

**MANAGEMENT OF INSTITUTIONAL REPOSITORIES AND SERVICE  
DELIVERY IN SELECTED AGRICULTURAL RESEARCH  
INSTITUTES IN NORTH WESTERN NIGERIA**

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**DECLARATION**

I declare that this thesis is my original work and has not been presented to any other University/institution for consideration for any certification. This research thesis has been complemented by referenced sources duly acknowledged. Where text, data (including spoken words), graphics, pictures or tables have been borrowed from other sources, including the internet, these are specifically accredited and references cited using the current APA system and in accordance with anti-plagiarism regulations.

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## **DEDICATION**

I dedicate this Thesis to His Highness, the Late Emir of Zazzau, Alhaji (Dr) Shehu Idris CFR, LLD, FNTI, and my late father, Alhaji Abubakar Magaji. May their gentle rest in Jannatul Firdausi.

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**LIST OF ABBREVIATIONS AND ACRONYMS**

ARI:	Agricultural Research Institution
DOAR:	Directory of Open Access Repositories
DSPACE:	Digital Signal Processing and Control Engineering
IAR:	Institute of Agricultural Research
IRs:	Institutional Repository
NAERLS:	National Agricultural Extension and Research Liaison Services
NAPRI:	National Animal Production Research Institute
ROAR:	Registry of Open Access Repositories

## ABSTRACT

Institutional repositories (IRs) play a vital role in the preservation, dissemination, and visibility of academic knowledge. Beyond serving as digital archives, IRs showcase an institution's research outputs, thereby enhancing its scholarly reputation and accessibility. In Northwestern Nigeria—a region facing persistent challenges in agricultural productivity due to inadequate access to relevant information—the Nigerian government has invested in research institutes such as the National Animal Production Research Institute (NAPRI), the Institute for Agricultural Research (IAR), and the National Agricultural Extension and Research Liaison Services (NAERLS). These institutions have established IRs to store and share critical agricultural knowledge. To this end, this study investigates the management and utilization of IRs within these agricultural research institutes, intending to enhance their capacity to deliver high-quality services to diverse users. Specifically, it investigated the criteria used for resource selection and uploading, evaluated indexing practices, examined user engagement, and explored strategies to improve the visibility and accessibility of IRs. Guided by the Technology Acceptance Model (TAM), the research targeted 291 key stakeholders—including chief librarians, digital librarians, extension agents, veterinary doctors, livestock officers, and agricultural officers—using a census sampling technique. Data collection involved both standardized questionnaires and in-depth interviews. Descriptive statistics were applied to quantitative data, while qualitative interviews were thematically analyzed. Key findings showed a perceived disconnect between repository content and institutional objectives, pointing to issues related to content diversity, visibility, and academic impact. Participants reported dissatisfaction with indexing quality and limited integration of repositories with global search engines. Usability challenges and a lack of user awareness further hindered effective utilization. Notably, the study introduces new insights by linking these challenges to gaps in user-centered content policies and insufficient metadata optimization—areas often overlooked in previous studies. Based on these findings, the study recommends a strategic realignment of content selection practices, the adoption of quality control frameworks, improvements in indexing standards, and user-focused outreach initiatives. These contributions expand the existing literature by emphasizing the importance of aligning repository practices not only with institutional missions but also with end-user needs. They underscore the need for continuous usability enhancements and sustained visibility efforts to maximize the relevance, impact, and adoption of institutional repositories in the agricultural research landscape of Nigeria.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

The chapter presents the background of the study, statement of the problem, research objectives, research questions, significance of the study, study scope, limitations, delimitation, study assumptions, theoretical and conceptual frameworks, and operational definition of terminology.

#### **1.2 Background to the Study**

Institutional Repositories (IRs) have become indispensable tools in preserving, organizing, and disseminating an institution's intellectual output. Defined as digital collections that house research articles, theses, technical reports, and other scholarly content, institutional repositories (IRs) serve as platforms for safeguarding knowledge and enhancing its accessibility, visibility and service delivery. They house a wide range of scholarly materials—research articles, theses, datasets, technical reports—and are designed to support open access, foster collaboration, and inform evidence-based decision-making (Narlock & Brower, 2021; Bashir et al., 2022).

