **37.0** | **55.6** | **55.6** | **37.0** | **55.6** | **48.1** | **44.4** | **51.9** | **51.9** | **55.6** | **29.6** | **51.9** | **55.6** | **40.7** | **40.7** | **40.7** |

## Discussion of the Findings

The results show that Kenya's strength in terms of the volume of research conducted in the country, as proxied through the number of published research outputs or publications, lies in medicine and agriculture, and biological sciences, which yielded 11 284 and 8 066 papers, respectively, thereby accounting for 40% of the country's subject-aggregated output. Onyancha, Mwai and Kwanya (2021), in their study entitled *Kenya's research excellence as indexed in the Web of Science: an informetrics' perspective,* found that the two fields were among the most researched and highly cited in Kenya. According to Onyancha, Mwai and Kwanya (2021), the top-cited fields in Kenya include medicine, environmental sciences and agriculture. The current study further reveals that the other subject areas or fields, besides medicine and agriculture, yielded less than 5 000 papers each. While the dominance of agriculture-specific papers can be attributed to the fact that Kenya is generally an agricultural country, and the country depends heavily on agriculture as the highest income earner not only for individual households but also as the largest contributor to the national gross domestic product (GDP) (World Bank 2021), medical research tops the list with the most papers due to the establishment of medical schools in almost all the universities in Kenya. The World Bank (2021) states that agriculture is the cornerstone of the Kenyan economy. Furthermore, agriculture and the health and medical sectors are among the most heavily funded sectors in the country. For example, in the 2021/2022 budget, the government of Kenya allocated a total of Kshs 3.6 trillion to agriculture and Kshs 47.7 billion to health.

An examination of the main grant donors in the Kenyan research ecosystem as reflected in the Scopus database reveals that medical research in

the country receives a financial boost from national and international organisations such as the Kenya Medical Research Institute, Bill and Melinda Gates Foundation, National Institute of Allergy and Infectious Diseases, National Institutes of Health and Wellcome Trust, among others. In fact, the aforementioned companies or institutions are the main research funders in the country, according to the data obtained from the Scopus database. The foreign research grants, which largely target the fields of agriculture and medicine, have led to a large number of co-authored papers in the two fields as observed by Onyancha, Mwai and Kwanya (2021).

The national outlook regarding the number of publications in each field is largely concurrent with the patterns of research production at university level. The two subject fields were ranked among the top 5 in the majority of the universities. Agriculture and medicine were ranked the first subject fields in 7 universities each, with exceptions being in 10 universities where these subject fields were mostly ranked in positions 2 or 3. Other subject fields that occasionally occupied position 1 in various universities include ENGI at DU, and SOCI at KIS and TK. It is illustrative therefore to note that agriculture and medicine occupied the top position in 14 out of 17 universities. The study also found that the least researched areas in Kenya are material sciences, which yielded 416, followed by chemical engineering (308), health professions (283), decision sciences (263) and dentistry (55). This pattern can be attributed to the low number of universities offering the courses as well as the student enrolment figures, especially in the postgraduate programmes (see Commission for University Education 2019).

Figure 1 and Tables 4 and 6 further reveal that the most productive universities were UN, JKU, MU, KU and EU. The same universities contributed a high percentage of papers in each field at national level when compared to the rest of the universities. Firstly, the performance of the aforementioned universities in terms of the total number of research publications mirrors their performance in the global ranking systems, where the most productive universities in this study have emerged top among the Kenyan universities (see Nafukho Wekullo and Muyia 2019). For example, World University Rankings placed UN in position 1 in Kenya, followed by MU, KU and JKU (Nafukho Wekullo and Muyia 2019). Secondly, the four universities that published in all the Scopus fields of research are among the oldest and largest universities in the country and have a long history of research. As explained by Frenken, Heimeriks and Hoekman (2017), the size of the institution is one of the characteristics impacting university research achievement and performance. These universities not only produced the highest number of publications but, with the exception of EU which published papers in 26 fields, they conducted research and published papers in all the 27 Scopus subject areas. UN, for example, was chartered in 1970, whereas KU, MU and JKU were chartered in 1985, 1984 and 1994, respectively. In contrast, the study found that the lowest average percentage contribution was registered by MER (0.4%), KAR (0.5%), TM (0.6%) and KIS (0.8%). These universities that have published in fewer subject areas were established or chartered after 2010. In fact, as Ogot and Onyango (2022) explain, the majority of the universities in Kenya are very young, having been chartered after 2013, and therefore they are yet to make their mark in the Kenyan and global research landscape. It follows that these universities are at their formative stages in terms of research development and identity. In addition, an examination of the number of subjects approved by Kenya's Commission of University Education (CUE) reveals that the older universities offer more academic courses than the less productive universities regarding research. For instance, the number of programmes or courses offered in the old universities is as follows: UN (571), KU (318), MU (256), JKU (250), MU (248), whereas the newly established universities in Kenya offer fewer courses (CUE 2019). In addition, we believe that the established universities' incentivizing research and researchers may be among the factors contributing to their dominance at the top of the most productive universities (see McCowan 2018).

Regarding the subject specialisation in the selected universities, Onyancha (2020) conducted a similar study and noted that Kenya specialised in the following 10 knowledge fields: Immunology (SI = 1.693), multidisciplinary (SI = 1.614), environment/ecology (SI = 1.588), agriculture (1.552), molecular biology and genetics (SI = 1.447), microbiology (SI = 1.413), plant and animal sciences (SI = 1.306), clinical medicine (S = 1.085), neuroscience and

behaviour (SI = 1.048) and social sciences (SI = 1.043). The study used the Web of Science data as obtained from the Clarivate Analytics (formerly Thomson Reuters) Essential Science Indicators (ESI). The ESI categorises the knowledge fields into 22 groups, as opposed to the 27 fields in Scopus. It is worth noting that the fields do not have similar names in the two databases, but can be distinctively identified as defining a given field. The current study found that many universities specialised in up to 15 fields (out of 27 Scopus fields). The subject fields that were the most common as fields of specialisation (i.e. field with $SI \geq 1.0$) in the selected universities included physics, engineering, material science, computer science, chemical engineering, chemistry, decision sciences, pharmacology, environmental sciences and mathematics. The least common fields included multidisciplinary, dentistry, medicine, veterinary sciences, psychology, health professionals and economics. Evidently, the universities specialise in a variety of fields, with some fields posting higher coefficients than others. The variety of fields of specialisation that each university posted in the study as well as the publication of research papers in almost all the Scopus classification fields for each university reflects the preference of diversification of subject areas. This is in line with the CUE (2019) analysis of the courses offered in different universities in Kenya regarding diversification. McCowan (2018) has associated diversification of courses in institutions of higher learning, and more so universities, to the growth of the education sector over the last 10 years, leading to stiff competition in student enrolment and staff recruitment. Many universities have deviated from their core fields to embrace new fields for financial stability and sustainability, especially in view of the fact that government funding for public universities has continued to decline over time. In that regard, for example, KU, which was originally an institution that was meant to offer education courses, now offers science courses including medicine. JKU's core mandate was agriculture, but now has 250 courses in almost all the Scopus classification systems (see CUE 2019). The new universities have followed in the footsteps of the old universities concerning the diversification of programmes, which, we believe, has led to the trend and pattern of publication of research in multiple fields as witnessed in this study.

## Conclusions

In conclusion, the research outputs in the selected universities mirror Kenya's research strength in terms of the number of publications, which proxy the volume of research. The most researched areas, both at national and university levels, are in the fields of agriculture and medicine. However, it was noted that, just as was the case at national level, several universities produced a substantial number of papers in fields other than medicine and agriculture, thereby implying diversification of the fields of research. This diversification in the selected universities is largely reflective of the status of the course offerings in many universities in Kenya. The lowest number of subject fields in which the universities conducted research was 8, whereas 4 universities conducted research in all 27 subject fields in the Scopus classification scheme. The majority of the papers were published in the fields of medicine and agriculture, whereas the least researched areas were dentistry, neurology, health professions and decision sciences. Dentistry was the least common research area or subject/course of study in the selected universities. Nevertheless, diversification of subject areas of research was visible across all universities, with the universities specializing in as many as 15 subject areas. The least number of specialisation fields was recorded at Pwani University, one of the newly established universities in Kenya. While the old universities dominated the research ecosystem in the country in terms of the number of publications produced per year, the low coefficients of subject area specialisation coefficients show that their extent of specialisation is weaker than that of the newly established universities, which yielded relatively higher specialisation index values, thereby implying the preference of diversification in big universities as opposed to specialisation. It was interesting to note that the poorly researched fields such as material science and decision sciences yielded higher specialisation index values than the most researched fields, implying that few universities consider these fields as their core areas of teaching and research.

## Recommendations

The findings of this study seem to support the Ministry of Education's proposal to merge disciplines,

especially the disciplines or fields that are rarely researched in public universities. Oftentimes, teaching departments at universities are established and named according to given fields of research. As a result, we recommend that universities review their academic administrative units (e.g. departments, schools and faculties/colleges) in view of the findings of this study. Furthermore, the study has identified the fields of research specialisation for each selected university, implying that some universities are stronger in certain fields than in others. Consequently, each university may wish to reconsider its research niches with a view to strengthening the core fields while reconsidering the fields that do not constitute the nucleus. We believe that reorganising the fields of research focus in universities can help to reduce the costs of servicing disciplines and maintaining universities, and more time can be devoted to a core niche of each university, thereby strengthening the research specialty.

We recommend consideration of a future study that will expand the scope to include private universities in the country for comparison purposes, especially in view of the standing of private universities in global ranking systems. We further recommend a replication of this study in other geographic regions in sub-Saharan Africa.

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# Librarians' Capacity Development Programmes and Job Performance in State University Libraries in South-South, Nigeria

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## Abstract

*This study investigated librarians' capacity development programmes and job performance in state university libraries in South-South, Nigeria. The study adopted a correlational design. The population of the study consists of one hundred and twenty-five (125) professional librarians across the ten state-owned university libraries, of which Ninety-eight (98) librarians participated in response to the instrument of the study indicating 78.4% return rate. Census sampling technique was adopted. Questionnaire was used as instrument for data collection. The structured questionnaire was designed to elicit information on the demographic characteristics of the respondents, responses on Librarians' Capacity Development Programmes such as on-the-job, in-service, off-the-job and mentoring (independent variables), and responses on Librarians' Job Performance (dependent variable). Four-Point Rating Scale was utilised. The instrument was validated by experts in the required fields. Cronbach Alpha formula was used to determine the reliability co-efficient (r) of 0.88 for capacity development programmes and 0.94 for job performance respectively. Data collected were analysed by descriptive statistics utilising frequency distribution, percentage, mean and standard deviation. Pearson Product Moment Correlation (PPMC) was utilised to determine the relationship between the dependent and independent variables while the hypotheses were tested at 0.05 alpha level of significance. The result revealed that, there were weak but positive relationships between on-the-job, in-service, off-the-job and mentoring capacity development and librarians' job performance in State university libraries. It was recommended that management should encourage more practice of internal rotation of librarians within the system in addition to proper orientation and delegation of responsibilities and that effective mentor and mentee relationship practice in academic libraries should be strengthened. This will give room for the active development of successful successors, amongst others.*

**Keywords:** *Librarians, Capacity Development Programmes, Job Performance, University Libraries*

## Introduction

Academic libraries are an indispensable part of every institution of higher learning such as universities, polytechnics, monotechnics and colleges of education. They are established with the aim of supporting teaching, learning and research in line with the goals, objectives and mission of the institution they are meant to serve. The achievements of the above goals are unrealistic without the effort of qualified, well-trained and competent librarians.

No academic library is known to have attained a sustainable growth without building the capacity of their librarians. The effectiveness of the academic library is a function of the level of the librarians' or staff competency and efficiency. This is why Singh (2015) argued that the best stocked academic library cannot give the valuable services to the readers and the entire academic community unless it does possess resourceful and well-trained staff or librarians for the actualization of the overall goal or objectives of the institutions.

The fundamental of capacity development programmes rest on the principle of learning and relearning. Capacity development programmes for librarians are tools designed to help them in coping with the constantly evolving technological and organisational changes by improving their knowledge, qualification and efficiency with a view to making them more proficient in performing their jobs. Capacity development programmes therefore, are organised activities and processes through which organisations such as academic libraries intend to increase librarians' knowledge, skills, attitude or abilities for performing a specific task or responsibility to support the attainment of institutional goals.

With the relevant skills and knowledge, arising from ample capacity development programmes for librarians, they can perform their various roles and responsibilities efficiently thereby safe-guarding them against professional obsolescence in the system such as academic institutions in Nigeria. On the contrary, employees that are not exposed to training and development cannot perform maximally, hence, will be like a bad omen and a liability to the organisation.

As such, for the libraries to be great, dynamic and effective in the academic community they serve, it is pertinent for management to wake up to the calling of greater need or yearning for building or developing the librarian's capacity continuously. Academic libraries that invest seriously in the area of librarians' capacity development stands to reap the benefits of high performance and increased productivity. This no doubt would enhance their zeal to perform their job excellently and as well equip them to constantly remain current, dynamic, unique, proficient, successful and ever relevant.

It is pertinent to note that until the management of academic institutions look inward and address the issue of exposing librarians' to the capacity development variables, meeting up with the expected skills, up-dated knowledge and competences necessary for the expected optimal performance will continue to pose a challenge to the productivity of the academic library and as such are bound to lose their relevance and the mandate of providing quality and excellent services to the entire academic community. It is against this background that this study is being carried out.

## Statement of the Problem

An employee will become more effective and productive if they are well developed or trained. As such the importance of librarians' capacity building or development programme in academic libraries cannot be over-emphasised.

The numerous expectations on the library to meet the various changing information needs of the university community has placed an increasing demand on librarians to provide corresponding services that are more timely, accurate, effective and efficient in this competitive information and technological age. This however, has posed a great challenge to most librarians and other library staff in terms of optimal performance for quality service delivery. This may continue to remain a mere say if adequate measures are not put in place to strengthen human capacity development.

It is disheartening to observe that librarians in university libraries especially institutions at the state level appear to be inadequately developed to acceptable standards. This tends to have contributed to librarians' poor performance at work resulting in poor service delivery, inefficiency and low productivity. Could these setbacks be attributed to such variables as inadequate on-the-job training, in-service capacity development, off-the-job training and poor mentoring programmes? This is a gap in knowledge that this study tends to fill. It is against this background that this study sought to investigate the nexus between librarians' capacity development programmes and job performance in state university libraries in South-South, Nigeria.

## Objectives of the Study

The objective of the study is to establish the relationship between librarians' capacity development programmes and job performance in state university libraries in South-South, Nigeria. Specifically, the study seeks to:

1. Ascertain the relationship between on-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria;
2. Find out the relationship between in-service capacity development and librarians' job performance in State university libraries in South-South, Nigeria;

3. Establish the relationship between off-the-job training and librarians' job performance in State university libraries in South-South, Nigeria;
4. Investigate the relationship between mentoring and librarians' job performance in State university libraries in South-South, Nigeria

## Hypotheses

The following hypotheses were formulated to guide the study at 0.05 level of significance:

1. $H_{o1}$: There is no significant relationship between on-the-job training and librarians' job performance in State university libraries in South-South, Nigeria.
2. $H_{o2}$: There is no significant relationship between in-service capacity development and librarians' job performance in State university libraries in South-South, Nigeria.
3. $H_{o3}$: There is no significant relationship between off-the-job training and librarians' job performance in State university libraries in South-South, Nigeria.
4. $H_{o4}$: There is no significant relationship between mentoring and librarians' job performance in State university libraries in South-South, Nigeria.

## Literature Review

Capacity development is a process through which people in organisations embark on in order to improve and enhance themselves for higher performances or productivity. Capacity development according to Bester (2015) is the process whereby people, organisations and society as a whole unlock, strengthen, create, adapt and maintain capacity over time. In a similar view, Tucker and Charles (2014) describe capacity development as the stock of competencies, knowledge, social and personality attributes, including creativity, embodied in the ability to perform labour so as to produce economic value. Put otherwise, it is the gateway through which desired change for a common goal can be independently and sustainably achieved by individuals and the organisation as well. This encompasses developing capacity that cuts across all facets of life.

Librarians as part of human resources are tools for sustainable goal of academic libraries' productivity. When librarians are effectively equipped with the necessary skills essential for the current job, they will discharge their functions as expected. This act will bring about the actualization of the objectives of the academic libraries (Akinsola and Akinsola, 2017). Librarians are constantly faced with critical roles to ensure the provision of quality materials and services that enhance the educational goal of academic institutions.

Staff development is important as opined by Alabi (2005) because staff have critical role to play in bringing about improved learning and the only way staff can effectively carry out these roles would be determined by the quality of staff development programme available for them to utilize. Thus, the effectiveness of academic libraries is a direct function of the efficiency of the development programmes provided for staff. In the study of Nangia (2012), staff training/development is important as it aimed at keeping librarians up-to-date and making them to be aware of the innovations and changes happening around the library world. In terms of building librarians' capacity in library, Sarmah (2014) states that capacity building for library is an investment for future sustainability. This is the reason behind the assertion of Akpokurerie (2014) that training professionals in the library is essential irrespective of their positions as developmental steps for new ideas that can build up the library.

Contrary to the above, Agah in Ozurumba and Amasuomo (2015) observed that most state-owned universities are not adequately productive due to inadequate staff development programmes. The authors linked the setbacks to inability of the state government and university administration to expose them to in-service training, conferences, research, community service and current practices in their fields. These they also claimed has resulted in reduction of quality manpower.

## Job Performance

Job performance according to Motowidlo and Kell (2012) is defined as the total expected value to the organisation of the discrete behavioural episodes that an individual carries out over a standard period of

time. Ramawickrama, Opatha and Pushpa-Kumari (2017) view an employee's job performance as the extent to which duties and responsibilities have been carried out.

From the library point of view, job performance is simply the extent to which library personnel carry out an assigned professional, academic and non-administrative responsibility or task that leads to achieving academic library set goal. In consonance with the above, Nwokike and Unegbu (2019) posit that job performance consists of a set of employees' behaviours that are perceived to be in agreement with organisational goals that can be measured, monitored and assessed as an achievement at an individual level.

Ninh, Tanner, Johanson and Denison (2010) states that one of the most important management activities in library and information centre is performance measurement. It has been asserted that employee's performance is measured against the performance standards set by the organisation (Kyule, 2017; Kamoche, Yaw, Frank and Gerry, 2004; Busingye, 2015). These measures or indicators to be considered as identified by the authors include; productivity, efficiency, effectiveness, quality, profitability, and skills required in performing the job. This therefore, implies that since performance results from organisational structure, library management have to set the desired levels of performance standard by which a given task would be measured for any given period. This is necessary in order to comprehend the impact the various strategies or measures put in place by academic library might have had on the staff performance. In view of this, one can rightly say that job performance is an important criterion that relates to organisation outcome.

## Methods of Librarians' Capacity Development Programmes

There are various methods of capacity development programmes available for librarians, they include; on-the-job, in-service, off-the-job training, mentoring, amongst others. The programmes comprise both formal and informal activities/types. These have been identified as on-the-job training; internship; apprenticeship; classroom; vestibule; conferences; induction and orientation; workshop; seminars; simulation exercises; off-the-training, etc. and they lead to high level of job performance (Bohlander, Snell and Sherman, 2001; Akpokurerie, 2014).

### *On-the-Job Capacity Development and Job Performance*

On-the-job training is usually organised within the staff workplace where individuals acquire specific skill while on the job. They are instructions designed to assist in the mastery of skills, techniques, procedures and other activities that are task-specific to a particular function or job in the library. According to Kyule (2017), on-the-job strategies refer to the systems that are linked in the work place, while the staff is in fact working to get particular skills. On-the-job training approach is required to develop the staff that lacks scholastic ability for his employment implementation. According to Salau et al, in Mahadevan and Yap (2019), on-the-job training could lead to organisational success and increases employee performance as they learn and perform the task at one go. In line with this, the impact of on-the-job development on staff performance as revealed in the study of Mahadevan and Yap (2019) is that, it is able to deliver training in an effective manner which allows the employee to practice immediately as they learn and therefore, conclude that such training is a crucial activity in an organisation due to its ability to enhance individual strength and performances which could eventually lead to achieving organisational goals.

Irrespective of these merits, most libraries inadequately utilise this cost-effective method. This setback could be due to unstructured training library environment, poor training skills of the trainers, absence of well-defined performance criteria, etc. In production industries for instance, Torrington, *et al.* (2011) pointed out that on-the-job training is not without any limitation and therefore, argues that conflict may arise should the trainer and trainee have different way of doing things which could lead to error in production or possibility of accident. However, these challenges can be addressed by developing a well clear goal/objectives that are realisable, set a feedback and evaluation period, and create an ambience that support effective training. Pointing to poor library environment as a challenge to training effectiveness and in the bid to proffer solution, Akinsola and Akinsola (2017) further

suggested that the library building or environment should be more conducive and pleasant for effective result and quality service delivery. Saakshi (2005) classified on-the-job training to include job rotation, internship and apprenticeship, orientation, coaching, job rotation, while off-the-job include vestibule training, role playing and classroom methods. From the above, it could be deduced that librarians acquire new skills and experience which could have a significant impact on their job performance for the attainment of the library goals while on the job.

### *In-Service Capacity Development and Job Performance*

In-service training is considered to be one of the most effective tools for executives to enhance the efficiency of their employee in order to ensure appropriate services in libraries. Eghonmwan (2008) defined in-service training as the upgrading and updating of the knowledge and skills of employees and the modelling and re-orientation of their attitude, so that they can be more effective, efficient and productive in the performance of their job. In-service training in the view of Sarboland and Mousavi (2012) includes periods of education performed by the organisation's training centre or companies under contract with the organisation responsible for training their employees. In-service training programme according to Maclean (2018) refers to all activities intended to increase the skills and capabilities of personnel. Hence, the programme involves equipping organisational workforce with all necessary skills needed for their improved satisfactory job performance, while Mehrdokht and Rezvan (2015) gave an encompassing definition of in-service training as a systematic activity, and subject to organisational conditions, which leads to the growth and fundamental changes in the level of scientific and technical skills, and development of human resources in any organisation or institution, so that its positive effects are evident in the performance of organisations. They resolved that by holding in-service training courses for librarians, they will increase their skills, abilities, knowledge, and information as well as their efficiency too which in effect, will positively result in quantitative and qualitative improvement in library's services (Mehrdokht and Rezvan, 2015). This can be achieved as seen in the study of Mohaghegh, Raiesi-Dehkordi, Alibeik, Ghashghaee and Janbozorgi (2016) which claim that with the advent of new technologies in the field of education, the problems and shortcomings of traditional in-service training courses were replaced with virtual ones. This implies that in-service training of librarians has gone beyond the traditional method as technology has opened new doors where such training can be utilized through electronic means.

### *Off-the-job Capacity Development and Job Performance*

Off-the-job training also known as information presentation techniques is a method of training that usually takes place off or away from the regular work station or place. This implies that the staff will not be fully on ground. For Alhalboosi (2018), off-the-job training is usually designed to meet the shared learning needs of a group rather than a particular individual's needs. However, the benefit of off-the-job development can be seen in several ways. Its usefulness is that it allows the individual to be away from work thereby having full concentration on the training itself. Said, Jahya, Mazlan, Ali and Yusof (2016) corroborated by stating that employees are able to pay more attention when they attend training outside of their working environment as the likelihood of being disturbed by work operations is far lesser compared to if the training was conducted in the working environment.

On the other hand, the worries of Mahadevan and Yap (2019) citing Riley regarding off-the-job training is that, it could lead to more work upon completion of training as it requires time-off from actual work. This could indirectly decrease work quality. Based on the above issue, it is believed that adequacy and the rotation of staff to fill in the gap with close and proper supervision could address or remedy such identified likely setback.

### *Mentoring and Job Performance*

Njoku (2019) define mentoring as a process whereby an experienced senior staff member helps to develop technical, interpersonal and organisational skills of a less experienced junior staff member, who is called the protégé. Corroborating this, Barik and Jena (2019) sees mentoring as that which involves passing

on tips from experienced, knowledgeable professional to less experienced professional.