Globally, IRs are recognized as strategic assets in enhancing institutional visibility and public value (Kumar & Amsaveni, 2021). In the United States, repositories managed by agricultural research bodies are designed to reach both scholarly and non-scholarly audiences, with emphasis on accessibility, subject coverage, and user engagement (Dalton, Tenopir, & Björk, 2020). Similarly, Malaysia's MARDI repository integrates advanced user interfaces and subject-specific content to support

national food security and agro-industrial development (MARDI, 2023). In contrast, many African countries—including Tanzania and Ghana—struggle with repository visibility, content quality, and user awareness (Nunda & Elia, 2019; Korkuvi, Budu, & Owusu-Ansah, 2022).

Nigeria's IR landscape reflects a mix of promise and constraint. While over 20 repositories exist across agricultural research institutes, many suffer from limited accessibility, outdated infrastructure, and weak policy frameworks (Adewumi, 2019; Mbughuni et al., 2023). For instance, NAPRI and IAR restrict access to intranet-only platforms, while NAERLS lacks a comprehensive digital policy. These limitations hinder the repositories' potential to support timely, data-driven service delivery.

In agricultural research institutions in Nigeria, particularly those mandated to produce practical knowledge that impacts food systems and rural development, well-managed IRs are critical for achieving core mandates. These institutions are tasked with improving crop and livestock productivity, addressing food insecurity, and enhancing environmental sustainability through research and extension services (Akande, 2020; Mbughuni et al., 2023). To fulfill these responsibilities, the prompt dissemination of validated scientific knowledge is essential.

Nigeria, home to over 20 agricultural research institutes spread across its six geopolitical zones, relies heavily on these bodies to inform agricultural policy and practice. In Nigeria, agricultural research institutes such as the National Animal Production Research Institute (NAPRI), the Institute for Agricultural Research

(IAR), and the National Agricultural Extension and Research Liaison Services (NAERLS) are mandated to generate and disseminate innovations in crop and livestock production. They play pivotal roles in advancing animal production, crop development, and extension services, respectively. These institutions are expected to maintain well-managed IRs to ensure the timely flow of research outputs to stakeholders, including veterinary doctors, livestock officers, extension agents, and policymakers (Akande, 2020; Yusuf et al., 2021). Yet, despite these mandates, the usability and utilization of their IRs remain questionable, particularly in Northwestern Nigeria, where agricultural challenges persist despite institutional presence.

Usability and utilization, though interrelated, are distinct concepts. Usability refers to the ease with which users can navigate and interact with the repository—its interface design, search functionality, and metadata quality—while utilization concerns the extent to which users apply the content in practice (Ranasinghe & Chung, 2018; Joo, Hofman, & Kim, 2019). Studies have shown that poor usability often leads to underutilization, thereby weakening the repository's role in supporting agricultural innovation and service delivery (Hatab & Owusu-Sekyere, 2021; Ejikeme & Ezema, 2019). This study investigates both dimensions separately to determine how each contributes to overall service delivery.

Service delivery, in this context, refers to the ability of research institutes to provide relevant, timely, and actionable knowledge to stakeholders. It encompasses the processes through which agricultural officers, researchers, and extension agents meet the informational needs of farmers and policymakers (Okube et al., 2021). For

instance, when livestock officers and veterinarians can retrieve recent findings on animal disease outbreaks or vaccination protocols quickly and apply them in the field, this reflects quality service delivery. Conversely, limited or delayed access to such information undermines the responsiveness of institutional support to rural communities. When IRs are well-managed, they enhance service delivery by ensuring that users can access, interpret, and apply research outputs effectively (Sønderskov & Rønning, 2021).