For Gray, Garvey and Lane (2016), mentoring is often associated with passing on experience and, at times, this is described as 'handing out gratuitous advice'. This experience according to them can be valuable but it is the way that it is used that counts. Stressing on the experience, Nichols (2016) noted that years of experience and practice do not necessarily guarantee that any senior employee can automatically become a leader or mentor. The point here is that one of the criteria or an attribute to guarantee a mentor is that they should be one who have manifested and exhibit excellent leadership qualities in the organisation and are supposed to encourage or influence young inexperienced employees. Giving clarification and broader concept to the attributes of a mentor, Ayodeji and Adebayo (2015) has this to add. The attributes of a good mentor are: act as a role model, ready to share experiences, teach by example, offer encouragement, good coach, desire to help, good reputation for developing others, positive experiences, time and mental energy, up-to-date knowledge, learning attitude as one who keeps adding to his/her knowledge repertoire by opening oneself up to new experiences and ideas, listening and understanding as well as demonstrating effective mentoring skills (coaching, counselling, facilitating and networking skills).

In librarianship as a service institution, library heads or sectional heads can develop a mentor and a mentee relationship or can mentor their subordinates by teaching them new trends thereby exposing them to gain insight in library parlance and beyond. Successful mentorship can take any form either in a formal or informal environment and on a short or long-term basis. It can be one on one or between groups. It is believed that every member of the organisation at all level must have passed through or undergone the process or path of mentoring either directly or indirectly.

David-West and Nmecha (2019) in their study also observed that when there is a good mentoring relationship, it will bring about career development and advancement within academic libraries. They maintain that mentoring is one of the most effective strategies that is a standalone programme as part of an existing work force development programme. They concluded that for mentoring to be effective, mentors need the right environment to carry on their role of mentoring to the mentees on both research writing and their job duties to achieve the desired goals of the library.

## Methodology

Correlational research design was adopted. The study was carried out in all the state universities in the South-South Geo-political Zone of Nigeria. The South-South of Nigeria comprises of Akwa-Ibom, Bayelsa, Cross-River, Delta, Edo, and Rivers States. There are ten (10) State-owned university libraries in the South-South Geo-political Zone of Nigeria. The population of the study consists of one hundred and twenty-five (125) librarians across the ten State-owned university libraries in the South-South Geo-Political Zone of Nigeria. Census sampling technique was adopted. The instrument used for data collection was a structured questionnaire designed to elicit information. It consisted of four parts. Part 1 collected information on the demographic characteristics of the respondents. Part 2 contained a total of 39 items of the instrument that generated responses on librarians' capacity development programmes such as on-the-job, in-service, off-the-job and mentoring (independent variables) arranged in four Clusters while part 3 contained 12 items of the instrument that generated responses on librarians' job performance (dependent variable). It consisted of four parts. The second part was designed using a Four-Point Rating Scale of: Strongly Agree (SA) = 4 points; Agree (A) = 3 points; Disagree (D) = 2 points; Strongly Disagree (SD) =1 point. Part 3 section was designed using Four-Point Rating Scale of: Very Good = (VG); Good = (G); Poor = (P); Very Poor = (VP). Parts 2 and 3 were designed in line with the specific objectives of the study. The instrument was validated by experts in the required fields. In order to apply relevant statistics to the study, the ordinal value obtained from the Likert scale instrument was converted to interval value hence Mean and Pearson Coefficient statistics were applied. To test the reliability of the instrument, 30 copies of the instrument were given to respondents at the Imo State University library who were randomly selected. Cronbach Alpha formula was used to determine the reliability co-efficient (r) which yielded a coefficient of 0.88 for librarians' capacity development

programmes and 0.94 for job performance respectively indicating a very strong reliability of the instrument. A total of 125 copies of the instrument was administered to the respondents out of which, 98 were completed, returned and found to be in usable form indicating 78.4% return rate. Data collected were analysed by descriptive statistics utilising frequency distribution, percentage, mean and standard deviation. Pearson Product Moment Correlation (PPMC) was utilised to determine the relationship between the dependent and independent variables while the hypotheses were tested at 0.05 alpha level of significance.

The list of the State-owned university libraries and the number of librarians is shown below.

| S/N | University Libraries | No. of Librarians |
|---|---|---|
| 1. | Cross River State University of Technology Library, Calabar, Cross River State. | 13 |
| 2. | Akwa Ibom State University Library, Uyo, Akwa Ibom State. | 19 |
| 3. | Rivers State University Library, Nkpolu-Oroworukwo, Port-Harcourt, Rivers State. | 11 |
| 4. | Ignatius Ajuru University of Education Library, Port-Harcourt, Rivers State. | 9 |
| 5. | University of Africa library, Toru-Orua, Bayelsa State | 8 |
| 6. | Niger Delta University Library, Amassoma, Bayelsa State. | 12 |
| 7. | Bayelsa Medical University Library, Bayelsa State | 1 |
| 8. | Delta State University Library, Abraka, Delta State. | 22 |
| 9. | Ambrose Ali University Library, Ekpoma, Benin, Edo State | 27 |
| 10. | Edo State University Library, Iyamo, Edo State. | 3 |
| | **TOTAL** | **125** |

**Source: (The University Library Authorities, 2020)**

## Results

**Table 1: Demographic Variables of the Respondents**

| Demographics | Category | N | % |
|---|---|---|---|
| **Gender** | Male | 34 | 34.69 |
| | Female | 64 | 65.31 |
| **Age** | 20-30 years | 5 | 5.10 |
| | 31-40 years | 31 | 31.63 |
| | 41-50 years | 34 | 34.69 |
| | 51-65 years | 25 | 25.51 |
| | 66 years and above | 3 | 3.06 |

| | | | |
|---|---|---|---|
| **Qualification** | BSc. /BLS | 26 | 26.53 |
| | PGDL | 14 | 14.29 |
| | MLS | 44 | 44.90 |
| | Ph.D | 14 | 14.29 |
| **Experience** | 1-10 years | 25 | 25.51 |
| | 11-20 years | 44 | 44.90 |
| | 21-30 years | 15 | 15.31 |
| | 31-40 years | 12 | 12.24 |
| | 41 years above | 2 | 2.04 |
| **Institution** | Akwa Ibom State University | 18 | 18.37 |
| | Ambrose Ali University Ekpoma | 10 | 10.20 |
| | Bayelsa Medical University | 1 | 1.02 |
| | Cross River State University of Technology | 13 | 13.27 |
| | Delta State University, Abraka | 19 | 19.39 |
| | Edo State University | 3 | 3.06 |
| | Ignatius Aguru University of Education | 7 | 7.14 |
| | Niger Delta University | 9 | 9.18 |
| | River State University, Nkpolu-Oroworukwo, Port Harcourt | 11 | 11.22 |
| | University of Africa, Bayelsa State Toru Orua | 7 | 7.14 |

**Research question 1:** What is the relationship between on-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria?

$H_{01}$: There is no significant relationship between on-the-job training and librarian's job performance in State university library in South-South, Nigeria.

**Table 2: Summary of descriptive statistics on the mean rating of the respondents over on-the-job-training as a dimension of librarians' capacity development programmes (N=98)**

| SN | ON-THE-JOB TRAINING | Mean | SD |
|---|---|---|---|
| 1 | My institution library organises internship/apprenticeship training for librarians to help them adapt easily to new technologies. | 2.95 | 0.95 |
| 2 | The library organises orientation and induction activities to enable librarians familiarize with the work system | 3.18 | 0.78 |
| 3 | The library arranges internal postings to allow for under-studying of superiors in different units. | 3.13 | 0.90 |
| 4 | The library rotates librarians from one job to the other to broaden their experience | 3.04 | 0.80 |
| 5 | I have been made to under-take additional responsibility | 3.14 | 0.81 |
| 6 | I have been exposed to both practical and theoretical aspects of the job. | 3.35 | 0.72 |
| 7 | I have often been delegated to various assignments. | 3.22 | 0.73 |
| | **Grand mean** | **3.15** | **0.64** |

The result from Table 2 shows the summary of descriptive statistics on the mean rating of the respondents over on-the-job-training as a dimension of librarians' capacity development programmes in state university libraries in South-South, Nigeria. It shows that the grand mean rating of the respondents over on-the-job-training as a dimension of librarians' capacity development programmes was 3.15, SD=0.64. The result further shows that the respondents strongly indicated that they have been exposed to both practical and theoretical aspects of the job (Mean=3.35, SD=0.72). This was followed by the fact that they have often been delegated to various assignments (M=3.22, SD=0.73), then the library organises orientation and induction activities to enable librarians familiarize with the work system (M=3.18, SD=0.78) and the least among others was that their institution library organises internship/ apprenticeship training for librarians to help them adapt easily to new technologies (M=2.95, SD=0.95).

**Table 3: Summary of descriptive statistics on the mean rating of the respondents over librarians' job performance (N=98)**

| SN | JOB PERFORMANCE | Mean | SD |
|---|---|---|---|
| 1 | Skilfully and professionally operate working tools | 3.33 | 0.55 |
| 2 | Adequately complete assigned work at stipulated time | 3.35 | 0.52 |
| 3 | Make quality input to the university library's growth | 3.47 | 0.52 |
| 4 | Work under minimal supervision | 3.40 | 0.57 |
| 5 | Maintain cordial relationship with colleagues and respect others feelings | 3.57 | 0.54 |
| 6 | Punctual and regular at work | 3.50 | 0.52 |
| 7 | Ability to perform task competently under pressure | 3.43 | 0.61 |
| 8 | Use technological tools and gadgets effectively | 3.26 | 0.61 |
| 9 | Anticipate and creatively proffer solution to information related challenges professionally | 3.24 | 0.58 |
| 10 | Deliver effective services to patrons/others | 3.44 | 0.56 |
| 11 | Effective communication and interpersonal skill | 3.39 | 0.62 |
| 12 | Adapt adequately with constant changes on the job | 3.29 | 0.54 |
| | **Grand mean** | **3.39** | **0.36** |

The result from Table 1.3 shows the descriptive statistics on the mean rating of the respondents over librarians' job performance in state university libraries in South-South, Nigeria. It shows that the grand mean rating of the respondents over job performance in state university libraries in South-South, Nigeria was 3.39, SD=0.36. The result further shows that the respondents strongly indicated that they maintain cordial relationship with colleagues and respect others feelings (M=3.57, SD=0.54), they are punctual and regular at work (M=3.50, SD=0.52), they make quality input to the university library's growth(M=3.47, SD=0.52), they deliver effective services to patrons/others(M=3.44, SD=0.56) and the least among others was that they anticipate and creatively proffer solution to information related challenges professionally (M=3.24, SD=0.58).

**Table 4: Summary of Pearson Product Moment Correlation on the relationship between on-the-job capacity development and librarians' job performance Correlations**

| | | On-The-Job Training | Job Performance |
|---|---|---|---|
| **On-The-Job Training** | Pearson Correlation | 1 | .365** |
| | Sig. (2-tailed) | | .000 |
| | N | 98 | 98 |
| **Job Performance** | Pearson Correlation | .365** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 98 | 98 |

**. Correlation is significant at the 0.01 level (2-tailed).

The result from Table.4 shows the summary of Pearson Product Moment Correlation on the relationship between on-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria. It shows that the relationship between on-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria was weak and positive (r=0.365). This further shows that there is a relationship between on-the-job training and librarians' job performance in State university libraries in South-South, Nigeria (p=.000). The null hypothesis one was rejected at .05 level of significance.

**Research question 2:** What is the relationship between in-service capacity development and librarians' job performance in State university libraries in South-South, Nigeria?

$H_{02}$: There is no significant relationship between in-service training and librarians' job performance in State university library in South-South, Nigeria.

**Table 5: Summary of descriptive statistics on the mean rating of the respondents over in-service capacity development as a dimension of librarians' capacity development programmes (N=98)**

| SN | IN-SERVICE CAPACITY DEVELOPMENT | Mean | SD |
|---|---|---|---|
| 1 | The library organises lectures for librarians | 3.04 | 0.80 |
| 2 | The library organises and allows my involvement in practical work schedule to enhance my skills | 3.11 | 0.73 |
| 3 | I receive on the job instructions by my supervisors | 3.18 | 0.65 |
| 4 | I participate in internal training courses organised for library personnel | 3.21 | 0.74 |
| 5 | Internal courses run by external consultants are organised for the librarians | 2.80 | 0.75 |
| 6 | Succession planning programmes are functional | 2.63 | 0.83 |
| | **Grand mean** | **3.00** | **0.60** |

The result from Table 5 the summary of descriptive statistics on the mean rating of the respondents over in-service capacity development as a dimension of librarians' capacity development programmes in state university libraries in South-South, Nigeria. It shows that the grand mean rating of the respondents over in-service capacity development as a dimension of librarians' capacity development programmes was 3.00, SD=0.60. The result further shows that the respondents strongly indicated that they participate in internal training courses organised for library personnel (Mean=3.21, SD=0.74). This was followed by the fact that they receive on the job instructions by my supervisors (M=3.18, SD=0.65), then the library organises and allows my involvement in practical work schedule to enhance my skills (M=3.11, SD=0.73) and the least among others was that succession planning programmes are functional (M=2.63, SD=0.83).

**Table 6: Summary of Pearson Product Moment Correlation on the relationship between in-service capacity development and librarians' job performance Correlations**

| | | In-Service Capacity Development | Job Performance |
|---|---|---|---|
| **In-Service Capacity Development** | Pearson Correlation | 1 | .287** |
| | Sig. (2-tailed) | | .004 |
| | N | 98 | 98 |
| **Job Performance** | Pearson Correlation | .287** | 1 |
| | Sig. (2-tailed) | .004 | |
| | N | 98 | 98 |

**. Correlation is significant at the 0.01 level (2-tailed).

The result from Table 6 shows the summary of Pearson Product Moment Correlation on the relationship between in-service capacity development and librarians' job performance in State university libraries in South-South, Nigeria. It shows that the relationship between in-service capacity development and librarians' job performance in State university libraries in South-South, Nigeria, was weak and positive (r=0.287). The result further shows that that there is significant relationship between in-service training and librarians' job performance in State university libraries in South-South, Nigeria (p=.004). The null hypothesis two was rejected at .05 level of significance.

**Research question 3:** What is the relationship between off-the-job training and librarians' job performance in State university libraries in South-South, Nigeria?

$H_{03}$: There is no significant relationship between off-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria.

**Table 7: Summary of descriptive statistics on the mean rating of the respondents over off-the-job capacity development as a dimension of librarians' capacity development (N=98)**

| SN | OFF-THE-JOB CAPACITY DEVELOPMENT | Mean | SD |
|---|---|---|---|
| 1 | I am given opportunity to play active role in decision making in the work scenario | 3.03 | 0.87 |
| 2 | I have understanding of the lecture topic when presented verbally | 3.03 | 0.71 |
| 3 | I have had the opportunity to go for studies to acquire knowledge in different areas | 3.03 | 0.83 |
| 4 | Correspondence courses are usually organised and delivered appropriately | 2.58 | 0.77 |
| 5 | I participate regularly in computer-based training or instruction | 2.77 | 0.82 |
| 6 | I participate in visit to other libraries to understudy their operations | 2.49 | 0.83 |
| | **Grand mean** | **2.82** | **0.61** |

The result from Table 7 shows the summary of descriptive statistics on the mean rating of the respondents over off-the-job capacity development as a dimension of librarians' capacity development programmes in state university libraries in South-South, Nigeria. It shows that the grand mean rating of the respondents over off-the-job capacity development as a dimension of librarians' capacity development programmes was 2.82, SD=0.61. The result further shows that the respondents strongly indicated that they are given opportunity to play active role in decision making in the work scenario (Mean=3.03, SD=0.87), they have understanding of the lecture topic when presented verbally (M=3.03, SD=0.71), they have had the opportunity to go for studies to acquire knowledge in different areas (M=3.03, SD=0.83), respectively. This was followed by the fact they participate regularly in computer-based training or instruction (M=2.77, SD=0.82), and the least (as agreed) among others was that correspondence courses are usually organised and delivered appropriately (M=2.58, SD=0.77), and that they participate in visit to other libraries to understudy their operations (M=2.49, SD=0.83).

**Table 8: Summary of Pearson Product Moment Correlation on the relationship between off-the-job capacity development and librarians' job performance**

**Correlations**

| | | Off-The-Job Development | Capacity Job Performance |
|---|---|---|---|
| **Off-The-Job Capacity Development** | Pearson Correlation | 1 | .294** |
| | Sig. (2-tailed) | | .003 |
| | N | 98 | 98 |
| **Job Performance** | Pearson Correlation | .294** | 1 |
| | Sig. (2-tailed) | .003 | |
| | N | 98 | 98 |

**. Correlation is significant at the 0.01 level (2-tailed).

The result from Table 8 shows the summary of Pearson Product Moment Correlation on the relationship between off-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria. It shows that the relationship between off-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria was weak and positive (r=0.294). The result further shows that there is significant relationship between off-the-job training and librarian's job performance in State university library in South-South, Nigeria (p=.003). The null hypothesis three was rejected at .05 level of significance.

**Research question 4:** What is the relationship between mentoring and librarians' job performance?

$H_{04}$: There is no significant relationship between mentoring and librarians' job performance in State university libraries in South-South, Nigeria.

**Table 9: Summary of descriptive statistics on the mean rating of the respondents over mentoring as a dimension of librarians' capacity development programmes (N=98)**

| SN | MENTORING | Mean | SD |
|---|---|---|---|
| 1 | Mentors do not assign work responsibility to mentees in my library | 2.26 | 0.90 |
| 2 | Mentors supervise my assigned jobs to avoid errors | 3.03 | 0.77 |
| 3 | Mentors do not discuss and explain the possible solution to challenging issues | 2.14 | 0.80 |
| 4 | Mentors hardly have time to share the work experience with mentees | 2.22 | 0.73 |
| 5 | Mentors avoid correcting the mentees in their jobs or assignments | 2.08 | 0.80 |
| 6 | Mentors provide initiatives and ideas on how to do things properly | 3.04 | 0.79 |
| 7 | Mentors do not give clear job tasks to mentees in my institution library | 2.08 | 0.80 |
| | **Grand mean** | **2.41** | **0.46** |

The result from Table 9 shows the summary of descriptive statistics on the mean rating of the respondents over mentoring as a dimension of librarians' capacity development programmes in state university libraries in South-South, Nigeria. It shows that the grand mean rating of the respondents over mentoring as a dimension of librarians' capacity development programmes was 2.41, SD=0.46. The result further shows that the respondents strongly indicated that Mentors provide initiatives and ideas on how to do things properly (Mean=3.04, SD=0.79). This was followed by the fact that mentors supervise my assigned jobs to avoid errors (M=3.03, SD=0.77). No other item was rated above the criterion mean score of 2.50.

**Table 10: Summary of Pearson Product Moment Correlation on the relationship between mentoring and librarians' job performance Correlations**

| | | Mentoring | Job performance |
|---|---|---|---|
| **Mentoring** | Pearson Correlation | 1 | .233* |
| | Sig. (2-tailed) | | .021 |
| | N | 98 | 98 |
| **Job Performance** | Pearson Correlation | .233* | 1 |
| | Sig. (2-tailed) | .021 | |
| | N | 98 | 98 |

*. Correlation is significant at the 0.05 level (2-tailed).

The result from Table 10 shows the summary of Pearson Product Moment Correlation on the relationship between mentoring and librarians' job performance in State university libraries in South-South, Nigeria. It shows that the relationship between mentoring and librarians' job performance in state university libraries in South-South, Nigeria was weak and positive (r=0.233). The result further shows that there is a relationship between mentorship and librarian's job performance in state university library in South-South, Nigeria (p=.021). The null hypothesis four was rejected at .05 level of significance.

## Discussion of Findings

The result from Table 4 showed that the relationship between on-the-job capacity development and librarians' job performance in State university libraries in South-South, Nigeria was weak and positive (r=0.365, p=.000). The null hypothesis one was rejected at .05 level of significance. Hence, a weak and positive significant relationship exists between the independent and predicting variables in the State university libraries. This positive relationship is in agreement with an earlier finding of Mahadevan and Yap (2019) which established that on-the-job training had a positive significant relationship with job performance although this relationship in their case was strong as against that of the present study which was weak. This implies that on-the-job training had a positive impact on employee performance. The reason for this positive impact is based on the fact that librarians are exposed to on-the-job training which have enhanced and strengthened their ability and performance as they learn, practice and perform the task at one go which eventually leads to organisational (library) success. The result of the study by Udu and Ewans (2016) showed that a strong positive relationship between on-the-job training and quality of employee job performance exists. The study by Mugisha (2015) also showed a strong positive relationship between on-the-job training and job performance while that by Said et al (2016) showed a moderate positive relationship between the two.

On the contrary, the findings of Saka, Akor and Opaleke (2016) revealed that on-the-job training was not considered as an appropriate method in the acquisition of skills as opposed to the finding of the current study. It is believed that on-the-job training as a capacity development strategy is crucial in equipping the employee with the necessary skills needed to perform their job effectively for the library turnover.

The result from Table 6 showed that the relationship between in-service capacity development and librarians' job performance in state university libraries is weak but positive (r=0.287). This result corroborates with the finding of Nkebem (2009) which reveals that in-service training has a weak but positive significant relationship with librarians' job performance in university libraries in South-South Zone, Nigeria. The study by Kyule (2017) also showed a weak positive relationship between in-service training and job performance. While the study by Maclean (2018) revealed a moderate positive relationship between in-service training and job performance, that by Mehrdokht and Rezvan (2015) showed a strong positive relationship between the two.

Librarians who engage in in-service training will update their knowledge and skills which invariably leads to better job performance. The evidence of this positive influence is also seen in the view of Mohaghegh, *et al.* (2016) especially in the area of handling and coping abilities to meet the demands presented with the new Information and Communication Technologies (ICT) in order to serve the users better which also supports this study. Also, the findings of Shepherd (2010) demonstrated the need for in-service training of academic librarians although a lack of Information Technology (IT) competencies was found among them. The findings of the study by Ozurumba and Amasuomo (2015) revealed that in-service training and attendance of conferences and workshops influence the output of academic staff which is in agreement with the findings of this study.

The result from Table 8 revealed that there exists a positive relationship between off-the-job capacity development and librarians' job performance in state university libraries in South-South, Nigeria. This is confirmed to be weak, positive and statistically significant (r=.294, p<.05). The study by Mugisha (2015) revealed a weak positive relationship between off-the-job training and job performance which is in consonance with the finding of the study. The study by Said et al. (2016) showed a moderate positive

relationship between off-the-job training and job performance. However, the findings of Udu and Ewans (2016) established that there is a strong positive relationship between off-the-job training and workers' efficiency.

The study by Mahadevan and Yap (2019) also revealed that off-the-job training have a strong positive significant impact on employee performance. This implies that off-the-job development technique or methods such as class room, demonstrations, lectures, simulations, game-based, computer-based, vestibule, role playing, etc have helped librarians to acquire new skills making them more useful, and resulting in better performance indicating a positive influence on their job performance. This view is also backed up by the view of Bakanye (2013). The implication therefore, is that off-the-job capacity development is effective in enhancing job performance of librarians as it exposes them to new ways of doing things outside their work environment for enhanced productivity of the librarian and the institution at large. Irrespective of the positive impact, Mahadevan and Yap (2019) on the other hand pointed out the challenge that it could lead to more work load for the individual upon completion of the training since the training requires time-off from the actual work area stressing that it could directly decrease work quality.

The implication of this study based on the finding is that this type of capacity development method is a reliable tool and an enabler for enhancing the knowledge and skill of librarians for improved performance. The reason is the evidence that when librarians are opportuned to acquire training outside their work area, they will be motivated to perform optimally by applying the acquired knowledge for the library's high productivity. Library management should ensure the sustainability of this method of development and seek stronger measures or ways for better improvement in the libraries of State institutions in South-South, Nigeria.

The result from Table 10 revealed that there was a weak but positive and statistically significant relationship between mentoring and librarians' job performance in State university libraries in South-South, Nigeria. The correlation coefficient value at .05 alpha level ($r=0.233$, $p<.05$) obtained is an indication of statistically positive relationship. This positive relationship is in agreement with an earlier finding of Adewuyi and Makinde (2018), which established that mentoring practices positively influence performance of librarian cataloguers in Nigerian libraries although their correlation value was moderate. However, they found no significant relationship between job performance and years of work experience. Mentoring generally enriches organisational effectiveness even though the finding reported a low influence in terms of the area of years of work experience.

The finding of this study is also in consonance with the findings of Njoku (2017) which established that mentoring contributed significantly to the performance improvement of librarians in academic institution libraries which makes them gain more clarity in their duties and develop more working initiatives under minimum supervision; hence, a positive relationship exists. The implication is that librarians have better tendency to act independently and have good judgment regarding their job challenges than those who do not have mentoring exposure. The result of Njoku (2017) is also in agreement with the finding of Nwabueze and Anike (2016) which reveal that inexperienced librarians who have not participated in such training development will be uncertain about their expectations and be generally nervous, hence, cannot perform effectively.

On the contrary, Agwu and Luke (2015) highlighted that loss of employees' morale, commitment, productivity and efficiency was attributed to conflict of interest between managers (mentors) and subordinates (mentees). Observation has also shown that an unsuccessful mentor/mentee relationship can result to a negative direction which tends to affect the goals and objectives of the relationship. Mentoring does not thrive where university libraries lack academic culture and their management does not believe in grooming new employees (David-West and Nmecha, 2019 citing Wilson, Andrew, Lesners and Adeniji). The assertion of David-West and Nmecha (2019) also is in tandem with the view of Agwu and Luke (2015).

## Conclusion and Recommendations

The fact remains that developing librarians' capacity in terms of skills, knowledge and competences which are basic building blocks for librarians is a key factor

that is directly related to the effective and efficient performance of their job professionally for organisational productivity. Thus, the study exposed that the only way for librarians and libraries to remain relevant in this era of technological transformation and navigate the intense pressure occasioned by ICT is to graciously embrace and utilize the various capacity development strategies within their reach. This would assist both the individual staff and academic libraries to attain sustainable growth and productivity. Based on the findings and conclusion, the following recommendations are made by the researcher.

- Management should encourage more practice of internal rotation of librarians within the system in addition to proper orientation. This will enable them familiarise and be more conversant and knowledgeable with various roles and as well fit into every aspect of the job in the entire library operations. In addition, the librarians would have a general overview of the policies, procedures and practices guiding the library and institution's system.
- Academic library heads should regularly organise in house development programmes for librarians in order to equip their capabilities and re-orientate their attitude and behaviour for efficiency in delivering appropriate services to the academic community and adaptation to the system.
- Library management should continue to invest in off-the-job training. This will expose the librarians to acquire new skills and learning experience that when transferred on their job can enhance performance.
- The study recommends that effective mentor and mentee relationship practice in academic libraries should be strengthened. This will give room for the active development of successful successors.

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# Promoting University Research Output in Ghana through Open Access Institutional Repository

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## Abstract

*The article focuses on awareness of institutional repository (IR), and visibility of research output through IR to enhance the visibility of university research output in higher education institutions in Ghana. One hundred and fifteen librarians were selected using a quantitative methodology. Data were collected using a questionnaire, and the results were generated using descriptive statistics. The study found out that universities in Ghana mostly relied on the "mediated-archiving" model during uploads of research output than self-archiving approach. Strategies to promote IR for its intended benefits include mandating academics and students to deposit intellectual content, linking publication metrics to academic promotions and aggressively enhancing awareness of the IR. Our paper concludes that information specialists need to be creative in sensitising researchers and the academic community regarding the visibility of their research output by using IR.*

**Keywords:** *Dspace, Institutional Repository, Open Access, Intellectual Output, Research Output, Ghana, University Libraries, Librarians, Social Exchange Theory*

## Introduction

Tertiary institutions in this age of electronic publishing, on a large scale, have come to accept that institutional repositories (IR) are key infrastructure for disseminating scholarly information (Hossain, 2010). Kutay (2014) argues that IR is a digital platform that manages and disseminates the digital materials (academic publications, electronic theses and dissertations, conference proceedings, university archival materials, and videos of important university events) of the university. The mission of university libraries is to address the information needs of faculty, students, and researchers in the university community (Bangani, 2018). Libraries capture, protect, and disseminate the university's research output, according to the Association of College and Research Libraries (2020).

Globally, Open Access (OA) promotes scholarly communication without restriction. Therefore, librarians in universities deploy the IR to engage with faculty, students, and other researchers and demonstrate the value of sharing scholarly output (Hulela, 2010). As a result, universities have placed a high value on research output, not only because it is considered that research improves teaching and learning, but also because it adds to the body of knowledge and is a vital driver of national and institutional reputation (Ntim and Fombad, 2021). The amount of research carried out in a country determines its wealth and economic advancement. In this study,

research output refers to the number of research or scientific discoveries that an academic or a student can do in a given timeframe in terms of publishing output. Journal articles, technical reports, publications, conferences, book chapters, and theses are all examples of this (Dlamini and Snyman, 2017).

In Africa, little is known about the nature of the research or the critical role that IR plays (Dlamini and Snyman, 2017). The rise of IRs in universities across Europe, Asia, and Africa is helping to unearth grey literature such as unpublished research reports, theses, and dissertations, as well as seminars and conference papers (Kakai, 2018). IR is increasingly being used as platform for publishing original, peer-reviewed content in an open-access setting (Saini, 2018), allowing universities to collect, archive, and disseminate locally developed intellectual works. According to Ukwoma and Dicke (2017), IRs improve the use of scientific information as well as author citations and visibility.

Ukwoma and Dike (2017) have supported the continuous need to implement IR to enhance university ranking in educational institutions. To this end, "rating agencies like Times Higher Education (THE) World University Rankings, Webometrics Ranking, and Quacqarelli-Symonds (QS) Rankings, which provide trusted academic institution performance statistics, have gained wide attention from stakeholders, both national and worldwide." The IR reiterates the aim to increase institutional visibility. An IR is a way to raise an institution's visibility and status. They also stated that "IR creates an enabling environment for scholarly publication and increases the global visibility of the research publications of an institution. IR adds to the credibility of a university and plays an important role in establishing the university's identity and values". The paper focuses on promoting the visibility of university research output in Ghana through the IR.

## University Landscape in Ghana

This study takes place in Ghana, a West African country near the Gulf of Guinea and the Atlantic Ocean. Ghana has a population of 24,658,823 people and a total area of 238,535 km2 (Ghana Statistical Service 2010: 1). The National Accreditation Board (NAB) defines a "university as an educational institution designed for advanced instruction and research in several branches of learning, conferring degrees in various faculties, and often embodying colleges, schools, and similar institutions" (National Accreditation Board (NAB), 2013).

In Ghana, tertiary or higher education generally begins after senior high school and is carried out at a university or college. In the last couple of years, enrolment in higher learning institutions (private and public universities), particularly tertiary education institutions have increased. In Ghana, ten (10) public universities exist, and over 150 private universities spread across the country. Accordingly, a range of qualifications is pursued including diplomas, degrees, master's, and doctoral programmes (NAB 2013). In comparison to a decade ago, the status of Ghanaian university libraries is improving and adjusting to a variety of technical and patron information needs. Owing to this, Ghanaian libraries have gradually integrated traditional library services into electronic library services, where core library functions such as collection development, cataloguing, and reference services, among others, necessitate the use of ICT-inclined staff to man the library space (Somuah, 2013).

It is inferred that at least two issues have affected university libraries in Ghana. First of all, the technological growth resulting in open access initiatives within higher learning institutions has increased the capacity for institutional research and innovation (Dlamini and Snyman, 2017). Secondly, the rapid changes in higher learning institutions in Ghana have at least prompted university libraries to promote the visibility of university research output through Institutional Repository.

The university library is central to advancing institutional research and innovations. For instance, the institutional repository was a major step in collecting, managing, sharing and archiving digital collections digitally. This was followed up with electronic databases (electronic journals, electronic books, etc), open access (institutional repositories) OA/IR and so on. In a bid to provide improved creation, management, storage and dissemination of information services to the university community, libraries have not relented on efforts to deploy institutional repositories (Thompson, Amuda and Akeriwe, 2015). Though challenges exist with the deployment of IR, the majority of university libraries

in Ghana have not yet been implemented (Dubnjakovic, 2012). This observation warrants an investigation into how IR promotes the visibility of university research output.

## Literature Review

### Concept of Open Access Initiative (OAI) and IR

In developing countries, readers have limited access to research output. Researchers have not been effective in engaging in research activities consequently low levels of scientific output. One of the new paradigms in scholarly communication is OAI. The open-access (OA) trend in academic/ university libraries spawned the concept of institutional open-access repositories (OAIRs) (Dlamini and Snyman, 2017). Libraries in developing countries today have more resources to promote local research and so bridge the information gap thanks to technological and interoperability requirements. Unlike in the past, when access to scholarly publications was restricted by commercial publishing companies' subscriptions, licenses, or other payments, OAI has led the charge to increase publishing alternatives (Plutchak and Moore, 2017).

The 'Budapest Open Access Initiative (BOAI) (2002)indicates that OA is; a "Worldwide electronic distribution of the peer-reviewed journal literature, completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds." In a similar vein, the 'Bethesda Statement' (2003) defines; "OA, where "The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship as well as the right to make small numbers of printed copies for their personal use" (Bjork, 2017). From the aforementioned discussion, OA calls for research output to be free without any restrictions on levels of access and use (Bjork, 2017).

According to Kodua-Ntim and Fombad (2020), OAI promotes and facilitates information access without any barrier (subscription fees or access charges) whatsoever, by allowing the public to read, download, copy, share, upload, and print as long as the customer is online. To increase the global visibility of research output, several universities in Africa and beyond have established IR services by making it OA (Abrizah, Noorhidawati, and Kiran, 2010). Abrizah et al. (2010) posited that IR advances OAI by archiving university intellectual output and making it available for free, access, and use. In Ghana, OAI has had an impact on IR services by encouraging depositors to archive and share intellectual works (Moahi, 2012). One authority in the field of IR is Lynch (2003). He argued that "university IR is a collection of services that a university proffers to its members intended for the management, organisation, and diffusion of digital works produced by these members". Kamraninia and Abrizah (2010) characterised an "IR as open, interoperable, cumulative, perpetual, contributes to the process of scholarly communication in collecting, storing, and disseminating the scholarly content".

### Development of IR in Ghana

In Ghana, universities are responsible for enhancing and promoting teaching, learning, and research. Libraries have collections of monographs, serials, journals, newspapers, and pamphlets to achieve this goal. CDs, microforms, and films are among the various collections.

Increasingly, institutional and subject repositories in universities in Ghana have gained wide acceptance and implementation in providing scholarly publications and information resources. These initiatives are in line with the OA. They are being developed both in private and public universities as a consequence of the availability of scholarly resources in digital formats and in response to OA policies and mandates. According to the Open Directory of Open Access Repositories (OpenDOAR), there was no IR in Ghana before 2008. The first institution to apply IR was Ghana's Kwame Nkrumah University of Science and Technology (KNUST), which was followed by the University of Ghana, Legon (UG) in 2011. Indeed, the promotion and full implementation of IR in Ghana started quite late. In 2019, all public institutions have implemented IR systems using open-source software (DSpace). Owing to the global benefits accrued in deploying IRs in other universities,

the private universities in Ghana have equally embarked on establishing IRs (Ntim and Fombad, 2021).

There is a scarcity of empirical evidence on the growth of IR in Africa. Inadequate information and communication technology infrastructure, skilled ICT personnel to set up and maintain the IR, insufficient funding, lack of knowledge of open access institutional repositories among researchers and academics, unreliable power supply, inadequate advocacy, and how to manage copyright, intellectual property rights, and how to manage it are some of the challenges that academic and research institutions face when establishing IRs (Agyen-Gyasi, Corletey, and Frempong, 2010).

The most common means to do so are to publish in open access journals and to deposit scholarly resources in institutional repositories (IRs). According to data from the Association of Commonwealth Universities, open access benefits schools by improving the visibility of their research, which can lead to higher rankings and hence a higher profile. Outside of academia, OA has a positive impact by spreading knowledge to other social and economic sectors. According to Kabugu (2014), the university library strongly advocates for OAI by engaging with faculty, students, and university management. Through effective communication channels, the libraries are strategically positioned by universities to create awareness and ensure that the university is continually informed about IR. This commitment by the university library has increased deposits from the university community (students, faculty, and other researchers) (Kabugu, 2014).

## Increasing the Visibility of Scholarly Communications

Historically, the library has been recognised as the centre of the university, a vital gathering place for all academics, researchers, and students on campus (Stamatoplos, 2015). Faculty and students alike visit the library regularly to consult the collections and use the facilities. Apart from that, universities are increasingly exerting an influence within the academy by serving as a physical representation of the academic ethos and disseminating research output to the world (Martin-Yeboah, Alemna, and Adjei, 2018).

Future generations of scholars working in an online environment may be unable to appreciate this intrinsic value. When establishing evidence for libraries' contributions to research, it is important to remember that the total idea is larger than the sum of its parts and that the library's value is a key cornerstone and expression of the academy's and scholarship's values. However, there are significant changes in the patterns of these activities, which are largely – but not totally – driven by the electronic availability of resources. The library's position in the lives of researchers is shifting substantially from what it has been in the past (Schwartz, 2012).

University libraries, according to Balakrishnan (2013), are important in supporting academics in taking full advantage of the benefits and opportunities of the networked world, including advances such as open access and social media. On the other hand, libraries aren't always well-equipped to promote change, and scholars can be resistant to efforts to change their habits. Many libraries, however, have been effective in resolving such difficulties by improving their links with academics and redirecting their services to promote and utilise new methods of scholarly communication known as IR. Globally, repositories are tasked with improving the profile of scholars and increasing the exposure of the institution (Jain, 2012) It was recently announced that universities now have repositories to keep and make institutional assets such as research papers and theses public.

According to Hockx-Yu (2015), institutional repositories are a new but essential area within the educational environment. They complement scholarly communication's open-access goal by making it easier for researchers to disseminate and share their products through unrestricted internet availability.

According to SPARC (Scholar Publishing and Academic Resources Coalition), institutional repositories are becoming an increasingly significant part of the evolving structure of scholarly communication (Akintunde and Anjo, 2012). The potential benefits of institutional repositories extend beyond authors who gain visibility and users who discover information more quickly to institutions who boost their research profile and funders who see wider dissemination of research outputs. Information retrieval, according to Saini (2018), has a lot of potential for material preservation, resource sharing,

and increasing the exposure of Nigerian libraries and institutions. The research councils in the United Kingdom have recommended mandating the deposit of research financed by the Council in publicly accessible repositories, according to RCUK (2005). Funding agencies all around the world have noticed this, and there is a global trend for funding agencies to compel the dissemination of research results via repositories (Hockx-Yu, 2015).

To promote and accelerate the transition to academic communication that is truly built for the digital world, IR can play a critical role. Few journals or publishers have made scholarly communication a priority. The IR can facilitate greater access to traditional scholarly content by empowering faculty and students to effectively use the new dissemination capabilities offered by the IR to advance the movement of electronic theses and dissertations or the growth of open educational tools by empowering them to use the new dissemination capabilities offered by the IR to advance the movement of electronic theses and dissertations or the growth of open educational tools (Lynch, 2017). With the introduction of e-print and preprint servers, this is also happening on a disciplinary level, at least in some fields (Lynch, 2003).

Institutional repositories can directly feed disciplinary repositories in situations where the disciplinary practice is complete. Individual academics can use institutional repositories to help lead the way in initiating disciplinary shifts in situations where the disciplinary culture is more conservative, or where scholarly organisations or prominent publications opt to resist change (Lynch, 2017). According to Lynch (2003), institutional repositories can foster the investigation and implementation of new forms of scholarly communication that make extensive use of digital media. This, in our opinion, is the most important and exciting payoff: facilitating change not so much in the existing scholarly publishing system as it is in the beginnings of entirely new forms of scholarly communication that will need to be legitimised and nurtured with guarantees of both short- and long-term accessibility. New scholarship techniques that highlight data as a key component of the record and academic discourse can benefit from IR (Westell, 2006). They can organise and make effective attempts to capture and disseminate learning and teaching materials, symposia and performances, and other documentation of universities' intellectual life (Abrizah, Noorhidawati and, Kiran, 2017).

The library, on behalf of the university, controls the repository most of the time, improving the exposure of the institution's outputs and raising its research profile. However, repositories are only as beneficial as the content they include, and the current emphasis is on expanding the volume of content by making it normal practice for researchers to deposit their products (Balakrishnan, 2013).

## Theoretical Framework

Social Exchange Theory (SET)is one of the most prominent conceptual models in organisational behaviour. SET is a social psychological and sociological paradigm that seeks to explain societal development and stability as a process of negotiated exchanges between parties. Human relationships, according to the notion, are established through the use of subjective cost-benefit analysis and the evaluation of alternatives (McDonell, Strom-Gottfried, Burton, and Yaffe, 2006). Because this theory has been used by a few academics in prior studies, the paper links the SET to the IR initiative in Ghanaian universities.

According to SET, depositors should consider cost as well as other beneficial factors for scholarly communication such as trust, identification, and pro-sharing norms (Kling and Spector 2003; Kankanhalli, Tan, and Wei, 2005; Swan and Brown, 2005; DOAR, 2018). Kankanhalli, Tan, and Wei (2005) identified these elements as contextual factors impacting the contribution of IRs. Trust, in this context, refers to faith in the good intentions and competency of other actors, such as a university and users. Academic members' concerns regarding collective outcomes, membership, and institution commitment are reflected in identification. In the IR literature, the phrase "pre-print culture" rather than "pro-sharing norms" is used to describe the practice of researchers sharing drafts of research articles with colleagues all over the world before they have been peer-reviewed, as a factor (Samzugi, 2017).

Based on this assumption, Samzugi (2017) investigated the factors that encourage or impede participation in IR. He offered both extrinsic and intrinsic benefits of promoting research output, which

is critical to IR contribution. Extrinsic benefits in IR include publicity, accessibility, and the reliability of documents, as well as professional recognition, institutional acknowledgment, and academic incentive. Intrinsic benefits are concerned with the altruistic aim and self-interest of the IR contribution. Total costs include both copyright issues and the additional time and effort required to make the IR contribution.

As this study relates to IR promoting university research output in Ghana, Ezema, and Onyancha (2016) posit that IR can increase the readership of the university research output (increase publicity). Although few works have discussed SET and IRs, the African perspective has relatively inadequate than other developed worlds. For instance, Hulela (2010) adopted SET to examine the "perceptions of Lawrence-Kuether (2017) investigated open access and data sharing practices among Virginia Tech faculty and found that "academic authors are self-archiving their scholarly works in the Bergen open research archive" in Sweden. In Kenya, Kathewera (2016) adopted SEC to investigate "the role of an IR in the creation and use of local content by staff and students at Lilongwe University of Agriculture and Natural Resources (Luanar), Malawi". Adopting SET in this study sets to close this gap in the African perspective. Based on SET, university stakeholders including faculty and students benefit greatly by enhancing their global individual visibility, citations, and institutional visibility. It must be noted that higher learning institutions have the responsibility to demonstrate to faculty and students, the great value that is obtained in providing/contributing content. SET is applied in this study to shape the behaviour of submitters towards IR contribution.

## Research Methodology

In this article, a quantitative methodology was applied. The methodology allowed the authors to collect numerical data and generalise the study findings to the sample population. The quantitative methodology was used to verify and refute prior findings in the literature and generalised to the study population to the IR. This shapes the behaviour towards IR contribution.

First of all, a global directory for academic OA repositories, called OpenDOAR was strictly used as the inclusion criteria to select the universities in Ghana running the IR platforms. OpenDOAR is the global repository of Open Access Repositories that is quality-assured. All the six university in OpenDOAR directory namely: Kwame Nkrumah University of Science and Technology (KNUSTSpace), University of Ghana (UGSpace), Aseshi University, University of Development Studies (UDSspace), University of Cape

Coast Institutional Repository and the University of Education, Winneba were selected and used as the sample cases. Universities that were not registered on the OpenDOAR directory were not considered or included in this study.

After the selection of these cases, staff in the respective IR units in the six universities were sampled. In all, one hundred and fifteen (115) staff (see Table 1) were directly managing collections, and archives, and sharing research output on the IR. The participants were directly contacted by the authors via email and telephone calls. Before administering the final questionnaire, a self-administered pilot study was conducted based on 5 responses collected from library directors. Upon completing the pilot study, minor modifications were effected to improve the validity and readability of the questionnaire. The purpose of the contact was to give consent to administer the questionnaire to each respondent in the IR unit. After granting permission, the face-to-face approach was used in meeting with the staff. Data was then gathered from the study sample. The participants included the repository administrator, repository librarian, technical support team and general repository support staff. In total, questionnaires were distributed to 115 staff from six universities. See table 1 for details of the sample distribution.

**Table 1: Sample distribution**

| | Name of university | Name of IR (URL) | Sample |
|---|---|---|---|
| 1 | Kwame Nkrumah University of Science and Technology | KNUSTSpace (http://dspace.knust.edu.gh/) | 30 |
| 2 | University of Ghana | UGSpace (http://ugspace.ug.edu.gh/) | 16 |
| 3 | Ashesi University | AseshiInstitutioanl Repository (https://air.ashesi.edu.gh/) | 10 |
| 4 | University of Development Studies | UDSspace (http://www.udsspace.uds.edu.gh/) | 17 |
| 5 | University of Cape Coast | UCC Institutional Repository (http://ir.ucc.edu.gh/dspace/) | 16 |
| 6 | University of Education, Winneba | UEW Institutional Repository (http://ir.uew.edu.gh) | 17 |
| **Total** | | | **115** |

For data analysis, the Statistical Package for Social Science (SPSS) software was employed. Items on the questionnaire were primarily collected from two studies: Ukachi (2018) and Markey, Rieh, St. Jean, Kim, and Yakel (2007).

## Analysis and Discussion of Findings

Demographic Biographical information was gathered in order to understand the respondents' viewpoints on the role of university libraries in encouraging research output and the general objectives of the study.

**Table 1: Demographic Information**

| **Gender of respondents** | | |
|---|---|---|
| **Responses** | **Frequency** | **Percent** |
| Male | 60 | 52.2 |
| Female | 55 | 47.8 |
| **Age of respondents** | | |
| **Responses** | **Frequency** | **Percent** |
| 18-29 years | 65 | 56.5 |
| 30 – 39 years | 25 | 21.7 |
| 40 – 49 years | 15 | 13.0 |
| **50 – 59 years** | **10** | **8.7** |
| **Total** | **115** | **100.0** |

**Source:** Field data, May 2019.

Male library staff in IR units comprised 52.2% of the study's population, while females comprised 47.8%. Furthermore, the majority of respondents (56.5%) were between the ages of 18 and 29, with only a few (8.7%) falling between the ages of 50 and 59. 73.9% of the total population.

**Table 2: Purpose of IR**

| Study Variables | N | Mean | Std. Deviation |
|---|---|---|---|
| Archive research output | 115 | 3.8905 | 1.22333 |
| Promotes research output | 115 | 3.8876 | 0.78767 |
| To boost the particular scholar's prestige | 115 | 3.3678 | 0.71234 |
| To boost your institution's prestige | 115 | 3.7905 | 0.7334 |
| "Provide open access to their intellectual output" | 115 | 4.5876 | 0.4007 |
| "To place the burden of preservation on the IR instead of on individual faculty members" | 115 | 4.312 | .01204 |

**Source:** Field data, May 2019.

Table 2 shows the means, standard deviations, and reliabilities of all variables based on responses. A mean ranking of the purpose of IR in universities revealed that most respondents largely agreed that IR in universities "Provide open access to their intellectual output" (m=4.5876) and "carries the burden of preservation on the IR rather than on individual faculty members" (m=4.312). Other reasons for establishing IR included archiving research output (M=3.89, S.D= 1.223), promoting research output (M=3.58, S.D=.787), (M=3.36, S.D=.712), and boosting your institution's prestige (M=3.7905, S.D=.546), in that order.

The purpose of the repositories, according to Islam and Akter (2013), is to "provide open access to their intellectual output" of the institutions. According to Islam and Akter (2013), IR "resolves the problem of developing-country scholars by providing unlimited access to intellectuals' work without economic barriers." They went on to say that "the most significant barrier for developing-country research scholars is limited access to scholarly works." IR solves this problem by removing economic barriers to accessing intellectuals' work.

In developing countries like Ghana, the cost which involves technical staff, training, cost of software, etc. is one of the challenges for libraries maximising IR in their universities (Ibinaiye, Esew, Atukwase, Carte and Lamptey, 2015). The section compares how libraries used open-source software versus proprietary software to establish IR in the university.

**Table 3: Software of IR in Ghana**

| Software used | Frequency | Percent |
|---|---|---|
| DSpace | 92 | 80 |
| Eprint | 1 | 0.9 |
| Digital Commons | 22 | 19.1 |
| Islandora | – | – |
| Hydra | – | – |
| **Total** | **115** | **100** |

**Source:** Field data, May 2021.

The table above summarises the various types of open or proprietary IR software used in Ghanaian universities. DSpace was identified as the open-source software used by the vast majority of respondents (80%). Other software repositories were Digital Commons, scoring 19.1%. Only one respondent confirmed Eprint as the IR software used for building the repository. None of the repositories used Islandora and Hydra software for IR development in Ghana.