The inclusion of veterinary doctors and livestock officers in this study is both rational and necessary. These professionals are direct implementers of research in animal health, disease control, and sustainable livestock management. They are frequent and essential users of repository content, and their insights into access and application can illuminate critical gaps in service delivery. Agricultural officers, extension workers, and agronomists equally depend on updated, accessible knowledge to address the dynamic needs of farming communities. Thus, capturing feedback from this broad spectrum of users allows for a comprehensive assessment of IR effectiveness. Moreover, the universality of this issue cannot be overstated. Agricultural challenges such as climate change, food insecurity, and zoonotic diseases transcend national borders. Thus, improving IR management in Nigeria and North-Western Nigeria in particular has implications for other developing regions with similar institutional and infrastructural constraints. Aligning repository practices with global standards—such as those promoted by UNESCO and the Confederation of Open Access Repositories (COAR)—can enhance Nigeria’s contribution to global agricultural knowledge systems (González-Pérez et al., 2020).

Several studies have shown that IRs, when properly managed, not only improve institutional reputation but also enhance public service delivery through data-driven interventions (Dalton, Tenopir & Björk, 2020). Yet, in Northwestern Nigeria, gaps remain in awareness, infrastructure, and policy frameworks supporting repository management. Bridging these gaps is urgent given the pressing need for innovation and resilience in Nigerian agriculture amidst climate change, food insecurity, and population growth.

This study, therefore, seeks to explore how the management of institutional repositories affects service delivery in selected agricultural research institutes in Northwestern Nigeria. By assessing usability, utilization, policy frameworks, and user perceptions, the research aims to generate actionable insights that can inform policy, improve repository performance, and ultimately strengthen the agricultural knowledge ecosystem.

### **1.3 Statement of the Problem**

Despite significant government investment in agricultural research institutes such as the National Animal Production Research Institute (NAPRI), the Institute for Agricultural Research (IAR), and the National Agricultural Extension and Research Liaison Services (NAERLS), agricultural productivity in Nigeria—particularly in the Northwestern region—has not reached expected levels (Abubakar, Wamae, & Gichugu, 2023; Akande, 2020). These institutions have developed institutional repositories (IRs) to collect, preserve, and disseminate agricultural research outputs via digital platforms. Ideally, these repositories, managed in conjunction with the Federal Ministry of Agriculture and Rural Development, are expected to offer user-

friendly interfaces and responsive information systems capable of addressing the real-time knowledge needs of field practitioners such as veterinary doctors, livestock officers, extension agents, and agricultural policymakers (Mbughuni, Wamae, & Gichugu, 2023; Ejikeme & Ezema, 2019).

However, empirical studies indicate that these repositories remain underutilized, poorly indexed, and often limited in accessibility, sometimes confined to institutional intranets (Adewumi, 2019; Yusuf, Adio, Zwalmam, & Suberu, 2021). The available evidence reveals no clear explanation as to why the performance of these repositories has not translated into improved agricultural service delivery. If this situation persists, the government's investment in agricultural research infrastructure risks yielding limited returns, and the nation's agricultural sector may continue to struggle with stagnation, inefficiency, and low responsiveness to pressing rural challenges (NADF, 2025; Olufolaji, 2018).

At the heart of the issue is the management of these institutional repositories, particularly with regard to the criteria for selecting repository content, strategies for enhancing user access, the extent of usability and utilization, and visibility within and beyond the institution (Bashir et al., 2022). Additionally, the lack of alignment with global best practices in repository architecture, indexing protocols, and user engagement further exacerbates the disconnect between the repositories' potential and their actual impact (González-Pérez, Ramírez-Montoya, & García-Peñalvo, 2020; Narlock & Brower, 2021).

It is against this backdrop that this study investigates how managing institutional repositories influences service delivery in agricultural research institutes in Northwestern Nigeria. By assessing usability, utilization, policies, and user perceptions, the study aims to provide insights that can improve repository performance and enhance the agricultural knowledge ecosystem.

#### **1.4 Purpose of the Study**

The study investigated management of institutional repositories and service delivery in selected agricultural research institutes in North-Western Nigeria. This was done by assessing how institutional repositories can be managed and used for the delivery of services in North-Western Nigeria.