A study by Thompson, Akeriwe and Aikins (2016) found that "using proprietary software is more expensive; hence, many academic libraries in the developing countries do not select that option". Thompson et al. (2016) confirmed the study's findings that most universities, including the University of Development Studies in Ghana, preferred open-source software over proprietary software because it is less expensive. It was suggested that the "UDS Library had the technical expertise for customising the open-source software and for the creation of the metadata". Respondents evaluated the types of content of the IR in the universities (Table 4).

**Table 4: Type of content in IR**

| Content types | Mean | S.D | Decision | Rank |
|---|---|---|---|---|
| Heritage (rare) materials | 2.51 | 0.21 | Neutral | 7 |
| Journals | 4.20 | 0.15 | agree | 3 |
| Lectures, Speeches, Reports | 3.71 | 0.10 | agree | 5 |
| Research Articles | 4.72 | 0.45 | Strongly agree | 1 |
| Conference Proceedings | 4.11 | 0.32 | agree | 4 |
| Theses | 4.50 | 0.05 | agree | 2 |
| Others (past questions) | 2.22 | 1.02 | Disagree | 6 |

**Note**: Strongly agree (5), agree (4), Neutral (3), Disagree (2), Strongly disagree (1).

The responses to the digital repository's content are shown in the table above. There was a high agreement for research articles ($X$=4.72, SD=0.45) and Theses ($X$=4.50, SD=0.05) as contents for the IR. On the other hand, a few respondents agreed with heritage materials ($X$=2.51, SD=0.21) and others (past questions) ($X$=2.22, SD=1.02). The results explained that respondents in the university libraries noted huge contents of research articles and theses in the digital repository but observed that past questions and heritage collections were rarely deposited in the IR.

Ezema and Onyancha (2016) have echoed that, IRs archive and promote research produced by the institutions. Previous studies including Martin-Yeboah, Alemna, and Adjei (2018); Safdar and Rehman, (2015) and Sani (2018) assessed the digital contents of IRs in their respective institutions. Safdar and Rehman (2015) confirmed the results in the present paper indicating that "various types of content such as research papers/articles, thesis, working papers, proceedings, past examination questions" are available in the IR. Preprints; working papers; theses and dissertations; research and technical reports; conference proceedings; departmental and research centre newsletters and bulletins; papers in support of grant applications; status reports to funding agencies; committee reports and memoranda; statistical reports; technical documentation; and surveys (Agyen-Gyasi, Corletey and Frempong, 2010).

## Submission Criteria

**Table 5: Submission criteria in IR**

| | Frequency | Percent |
|---|---|---|
| Only self-archive | 13 | 11.3 |
| Strictly mediated archive | 69 | 60.0 |
| Both Mediated and self-archive | 33 | 28.7 |
| **Total** | **115** | **100** |

**Source:** Field data, May 2021.

The results revealed that most (60.0%) of the library staff in the IR unit alluded that electronic materials are often mediated archived (11.3%) other than self-archived. It can be said that among all the six universities, library staff receives the electronic copies on Compact Discs or emails and then submit them to the IR.

There are two types of archiving, according to Bamigbola (2014): self-archiving and mediated archiving. In self-archiving, the author submits the digital item by himself, whereas someone else archives the author's work in the mediated archiving method. Armstrong (2012) adopted mediated archiving at Boise State University in the United States, where library staff was entrusted with uploading documents to the institutional repository. If instructors know they won't have to spend time self-archiving, they may be more inclined to contribute their work.

## Promoting Research Output

Respondents were asked to use a 5-point Likert scale based on Strongly Disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), and Strongly Agree (5) to assess the functions of IR in universities (5). Table 6 displays the means and standard deviations.

**Table 6: IR and promoting research output**

| | Mean | S.D | Decision | Rank |
|---|---|---|---|---|
| The IR collects the research/intellectual output of the university | 4.31 | 0.23 | 4 | 1 |
| The IR preserves the research/intellectual output of the university | 4.09 | 0.11 | 4 | 3 |
| IR improves citation rates of research output | 4.19 | 1.32 | 4 | 2 |
| The IR enhances student research for the global audience | 3.84 | 0.25 | 4 | 5 |
| The IR provides opportunities for research collaboration from other institutions | 4.03 | 0.39 | 4 | 4 |

**Source:** Field data, May 2021.

The results revealed high scores for all five items. Specifically, respondents rated "IR collects research/ intellectual output of the university"($X$=4.31, SD=0. 23) as the highest reason for promoting the intellectual output of the university. This was followed by "IR improves citation rates of research output" ($X$=4.09, SD=0.11) and IR provides opportunities for research collaboration from other institutions ($X$ =4.03, SD=0.39). The understanding here is that, the IR's ability to capture the intellectual capital of the institution, enable long-term preservation of digital assets, and expose staff research to a wider international audience have all contributed to its relevance as a tool for scholarly communication. The findings of the study are consistent with those of Ukachi (2018), who discovered that IR collects university research/intellectual output and that many of these resources have become essential tools for scholars conducting research, building scholarly networks, and disseminating their ideas and work.

**Table 7: Motivations for depositing scholarly works**

| Motivations for depositing scholarly works | Frequency | Percent |
|---|---|---|
| Depositing scholarly work on IR increases the likelihood of communicating research findings with others and peers. | 17 | 14.8 |
| Provides researchers with credible publication sources. | 5 | 4.4 |
| Depositing research work on IR will increase my visibility within the discipline to which I belong. | 15 | 13 |
| Depositing work increases the number of people who read the materials. | 19 | 16.5 |
| The potential impact of research will be increased by depositing scholarly work. | 15 | 13 |
| Scholarly work on IR will be cited more frequently. | 10 | 8.7 |
| Posting research output on IR improves one's chances of advancement. | 3 | 2.6 |
| Posting scholarly works on IR allow other scholars to have access to the materials they could not otherwise access | 16 | 14 |
| Posting research on IR will increase the chances of attaining grants for research | 15 | 13 |
| **Total** | **115** | **100** |

**Source:** Field data, May 2021.

The results shed light on some of the motivations for depositing scholarly works in a university. Respondents generally agreed that depositing university research in the IR increases the readership of the research output (16.5% ). Second, 14.8% of respondents stated that depositing scholarly work on IR increases the possibility of communicating research findings with other people and peers. In general, librarians revealed several reasons why faculty and researchers deposit research output into IR.

Hulela (2010) concurred with the study's findings. According to Table 7, academic authors want to share their scholarly work with others because they have benefited from other people's research. This suggests that the altruism factor influenced their decision to engage in an IR. Other important motivators included the preservation of scholarly work in an IR, the maintenance of rights to their scholarly work, and increased exposure within their university and departments. The notion that contributing to IR might boost prospects of promotion did not appear to be a big issue for the respondents; it had little impact

on them. There is no link between IR contributions and the promotion of academic authors. It also shows that IR did not affect the respondents' financial incentives. Respondents to the study addressed the challenges that hampered the optimisation of IR in Ghanaian universities (see Table 8).

**Table 8: Barriers to promoting research output**

| Questionnaire item | Mean | Standard Deviation | Rank |
|---|---|---|---|
| Difficulties getting internet access/slow internet | 3.2609 | 1.07676 | 5 |
| Inadequate ownership/intellectual rights | 4.3261 | 1.17175 | 2 |
| Inadequate collaboration among academics, researchers, | | | |
| and libraries | 3.7826 | 1.10646 | 3 |
| Librarians lack the requisite promotional competence | 3.5217 | .88206 | 4 |
| Not conducive environmental /platforms for sharing | | | |
| research output | 2.5217 | 1.17986 | 7 |
| Academic members and students are unaware of the | | | |
| potential of open access resources. | 3.0217 | .97646 | 6 |
| Policy absence mandating academics and students to | | | |
| submit research output | 4.8913 | 1.05710 | 1 |

**Source:** Field data, May 2021.

According to the mean value generated, 'policy absence mandating academic and student submission of research output' received the highest mean of 4.8913 per respondent. This was followed up by "Inadequate ownership/intellectual rights" with ($X$ =4.3, SD=1.17)On the contrary, with a mean score of 2.522, 'non-conducive environmental /platforms for sharing research output' was rated the lowest. Given this, the university administration must establish a policy requiring faculty or academics and students to submit research output.

**Table 9: Increasing the visibility of university research**

| Questionnaire item | Mean | Standard. Deviation | Rank |
|---|---|---|---|
| Build a solid commitment to promoting research output. | 4.2304 | .95073 | 1 |
| Increase the accessibility of research output. | 4.1404 | .85349 | 2 |
| Encourage academics, students, and the library to work together effectively. | 4.1364 | 1.08030 | 3 |
| Increase graduate students', professors', and researchers' awareness of open access resources. | 4.0870 | 1.48422 | 4 |
| Librarians should be periodically trained in ICT skills. | 4.0720 | 1.66429 | 5 |
| Find and create credible publications for researchers. | 4.0570 | 1.86429 | 6 |
| Make research findings more visible. | 4.0230 | 1.93250 | 7 |
| Strategy for University-Wide Research Development. | 4.0000 | 1.98230 | 8 |

**Source:** Field data, May 2021.

According to the mean values generated, 'developing a strong commitment towards promoting research output' obtained the highest mean of (4.23), indicating that it is the best method for promoting research output according to the respondents. This was followed by increasing research output accessibility (4.14), promoting appropriate collaboration among academic members, students, and the library (4.13), raising awareness of open access resources (4.08), regularly training librarians on ICT competencies (4.07), identifying and creating credible publication sources for researchers (4.05), and increasing research output visibility (4.05). (4.06). (4.02). Despite this, the 'university-wide research development strategy' obtained the lowest grade, with a mean score of 1.98. This suggests that respondents were not enthusiastic about the University of Ghana implementing a university-wide research development strategy as an effective strategy for tackling the challenges connected with promoting research output.

## Conclusion and Recommendations

The paper discusses how IR is used to promote the visibility of university research output in Ghana. In structuring and redefining the mandate of university libraries, OAI and IR have become innovative platforms that enhance scholarly communications. This paper revealed that IR is key to promoting scholarly communication within higher learning institutions in Ghana. Our paper established the following conclusions:

- The submission of digital content into the university IR was largely mediated archiving other than self-archiving.
- IR collects, preserves, shares, and promotes the research/intellectual output of universities in Ghana.
- Unlike academics, students were mandated to deposit into the IR. No policy supported faculty submissions on the IR.
- Strong commitment from library and university management towards OAI can greatly promote the visibility of university research output through IR.
- The authors expect, among other factors, to contribute research output for individual and institutional visibility.

The main recommendation of this paper is that concrete strategies should be taken by library and university administrations, as well as other interested stakeholders, in increasing the visibility of research output in Ghana by promoting the IR platform. This is because, despite advances in OA, academics remain largely unaware of the concerns, justifications, and benefits. OA aids academia by promoting published works while also allowing academics to be known by others. This ability to bridge the information gap between industrialised and developing countries is increasingly vital for educational, cultural, and scientific advancement. Promoting IR in universities in Ghana might thereby encourage information and knowledge sharing among the academic communities. Based on the study's findings, the university library can create guidelines to orient submitters on archiving techniques (self-archiving and mediated) in the IR. The library instructions should minimise technological difficulties/ barriers, as well as the time and effort required to deposit materials. In terms of strategic priorities, the universities in Ghana must identify OA as a strategy for boosting research and improving institution visibility. Surely, management must identify and prioritise IR by mandating academics and students to deposit content into the IR. The degree of emphasis by university management through an IR policy plays a more important role in committing the user community to mandatorily contribute to IR. By so doing, institutional and individual visibility of the intellectual output of the university. It is also recommended that connect publication metrics to academic promotions. The university should link relevant publishing metrics to promotions to foster academic research in Ghana. By depositing research findings in the IR, academics or researchers might be encouraged to advance in promoting research findings within their disciplines. There should be collaborations between stakeholders and the library through aggressive publicity to create more awareness of the IR. A few publicity strategies include providing google analytics reporting, one-on-one engagements, flyers, posters, email systems, and internal memos.

In Ghana, workshops to enhance interactions between the stakeholders and the university library will be an advantage.

### Implications for Future Research

Even though the success of IR is dependent on academics and students depositing research output, universities in Ghana are experiencing problems attracting digital content. Academics and other researchers in the academic community are not yet particularly interested in IR. From the study, librarians and IR teams need to be creative in sensitising researchers and the academic community regarding the visibility of their research output by using IR.

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# Use, Accessibility, and Satisfaction of Librarians in Selected Higher Educational Institutions in Oyo State, Nigeria with Integrated Library Management Systems

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## Abstract

*This study was conducted to examine the use, accessibility, and satisfaction of librarians in selected higher educational institutions in Oyo State, Nigeria with integrated library management systems. Data were collected from 170librarians, library officers and system analysts, using a questionnaire designed and administered by the researcher. The majority of the institution libraries use of PMB (PhpMyBibl) software and only one institution namely the University of Ibadan, Integrated Library Management Software (ILMS) and Dominican University make use of in-house software. Cataloguing module is the most deployed compared to other modules of the ILMS in use. The most available module of the ILMS is the cataloguing module while the library registration service is the most accessible service. Librarians with higher qualifications, who have lower positions at work, and less number of years in the services, are females, and younger in age expressed satisfaction with the ILMS compared to others. With regards to specific accessibility factors, only system quality, net benefits, availability, and affordability were significantly related to satisfaction of the librarians in respect of the use of the ILMS to meet their library services' needs. The number of years the librarians have spent in service, and the gender of the librarians are not significant variables in respect of the satisfaction of the librarians with the ILMS. The quality of service delivered by the systems, their accessibility, utilisation, adequacy, and acceptability which are ordinarily considered crucial factors, did not predict satisfaction with the use of the ILMS.*

**Keywords:** *Integrated Library Management Systems; Integrated Library Management Software; Penchansky and Thomas' Theory of Access; Delone and McClean's Information Systems Success Model*

## Introduction

Developments in information and communication technologies (ICTs) in the last three decades have brought about changes in the information management practices in libraries that cover creation, organisation, storage, distribution, and retrieval issues (Omopupa, Adedeji, and Sulayman-Harron, 2019). Today, libraries rely more on electronic resources, and effective management of these resources to meet their information service needs (England and Miller, 2016). New technologies are continuously emerging, and the need to acquire and continuously adapt to new technologies is often challenging. With the overabundance of digital technologies in many formats, libraries are continuously upscaling their facilities, adopting innovative strategies to manage information resources and services. A typical example of this technology is integrated library management software.

Olatunji, Farouq, and Idris (2018) have defined integrated library management software as an enterprise resource planning system for libraries, used to track items owed, orders made, bills paid, and

patrons. Muller (2011) has described "integrated library systems (ILS) as multifunction, adaptable software applications that allow libraries to manage, catalogue and circulate their materials to patrons". ILMS supports selection, meta management, workflow, and mobile accessibility. ILMS is frequently designed as an information system with a relational database and software to interact with that database. An ILMS typically has two graphical user interfaces, one for patrons and one for staff. ILMS can manage the entire operation of any library, from the acquisition and processing of library resources to making them available to library users and preserving the resources for future use. It improves the efficiency and effectiveness of library service delivery by increasing the speed, productivity, adequacy, and efficiency of library staff.

The key typical modules comprise cataloguing which represents works in the library's collection and circulation which automates tasks related to loaning items to library users. Others are serials control for managing journals, acquisitions to handle the procurement process for new items added to the collection, and the online public access catalogue to allow library users to search or browse through the library's collection. Each of these modules offers very detailed features to accommodate the multifaceted routines involved in library work. This implies a high degree of computerisation of various routine and repetitive tasks thereby increasing productivity in service delivery (Okuonghae and Idubor 2021).

Integrated library management software packages (ILMS) can be proprietary, which means the source code is not free and must be paid for and renewed, or open source, which means the source code is free, though some institutions develop applications for in-house use (Uzomba, Oyebola and Izuchukwu, 2015). The proprietary products have been available for many years, have reached a high level of maturity, and remain the dominant approach used for library automation. The software varies by several factors, including scalability, database type, compatibility, support for bibliographic record formats, traditional services, inter-library loan management, managing electronic materials, and basic common management systems, such as security, alerting system, and statistical reports. Some management systems are fully web-compatible with Web 2.0 and support maximum technological features.

ILMS are used in many academic libraries in Nigeria, but they are neither adequately accessible nor utilised due to social and technical factors (Uzomba, Oyebola, and Izuchukwu, 2015). It is not enough that software is adopted, but accessibility, availability, and utilisation of the resource by library staff that operates the software are required to facilitate optimal use. A continuous examination of these issues is required to generate information about key factors that enhance or inhibit the successful deployment of the technologies.

In selecting ILMS, many libraries are interested in brands or known suppliers in the market, documentation, assessment ease of maintenance, cost, aftersales service, technical compatibility, interface, and integration, supplied format, etc, these would foster a good user experience with the software. Also, the concept of system quality is measured by ease of use of the software package, system flexibility, system reliability, and ease of learning, response time; service quality, that is, the quality of the support that system users receive from the information systems organisation and IT support personnel, responsiveness, accuracy, reliability, and technical competence. There are issues about net benefits, that is, the extent to which information systems are contributing (or not contributing) to the success of individuals, groups, organisations, industries, and nations), and user satisfaction are the concepts of Information System Success model that can be considered and put in a position to cover all library house functions and modifications or provisions for library resources such as journals, books, theses, data archives, e-manuscripts, research reports, bibliographic databases necessary to supplement learning and research in real-time without loss of data and must be available and accessible at all time for use. Even when ILMS is accessible, are the librarians that use the software satisfied with the role and performance of the technologies in their library services? (Olagoke and Kolawole 2019).

Recently, a study by Olatunji (2020), evaluated the adoption and use of ILMS in selected private universities in Osun State, Nigeria. The Technology Acceptance Model and LibQual construct, but did not address whether the software is considered accessible, available, and usable to the library staff.

Rather the very insightful study undertook the evaluation from information technology use and adoption perspectives. The present study focuses on all higher education institutions in Oyo State, and it addresses whether library staff are satisfied with the ILMS concerning accessibility, availability, usability, and other associated factors. Furthermore, numerous library software has appeared in the market in the last few years; some have fizzled out of use due to technical and other problems (Ahmad and Bakhshi 2021)).

## Objectives of the Study

The purpose of this study is to examine how accessibility of integrated library management software (ILMS) packages in selected higher education institutions libraries in Oyo State, Nigeria, explains user satisfaction with the technologies. Specifically the following objectives were examined:

(i) the ILMS packages used in the selected higher educational institution libraries in Oyo State, Nigeria.

(ii) The extent of ILMS software accessibility, availability, and use in the libraries in Oyo State, Nigeria,

(iii) the challenges faced when accessing ILMS, and,

(iv) the strategies deployed to overcome the challenges faced when using ILMS

(v) to evaluate the satisfaction of librarians with the ILMS in their institutional libraries.

We hypothesise that there is no significant relationship between accessibility factors and librarians' satisfaction with the ILMS.

## Theoretical Framework

This study was guided by variables extracted from two theories: (i) Theory of Access (Penchansky and Thomas 1981) and, (ii) Delone and Mclean's Theory (1992; 2003). Penchansky and Thomas' theory focuses only on access/accessibility, without addressing ICT issues while Delone and Mclean's Theory (1992; 2003) is required to understand the role of the ICT component in the study.

## Penchansky and Thomas' Theory of Access

There are many opinions about the meaning of access. Adegboye (2015) defines information access as any means through which an information seeker gets required information to meet his/her information need. According to Penchansky and Thomas (1981), access is the degree of fit between consumers of the services of a system and the services provided by the system. The better the fit, the better the access. Access is also defined as the freedom and ability to obtain and make use of library and information resources and services. According to Penchansky and Thomas, access comprises accessibility, availability, affordability, adequacy, and acceptability. Penchansky and Thomas theory of access can be used to gain insight into how these variables are related, and how they interact for efficient service delivery of ILMS in academic libraries.

Access inûuences consumers and systems in three ways: use of the service, user satisfaction, and system practice. Penchansky and Thomas somewhat differentiated between access and accessibility. Accessibility refers to whether everyone involved in a system can perceive, understand, navigate and interact with the system; it is the ability to have full access to the contents of a facility, regardless of any physical, motor, cognitive, or software disability. The U.S. Department of Education describes software accessibility as the extent to which applications are accessible by people with or without disabilities. The department developed a checklist "Requirement for Accessible Software Design" which covers ten characteristics. The features include documentation, display, keyboard access, timing, screen element, etc. in essence, features such as text-to-speech, processing speed, technical support, and user interphase are elements that indirectly affect the use of library management software. Accessibility in social psychology refers to the ease with which an idea or concept can be retrieved from the memory about the attitude that guides behavior. The above opinions explain the importance of software accessibility by users to achieve information needs regardless of capability, coupled with usability characteristics: effectiveness, efficiency, engagement, error tolerance, and ease to learn.

Helen, Andreas, and Christopher (2015) examined a unified definition of web/software accessibility, irrespective of users' noted that to achieve accessibility, software must be designed and developed to support accessibility and usability across different contexts. In the research, 50 definitions of web/software accessibility were analysed and six concepts have emerged from the definitions which are; all users regardless of capability, can access, use and interact with the software, with usability characteristics, using mainstream or assistive technologies, design and development processes and in specific contexts of use.

MDN Web Docs (2022) content for web technologies introduces cognitive accessibility and improves the accessibility of the web for people with cognitive and learning differences. The study explained Cognitive impairment as a broad range of disabilities that may have the most limited capabilities, to age-related issues with thinking and remembering and people experiencing a common set of functional problems which includes difficulty with understanding content, remembering, remembering how to complete tasks, and the confusion caused by inconsistent or non-traditional web page layouts. MDN Web Docs further explained cognitive and intellectual disabilities as momentary, temporary, or permanent, it further explained cognitive skills as a way to address cognitive differences to includes; attention, memory, processing speed, time management, letters and language, numbers, symbols, and math, and understanding and choices. Pot, van Wee and Tillema (2021) explained diagrammatically how some individual factors such as socio-demographic characteristics, capabilities, attitudes, preferences, and context can affect the perception of the accessibility and perceived accessibility for decision making. The above can explain the concept of integrated library management software accessibility and what people perceived to be accessible based on individual factors.

Oyewusi and Oyeboade (2009) researched the use of library resources by undergraduates in a Nigerian state university of technology. The respondents were asked to indicate their perception of the accessibility of information necessary for their academic pursuit on the Internet. The result showed that 313 (79.7%) respondents agreed strongly that they found information more accessible on the Internet while 80 (20.4%) disagreed about the accessibility of information on the Internet. The result indicated that information is more accessible on the Internet for undergraduate students, except in a few cases where the users need to pay a certain amount to access information. The respondents were also asked to indicate the IT facilities that were available and accessible in the library, the results indicated that 94.4% of the respondents found the photocopy machine accessible for use while all the respondents indicated that electronic databases, OPAC, Close Circuit TV (CCTV), e-journal, microfilm, and facsimile were not accessible for use.

Abbas and Song (2020) ascertained the level of accessibility of electronic information resources in research activities in agricultural research institutes in Kaduna State, Nigeria, they used seven items to rate the level of accessibility and none of the respondents rated not applicable to the items on level of accessibility of the resources for his/her research activities. It was also revealed that all the respondents indicated that they access relevant EIRs on the Internet through passwords obtained from the institutes' libraries, they prefer to access EIRs for research than the print materials and policy on accessibility and use of EIRs are effective for research activities. Zhang, Tlili, and Nascimbeni (2020) define 'accessible' as meaning that a person with a disability is allowed to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability in an equally effective and equally integrated manner, with substantially equivalent ease of use. The research further highlighted a description of the WCAG 2.0 Attribute and Guidelines by W3C (2008) applied to open educational resources (OER). They include perceivable, operable, understandable, and robust. The result of the review showed that among the four accessibility attributes, 'robust' has the highest percentage of errors.

Accessibility relates to availability. Availability is the quality of being able to be used or obtained. According to Penchasky and Thomas (1981), availability is the degree to which a system is in a specified operable and committable state at the start of a mission. Availability is also referred to as physical access, as the relationship between the volume, and type of services which exist and the volume and type of needs of the client. There is also a relationship

between accessibility and utilisation. Utilisation is the action of making practical and effective use of something or skilled in the utilization of computer usage, it is also the act of bringing something to bear; using it for a particular purpose. Use is the key construct in Technology Acceptance Model and it has two perspectives: perceived ease of use and perceived usefulness which may shed some light on the concept of the use in this study.

Perceived usefulness is the degree to which a person believes that using a particular system would enhance their job performance while perceived ease of use is the degree to which a person believes that using a particular system would be free from effort (Davis, 1989). Then links the concept of acceptability, which is the characteristic of a thing being subject to acceptance for some purpose, a thing is unacceptable if it deviates so far from the ideal that is no longer sufficient to serve the desired purpose or goes against that purpose. Saurman (2016), explained acceptability using Penchansky and Thomas' (1981) theory of access as the consumer perception, he further indicated acceptable service responds to the attitude of the provider and the consumer regarding characteristics of the service and social or cultural concerns.

Finally, accessibility links to affordability which is the degree by which system performance, cost, and schedule constraints are balanced over the system life, while mission needs are satisfied in concert with strategic investment and organisational needs (Incose 2015). Saurman (2016) explained affordability as financial and incidental costs, affordable services examine the direct costs for both the service provider and the consumer. According to the COBUILD dictionary, adequacy is the quality of being good enough or great enough in amount to be acceptable. Affordability is the fact of being enough or satisfactory for a particular purpose (Cambridge dictionary). A library service is considered well organised if, among others, it accepts clients, and clients can use the services without any inhibitions (Saurman, 2016).

## Delone and McClean's Information Systems Success Model

Information systems (IS) success is an IS theory that seeks to provide a comprehensive understanding of IS success by identifying, describing, and explaining the relationships among the most critical dimensions of success along which information systems are commonly evaluated. The information systems success model evaluates the effective creation, distribution, and use of information through technology. Information Systems Success Model (ISS) was developed by (DeLone and McLean, 1992; 2003). Also known as the DandM model, the aim is to provide a framework for understanding the multi-dimensionality of IS success. The revised and final version of the model revised the "use" construct to intention to use. The basic key elements of information system success are quality (information and system), use, and outcomes (individual and organisation impact). The IS model measures six constructs.

System quality is concerned with the desirability characteristics of an information system. Examples are ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times. Information quality is concerned with those desirable characteristics of the system outputs; i.e., management reports and Web pages. For example, relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability. Also, service quality describes the quality of the support that system users receive from the information systems organisation and IT support personnel. For example, responsiveness, accuracy, reliability, and technical competence.

Use on its part is the degree and manner in which librarians and users utilize the capabilities of an information system. For example, amount of use, frequency of use, nature of use, appropriateness of use, the extent of use, and purpose of use. The net impact is the extent to which information systems are contributing (or not contributing) to the success of individuals, groups, organisations, industries, and nations. Examples: improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development. User satisfaction in this study is viewed from the perspective of IT user satisfaction which we define as the "extent to which users believe the information system available to them meets their information requirements" (Ives et al. 1983: p. 785].

In the same way, Swanson (1974) has defined IT user satisfaction as the "manifold of beliefs about the relative value of the MIS". In our study, we chose to define IT user satisfaction from the perspective of users' responses to the accessibility appraisal of the ILMS.

## Literature Review

### ILMS in Nigerian Academic Libraries

Most libraries in Nigeria use open-source software such as CDS/ISIS and Koha. However, Emasealu (2020) observed that the functions of library management software are abysmally under-utilised in academic libraries in Nigeria, thus, the progression of automation projects remains a swinging pendulum. Similarly, Omopupa, Adedeji, and Sulayman-Harron (2019) opined that the benefits of adopting Koha in the University of Ilorin library would have been higher if the University library makes use of all the modules. Also, Egbonodje (2016) did a study that listed 19 different Open-Source Software (OSS) and revealed that most librarians in Nigeria have limited awareness of the availability of the varying OSS hence, and do not significantly utilize them in their libraries.

There are different types of integrated library software used by libraries in Nigeria. Obajemu, Osagie, Akinade, and Ekere, (2013)e stated that "… some of the first generation universities in Nigeria started with TINLIB software but they could not continue due to some technical difficulties, maintenance problem, poor revision policy and the prohibitive cost of processing and maintaining it. Also, Osaniyi (2010) opined that several library management software has thrived with much patronage, but most of the software has failed to result in a waste of time, funds, and energy. The availability of integrated library management software in the academic library does not result in automatic usage if the ILMS is not accessible by the library staff.

A preponderance of libraries in Nigeria use Koha software and it is gaining ground because it has web-based architecture (Web 2.0 facilities like tagging, comment, social sharing, and RSS feeds), Unicode computer-friendliness, and extensive customization possibilities. A survey of ILMS adoption in southwest universities by Uzomba, Akinyede, and Ubogu (2021 revealed that KOHA, VIRTUA, and SLAM are library software packages adopted in the libraries and that the software packages are used to a high extent**.** Similarly, a survey conducted in the science and technology library in Kano state revealed NewGenLib ILMS as the main library software because of its pecks. There are other modern commercial and open/free source software available integrating various features to automate the operation of library and information Centre. However, the adoption of any software depends on software quality and the ICT infrastructure available in the library.

Uzomba, Oyebola, and Izuchukwu (2015) explained different standard modules in Koha that attract libraries in Nigeria, and they include: cataloguing for creating bibliographic records that represent works in the library collection, circulation that automates tasks related to loaning items to patrons, serials control for managing periodicals and serials, acquisitions to handle the procurement process for new items added to the collection, and the online public access catalogue to allow library users to search or browse through the library's collection. Each of these modules offers a very detailed suite of features to accommodate the complex and nuanced routines involved in the library work. Integrated library systems rely on databases that are shared among the functional modules.

Ukachi, Nwachukwu, and Onuoha (2014) stated that "library software come in two different models- the Proprietary software (those that require the payment of subscription fee) and the Open Source Software (OSS)". Some of the major proprietary ILMS products according to Breeding (2012) that are currently available include Symphony from Sirsi Dynix, Millennium from Innovative Interfaces, Aleph from Ex Libris Group, Voyager from Ex Libris Group, Polaris from Polaris Library Systems, Library Solution from The Library Corporation, Carl. X from The Library Corporation, Spydus from Civica, and many others. The proprietary products have been available for many years, have reached a high level of maturity, and remain the dominant approach used for library automation.

The embrace of ILMS is connected to the emergence of Open-Source Software. Open-Source Software (OSS) is computer software that is available free of cost, and whose source code is made available

to the users under a license that bestows them the right to study, change and improve the software, and to do modifications to it as per the need and can distribute its copies to other users to follow a pattern. The software gives the users the freedom to manipulate it into a form that will suit their specific purposes. Examples of open-source software include KOHA software, New Gen Lib software, Evergreen software, ABCD Software, CD/ISIS software, Emilda software, PMB (Php My Bibli) software, and WEBLIS. Muller (2011) ranked Koha ILS as the most complete Free/Open-Source Software because of functions including inventory control, authority, generation of "notices to customers, and order tracking, among others. Library management software performs several functions in library services. These packages are generally organised into modules that address specific functional areas. Bhardwaj and Shukla (2000) opined that library software enhances the speed, productivity, adequacy, and efficiency of the library professional staff and saves the manpower to avoid some routine, repetitive and clerical tasks such as filing, sorting, typing, duplication, checking, etc. Decent and dependable library software enhances management, control, and easy access to information resources.

Egbonodje (2016) studied open-source software in libraries in Nigeria and discovered that some 5 libraries accepted KOHA and 3(7.1%) other libraries indicated the availability of Greenstone, a digitization software in their libraries. DSpace is available in only two libraries while Open office and Eprints are available each in a library. The outcome of this finding implies that most of the libraries in Nigeria lack adequate knowledge and awareness of the existence of this software. Egbonodje showed that over 90% of the entire respondents indicated that out of the 19 OSS listed, they are unaware of the availability of 11 which include; Eprints, Joomla, Drupal, Plone, KOfice, Evergreen, Chrome, PHP, Perl, Python, and Jabber while CD/ISIS which received the highest awareness and availability, The above study shows that the availability of resources does not equate to maximum utilization, what could enhance the combined effect of availability and utilization of integrated Library Management system is awareness and prime access to the ILMS. Likewise, Omopupa, Adedeji, and Sulayman-Harron (2019) in their study on the adoption and use of the Koha Integrated Library System in the University of Ilorin Library discovered that inadequate knowledge of technical know-how was a challenge for accessing and using Koha.

Apart from known challenges relating to the adoption and use of library software, this study seeks to uncover software accessibility as it affects the utilization of library management software, most libraries in Nigeria use open-source software such as CDS/ISIS and Koha. However, Emasealu (2020) observed that the functions of library management software are abysmally under-utilized in academic libraries in Nigeria, thus, the progression of automation projects remains a swinging pendulum. Similarly, Omopupa, Adedeji, and Sulayman- Harron (2019) opined that the benefits of adopting Koha in the University of Ilorin library would have been higher if the University library makes use of all the modules. Also, Egbonodje (2016) did a study that listed 19 different Open-Source Software that revealed that most librarians in Nigeria have limited awareness of the availability of the varying OSS hence, do not significantly utilize them in their libraries.

## Research Methodology

The study was carried out in Oyo State, Nigeria, adopting a quantitative approach and a descriptive survey design. The target population for this study comprises all the librarians, library officers, and system analysts who have at least diplomas, or degree holders in librarianship and other professions. At the time of this study, there were six universities: (Federal, State, and Private), six polytechnics, and 24 colleges of education, agriculture and technology in Oyo State, Nigeria. During preliminary investigation, the researcher found that out of the 36 higher educational institution libraries in Oyo State, only 10 libraries had one kind of ILMS or the other. Table 1 shows the number of higher educational institutions in Oyo state by type. The target population is shown in Table 1.

**Table 1: Population of the study**

| S/N | Institution | Librarians | Library officers | System analysts |
|---|---|---|---|---|
| 1 | University of Ibadan | 28 | 39 | 1 |
| 2 | Ladoke Akintola University of Technology | 18 | 10 | 1 |
| 3 | Lead City University | 8 | 5 | 1 |
| 4 | Dominican University | 2 | 6 | 1 |
| 5 | Ajayi Crowther University | 4 | 3 | 1 |
| 6 | The Polytechnic, Ibadan | 9 | 18 | 1 |
| 7 | Federal School of Survey, Oyo | 6 | 2 | 1 |
| 8 | Federal College of Education, Oyo Special | 22 | 10 | 1 |
| 9 | Emmanuel Alayande College of Education | 8 | 16 | 1 |
| | **TOTAL** | **105** | **109** | **9** |

Table 1 already contains some useful information, with only three institutions having more library staff than librarians: the University of Ibadan, the Polytechnic, and the Emanuel Alayande College of Education, and each library under study has only one system analyst, even though ILMS is a system.

A census procedure was deployed to enumerate all the library staff and systems analyst in the nine institutions that have ILMS in their libraries. Quantitative data was collected through the use of a structured questionnaire. The questionnaire was self-administered by the researcher with the help of two research assistants. A total number of 170 copies of the questionnaire was administered to the participants in the nine institutional libraries. The accidental sampling technique was used to select staff found at their duty posts to voluntarily complete the questionnaire.

The questionnaire was divided into four sections. Section A contained the demographic information of the respondents. This information includes: the institutional library of the respondents, level of education, position at work, number of years in service, and, gender and age. Section B captured the information on availability, adequacy, quality, accessibility, and utilization of integrated library management software. Section C included questions about the challenges that library staff face when accessing integrated library management software. This section contained items that gathered information about the respondents' challenges in accessing the ILMS. Section D included questions designed to elicit library staff strategies for overcoming challenges when using integrated library management software: This section collected data on the strategies to be used to overcome the difficulties encountered by library staff when using ILMS.

The instrument was subjected to validity using face, content, and construct validity using the Cronbach Alpha. The findings show that the instrument is reliable as the co-efficient values of all of the items in the instruments are above 0.7. The data obtained were analysed using Statistical Package for Social Science (SPSS) after going through data validation, data editing, and data coding. Analysis of data was based on the use of descriptive statistics and inferential statistics.

We used the Compute Command in SPSS to aggregate the various dimensions of system quality, service quality, affordability, adequacy, and acceptability to achieve unit variables for each category. This study deployed multiple regression to test the hypothesis that there is no significant relationship between the accessibility factors and librarians' satisfaction with the use of ILMS in the institutions.

## Results

The demographic characteristics of the respondents show that the highest number of respondents (40%) came from Kenneth Dike Library of the University of Ibadan, while the least came from Lead City University and Mamman Kotangora School of Survey Library (3.5% each) according to Table 2. Also, most of the respondents (23, 13.5%) were senior librarians followed by senior library officers 12 (12.4%) while the least respondents were assistant chief library officers 2(1.2%). As revealed from the table, 92 (54.1%) of the respondents were male while 77 (45.3%) were female. A large proportion of the respondents 147 (86.5%) were above 31 years while the least 2(1.2%) were within the age range of 16-20 years.

**Table 2: Demographic Characteristics of the Respondents**

| Demographic Information of the respondents | Measurement | Frequency | Percentage |
|---|---|---|---|
| Name of the Institution Library | Ajayi Crowther University | 7 | 4.1 |
| | College Library FCE Special, Oyo | 24 | 14.1 |
| | Dominican University | 7 | 4.1 |
| | Emmanuel Alayande College of Education | 18 | 10.6 |
| | Kenneth Dike Library, University of Ibadan | 68 | 40.0 |
| | Lead City University | 6 | 3.5 |
| | M.T. Kotangora Library, Federal School of | 6 | 3.5 |
| | Surveying, Oyo | | |
| | Olusegun Oke Library, LAUTECH | 13 | 7.6 |
| | The Polytechnic Ibadan | 21 | 12.4 |
| | **Total** | **170** | **100.0** |
| Position at Work | Assistant Library Officer | 11 | 6.5 |
| | Library Officer | 9 | 5.3 |
| | Higher Library Officer | 14 | 8.2 |
| | Senior Library Officer | 21 | 12.4 |
| | Principal Library Officer II | 16 | 9.4 |
| | Principal Library Officer I | 12 | 7.1 |
| | Assistant Chief Library Officer | 2 | 1.2 |
| | Chief Library Officer | 6 | 3.5 |
| | System Analyst | 8 | 4.7 |
| | Librarian II | 15 | 8.8 |
| | Librarian I | 10 | 5.9 |
| | Senior Librarian | 23 | 13.5 |
| | Principal Librarian | 13 | 7.6 |
| | Assistant Chief Librarian | 5 | 2.9 |
| | Chief Librarian | 5 | 2.9 |
| | **Total** | **170** | 100.0 |
| Number of Years in Service | 0-5 Years | 25 | 14.7 |
| | 6-10 Years | 38 | 22.4 |
| | 11-15 Years | 41 | 24.1 |
| | 16-20 Years | 27 | 15.9 |
| | 21 and above | 39 | 22.9 |
| | **Total** | **170** | **100.0** |
| Gender | Male | 92 | 54.1 |
| | Female | 77 | 45.3 |
| | Missing | 1 | .6 |
| | **Total** | **170** | **100.0** |
| Age | 16-20 Years | 2 | 1.2 |
| | 21-25 Years | 13 | 7.6 |
| | 26-30 Years | 8 | 4.7 |
| | 31 and Above | 147 | 86.5 |
| | **Total** | **170** | **100.0** |
| Level of Education | NCE/OND | 17 | 10.0 |
| | HND | 10 | 5.9 |
| | Bachelor | 43 | 25.3 |
| | Master | 83 | 48.8 |
| | PhD | 17 | 10.0 |
| | **Total** | **170** | **100** |

About the level of education, the majority of the respondents 83(48.8%) were master's holders, followed by bachelor's degree holders 43 (25.3%) while the least were HND holders 10 (5.9%). The majority of the respondents 39 (22.9%) have been working for 21 and above years, 38 (22.4%) informed that they have been working for 6-10 years while the least 25 (14.7%) have been working for 0-5 years.

## The ILMS Packages Available

Table 3 shows the frequency distribution of the ILMS available in the institution libraries. Only one institution, the University of Ibadan, reported using an in-house ILMS, the rest of the institutions adopted turnkey systems. The table reveals that the majority 63.5% reported that PhpMyBibli was available, while 55.9% and 42.9% reported Koha and UI-ILMS to be available.

**Table 3: ILMS Available**

| S/No | ILMS software | No % | Yes % |
|---|---|---|---|
| 1 | PMB (PhpMyBibli) | 36.5 | 63.5 |
| 2 | KOHA Software | 44.1 | 55.9 |
| 3 | UI ILMS | 57.1 | 42.9 |
| 4 | VIRTUA Software | 84.7 | 15.3 |
| 5 | TINLIB software | 88.2 | 11.8 |
| 6 | Alice4Windows Software | 92.4 | 7.6 |
| 7 | CD/ISIS Software | 93.5 | 6.5 |
| 8 | NewGenLib Software | 94.7 | 5.3 |
| 9 | ABCD Software | 96.5 | 3.5 |
| 10 | WEBLIS Software | 90.6 | 3.5 |
| 11 | Others, please specify | 91.8 | 8.2 |

Virtua, TINLIB, Alice4Windows, and CDS/ISIS were reportedly available by 11.8%, 76%, 6.5% and 65% respectively. The least used ILMS are WEBLIS Software and ABCD, 3.5% each. It is informative that 8.2% of the respondents reported that their libraries were using ILMS software not listed in the instrument, but they did not indicate which packages they were.

## Modules of the ILMS already Deployed

The result shows that the cataloguing module is the most deployed module (68.8%), followed by the circulation module (60.6%).

**Table 4: Distribution of modules of ILMS deployed**

| S/N | ILMS Modules | Responses % | | | | |
|---|---|---|---|---|---|---|
| | | SD | D | U | A | SA |
| 1 | Cataloguing module | .6 | 1.8 | 1.2 | 27.6 | 68.8 |
| 2 | Circulation module | .6 | 2.4 | 4.7 | 31.8 | 60.6 |
| 3 | Serial management | .6 | 4.1 | 1.8 | 34.1 | 59.4 |
| 4 | Acquisition module | 1.2 | 6.5 | 2.4 | 32.4 | 57.6 |
| 5 | Reference module | 1.2 | 10.0 | 6.5 | 28.8 | 53.5 |

SD= Stringy Disagree, D= Disagree, Unsure, =A= Agree, SA= Strongly Agree

The others are serial management (59.4%), and acquisition module (57.6%) while the reference module is the least deployed module (53.5%).

## Level of Satisfaction

Table 5 shows the distribution of the level of user satisfaction with the use of ILMS. Majority of the respondents 98 (57.6%) indicated a very high level of user satisfaction with the library registration service. Most of the respondents 84 (49.4%) had a very high level of user satisfaction with access to e-resources. 80 (47.1%) of the respondents are satisfied with online public access catalogue (OPAC). The least of the respondents 76 (44.7%) revealed a very high user satisfaction with the returning of information materials (discharging) service.

**Table 5: Level of User Satisfaction**

| S/N | User Satisfaction | Responses% | | | | |
|---|---|---|---|---|---|---|
| | | Very Low | Low | Medium | High | Very High |
| 1 | Library Registration Service | 2.9 | 5.3 | 8.8 | 25.3 | 57.6 |
| 2 | Access to e-resources Service | 2.4 | 7.6 | 14.1 | 26.5 | 49.4 |
| 3 | Online Public Access Catalogue (OPAC) Services | 2.9 | 5.9 | 18.2 | 25.9 | 47.1 |
| 4 | Returning of Information Materials (Discharging) Service | 3.5 | 7.1 | 11.8 | 32.9 | 44.7 |
| 5 | Reference Service (ask-a-librarian) | 29 | 7.6 | 7.1 | 31.8 | 40.6 |
| 6 | Loaning of Information Materials (Charging) Service | 3.5 | 5.9 | 15.3 | 35.3 | 40.0 |
| 7 | Self-Renewal of Information Materials Service | 5.9 | 14.7 | 14.7 | 25.9 | 38.8 |
| 8 | Notifications on New Arrival (Current Awareness Service) Service | 5.3 | 11.8 | 17.1 | 28.2 | 37.6 |
| 9 | Book Reservation Service | 2.9 | 10.0 | 24.1 | 28.2 | 34.7 |
| 10 | Connections to websites of various offices, faculty, departments and units of the library through provided links | 7.6 | 8.2 | 21.8 | 28.8 | 33.5 |
| 11 | Connection to the ILMS or electronic resources of other Higher Institution libraries abroad through provided links | 10.6 | 15.3 | 20.0 | 24.7 | 29.4 |
| 12 | Connection to the ILMS or electronic resources of other Higher Institution libraries in Nigeria through provided links | 15.3 | 20.0 | 29.4 | 27.6 | 7.6 |

Table 5 shows further that 18 (10.6%) have a very low satisfaction with connection to the ILMS or electronic resources of other higher institution libraries abroad through provided links while respondents 13 (76%) revealed a very low connection to websites and connection to the ILMS or electronic resources of other higher institution libraries in Nigeria through provided links. Also 10 (5.9%) indicated a very low user satisfaction with self-renewal of information service while 9(5.3%) also indicated very low level of user satisfaction with notification of new arrival services.

## Librarians' Opinions about Factors Influencing their Satisfaction with ILMS

From table 7, the major affecting satisfaction with the use of the ILMS is technical know-how where the majority of the respondents agreed with the assertion (Mean=4.40, SD=0.700). The majority of the respondents also agreed with all other factors, with the mean ranks lying between 3.5 and 4.5.

**Table 7: Factors influencing ILMS**

| Issues | Mean | SD | Min | Max |
|---|---|---|---|---|
| Technical know-how | 4.40 | 0.700 | 2 | 5 |
| Cost of software | 4.26 | .839 | 1 | 5 |
| Ease of use on accessibility | 4.26 | 0.867 | 1 | 5 |
| Maintenance problems | 4.25 | 0.996 | 1 | 5 |
| Cost of processing the software | 4.23 | 0.923 | 1 | 5 |
| Product service support | 4.19 | 0.936 | 1 | 5 |
| Reference of other college librarians on accessibility, availability, and usability of the integrated library management software | 4.17 | 0.864 | 2 | 5 |
| Revision policy | 4.15 | 1.013 | 1 | 5 |
| Digital literacy | 4.14 | 0.967 | 1 | 5 |
| The outcome of the evaluation of the modules | 4.09 | 0.978 | 1 | 5 |
| Quality of vendor service support | 4.09 | 1.056 | 1 | 5 |
| Free and open-source nature of the software | 4.07 | 1.075 | 1 | 5 |
| Demo of the software before purchase | 4.06 | 1.047 | 1 | 5 |
| Peer pressure from people with prior knowledge about the system | 3.89 | 1.099 | 1 | 5 |
| Anxiety | 3.85 | 1.175 | 1 | 5 |

The factors include the cost of software, ease of use on accessibility, maintenance problems, and cost of processing the software, product service support, reference of other college librarians on accessibility, and, availability and usability of the integrated library management software. Others are revision policy, digital literacy, and outcome of the evaluation of the modules, quality of vendor service support, free and open-source nature of the software, a demo of the software before purchase, peer pressure from people with prior knowledge about the system, anxiety

## Strategies to Overcome the Challenges faced by Library Staff when using ILMS

The study also inquired from the respondents about the strategies they would consider appropriate to address the issues they have observed. Table 8 shows that the respondents strongly agreed that sponsorship to seminars, conferences, and workshops was the major strategy to prepare the librarians to use the ILMS effectively.

**Table 8: Strategies to overcome the challenges faced by library staff when using ILMS**

| Issues | Mean | SD | Min | Max |
|---|---|---|---|---|
| Staff should be sponsored to attend seminars, conferences, and workshops where they will be trained on how to use the ILMS | 4.69 | .568 | 2 | 5 |
| The University management should provide needed technical and financial support | 4.65 | .548 | 2 | 5 |
| Alternative means of power supply should be provided | 4.65 | .646 | 2 | 5 |
| The internet bandwidth should be increased | 4.64 | .694 | 1 | 5 |
| The library management should provide the necessary technical facilities needed for the smooth running of the ILMS | 4.60 | .629 | 2 | 5 |
| More staff should be deployed | 4.36 | .796 | 1 | 5 |

They also strongly agreed that the University management should provide needed technical and financial support, alternative means of power supply should be provided, the internet bandwidth should be increased, and the library management should provide the necessary technical facilities needed for the smooth running of the ILMS. Deployment of more staff was the least strategy suggested by the librarians (Mean =4.36, SD =0.796).

Table 9 relates to the regression result of the analysis explaining the relationship between accessibility factors and librarians' satisfaction with the use of ILMS in their institutions.