#### **1.5 Objectives of the Study**

- i. To evaluate the alignment between content selection criteria for institutional repositories and the core mandates of agricultural research institutes in Northwestern Nigeria.
- ii. To investigate the extent to which the agricultural information resources uploaded to institutional repositories meet the information needs of target users involved in agricultural service delivery.
- iii. To assess the usability and actual utilization levels of institutional repositories by diverse user groups within the selected research institutes.
- iv. To analyze the quality and effectiveness of institutional repository indexing systems in facilitating timely retrieval and access to agricultural information.
- v. To examine the current visibility and accessibility enhancement strategies employed by the institutes for promoting institutional repository usage.

## **1.6 Research Questions**

1. To what level do the content selection criteria used in institutional repositories reflect the core mandates of agricultural research institutes in Northwestern Nigeria?
2. How effectively do the agricultural information resources uploaded to institutional repositories fulfill the specific needs of users involved in service delivery?
3. What are the usability experiences and levels of institutional repository utilization among various user groups in the selected research institutes?
4. How adequate is the indexing quality of institutional repositories in supporting prompt and accurate retrieval of agricultural information by relevant users?
5. What strategies are currently employed to enhance the visibility and accessibility of institutional repositories within the research institutes, and how effective are they perceived to be?

## **1.7 Significance of the Study**

The significance of this study spans multiple layers of agricultural knowledge management and delivery, with relevance for a diverse set of stakeholders, including digital librarians, extension workers, veterinary doctors, livestock officers, agricultural officers, internet users, scholars, researchers, and information science policymakers.

At its core, the study introduces a new dimension by focusing on the usability and utilization levels of institutional repositories (IRs) and their relationship with service

delivery in agricultural research institutes in Northwestern Nigeria. Unlike previous research that emphasizes repository development alone, this study investigates how repository design, content selection criteria, indexing strategies, and visibility protocols directly influence the practical application of research outputs by end users.

For digital librarians, the study presents practical frameworks for improving repository management by bridging gaps between technology infrastructure, metadata standards, and real-world user needs. It offers insights into how digital librarians can proactively align repository architecture with global best practices in accessibility and discoverability, especially in agricultural contexts where digital systems are underused. The study also highlights the importance of digital librarians taking leading roles in policy development, metadata quality assurance, content stewardship, and user training, further professionalizing their contributions to research dissemination.

Extension workers, veterinary doctors, and livestock officers will benefit from improved access to curated, up-to-date research content relevant to animal production, disease control, and crop management. By simplifying search pathways and improving the visibility of actionable knowledge, the study supports more efficient service delivery in rural and agricultural communities.

For agricultural officers and internet users, the study fosters greater awareness of institutional repositories as reliable sources of contextually relevant agricultural

information, especially for planning, decision-making, and public engagement. It promotes a shift from passive data storage to active knowledge sharing.

Scholars and researchers will find value in the study's contributions to the evolving literature on institutional repositories, open access, and knowledge dissemination in the Global South. It provides a localized yet scalable model for evaluating repository effectiveness in research ecosystems. Finally, for information science policymakers, the findings offer evidence-based recommendations for establishing digital repository policies that address infrastructure deficits, standardize metadata practices, and incentivize content contribution and reuse. This can help guide funding priorities, institutional mandates, and digital transformation strategies within Nigeria's agricultural research sector.

### **1.8 Scope of Limitation of Study**

This study specifically examines the management and utilization of institutional repositories (IRs) within agricultural research institutes in North Western Nigeria, to enhance their role in service delivery. It focuses on four core areas: (i) the extent to which content selection criteria reflect and support each institute's core mandate; (ii) the degree to which uploaded agricultural information resources meet the actual needs of repository users, particularly extension workers and agricultural officers; (iii) the levels of usability and utilization of the repositories by these users; (iv) the quality and effectiveness of indexing mechanisms for facilitating timely access and retrieval; and (v) the visibility and accessibility strategies employed by repository managers. The study is confined to three pioneering agricultural research institutes—NAPRI, IAR, and NAERLS—located in the region, chosen for their

national prominence and long-standing contributions to agricultural innovation. The primary users considered include extension workers and agricultural officers, both within and outside these institutions, whose ability to deliver services depends on timely access to relevant knowledge housed in the repositories. The study is anchored in the understanding that improving these dimensions will enhance the delivery of relevant agricultural research services to end-users, thereby strengthening the knowledge-sharing ecosystem across institutional and field-based actors in North Western Nigeria.