**Table 9: Regression analysis of user satisfaction with ILMS use**

| Variables | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | -1.981 | .814 | .025 | -2.433 | .016 |
| Level of Education | .013 | .063 | -.004 | -.048 | .002 |
| Position at work | -.028 | .016 | -.043 | -.511 | .010 |
| Number of years in service | -.002 | .039 | -.004 | -.058 | .954 |
| Gender | -.060 | .094 | -.040 | -.638 | .524 |
| Age | -.078 | .086 | -.062 | =.901 | .039 |
| System quality | .024 | .026 | .122 | .918 | .030 |
| Service quality | .042 | .029 | .200 | 1.433 | .154 |
| Net benefits | .051 | .022 | .429 | 2.274 | .024 |
| Availability | -.013 | .095 | -.009 | -.142 | .008 |
| Accessibility | .054 | .074 | .049 | .728 | .468 |
| Utilization | -.039 | .060 | -.044 | -.653 | .514 |
| Affordability | -.010 | .015 | -.002 | -.126 | .028 |
| Adequacy | .254 | .027 | .038 | .627 | .357 |
| Acceptability | .232 | .035 | -.002 | -.163 | .416 |

With respect to the demographic characteristics, Table 9 shows that level of education (B=0.13, p=0.002) positively but marginally predicted librarians' satisfaction with ILMS; position at work (B=-0.028, p=0.010) also predicted user satisfaction, but negatively. Also, age (B=-0.078, p=0.039) predicted user satisfaction with the negative slope showing that younger librarians expressing more satisfaction with the use of ILMS than older ones. With respect to the accessibility factors, net benefits (B=0.051, p=0.024) and availability (B=-0.013, p=0.008), all marginally but positively predicted librarians satisfaction with the ILMS. Finally, affordability (B=-0.010, p=0.028) also negatively and marginally predicted satisfaction with the use of the ILMS by the librarians. The Table 9 further shows that number of years spent in service, gender of the librarians, service quality, accessibility, utilization, adequacy and acceptability did not significantly predict librarians' user satisfaction with ILMS.

## Discussion of Findings

This study examined librarians' use of Integrated Library Management Systems in selected high educational institutions in Oyo State, Nigeria. The study revealed that the majority of the selected higher educational institution libraries make use of KOHA software while the University of Ibadan UI ILMS and Dominican University make use of in-house software. This concurs with the findings of Madhusudhan and Singh (2016) that ILMS have become essential tools that are deployed for the effective support of various library services. It also buttressed the findings of Egbonodje (2016) that several library software such as KOHA is deployed for effective and efficient library service.

Also, the perception of librarians on the ILMS modules deployed in the institution libraries revealed that the cataloguing module was the most deployed module of the ILMS, followed by the circulation module and others including serial management, acquisition module while the reference module is the least deployed module. This opinion is supported by the work of Pratheepan (2014) that ILMS is used to manage various aspects and activities of the libraries. This justifies why England and Miller (2016) noted that libraries rely more on electronic resources, and effective management of these resources is crucial to the provision of library services. This supports the assertion of Ukachi *et al*. (2014) that the deployment of ICTs to provide library services to the public is inevitable, especially in the era of the global internet.

There is also a very high degree of accessibility of ILMS in the selected higher educational institutional libraries as a majority have access to ILMS anytime. However, the findings of the study revealed a very low level of utilisation of ILMS. Also, there is a very high degree of availability of ILMS among the libraries as a very high percentage indicated that ILMS in their libraries is available anytime. In addition, apart from the distinct barrier of making the ILMS available, availability of ILMS, accessing the software, and, utilization of ILMS are a major barrier to using ILMS among the libraries. This contradicts the works of Gbadamosi, (2011) and Otulugbu *et al* (2019) that none of the academic libraries in Oyo State was adequate in terms of deployment of technology to aid the library services due to the failure of many proprietary and open-source software. The finding of this study supports the work of Zhang, Tlili, and Nascimbeni (2020) that accessibility is a major factor that could affect the use of open educational resources which refers to the use of ILMS among libraries. However, the findings of this study support the works of Oyewusi and Oyeboade (2009) and Abbas and Song (2020) that accessibility of such library software is high among users. This also contradicts the work of Egbonodje (2016) who indicated a very low level of availability of digitisation software which refers to the use of ILMS among the libraries.

The findings also revealed a very high level of user satisfaction with the library registration service, especially with access to e-resources, online public access catalogue (OPAC), and the returning of Information Materials (Discharging) Service. Also, a majority have a very low user satisfaction with connection to the ILMS or electronic resources of other Higher Institution libraries abroad through provided links, connection to website and connection to the ILMS or electronic resources of other Higher Institution libraries in Nigeria through provided links, with self-renewal of information service, and with notification of new arrival services. The findings of this study revealed that the use of ILMS has several net benefits such as it saves time, makes the library

more efficient and effective in service delivery, augmenting speed, productivity, adequacy, and efficiency of the library staff, it helps libraries to manage the internal and external resources, it aids effective access to library collections, collections management and services management by the Institution library, among others. Others include creating and trying out new ideas for routine work, assisting in decision making by supporting information flow, aiding job performance and satisfaction, and regulating work processes and performance.

This findings is in line with Gatete and Uwizeyimana (2020) that ILMS could enhance automated administrative activities and assist decision-making by supporting information flow. This supports the findings of Ukachi *et al*. (2014) and Ankrah *et al*. (2019) that new technologies such as the ILMS usage in academic libraries have diffused into higher educational institutions due to the wide range of benefits they provide. This also concurs with the findings of Madhusudhan and Singh (2016) and Pratheepan (2014) that ILMS is used to manage resources such as library and information resources made available for users. The findings of this study also concur with the work of Aladeniyi and Owokole (2018) that the utilization of information resources is high which in this study could refer to ILMS.

This study revealed a high system quality, service quality, affordability, adequacy, and acceptability of the ILMS. The study also revealed several challenges that affect ILMS such as maintenance problems, technical know-how, cost of processing the software, revision policy and free and open-source nature of the software, demonstration of the software before purchase, anxiety, internet network issue, erratic power supply, insufficient manpower, the lack of technical facilities, unfriendly user-interface of ILMS, lack of Supervision and lack of training and re-training of staff. This finding supports the work of Obajemu *et al*. (2013) and Umoh (2017) that several challenges mitigate the use of ILMS such as technical difficulties, maintenance problems, poor revision policy, and the prohibitive cost of processing and maintenance. The findings also concur with the works of Uzomba *et al*. (2015) that the lack of fundamental flexibility to readily adapt to the future trends of library demands is a major challenge in combating the availability, accessibility, and use of ILMS.

A possible way to explain the marginal explanation of the user satisfaction of the librarians with the use of ILMS by all the variables might be related to the fact of the ease of use of the ILMS; they appear not to be complex and do not require users to be very highly educated to use them. However, younger librarians have some more satisfaction advantage compared to older ones, possibly because of the popular IT/IS savviness often attributed to young persons compared to their older counterparts. Underpinning their conversance with the systems, the librarians are able to assess the quality of the system, and that is why their satisfaction with the ILMS was only marginally explained by system quality. Affordability is actually a variable that could be addressed at the institutional level, and this may why the librarians did not consider the variable a serious factor in their opinions about their satisfaction with the ILMS, as exemplified by the negligible slope.

## Conclusion

Majority of the institution libraries use PMB, followed by KOHA software, and only two institutions namely the University of Ibadan UI ILMS and Dominican University make use of in-house software. Cataloguing module is the most deployed compared to other modules of the ILMS in use. The most available module of the ILMS is the cataloguing module while the library registration service is the most accessible. Librarians with higher qualifications, who have lower positions at work, and less number of years in the services, are females, and younger in age expressed satisfaction with the ILMS compared to others. With regards to specific accessibility factors, only system quality, net benefits, availability, and affordability were significantly related to satisfaction of the librarians in respect of use of the ILMS to meet their libraries' services' needs. The number of years the librarians have spent in service, and the gender of the librarians are not significant variables in respect of satisfaction of the librarians with the ILMS. The quality of service delivered by the systems, accessibility, utilization, adequacy, and acceptability which are ordinarily considered as crucial factors, did not predict satisfaction with the use of the ILMS.

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# Plagiarism and Copyright among LIS Professionals in Nigeria: An Assumption or A Reality?

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## Abstract

*Every day, papers are published from research by professionals in different journals, books, and websites for new knowledge. These are good practices for sharing knowledge. However, academic misconduct has been noticed, indicating plagiarism and infringement of copyright. This paper investigated the existence of plagiarism and copyright infringement among LIS professionals in Nigeria; the degree of involvement; causes; and punitive measures for the offenders. This is a survey research design that uses an online Google form for the collection of data. The online questionnaire was sent to different librarians' WhatsApp platforms. Findings showed that 98% of the respondents acknowledged the existence of plagiarism and copyright infringement. It was also discovered that poor searching skills, laziness, the pressure of publish-or-perish, and lack of punishment cause plagiarism and copyright infringement. The respondents strongly agreed that offenders could be demoted, prosecuted, and have their publication withdrawn and announced publicly. The implication of the study is that intellectual property would be abused and disregarded if plagiarism and copyright infringement were not checked by LIS professionals. The study recommended more awareness, training, use of plagiarism checkers, and punishment enforcement to curb plagiarism and copyright infringement.*

**Keywords:** *Academic Integrity and Misconduct, Copyright Infringement, Plagiarism, Librarians, LIS Professionals, Nigeria.*

## Introduction

Every professional in the academic sector is a faculty member who reads, researches, and shares scholarly works for a more knowledgeable society. Educators, in particular, are committed to regular publications in order to avoid the hammer of academic promotion's "publish-or-perish syndrome." As plagiarism and copyright infringement are two-edged swords that check on the professionals' integrity, it is critical that astute conduct and ethics must be employed for academic production. Unarguably, plagiarism and infringement of copyright offend the sensibilities of the original owner of the intellectual property. The work a scholar puts his ideas, mind, body, heart, and soul to produce becomes a pawn in the hand of another person to copy with impunity. It is understandable that different aspects of scholarly works are carried out in academic institutions, organisations and agencies. These academic products, which include assignments, projects, conference papers, inaugural speeches, research work, book writing, and others, have accidentally or deliberately applied plagiarism and infringed on copyright (University of Illinois, 2021). This makes plagiarism and copyright become two sides of a coin that define the standard of intellectual property.

Plagiarism is the adoption of another's work without mentioning or acknowledging the source (Chen and Chou, 2017; Francis, 2015). It shows the denial of accrediting a source in one's work. Gaur (2019) succinctly puts it that plagiarism is an offence against an author, while copyright violation is an offence against a copyright holder. Arguably, they are common knowledge both through online and offline mechanisms. Therefore, any claim of ignorance of plagiarism and infringement of copyright is often not acceptable. However, the ability to demonstrate awareness of issues such as ethics, data protection, copyright, plagiarism, and other intellectual property has been instrumental in reducing cases of academic misconduct (Nwosu, Obiamalu, and Udem, 2015). To buttress this, IFLA takes a critical stand on academic standards and ethical considerations on plagiarism and has organised webinar series, conferences and training to reflect the importance of academic integrity.

It is significant to note that the world has witnessed several cases of plagiarism and copyright infringement among academia, government officials, politicians, and highly placed individuals. For example, ex-German Defense Minister Karl-Theodor zuGuttenburg resigned in 2011 after being accused of plagiarizing his doctoral thesis (Ruiperez and Garcia-Cabrero 2016). The public record of American Senator Edward Kennedy paying someone to take his Spanish exam in the 1960s was available (Singh and Remenyi, 2016), as was Melania Trump, the wife of former President Donald Trump, whose speech was a paraphrase of that of Michelle Obama, the previous First Lady (Werner and Colvin, 2016). Plagiarism is a colossal embarrassment to the government sector, the academic community, and professional organisations. Thus, librarians, being smart information managers, ought to render services and facilitate access to information on the importance of a high level of integrity and ethical standards in scholarly work.

Plagiarism can be divided into three types: (i) intentional plagiarism, in which falsification and fabrication of research data are used, (ii) unintentional or accidental plagiarism, in which there is a failure to document, most likely due to a lack of citation skills or careless paraphrasing, and (iii) self-plagiarism, in which an author copies his previous work as a new product without realizing that the act infringes on a publisher's copyright (Ashare, 2021; Gaur, 2019). In Nigeria, LIS professionals are mentors to the students they nurture and the colleagues they assist. So, they have the mandate of best practices both in teaching in the classroom and in sharing their research outputs. This study investigated the existence of plagiarism and copyright infringement among librarians in Nigeria; the degree of involvement of professionals; causes; and punitive measures for the offenders.

## Statement of the Problem

LIS Professionals are highly respected and valued because of their expertise, research, and contributions to development. While they work towards researching for a better world and new knowledge, they are expected to maintain academic integrity. In other words, they are meant to produce original intellectual property without violating academic norms or infringing on another's copyright. However, it becomes uncomfortable when accusing fingers are pointed at the professionals with statements of unethical practices and academic misconduct in the bid to reach the peak. Indeed, so much has been discussed about plagiarism and copyright among the LIS professionals in Nigeria. With the new technology, the proliferation of academic misconduct and ethical issues in publication seems to go up as people copy direct quotations from existing work, even from fellow students, as well as paraphrase another's ideas without crediting the source. Plagiarism is also applied to digital content, video, audio, and artwork. Some institutions have set up platforms to check for plagiarism in students' projects and dissertations. Some publishers seem to use plagiarism software to review submitted articles for publication. There is a need to verify and state the dichotomy between the ethos of plagiarism and copyright for professionals in Nigeria. This study was focused on establishing the reality or assumption of plagiarism and copyright infringement among LIS professionals in Nigeria.

## Research Questions

The following research questions guided the study

1. What is the level of involvement of LIS professionals in plagiarism and copyright infringement?

2. What are the causes of plagiarism and copyright infringement among LIS professionals in Nigeria?
3. What are the punitive measures that can control plagiarism and copyright infringement among LIS professionals in Nigeria?

## Literature Review

Publications and scholarly output must go on to add value to the world of knowledge. Based on this, plagiarism and copyright infringement need to be checked for personal, institutional, and national integrity. Plagiarism is using another's work without accrediting the source (University of Illinois, 2021; Nwagbara, 2019). In other words, it could be a deliberate falsehood or a cheat on the original owner. Northeastern University Academic Integrity Policy (2021) defined plagiarism as one's own words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Gaur (2019) called it research misconduct. In the words of Northeastern University Library (2022), plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. This indicates that not giving attribution to the source of the work or idea used is a violation of academic norms. It simply violates the author's rights. All these reflect cheating and unauthorised copying or presentation of already existing work as one's own work.

In copyright, when a published material is restricted and someone uses it without the necessary consent, it becomes an infringement. In throwing more light on the two concepts, Gaur (2019) stated that copyright is applicable to licensed content only, while plagiarism is applicable to both licensed and unlicensed content. What the licenses and unlicensed contents mean is that, apart from copying from a published work, copying from unpublished works like class assignments, seminar papers, term papers, and projects, among others, is an act of committing plagiarism. In another scenario, Arnold and Levin (2021) stated that copyright infringement occurs when a party takes an action that implicates one or more of the rights listed above without authorisation from the copyright owner or an applicable exception or limitation in the copyright law, such as fair use.

Plagiarism is also connected with inexperienced use of information sources, peer pressure, pressure to succeed, lack of skill, lack of resources, and standards (Anaman and Agyei, 2021; Ikenwe and Anaehobi, 2020; Liles, 2019; Aisyah and Sugihartati, 2019). However, writing skills and academic integrity are taught in a variety of educational institutions. Thus, educators can easily be referred to as having the responsibility of teaching the proper skills in academic writing and research. There is probably a gap in imparting this knowledge, as the various software for plagiarism checking would have easily picked up any academic misconduct. But the issue is how many institutions have plagiarism policies that fight against this anomaly (Ocholla and Ocholla, 2016). It becomes clear that professionals and academic institutions need authentic and exact intellectual property to work with in practising academic uprightness to decrease occurrences of plagiarism among professionals. To buttress this, Northeastern University Library (2022) stated that the following sources require citation:

- Word-for-word quotations from a source, including another student's work.
- Using paraphrase (expressing others' ideas in your own words).
- Unusual or controversial facts are not widely recognised.
- Audio, video, digital, or live exchanges of ideas, dialogue, or information.

Thus, it is considered good practice when credits are given to the original creators of a work. The fact that plagiarism offends the original author, the institution, and the profession makes it a worthwhile topic to be given adequate attention.

Studies have shown that professionals plagiarised and infringed on someone's copyright, even amidst global outcry. For instance, a researcher in the United States named Craig Grimes faced criminal fraud for accepting duplicative grants for one proposal, and he was banned for two years from receiving further funds for research (Reich, 2012). In India, at Delhi University, the ex-Vice Chancellor, Deepak Pental, was jailed for plagiarising a colleague's research (The Times of India, 2014). Radio Poland (2012) reported on a Polish professor who plagiarised a book under copyright's law, stating

that he could go to prison for three years. Even when these are reported and publicised, the misconduct keeps increasing, which questions the standard of teaching research writing and the ethics of the profession. A look at the medical field revealed that in 2016, Springer and BioMed Central retracted 58 articles published across their seven journals due to plagiarism. These were found out during peer review processes and allocation of authorship. In the same vein, BioMed Central found out about 28 articles and marked them for retraction while investigating over 40 more articles to be decided on. Springer also marked 30 articles for retraction, with 9 more articles under investigation (BioMed Central, 2022). These are highly respected scholars in their disciplines.

Furthermore, a group of Chinese researchers were caught trying to publish a plagiarised article in the Journal of Korean Medical Science. They were banned from submitting to the journal for five years (Shabe, 2018). Another was the withdrawal from the election in the US Senatorial election of John Walsh in 2014 when it was discovered that he had plagiarised his final paper during his master's degree at the United States Army War College (Shabe, 2018). In 2012, author and television personality Monica Crowley plagiarized her book without accrediting the original sources. The sale was stopped until the author revised the book with proper citations (Kaczynski, 2021). Another scenario was the resignation of Karl-Theodor zu Guttenberg as defense minister after the disclosure that he plagiarised his doctorate thesis. The University of Bayreuth stripped Guttenberg of his doctorate (Guardian News and Media Limited, 2021). Seife (2012) reported that science writer and contributor to Radio Lab, Jonah Lehrer, was accused of recycling his old work and publishing it as new. One wonders why people are still plagiarising and copyrighting. Plagiarism and infringement of intellectual property rights affect all professions and industries.

The causes of plagiarism have been identified by researchers. Jereb, Perc, Lämmlein, Jerebic, Urh, Podbregar and Sprajc (2018) identified gender, socialisation, efficiency gain, motivation for study, methodological uncertainties, or easy access to electronic information via the Internet and new technologies, as reasons driving plagiarism. From Gaur (2019), the causes of plagiarism include study pressure, disorganised research work, poor study habits, cut-and-paste culture, English as an international language in many non-English-speaking countries, lack of understanding of the seriousness of plagiarism, lack of strict academic discipline, careless attitude, and lack of referencing skills. Other causes include fear, recklessness, sheer laziness in research and poor writing skills (Okere, Adam and Sanusi, 2017). However, some reasons that push one to commit violations are not justifiable in stealing one's original intellectual property. There is another group that may be causing the issues of plagiarism and copyright infringement. This is the editor or the publisher. According to Woker (2015), the problem of plagiarism is not only of concern to those who conduct and publish research; it should also be of concern to editors. This is due to the fact that if editors and publishers do not check what is submitted to them before accepting publication, they are inadvertently causing academic misconduct.

Studies also show that scholars who commit academic misconduct are punished. One of the major consequences is damaging one's reputation and professional inclination, which is an aberration on integrity (Nwagbara, 2019; Shabe, 2018). Besides, defaulters have been known to face punitive measures like public denouncement, demotion to lower rank, dismissal, suspension, prosecution, withdrawal of publication, repeat of class for post-graduate students, among others (Gaur, 2018; Oriji, and Young, 2020). Purdue University (2022) stated that violators of copyright are punished through paying the actual dollar amount of damages and profits, which the law provides a range of from $200 to $150,000 for each work infringed; paying for all attorney's fees and court costs; issuing a court injunction to stop the infringing acts; impounding the legal work; and going to jail. Even with these consequences, many scholars and students still go ahead and plagiarise without impunity. Maybe the legal implications have been mere lip service, as research shows that only a few authors or writers sued other writers in court over the plagiarism act and copyright infringement (Francis, 2015).

As plagiarism and copyright infringement affect all sectors, the government makes policies that guard against intellectual property. In Ghana, plagiarism is being given serious attention with policies

in universities to guide the faculties, students, and staff (University of Ghana, 2019; Anaman and Agyei, 2021). In Nigeria, the aspects of plagiarism and copyright infringement are addressed with consequences for violators (Okere, Adam, and Sanusi, 2017). The involvement of the government in issues of plagiarism and infringement on copyright demonstrates the inclusive sectors' commitment to reducing wrongdoing in research. Apart from countries, professional organizations and academic institutions frown on scholarly misconduct as it affects authentic and accurate information sharing. The belief is that any published work must be an authoritative, complete, and original source for problem solving and contributing to knowledge (American Journal of Medical and Clinical Sciences, 2022).

Perhaps everybody should be responsible for expanding the avenues where plagiarism happens. It should be noted that lessons on avoiding plagiarism and copyright violations are provided in conferences and training sessions. There are also off-the-job training and conferences on citing rights and avoiding copyright infringement. The teachings reflect the use of internet searches, databases, building and formatting bibliographies, and sharing research (Ashare, 2021). Liles (2019) stated that librarians also offer their services to lecturers by having workshops to assist students on the importance of correctly documenting sources to avoid plagiarism. Other courses that are supposed to impart academic integrity include introduction to bibliography, information literacy, reference services, and so on. Based on this, LIS educators need to put emphasis on these courses and the training because, when the students learn, they will avoid the academic misconducts.

## Methodology

This is a survey research design. The population is comprised of LIS professionals that are members of the professional WhatsApp platforms. Librarians are used for this study because librarians are acadamic staff in the higher institutions of learning. Many of them are given courses to teach in the departments and even to guide post graduate students. Because they are teachers, project supervisors, mentors and authors, they have stake in plagiarism and copyright. Many librarians have dual employment that make them teachers and librarians the same time. In addition, librarians are appraised and promoted like other academic staff which they are. They write papers, present and publish for professional development.

The Nigerian Library Association has different WhatsApp platforms that include Academic and Research Libraries (ARL), the National Association of Library and Information Science Educators (NALISE), and the State Chapters. A total enumerative sampling technique was used to select all the 130 LIS professionals who responded to the online survey. The instrument for data collection was an online Goggle form. The Google form was sent to NLA WhatsApp platforms while members were enjoined to fill in the form. This took place in August, 2021. The questionnaire was structured into two sections. Section A was made to collect biographical data of the respondents, while Section B collected data based on the research questions. The online questionnaire was sent to different librarians' WhatsApp platforms. The instruction was to click on the appropriate responses as they applied to the respondents. The questions were structured into "Yes" and "No" answers, as well four-point Likert scale options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The online questionnaire was allowed to be on the online platform for two weeks with reminders. This was to enable every member of the group to participate. It was structured so that no one could fill out the form more than once. Thus, it gave the data collection credible responses from different participants. The data collected with the online Google form, which was saved in an excel spreadsheet, was imported into SPSS computer software. Values were given to the responses to each statement on the Likert scale: SA (4), A (3), D (2), and SD (1). The level of measurement was changed to scale (that is, interval scale) for the items in Tables 1 to 3, which was done under Variable view in SPSS. The frequency counts and percentages were used to analyse the data, while the mean scores and standard deviation were used to analyse the Likert data. A benchmark of 2.5 was used for decision making. It indicated that mean scores below 2.5 were rejected while mean scores above 2.5 were accepted. All analyses were computed using the SPSS computer software package.

# Results

## Demographic Data of the Respondents

Table 1 shows the demographic characteristics of the respondents. Majority of the respondents were female (53.1%), while the male respondents were 46.9%.The age range of the participants varied. Majority of the participants were between 41 and 50 years. Others were between 31 and 40 years (33.8%); 51-60 years (16.9%); 30 years and below (10%) and finally those above 60 years (2.4%).The years of experience of the respondents within 6 -10 years of service (33.1%) rated highest in data collection. This was followed by 21.5% that represented respondednts within 11-15 years of service, 18.5% for 5 years and below, while 13.8% and 13.1% represted 21 years and above and 16-20 years of service, respectively. Majority of the respondents were working in academic institutions (90.8%). Public library has 3.1%, information centres constitute 2.3%, research centers 1.5%, government and special libraries have 1% respectively.