This study focused on investigating the management of institutional repositories in agricultural research institutes located in North-Western Nigeria. The scope of the study was limited to three selected institutes: the National Animal Production Research Institute (NAPRI), the Institute of Agricultural Research (IAR), and the National Agricultural Extension and Research Liaison Services (NAERLS). While these institutes are representative of the agricultural research landscape in the region, the findings are limited to the region due to variations in institutional structures, resources, and policies.

To mitigate the potential limitations in data access, the researcher collaborated closely with the management of the selected institutes to obtain the necessary permissions and access to relevant data. The study utilized a combination of primary and secondary data sources, including surveys, interviews, and institutional records, to ensure a comprehensive understanding of the management practices and challenges faced by the repositories.

The researcher acknowledged the potential challenges in obtaining the required responses from respondents, particularly considering their busy schedules and potential concerns about data confidentiality. To address this, the researcher communicated the purpose and significance of the study to the respondents, emphasizing the potential benefits of improving the effectiveness of the institutional repositories. The researcher also assured respondents of the confidentiality and anonymity of their responses, adhering to ethical guidelines throughout the research process.

To enhance the reliability and validity of the study findings, the researcher employed a mixed-methods approach, combining quantitative and qualitative data collection and analysis techniques. This triangulation of data sources and methods helped to corroborate the findings and provide a more comprehensive understanding of the research problem.

While the study was conducted within a specific timeframe and budget, the researcher carefully planned and allocated resources to ensure that the scope and depth of the study were not compromised. The researcher also sought the guidance and support of experienced mentors and colleagues to optimize the research process and outcomes.

By acknowledging and addressing these limitations and delimitations, the researcher aimed to conduct a rigorous and reliable study that contributes valuable insights and recommendations for improving the management of institutional repositories in agricultural research institutes in North Western Nigeria.

## 1.9 Assumptions

The study was grounded in the understanding that participants' behaviours and perceptions regarding institutional repositories (IRs) are socially constructed and context-dependent. Accordingly, the following assumptions guided the research:

- i. It was assumed that agricultural researchers and staff within the selected institutions would be open to sharing their subjective experiences and contextual understandings of how institutional repositories are managed and how this influence service delivery.
- ii. The study assumed that institutional support, in terms of access to information and cooperation from gatekeepers, would be present—acknowledging that such support often emerges from shared institutional cultures and norms.
- iii. It was assumed that the researchers and staff in the selected agricultural research institutes engage with institutional repositories based on their individually constructed meanings, shaped by professional background, training exposure, and institutional environment.
- iv. The study assumed that challenges faced in the management and use of institutional repositories vary across institutions, yet share common patterns grounded in regional realities and organizational culture within northwestern Nigeria.
- v. Lastly, the study assumed that findings derived from participants' narratives and localized practices would offer transferable insights that could inform similar contexts, where users' actions and technological interactions are mediated by socio-cultural and institutional settings.

## **1.10 Theoretical Framework**

### **1.10.1 Technology Acceptance Model (TAM) by Davis (1989)**

The theoretical framework adopted for this study is the Technology Acceptance Model (TAM), proposed by Davis (1989). This model has become a foundational theory for understanding how users come to accept and use technology. TAM provides a structured lens through which to assess user interaction with technological systems, particularly focusing on their perceptions and behavioural intentions. It has since become one of the most widely used models in information systems research, particularly in the evaluation of digital platforms and user interaction with them.

According to Davis (1989), the Technology Acceptance Model posits that two primary factors influence an individual's decision to adopt and use a new technology: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived Usefulness refers to the extent to which a user believes that using a particular system will enhance their performance, while Perceived Ease of Use denotes the degree to which the user believes that employing the system will be free from effort. These perceptions directly influence the user's attitude toward the technology, which then affects their actual usage behavior.

This theoretical model is highly relevant to the present study, which examines the management of institutional repositories (IRs) within agricultural research institutes in Northwestern Nigeria and how these systems support service delivery. The concepts of usability and utilization, as examined in the study, align directly with the TAM constructs. Usability corresponds to Perceived Ease of Use—how easily

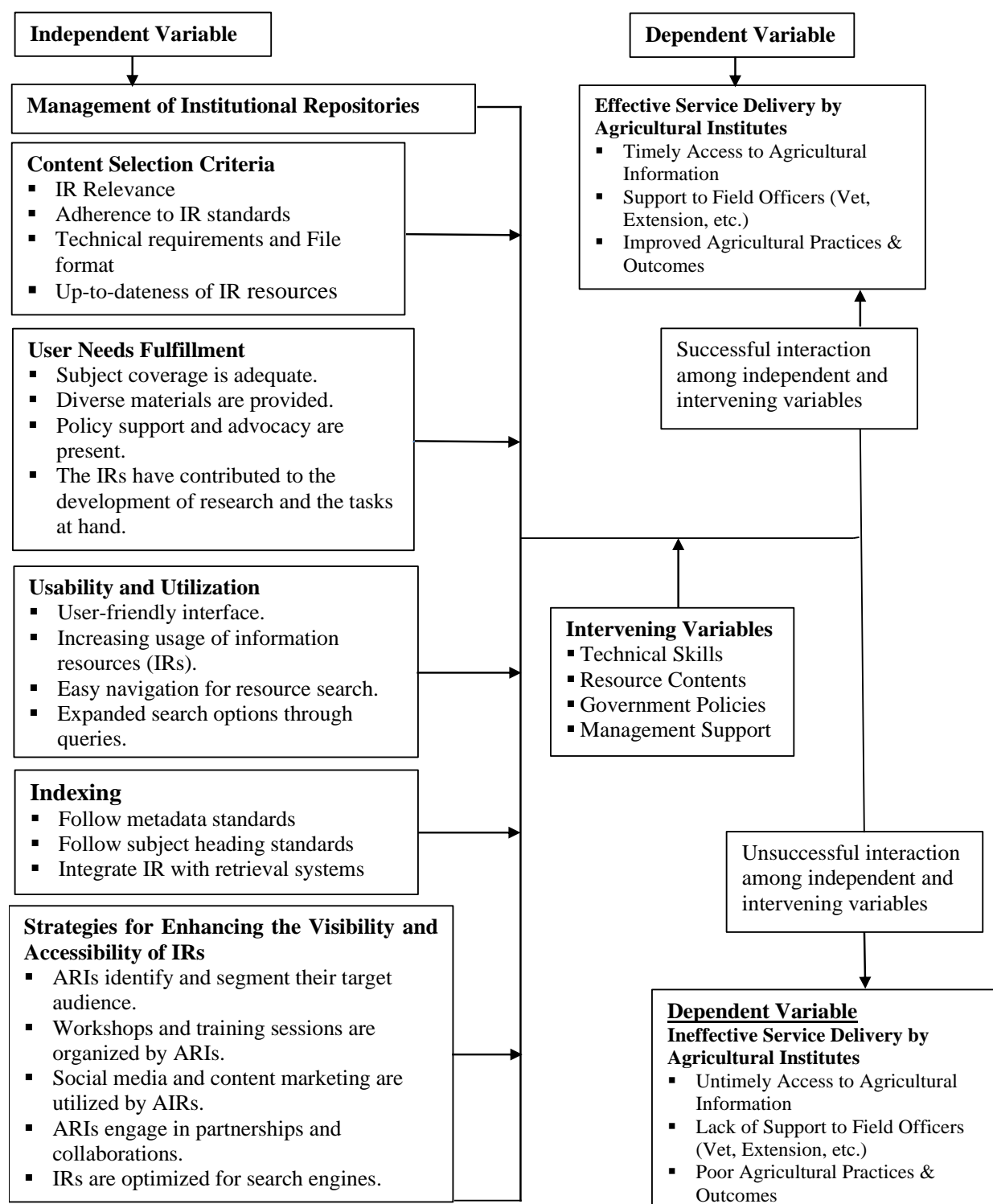
stakeholders such as veterinary doctors, extension officers, and agricultural researchers interact with the repository interfaces, search functions, and access pathways. Utilization aligns with Perceived Usefulness—whether users believe the IRs help them fulfill their professional roles more effectively, such as providing accurate agricultural advice, managing livestock more efficiently, or accessing the latest research findings.