**Table 1: Demographic Characteristics of Respondents**

| S/N | Characteristics | Frequency | Percentage (%) |
|---|---|---|---|
| 1. | Gender | | |
| | Female | 69 | 53.1 |
| | Male | 61 | 46.9 |
| | **Total** | **130** | **100.0** |
| 2. | Age | | |
| | 30years and below | 13 | 10.0 |
| | 31-40 | 44 | 33.8 |
| | 41-50 | 48 | 36.9 |
| | 51 – 60 | 22 | 16.9 |
| | 61 and above | 3 | 2.3 |
| | **Total** | **130** | **100.0** |
| 3. | Educational Qualifications | | |
| | BLIS/HND | 24 | 18.5 |
| | MLIS/MSc | 64 | 49.2 |
| | PhD | 42 | 32.3 |
| | **Total** | **130** | **100.0** |
| 4. | Years of Experience | | |
| | 5 years and below | 24 | 18.5 |
| | 6-10 years | 43 | 33.1 |
| | 11-15years | 28 | 21.5 |
| | 16-20years | 17 | 13.1 |
| | 21 years and below | 18 | 13.8 |
| | **Total** | **130** | **100.0** |
| 5. | Types of Institution | | |
| | Academic institution | 119 | 91.5 |
| | Government Library | 1 | 0.8 |
| | Information Centers | 3 | 2.3 |
| | Public library | 4 | 3.1 |
| | Research Library | 2 | 1.5 |
| | Special Library | 1 | 0.8 |
| | **Total** | **130** | **100.0** |

## Plagiarism and Copyright Infringement

In order to determine the level of involvement of LIS professionals in plagiarism and copyright infringement, the respondents were first asked to indicate if they were aware that plagiarism and copyright infringement exist among LIS professionals in Nigeria, the repondents rated in affirmative that plagiarism and copyright infringement exist among LIS professionals in Nigeria, an overwhelming proportion of the respondents 127 (97.7%) were in the affirmative.Though three of the respondents, 2.3% responded in negative.

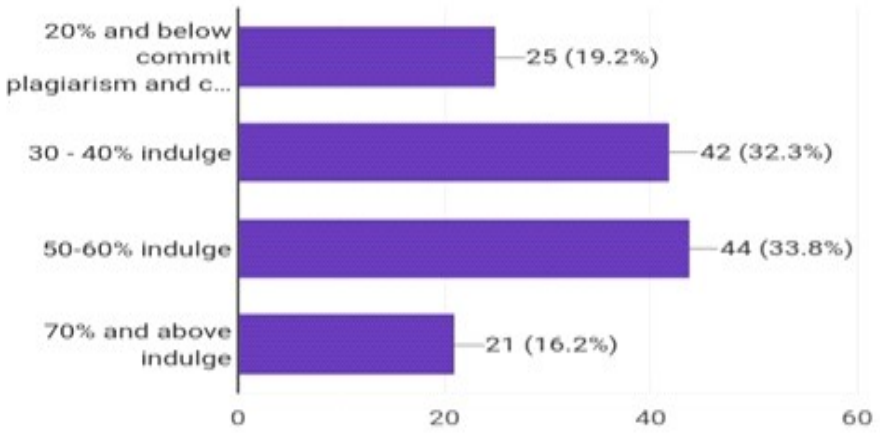


**Figure 1: The level of involvement of LIS professionals in pliagiarism and copyright infringement**

From Figure 1, the data shows that the respondents agreed that LIS professionals were involved in plagiarism and copyright infringement to the level of 50%–60% (33.8%). Other responses indicated 30–40% (32.3%), 20% and below (19.2%), and 70% and above (16.2%).

**Table 2: Mean scores of the Respondents on the possible causes of plagiarism and copyright**

| S/N | The possible causes of plagiarism and copyright | Mean | Std. Deviation |
|---|---|---|---|
| 1 | Lack of literature searching skills | 3.22 | .780 |
| 2 | Sheer laziness in research activities | 3.51 | .626 |
| 3 | Poor knowledge of research methods | 3.39 | .675 |
| 4 | Non-application of punishment to offenders | 3.35 | .692 |
| 5 | Pressure from publish or perish syndrome | 3.31 | .746 |
| 6 | Lack of self-respect, integrity and dignity | 3.01 | .812 |
| 7 | Lack of plagiarism check by the Editors, Publishers and Institutions | 3.41 | .690 |

Table 2 covers statements on the possible causes of plagiarism and copyright. Librarian's mean ratings which range from 3.01 to 3.51 as well as their corresponding standard deviations show that they agreed with all the possible causes of plagiarism and copyright, as listed. However, non-application of punishment to offenders has the highest mean rating of 3.51 while lack of self-respect and integrity has the lowest mean rating of 3.01.

**Table 3: Mean scores of the Respondents on the punishment to the offenders of plagiarism and copyright infringement.**

| S/N | To check plagiarism and copyright, offenders should be punished by | Mean | Std. Deviation |
|---|---|---|---|
| 1 | Demotion to the lower rank | 3.05 | .740 |
| 2 | Prosecution and payment for damages | 3.20 | .709 |
| 3 | Announced publicly | 3.02 | .762 |
| 4 | Withdrawal of publication | 3.50 | .650 |
| 5 | Repeat the class in case of PG student | 2.97 | .835 |

Table 3 covers questions on the punishment for offenders of plagiarism and copyright infringement. The mean ratings of 2.97 and above, with their corresponding standard deviations, show that librarians agree with all the listed likely punishments. However, withdrawal of the publication has the highest mean rating of 3.05, while repeating the class in the case of a PG student has the lowest mean rating of 2.97.

## Discussion of Results

The big questions on the existence of plagiarism and copyright infringement show massive acknowledgment by the respondents. It corroborates with the studies that researchers, authors, faculties, students and staff commit plagiarism and copyright infringement (University of Ghana, 2019; Anaman and Agyei, 2021; Kaczynski, 2021; Shabe 2018). It is surprising and abysmal that those who should teach others are guilty of such misconduct. This shows the danger of more violations and the unending stoppage of plagiarism and copyright infringement.

Another disclosure on the level of involvement of LIS professionals in plagiarism and copyright infringement indicated up to 60%. This is in line with Onifade and Alex-Nmecha (2020) findings that revealed a high level of plagiarism and a moderate level of engagement in curbing the menace among LIS professionals in Nigeria. Similarly, The Times of India (2014) and Radio Poland (2012) worry that when librarians or professors who are looked up to are suspected of academic misconduct, their junior colleagues can easily follow suit. This implies that academic integrity is a big issue among professionals. LIS professionals can be extremely helpful in addressing the issues of plagiarism and copyright infringement. LIS professionals are expected to play a significant role in a variety of capacities, including instructing other academics, researchers, and students in information literacy, internet searching, bibliographic practices, and information ethics. Despite the fact that academic institutions have relied on detective software to prevent plagiarism, this software has drawbacks. Olutola, cited in Onifade and Alex-Nmecha (2020), contends that there should be a shift away from complete reliance on plagiarism software toward assertive and persistent training on scholarly writing nested within various academic institutions' related curricula.

Furthermore, the possible causes of plagiarism and copyright infringement as rated by the respondents with high mean scores (Table 2) indicated high volumes of misconducts. The acceptance that lack of literature search skills, laziness, poor knowledge, pressure, lack of respect, and plagiarism contribute to the anomaly is an indication that more training is needed. These causes are also identified in the studies of Anaman and Agyei (2021), Ikenwe and Anaehobi (2020), Aisyah and Sugihartati (2019). It implies that the training must be regular and strategised to create the desired impact. That non-application of punishment was rated high corroborates with the study that the legal implications have been mere lip service without as few authors having really sued over the plagiarism act and copyright infringement (Francis, 2015). Probably, only positive firm actions will reduce the incidence of plagiarism and copyright infringement to a minimum.

So it becomes imperative that punitive measures must be applied to save the original sources, the profession, country and the academic institution as plagiarism and copyright infringement hurt streams of contenders. The current findings fit the submissions of Gaur (2018) andOriji and Young (2020). Perhaps, the issue now is how to enforce these measures to the later. Without enforcement of the punitive measures, copying of someone's work can become a norm, Nigeria professionals may lose their integrity and research standards in the global field.

## Conclusion and Recommendations

This study has shown that the issues of plagiarism and copyright infringement are relative and can cause grave harm to all players in the publishing and academic sectors. It is interesting to note that the studies carried out on academic dishonesty covers every faculty, government and communication sector. The studies also condemn the acts. Therefore, this study concludes that:

1. Plagiarism and copyright infringement exist among LIS professionals in Nigeria;
2. The level of the involvement of the professionals is notably high;
3. The causes include lack of searching skills, laziness in research, poor knowledge, pressure from publish or perish syndrone and lack of enforcement of punitive measures; and
4. To stop the anomaly, it may be necessary to punish the violators with a reduction in rank, legal action and payment of damages, public announcement, retraction of a publication, or repeating the course in the case of PG students. Based on the findings, the study recommended

- Creation of awareness and provision of knowledge on the decadence of plagiarism and copyright infringement, especially to the career ready students.
- Organisation and facilitation of trainings and conferences for capacity building on how to cite and write plagiarism free articles.
- The re-strategisation and innovative ways of teaching the courses that relate to searching skills and research writing in library schools.
- Ensuring of punishment of the offenders and administration of plagiarism check by all institutions, journals and conference organizers.

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# Memory and Archives: Documenting White Minorities in Post Colonial Zimbabwe

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## Abstract

*Archives and societal memory are contested territories, archives are selective memory and the voices of the elites overshadow those of minorities and the underrepresented. The archives of Zimbabwe are inherently colonial like most former colonies and attempts at addressing the colonial imbalance (Oral History Programmes) has resulted in the marginalisation of the white community as both a racial and numerical minority. The study sought to ascertain the strategies employed by the White Community in the archiving of their Historical Manuscripts (HM). Data were collected from the management committees of former white community institutions, and individuals with knowledge on white minority archives in Zimbabwe using interviews. The findings of the study established that the records of the white community are stored and preserved in undetermined conditions, their format nature and quantity unknown and thus vulnerable to neglect and decay. The major recommendation arising out of the study is that intervention strategies are required to ensure that records originating from the White settler associations are collected and preserved so that they will ultimately contribute to an integrated societal memory in Zimbabwe.*

**Keywords:** *Archives, Memory, Minority, Oral History Programme, White Community, And Integrated Societal Memory.*

## Introduction

Discourse on the state of archives in Africa and in particular Zimbabwe, tends to focus on the challenges and the opportunities that exist, this discourse paints a bleak picture inherited from the former Colonial Administrations, and continued by the successor states, (Mnjama, 2010; Tough, 2009). Some of the challenges range from inadequate funding, lack of recognition by national governments of the role that archives play, poor storage facilities, poor arrangement and description standards, inadequate retrieval systems, lack of professional staff and understaffing, migrated archives, and "silences" and "absences" of minorities and the underrepresented in the Archive, to mention just but a few.

White Zimbabweans are people from the southern African country Zimbabwe, who are white in linguistic, cultural and historical terms. They are of European ethnic origin and comprise of the English-speaking descendants of British and Irish settlers, the Afrikaans speaking descendants of Afrikaners from South Africa and those descended from the Greek, Portuguese and Italian settlers. People of European ethnicity first came to Southern Rhodesia (now Zimbabwe), during the late 19$^{th}$ century (Crush

and Tevera, 2010:52). At its peak in 1975 the white population was 296,000, representing 8% of the population of Rhodesia. In 1999 it fell to around 120,000 and to less than 50,000 in 2002 (Crush and Tevera, 2010:52). According to the Zimbabwe National Statistics Agency (2013) The white population of Zimbabwe was listed as 28,732 in the 2012 census. By the time of doing this study (2015-2018) whites were both politically, economically, and socially disenfranchised as an ethnic minority in Zimbabwe. The study posits that post-colonial efforts at filling the gaps in the Archive, resulted in the expansion of the Oral History (OH) programme to fill in the "silences" and "absences" of the voices of the black majority at the expense of the white minority. At the same time the Registry Model that defined the archival endeavour in Zimbabwe, reflected that public-sector records and archives predominated in the mainstream archives of Zimbabwe (Ngulube, 2012).

## Objective of the Study

The overall purpose of the study was to explain the context and documentation strategies of archiving and preservation of Historical Manuscripts of the White community in post-colonial Zimbabwe. The specific objectives of this study was to: Ascertain the strategies employed by the White Community in the management of both pre-archival and archival HM of the White Community; and the specific research question was: What are the current documentation strategies employed by the White Community in post-colonial Zimbabwe? The sub questions focussed on:

- The challenges of archiving white community memory,
- What happened to HM of the white community in the post-independence era (1980-)? And
- Whether there was a vibrant civic engagement in white activities and interest in documenting white memory in post-colonial Zimbabwe?

## Literature Review

The literature reviewed in this study focused on conceptualising minorities, and the strategies currently utilised to address the "silences" and "absences" in the archive. Literature indicates that archivists have to be transparent and accountable to society in their activities in particular when documenting societal memory. Literature also indicates that mainstream archival activities are the main cause of the "silences" and "absences" from the archive of minorities and the underrepresented (Jimerson 2003). (Kaplan, 2000; Jimerson 2003) observed that archives are not sites of objective historical truth: The archival record doesn't just happen; it is created by individuals and organisations, and used, in turn, to support their values and missions, all of which comprises a process that is certainly not politically and culturally neutral. Archives thus become "major players in the business of identity construction and identity politics". In summary the global initiatives especially those exhibited in America and Europe fall into these broad categories, archival social justice of Daniel (2010), the concept of total archives, whose main proponents are (Millar, 1999; Momryk, 2001; Bastian, 2004). The other strategies being utilised in the developed world are provenance (social and ethnicity) as argued for by Daniel (2010) and Nesmith (2006), custody versus stewardship as posited by Wurl (2005), documentation strategy of Samuels (1986) and Cook (1992), social movements and social justice forms of, Stevens, Flinn and Shepherd (2009), archival activism McDonald (2008), and Millar (2010) community archives CADG (2007), and Bastian (1999) digital archives and web technologies Daniel (2010) and Flinn (2010). One can also add the efforts by White (2009) focusing on archival education in Mexico, particularly in as far as training imparts archiving skills that are eventually applied in the process of archiving and archivilisation. An Afrocentric initiative is by Rodrigues, Van der Walt and Ngulube (2014) who propose an archival collecting plan to document minorities.

The context of study is that literature reviewed shows that there is a dearth of literature on the subject. Most of the literature is Eurocentric and Africa is represented by only three seminal studies, that of Garaba (2010), which focused on the documentation of liberation movements in southern Africa, and that of Rodrigues (2013), who studied the documentation of the Lusophone community in Gauteng Province of South Africa, and Chabikwa (2019) that focused on archiving white community historical manuscripts in post-colonial Zimbabwe.

## Methodology

The method for the study was qualitative, relying on face-face interviews and case studies for data collection. A multiple case study research was used to address the exploratory, descriptive, and explanatory research questions. The justification was that a case study is holistic, it exists in real-life context. The population of the study was members of the white community in Zimbabwe, the White Community was a difficult population to study and extract data from, given the political climate that prevailed at the time of conducting the study. The white community had been displaced from the land as a result of the acrimonious land redistribution programme. The study relied on snowball sampling for the white community and yielded three male managers from the White Associations and four male members of the White Community in Zimbabwe. The above constituted the actual sampled population for this specific objective of the study. This did not yield any female participants, hence their absence from the study. The study also excluded other racial, ethnic, gender (women included), and religious minorities from the study because of the limited resources.

Non-probability sampling techniques were employed (purposive sampling). The study snowball sampled the leadership or management committees of the various White Associations and members of the White Community locally. The respondents were selected because it was expected that they were representative of the population of interest (white minorities in Zimbabwe) Hofstee (2006). Data analysis utilised open coding as well as the identification of developing themes as they emerged from the qualitative data. This was done without predetermining what categories would emerge (Strauss and Corbin, 1998:101). Analysis was generally descriptive, theory generation, analytic and thematic. Ethically, the study observed the following: participation was voluntary and informed consent was obtained; and privacy and confidentiality were observed to protect the identity of the participants using pseudo-names and ultimately it was bias free in writing about the underrepresented and minorities (Rubin and Babbie, 1997:76-77).

## Findings

In light of the apathy that characterised white community participation in the study, the article reports on the findings from seven members of the White Community who responded to issues that addressed how whites were preserving their memory. The findings revealed the following:

### Hindrances to Archiving HM of the White Community in Zimbabwe

In a preliminary interview that was held with Respondent D, the interview revealed the challenges listed below as being the major hindrances to archiving HM of the White Community Associations' in Zimbabwe.

1. No records management systems were in place for most of the White Community Associations except for a few organisations;
2. Funding was the major problem facing these associations and organisations;
3. Economic challenges and dwindling membership resulted in most associations collapsing especially after the land reform of 2000;
4. Members were too few and too old and on pensions as a result they could not afford to fund the operations of their associations through membership fees;
5. The respondent belonged to three associations that had folded up due to 2,3 and 4 above;
6. There was suspicion by the Rhodesian element and access to assess and utilise their records or HM was difficult to obtain even for white researchers;
7. Most whites kept a low profile and this applied to their activities and the documentation of their memory;
8. All former military, police and air force associations did not cooperate with researchers internally unless one was a member or ex-serviceman;
9. Most records/HM were kept by individuals, families and organisations in undetermined conditions of storage and preservation;

10. When associations collapsed or ceased to exist, records were burnt or just given away to those interested in them;
11. Most surviving heirs migrated part of the records they needed or managed to carry outside of the country, what is of no interest to them was then destroyed mainly through burning;
12. Respondent D was a beneficiary of records bequests and donations mainly from heirs within the White Community and these are the ones the respondent utilised to write the history of Bulawayo and its society; and
13. The Pioneer Society of which he was a member was probably the only organisation with a professional archivist in its employ managing its HM from the 1890's mainly genealogical records of the pioneers. The archives were only accessible to members and descendants of the pioneers. The collection was managed using library methodologies, a database exists but not networked. It was a computerised system without a website or online tools for access or management. Digitised content was available of the collection, there was no evidence of backup copies anywhere. The reasons why the archives of the organisation fared better than those of other associations, was because the members who are descendants of the White Pioneers inherited land and other properties and businesses. The proceeds were used to fund the documentation and preservation of their memories, unlike the generality of white Zimbabweans who struggled with the day to day challenges of a dysfunctional economy.

Personal observations revealed that the issue of a lack of funding was a common problem affecting the archiving of HM of the White Community in Zimbabwe. This problem affected both cultural heritage institutions, and the White Community itself.

On the issue of what happened to records of the former White Community Associations in the post-independence era, (1980-), Respondent A, stated that:

> as committees change and as management changes, they have probably destroyed those records or dumped in some storeroom and being destroyed by some white ants, I think. I was researching about Greendale club and the other information is available on boards at the club, (true of a number of sporting clubs in the country boards or roll of honours are still available in some places whilst others have been removed or defaced, the case of the Sailing Club is a sad one given that new owners took them down and workers said they were used to braai some meat) but specific detail about membership, activities, policy and management could not be found, it had disappeared or destroyed over the years mainly due to neglect and lack of proper records management strategies.

He went on to aver that:

> we can say that memories of the White Community in post Rhodesia are in danger of being lost for posterity. There has been reluctance to write these things down, although a lot was written about infrastructure, facilities and life in Rhodesia, this can be found in the National Archives of Zimbabwe (NAZ), unfortunately the old generation of whites are no longer documenting life after Rhodesia, and this a sad scenario given that young whites are not interested or are busy with day-to-day challenges and survival or they have migrated to other countries. The culture of documenting memory was alive during Rhodesia but I don't know if it was carried on after 1980.

In discussing the lack of interest in documenting the memory of White Community Associations, Respondent A strongly argued that:

> I think probably not, I suspect and think probably it has not been recorded, to be honest even in the white days 99% of the members cared less about the history and memory of their clubs, because they went

> to enjoy the game of tennis or socialise and enjoy a few beers and that was all they were interested in, even management committees then were not that interested in preserving the memory of clubs and associations, I don't think they were that historically minded at all. Throughout the White Community people were not interested in art or history, even me as a child had uncles who served in World War I and talking about East Africa and South West Africa but it was of no interest to me, it is the same all the time, I think. Not documenting memory is typically a Zimbabwean problem than ethnic issue. I got interested in the history of the family in my later years but the elders had passed on and they had vast wealth of information about the military and mining in Rhodesia and that's memory already lost to me and ultimately to society.

Interestingly, Respondent A did mention the fact that the Salisbury Poultry Club donated (dumped in his own words) their records to him which he transferred to the NAZ after a number of years. In fact, most associations if they still exist give their records to Historians and those interested, if there are no takers, they throw them away in the rubbish bins or just burn them.

Respondent B corroborated the observation by Respondent A, but attributed this to the fact that, in essence most of the cultural, social and political institutions that existed before independence have died a natural death, largely because whites have no political power, but on the social side of things there is no cohesion because the numbers are just not there. With 50,000 whites in the country for example to maintain Scottish or Irish traditions is just impossible, the Rhodesian element is gone.

On the other hand, Respondent C averred that two years ago they realised that white documentation was being lost to this country for various reasons "some whites did not want to donate their material to the National Archives not out of political or racial reasons, but because they had become aware that the National Archives was taking years and years to process material and therefore putting it in the archives was like putting it in a cold storage refrigerator where no one will see it for thirty years which rather defeats the objective of donating to the NAZ".

According to Respondent C, the biggest challenge, in documenting memory of the White Community and that of all Africans in general is finance even self-publishing which is the most viable option is not cheap. Respondent C argued that "The person who is self-publishing has to put upfront at least US$3000 they may recoup some of that through book sales but the book market is in decline in this country because of the economic hardships. On the one hand, the community is generally poor because the average age is probably 60 years, and most whites are retired and living on pensions which have been decimated by hyper-inflation over the years".

The second biggest challenge according to Respondent C, is that "all these people who want to write reminiscences are not trained historians, and most of them have not written anything in life except answering letters that's all and putting up a book is quite a challenge and they need quite a lot of help in editing and selecting and so on".

Asked if the above efforts stemmed from the realisation that memory was being lost to the White Community and ultimately to society in general, the respondent asserted that:

> Yes it is being lost, increasingly the whites are in danger of reverting to what they were 50 years ago, and thinking only about Cecil Rhodes, Dr Jameson, the Pioneers and things that are well documented and the most important is to forget what the whites did or did not do in the 100 years after the famous people who have been well documented and written about, but much more interesting things are being lost and the other thing I did recently at the archives, I met a retired Native Commissioner, who wanted to write his reminiscences and I urged him to publish it, they were fascinating because he was brought up in the most extreme poverty, poverty the sort that whites have totally forgotten existed in this country and probably to the depth that no African ever believed whites had to endure.

### Opportunities

Based on the above findings, the opportunities that arise from the difficulties of archiving HM of the White Community in Zimbabwe, seem to focus on self-publishing as a solution. Little if any solutions are considered to utilise web tools, to complement the encouragement to the white community to continue donating HM to cultural institutions. The NAZ needs to play a pivotal role in the archiving of societal memory and must instil confidence in the White Community that materials donated or bequeathed are processed to enhance access and bring them into wider scholarly circulation.

## Discussion

The objective of the study sought to ascertain the strategies employed by the White Community in the management of both pre-archival and archival HM of the White Community. The findings revealed that there were no proper records management practices and lack of good houseman ship endangered the preservation of the HM in the custody of the White Community Associations. There is lack of proper systems in relation to standard records life cycle procedures from creation/receipt, use and maintenance, and ultimate disposal, ideally to an archival facility as dictated by statute and policy.

The consequences of an aged population and a large number in the diaspora means limited funding and budgets to finance operations let alone manage records properly. These financial challenges are related to the literature reviewed in that, as of 1935 when the Archives was set up in Rhodesia, funding came from taxing the White Community as observed by Murambiwa, Ngulube, Masuku, and Sigauke (2012). Ironically, at the time of conducting the study the White Community could not afford to fund the preservation of their memory within the community initiatives that exist. The White Community Associations are willing to take on board a technical partner to provide technical archival support for the preservation of their memory. This finding corroborates the clarion call for NAZ to begin to render that archival support as argued by Ngulube (2012).

The White Community Associations acknowledged that they lack the technical expertise and are willing to collaborate or partner with individuals or organisations that would help them preserve their HM for posterity. On the other hand, they ascribe both historical and cultural value to their collections (documents) or HM. Implicitly the findings reveal that White Community Associations believe that cultural heritage institutions must be responsible for documenting memory. This tallies with the literature reviewed. In fact, the findings point to a greater role for the NAZ, as one respondent lamented the processing backlogs at the NAZ, which have prompted others to consider setting up their own archives as (Kaplan, 2000; Jimerson, 2003; and Haskins 2002) averred in the literature reviewed on community initiatives. The challenge as mentioned earlier is to do with the practical difficulty (technical expertise, financial costs) which prevents such an initiative for the White Community.