TAM also helps explain variations in service delivery effectiveness. If IRs are not perceived as useful or easy to use, users are less likely to engage with them meaningfully, thereby weakening the institutions' ability to fulfill their mandates. By adopting this model, the study not only identifies key usability and utilization issues but also reveals behavioral and perceptual barriers that may prevent IRs from achieving their intended impact. Moreover, the findings drawn from TAM offer guidance for system designers, digital librarians, and policy stakeholders on how to enhance the design and management of IRs to maximize adoption and service delivery outcomes. The Technology Acceptance Model offers a robust explanatory framework that bridges the gap between repository system design and real-world user engagement. Its adoption in this study provides both a diagnostic tool and a prescriptive guide for improving the effectiveness of institutional repositories in the agricultural research sector.

### **1.11 Conceptual Framework**

A conceptual framework is a visual representation that illustrates the interconnections and associations among the variables under investigation. The visual representation of the conceptual framework is illustrated by the deep

Information and Communication Technology interfaces in Figure 1.1, presented herein.



**Figure 1.1: Conceptual Framework**

Source: Modified from Davis (1989)

The conceptual framework illustrates how the management of institutional repositories (IRs) within agricultural research institutes influences the effectiveness of service delivery, particularly when certain supporting conditions—referred to as intervening variables—are present. It offers a logical flow from input (management practices) to output (agricultural impact), helping to understand the pathway through which digital information systems contribute to real-world development outcomes.

At the top of the framework is IR management, which encompasses five key components: how content is selected, the extent to which that content meets user needs, the usability and frequency of repository use, the quality of indexing for fast retrieval, and the strategies used to make the repository visible and accessible. These elements form the foundation of a well-functioning repository, ensuring not only that valuable agricultural knowledge is captured but also that it is easy to find, relevant, and timely.

The relationship between repository management and service delivery is, however, not entirely direct. It is influenced by several intervening variables that either facilitate or obstruct the process. These include the technical skills of staff and users, the quality and relevance of content housed in the repository, the strength of government policy backing digital access, and the level of administrative or institutional support. When these factors are present in sufficient strength, they create a favourable environment where the benefits of good IR management can be fully realized.

The result—agricultural service delivery—reflects how effectively research institutes can support field officers, veterinary doctors, livestock experts, and extension workers with accurate, accessible, and applicable information. This service delivery can either be effective, marked by timely responses and improved agricultural outcomes, or ineffective, characterized by delayed information access, poor decision-making in the field, and underutilized research.

Altogether, the framework shows a chain of influence: strong management of institutional repositories enhances usability and access to vital knowledge, especially when enabling conditions are in place, ultimately improving the services agricultural institutes provide to their stakeholders. If any link in this chain is weak—such as poor indexing or lack of visibility—the whole process can suffer. This makes the framework a valuable tool for diagnosing challenges and designing interventions in the management of digital repositories.

### **1.12 Operational Definition of Terms**

**Institutional Repositories (IRs):** In the context of this study, institutional repositories refer to digital platforms managed by agricultural research institutes to collect, preserve, and disseminate scholarly and research outputs—including technical reports, journal articles, theses, and datasets—generated within the institutions.

**Agricultural Extension Officers:** For this study, agricultural extension officers are considered institutional staff who serve as intermediaries between research institutes and farming communities. Their role involves utilizing repository-sourced

knowledge to support farmer decision-making and promote sustainable agricultural practices.