Of concern to the study is the issue of accessibility to HM by the general populace. The study highlights the strategy of encouraging the White Community to donate material to the NAZ, although there are concerns by the White Community that the failure to arrange and describe the material hinders access, and ultimately renders the archival endeavour redundant. The issue of backlogs feature, prominently in the findings, it creates a scenario that corroborates the argument that mainstream archival activities are the causes of the imbalances in the archive as White (2009) observed. The study argues that this compounds a situation where emigration denies access the heirs to provenance and this lack of capacity has been described by a respondent in this study as equal to putting archives in the freezer and forgetting about them.

The claim that HM donated to NAZ in the 1960's is yet to be processed raises alarm and concern about the state of archiving of HM in Zimbabwe. The registry model as described by (Ngulube, 2012; Murambiwa, et. al., 2012) affirms the observation and finding that mainstream archival activities marginalise racial and numerical minorities like whites in the archive, in postcolonial Zimbabwe. The findings on the issue of archival backlogs is also one of the discontents in the literature reviewed made by Foucault (1969) and Derrida (1996) as they postulated theoretical questions about processing, applications, selection and description of archival collections. It can be inferred that NAZ needs to clear the processing backlogs to enhance access to this shared cultural heritage. This was corroborated

by Mnjama (2006) when describing the three consequences of archival backlogs that "the existence of backlog accumulations leads to the denial of access for researchers to materials some of which have reached mandatory statutory periods for their opening…It can therefore be argued that any archival institution holding backlog accumulations containing records that are more than 20-30 years old is denying its citizens their inalienable right of access to part of their archival heritage".

The issue of custody of white community archives is a contentious one given the politics of the day. Setting up a community archive for the white community would be deemed politically incorrect and inappropriate. This is also corroborated by the findings themselves in that the solution lies in the NAZ playing a leading role in the archiving and preservation of HM from the White Community. The findings point out the waning influence of whites, and ultimately the loss of their memory for posterity if custody or other interventions invested in the NAZ are not implemented. The findings reiterate this argument by Ngulube (2012), and also expect that the initiative should come from the NAZ.

A web presence though critical for the White Community Associations, it has not been widely adopted and utilised. The findings reveal that prohibitive costs have not encouraged the utilisation of web tools in Zimbabwe, by the White Community Associations. The initiative is limited to the Hellenic community which is still vibrant and actively documents its activities online, unfortunately for the rest of the White Community in their varied ethnicities little or no effort has utilised web tools for documenting memory.

A further gap in knowledge about archiving white memory that the study addresses is the issue of what happens to records when associations fold up. The findings revealed that records (HM) have been destroyed or simply dumped in some storerooms and exposing them to neglect or decay. The neglect of records that document White Community Associations, has resulted in the loss of memory, and invaluable information about membership, activities, policy and management, and this compounds the gaps that have been created by the OH programme and the registry approach in Zimbabwe. The lack of proper records management strategies and neglect have not helped either. The implication is that white memory in post Rhodesia is in danger of being lost for posterity. Although the Zimbabwean archive is largely colonial, the study revealed that gaps in White memory emerge in the post Rhodesian era, there is little documentation of whites after Rhodesia. Equally, the younger white generation is not interested or have migrated to other countries. It can be inferred that the culture of documenting memory that existed during Rhodesia has declined with the demise of Rhodesia.

Murambiwa et. al. (2012) and Manungo (2012) acknowledge that the archive is largely colonial in Zimbabwe, the findings suggest that few whites were historically minded and this continues today. As such it can be inferred that the colonial archive did marginalise or created gaps in its documentation of white memory. The voice of the black citizens in the case of Zimbabwe, continues to be absent from the archive and this is corroborated by Jimerson (2003) and Haskins (2007:402) who argue that "what was selected for preservation by mainstream archives were typically from the intellectuals and elites rather than from the illiterate". It can be inferred and argued that the colonial archive did promulgate official ideologies at the expense of the underrepresented black population and the same continues today in post-colonial Zimbabwe.

Although literature highlighted the role of the NAZ in documenting memory in Zimbabwe, the findings however, revealed that there are other forums and initiatives that are actively documenting white memory though in a limited way in the country. *Heritage Zimbabwe*, the successor to *Rhodesiana* continues to publish manuscripts from predominately the White Community, and it ensures that the history of whites continues to be recorded in a way, even though mainstream activities tend to marginalise white documentation.

The desire to avoid unnecessary attention on the part of the whites' entails that people meet and they don't keep minutes, as the findings reveal this affects how memory is documented. This reliance on human memory ultimately means that with time memory will be lost due to forgetfulness. Related to this, is the issue of how anything that conflicts with the national ideology espoused by the ruling party (ZANU PF) renders memory work difficult, and minorities in Zimbabwe, whites included are increasingly being left out of the archive as argued

by postmodern dictums (Cook, 2000; Jimerson, 2003; and Harris, 2000).

Another key finding is the fact that there is little or no interest from both a regional, national or institutional level to collect and preserve HM. This has been left to individuals and this questions the sustainability of such efforts, at the same time transmission for posterity is not guaranteed. As such, there is need for intervention strategies to ensure that these HM, if they do survive neglect and decay can be migrated to new formats for accessibility in the future. The efforts by individuals to document themselves is limited, informal and covert. There is no central plan or organisation besides the Pioneer Society in Bulawayo.

The current efforts at documenting whites emerged largely from the observation that whites are not keen at donating their material to cultural heritage institutions, NAZ included. Firstly, this is because of poor collection development, on the part of cultural heritage institutions. Secondly, that the white population is aged and at death most of the HM are thrown away or burnt because nobody is interested in them, at times it gets migrated out of the country. The consequence of this is that memory is deliberately being lost through lack of archival intervention. The haphazard and covert documentation of white memory has tended to be in the form of publishing memoirs and reminiscences. Interestingly, it avoids the big men in history but focusses on the ordinary citizen as noted by (Haskins, 2007).

## Conclusion and Recommendations

It has emerged in this study that the White Community Associations are predominately white. The reduction in numbers of the white population means race specific organisations don't exist anymore. This partly explains why most associations that were race specific folded up. Such associations would not survive the political climate that is Zimbabwe. The study therefore differs from other studies reviewed which can identify race specific institutions like archives or museums as argued for by Haskins (2007), Kaplan (2000) and Rodrigues (2013). This has a bearing on the proposed management framework to archive HM of the White Community.

The study makes the following recommendations to the White Community and their Associations that they should:

1. Devise new or alternative funding models to fund operations of these associations;
2. Set up proper records/archival management systems to address the challenges of a lack of records/archival systems that relate to creation/ receipt, use, maintenance, and disposal;
3. Document their activities and not conduct business without proper documentation, as such they should employ and retain administrative staff to assist with the management of and documentation of activities;
4. Be encouraged to donate and bequeath their HM with the NAZ and other selected cultural heritage institutions than to burn or destroy these when no longer needed;
5. Collaborate with selected cultural heritage institutions in particular the NAZ as part of the stewardship management framework, to acquire or access curatorial/archival technical expertise and services for the management of their collections;
6. Be discouraged from migrating their HM and records to other countries outside of Zimbabwe;
7. Adopt and utilise web-based tools for documenting their memories and enhancing remote access to their collections by society;
8. Assist the NAZ and selected cultural heritage institutions to identify and quantify the extent and nature of HM migrated and displaced after independence and post the land reform era of 2000; and
9. Members of the White Community should be encouraged to self-publish their memoirs and reminiscences as a complement to mainstream archival documentation strategies.

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# Gender Differences and Use of Digital Resources in University Libraries in Nigeria

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## Abstract

*Gender inequalities and the use of digital resources (DR) were investigated among students at the University of Africa (UAT) in Bayelsa State and the Ignatius Ajuru University of Education (IAUE) in Rivers State, Nigeria. The research was directed by two research questions and one hypothesis. Descriptive and inferential statistics were used by the researchers. The study's population comprised 6,500 students from the two universities and the sample size was based on the total number of students who used the digital libraries during the 2020/2021 academic year. The sample size was generated from the students' registration list in the digital libraries. The questionnaire was the instrument used for data collection. Yamane sample size formula was used to determine the sample size which is 696. Data were analysed with frequency counts, simple percentages, and Statistical Product and Service Solutions (SPSS) version 23 was used to generate the mean, and standard deviation, while Chi-Square was used to test the hypothesis at a 0.05 significant level. The results found that the male students used digital resources more than female students. Data were analysed with frequency counts, simple percentages, and Statistical Product and Service Solutions (SPSS) version 23 was used to generate the mean, and standard deviation, while Chi-Square was used to test the hypothesis at a 0.05 significant level. The results found that the male students used digital resources more than female students and the students he questionnaire was the instrument used for data collection, and the Taro Yamane sample size formula was used to determine the sample size which is 696. Data were analysed with frequency counts, simple percentages, and Statistical Product and Service Solutions (SPSS) version 23 was used to generate the mean, and standard deviation, while Chi-Square was used to test the hypothesis at a 0.05 significant level. The results found that the male students used digital resources more than female students and the sample had positive perceptions of the effects of using digital resources. Further analysis using Chi-Square revealed that there is a statistically significant difference in the use of digital resources by gender in the study. The researchers concluded that university libraries should create more awareness and continue to expand and encourage female students to use digital resources to favorably compete with male students to enhance learning outcomes. The libraries should also organise training on how to use digital resources focusing more on female students.*

**Keywords:** *Gender differences, Digital resources, Use, University libraries, Bayelsa and Rivers States, Nigeria.*

## Introduction

University libraries are information centres that provide materials to assist their parent body's learning, and research goals. The university library is regarded as the most important resource centre because it provides relevant and current resources for faculty members' research and teaching, as well as for students learning and their general interests. Due to the rapid growth of electronic publishing, library collections that previously comprised printed items are rapidly changing. The majority of university libraries have expanded their collections to incorporate digital resources, giving students access to global resources for learning and research (Ebijuwa, 2018). Because it provides students with much-needed comfort, ease, and timely information for studying, completing academic tasks, and conducting research, digital resources have become a vital aspect of library collections (Mawere and Sai, 2017).

Digital resources (DR) are those that can only be accessed through the use of Internet-connected devices. It also refers to materials that are available in an electronic version. Websites, databases, e-books, e-reports, online course content, and educational films are just a few examples. Digital resources are widely accessible via computers and handheld mobile devices, and they cover a wide range of topics (Ebijuwa, 2018). Digital resources are effective research tools that can help students learn more deeply and improve their academic performance. They are handier than print resources because they allow users access to materials that might otherwise be unavailable to them owing to geographical restrictions, financial constraints, or other factors (Lo et al., 2017; Anunobi and Okoye, 2008). Students can access digital content from anywhere, and they can use the same resources at the same time. Various university libraries, without a doubt, invest heavily in the provision of digital materials and associated computer-based technology to support students' learning and research activities. Both male and female students are required to use these resources equally.

Gender refers to the social characteristics and opportunities that come with being a man or a woman. Gender, according to Moser (2011), is a socially created relationship between men and women that should be at the centre of development efforts. Gender disparities in higher education, technology use, employment, and societal roles, among other things, have been a topic of public debate. Gender is a common topic of study in technology-related research, with known disparities between boys and girls in terms of engagement style and frequency and length of use of digital resources (McFarlane et al., 2002; McFarlane, et al., 2000). According to Sobieraj and Krämer (2019), research on technology use and acceptability has revealed that women and men use technology differently and have distinct self-perceptions about it. Women and men interact with technology in different ways, according to studies, with women having fewer capacities and displaying less enthusiasm for using computers than males (Hargittai and Shaw, 2015; Van Deursen et al., 2015; Imhof et al., 2007). Gender role beliefs, according to which women are supposed to be less interested in and less competent in using technology than males, have been proposed as possible explanations for these inequalities (Morahan-Martin and Schumacher, 2007).

Many studies have examined the topic of gender inequalities among students' attitudes towards library resources, and gender has been highlighted as one of the factors influencing students' attitudes towards digital resources and information-seeking methods. Gender is connected with the use of digital resources, according to Manda and Mukangara (2007), with male students being more likely to use digital resources than female students. Waldman (2003) noted that gender is a relevant factor in the use of electronic databases, and the ability to use a computer system is one of the factors that influence students' use of digital resources. He claimed that students who are unfamiliar with computer systems will have a tough time using the digital resources available to them. Female library users have substantially lower skills and use of computer self-efficacy (CSE) than their male counterparts, and consequently employ technology at a far lower rate (Venkatesh and Karahanna, 2014).

One of the repeating themes in the low use of digital resources, according to Tella and Mutula (2008), is a lack of appropriate competencies, with females being more affected than males. Jenson (1999) found that women's lack of computer

experience was a significant factor in shaping their attitudes and fears about computers. This could be due to gender roles imposed by various cultures, which have led many women to believe that technology and its application are only for men. If this is correct and the trend continues, male students will continue to outnumber female students in the usage of digital resources for academic, research, and other purposes.

The use of digital resources, on the other hand, is gender-neutral, as both male and female students require it for learning and research purposes. As a result, both genders are required to learn the necessary skills to effectively use digital resources to improve their academic performance. Because of the potential benefits and the availability and capabilities of modern technology for enabling their use, a significant amount of money has been invested in purchasing and storing various types of digital resources in university libraries (Goncalves et al., 2007; Kennedy, 2004; Miller-Francisco, 2003). This has resulted in the growth of digital resources and the creation of digital libraries (Raza and Nath, 2007; Santos et al., 2007; Kahl and Williams, 2006; Koh and Kim, 2004). As a result, a greater knowledge of gender disparities in the use of these key resources is required. This aids the library in better comprehending the needs and expectations of users when it comes to using digital resources (Deng, 2010). Specific strategies and policies for improving the use of digital resources can be developed as a result of this understanding. It is on this note, therefore, that this study investigated gender differences and the use of digital resources in university libraries in Nigeria.

## Objectives of the Study

The main objective of this study is to examine gender differences and the use of digital resources in university libraries in UAT and IAUE, Nigeria. The specific objectives are:

- To determine gender differences in the use of digital resources
- To ascertain the students' perceptions of the effects of using digital resources

## Research Question

- What are the gender differences in the use of digital resources?
- What are the students' perceptions of the effects of using digital resources**?**

## Hypothesis

- There is no significant difference between gender and the use of digital resources**.**

## Literature Review

Several studies have been conducted on gender differences and the use of digital resources. Some of the research in this area has yielded mixed results. Based on their conclusions, these studies can be divided into two groups. The first group of studies confirms that gender is connected with the use of digital resources, with male students using digital resources the more. On the other hand, the second stream of research suggests that female students used digital resources more than males. A review of some of these investigations is offered in this section.

For instance, Bassi and Camble (2011) did a study on gender inequalities in the use of digital resources at university libraries in Adamawa State, Nigeria. The study population comprised 5,269 students, and 1,053 students were used as samples. The data collected were analysed using descriptive and inferential statistics (t-test), and the study found that there is a statistical difference in the use of digital resources between male and female students, with male students using digital resources more than female students. There have been similar findings in other studies. For example, Buba et al. (2018) examined gender inequalities in the use of digital resources by undergraduate students in university libraries in Jigawa State, Nigeria. The study employed analytical survey research, with a sample of 380 drawn from a population of 1,905 registered undergraduate students in the libraries. The findings of the study revealed that male and female undergraduate students use digital resources differently, with male students using them more than female students . In another study by Ebijuwa (2018) on gender differences in the use of digital resources by students at a few private Nigerian universities. The study used a descriptive survey design with a population of 4,452 undergraduate students, and data was collected using a questionnaire, Cross Tab

Analysis (Pearson Chi-Square), and a T-test were used to analyse it. The result of the analysis revealed that gender had a substantial impact on students' use of digital resources. Bassi and Camble (2011) did a study on gender inequalities in the use of digital resources at university libraries in Adamawa State, Nigeria. The population of the study comprised 5,269 registered library users with a sample size of 1,053 students. The study discovered a statistical difference in attitudes regarding the use of digital resources between male and female students, as the male students used digital resources more than female students and the female students had more trouble locating information online. Ahmad and Muneebulla (2016), in their study on gender differences in the use and awareness of digital resources, found that male students have better computer experience than female students.

However, some studies have found that female students used digital resources more than males. In a study by Deng (2010) on the new patterns and trends in the use of digital resources in higher education in Australia. The online survey was done at a university with approximately 57,000 students, and the study found that females (55.7%) used digital resources more than males (44.3%). In a similar study, Hohlfeld et al. (2013) examined gender disparities in Information and Communication Technology (ICT) literacy among 1513 students from Florida public schools. The results of the t-test statistical analyses show that females had a considerable advantage in all areas. In perception measures of frequency of computer use, perceived ICT skills, and attitudes towards computers, females had higher factor scores. Furthermore, female students scored much higher on the student tool for technology literacy, a performance-based evaluation, in all six sections. These findings contradict several empirical research studies that show males outperform females in ICT skills and have a more positive attitude towards computers. In contrast, Bamidele and Adekanmbi (2019) discovered that there is no basis for gender differential in the use of digital sources because the gender gap in the use of digital resources appears to be insignificant among undergraduates at a few universities in southwest Nigeria. Ogunbodede and Oribhabor (2022) did a study on digital resource use and academic performance of undergraduate students at the University of Africa, Toru-Orua, Bayelsa State, Nigeria. The finding revealed that the students mostly used Internet resources and had a positive perception of the impacts of digital resource use.

However, some of the reviewed studies are similar to ours in the sense that they all studied gender differences and the use of digital resources. The studies are also similar to our study because they all investigated undergraduate students. The studies are, however, different from our study because they all used the questionnaire as the instrument for data collection while our study generated data from the students' registration lists in the digital libraries. The studies are also different from our study because most of the studies used Cross Tab Analysis (Pearson Chi-Square), and T-test to test the hypotheses, while our study used Chi-Square (non-parametric) to test the hypothesis. The sample size of our study is also larger than each of the reviewed studies. As a result, all the reviewed studies created a gap by using the questionnaire to elicit responses from the respondents, which may produce dishonest answers. My study, however, fills this gap because the data was generated from the registration lists of actual users of digital resources in the two digital libraries, which is not based on the opinions of users. This study, therefore, extends the scholarly conversation and agrees with other authors who indicated that there is a statistically significant difference in the use of digital resources by gender.

## Methodology

The study employed both descriptive and inferential statistics. In the 2020/2021 academic session, the study's population comprised 1500 and 5000 students from the University of Africa (UAT) in Bayelsa State and the Ignatius Ajuru University of Education (IAUE) in Rivers State. The sample size was based on the total number of students who used the digital libraries during the 2020/2021 academic year. The sample size for Research Question 1 was calculated based on the student registration lists in the digital libraries. For Research Question 2, the questionnaire was the instrument used for data collection, and the Taro Yamane sample size formula was used to determine the sample size, which is 696. The response to each of the items was weighted on a 4-point Likert-type scoring scale. The respondents

were free to choose Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points, and Strongly Disagree (SD) = 1 point. From the scale, a criterion score of 2.5 was adopted. The criterion score was obtained as follows: Criterion score = (4+3+2+1)/4 = 2.5. For Research Question 2, a mean response of less than 2.5 was classified as "negative perceptions," while a mean response of 2.5 or more was classified as "positive perceptions. Data were analysed with frequency counts, and simple percentages, and Statistical Product and Service Solutions (SPSS) version 23 was used to generate the mean, and standard deviation, while Chi-Square was used to test the hypothesis at the 0.05 level of significance. The results are presented in the tables below.

## Results

The findings of the study are presented in the following tables with explanations.

### Research Question 1:

What are the gender differences in the use of digital resources in IJAT and IAUE?

**Table 1: Gender Differences and Use of Digital Resources in the University of Africa**

| Rows | Gender | Frequency | Gender | Frequency | Total |
|---|---|---|---|---|---|
| Row 1 | Male (UAT) | 1546 (69%) | Female (UAT) | 710 (31%) | 2256 |
| Row 2 | Male (IAUE) | 1784 (64%) | Female (IAUE) | 986 (36%) | 2770 |
| | **Total** | **3330** | **Total** | **1696** | **5026** |

Table 1(Row 1) shows that 1546 (69%) of the students were male while 710 (31%) were females. Table 1 (Row 2) shows that 1784 (64%) of the students were male while 986 (36%) were female. This implies that the male students mostly used digital resources in the two university libraries during the 2020/2021 academic session.

### Research Question 2:

What are students' perceptions of the effects of using digital resources?

**Table 2: Students' Perceptions of the Effects of Digital Resources' Use**

| S/N | Perceptions of Students | SA | A | D | SD | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| 1. | My use of DR influences my performance in the examination | 397 | 263 | 24 | 12 | 3.5 | 0.65 |
| 2. | My use of DR increased my research productivity | 402 | 264 | 30 | – | 3.5 | 0.57 |
| 3. | My use of DR influences my performance in the in-class test | 355 | 325 | 9 | 7 | 3.4 | 0.57 |
| 4. | My use of DR assists me with current literature | 242 | 416 | 25 | 30 | 3.2 | 0.61 |
| 5. | My use of DR has improved my level of literature search | 262 | 379 | 55 | – | 3.2 | 0.60 |
| 6. | My use of DR influences my performance in seminar writing and presentation | 204 | 360 | 113 | 19 | 3.0 | 0.74 |
| 7. | My use of DR influences my performance on an in-class assignment | 163 | 373 | 145 | 15 | 2.9 | 0.72 |
| | **Grand Mean** | | | | | **3.2** | **0.63** |

Table 2 shows the students' perceptions of the effects of using digital resources. The Table shows that items 1–7 have mean values that are above the criterion mean of (2.5). More so, the grand mean (3.2) is greater than the criterion mean (2.5), which implies that all the respondents have positive perceptions of the effects of using digital resources.

### Hypothesis:

There is no significant difference between gender and the use of digital resources.

**Table 3: Differences between gender and use of digital resources**

| Variable | Observed N | Expected N | Chi-Square Value | Df | p-value | Remark |
|---|---|---|---|---|---|---|
| Male | 3330 | 2513.0 | 531.228 | 1 | 0.000 | Significant |
| Female | 1696 | 2513.0 | | | | |

$\alpha = 0.05$

Table 3 shows the difference between male and female students' use of digital resources in UAT and IAUE. The table shows a p-value of 0.000. Testing the hypothesis at 0.05, the p-value is less than the alpha value of 0.05. This means that the null hypothesis is rejected. Therefore, there is a statistically significant difference between male and female students' use of digital resources at UAT and IAUE.

## Discussion of Findings

Research question one revealed that in both universities, male undergraduate students largely accessed digital resources more than their female counterparts. Manda and Mukangara (2007) stated that gender is connected with the use of digital resources, with male students being more likely to use digital resources than female students. Waldman (2003) noted that the ability to use a computer system is one of the factors that influence students' use of digital resources and that female library users have substantially lower skills and use of computer self-efficacy than their male counterparts, and consequently employ technology at a far lower rate (Venkatesh and Karahanna, 2014). As a result, it can be claimed that male students have a high degree of digital literacy and are comfortable with computers, the Internet, and the use of digital resources. The finding is in agreement with that of Buba et al. (2018), who found that male and female undergraduate students use digital resources differently, with male students using them more than female students. Research question two established that students have positive perceptions of the effects of using digital resources. Students believed that using digital resources influenced their performance in the examination, in-class test, and assisted them with current literature, among others. According to Pardada et al. (2019), younger users who are more computer knowledgeable tend to have more positive attitudes regarding digital reading because they typically have the necessary expertise and knowledge of digital texts. This finding conforms to Ogunbodede and Oribhabor (2022), who found that students' had a positive perception of the usefulness of digital resources. The test of the hypothesis also revealed that there is a statistically significant difference between male and female students' use of digital resources in the study. This finding is in agreement with that of Ahmed (2015) and Ebijuwa (2018), among others, who indicated that there is a statistically significant difference in the use of digital resources by gender. The outcomes of this study suggest that gender differences still exist in the use of digital resources.

## Conclusion and Recommendations

The study's findings show that male undergraduate students in the two institutions used digital resources more than female students; students have positive

perceptions of the effects of using digital resources; further analysis using chi-square also revealed that there is a statistically significant difference in the use of digital resources by gender in the two university digital libraries. The researchers concluded that the university libraries should create more awareness and continue to encourage female students to use digital resources to favourably compete with male students and enhance learning outcomes. The libraries should also continue to expand access to digital resources and organise training on how to use digital resources, focusing more on the needs of female students.

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