**Agricultural Research Institute:** Refers to government-established institutions in Northwestern Nigeria that focus on generating research-based solutions to challenges in crop production, animal husbandry, and agricultural innovation. They serve as the focal organizations in the study.

**Collection Development:** In this study, collection development denotes the systematic process by which institutional repository content is selected, acquired, and organized to align with institutional mandates and user information needs.

**Competent Personnel:** Defined as individuals within the institute (e.g., librarians, IT staff, content managers) who possess the professional training, technical skills, and experience required to effectively manage and maintain the institutional repository system.

**Digital Librarians:** Digital librarians, in the context of this study, are information professionals responsible for curating, organizing, and maintaining digital repositories within agricultural research institutes in Nigeria. Their expertise ensures that agricultural research outputs are accessible, relevant, and usable by stakeholders such as extension workers, veterinary officers, and policy developers.

**Institutional Policies:** Institutional policies refer to formal guidelines and operational frameworks established by agricultural research institutes to regulate content inclusion, access protocols, metadata standards, and repository governance.

**Service Delivery:** Operationally, service delivery encompasses the provision of agricultural information, training, and research-based services to end users—such as farmers, field agents, and policymakers—facilitated by institutional repository access and use.

**User Awareness:** User awareness indicates the extent to which potential repository users (internal and external) are informed about the existence, purpose, and benefits of the institutional repository within the selected agricultural research institutes.

**User Competency:** User competency refers to the ability of repository users—including researchers, librarians, and extension workers—to effectively locate, navigate, and apply information resources housed within the institutional repository system.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter provides a literature review on the selection of resources for agricultural institutional repositories, User needs by the information resource uploaded in the repositories, indexing of agricultural institutional repositories, Usability and utilization levels of agricultural institutional repositories by users, and the strategies being used by the management of agricultural institutional repositories to make the contents accessible. Lastly, this chapter identifies and presents research gaps as per the reviewed literature.

#### **2.2 Criteria for Selection of Resources for Agricultural Institutional Repositories**

The criteria for selecting resources for institutional repositories (IRs) are fundamental to the effective management of digital collections within research institutions. This selection process is influenced by various factors, including the alignment of resources with the institution's mission, the research impact of the materials, the diversity of content, and the implementation of quality control mechanisms. A primary consideration in selecting materials for IRs is their relevance to the institution's research output. The quality of content is paramount in establishing an effective IR. As noted by Romary and Armbruster (2010), the value of a repository is largely determined by the quality of information provided by content creators, which necessitates the development of clear policies regarding acceptable standards. Furthermore, diversity in content types is essential. Salehi et al. (2019) found that IRs that offer a wide range of resources—including research

papers, theses, datasets, multimedia content, and grey literature—are better positioned to meet the diverse needs of users. This diversity not only enriches the repository but also enhances its utility as a resource for the academic community.

Quality control mechanisms are crucial in maintaining the credibility and reliability of repository materials. Dawes and Hirsch (2012) emphasized that rigorous peer review and curation processes foster user trust and confidence in the content. Effective self-archiving policies, as discussed by Xia and Sun (2007), are also vital for ensuring timely uploads of research outputs, further contributing to the repository's overall effectiveness. Additionally, aligning repository content with institutional goals is essential, as highlighted by Jones and Bozarth (2015). This alignment ensures that selected materials resonate with the institution's mission and strategic objectives, particularly in promoting open access and disseminating research outputs.

Research impact is another critical criterion in the selection process. Piwowar et al. (2018) demonstrated that open-access articles included in IRs tend to receive more citations than their non-open-access counterparts, underscoring the importance of selecting materials that have the potential to significantly influence the academic community. Institutions increasingly recognize the role of IRs in enhancing the visibility and impact of their research outputs, as noted by Bosman and Kramer (2018).

Balogun and Kalusopa (2021) highlighted the importance of sound policies for the digital preservation of Indigenous knowledge, pointing out that heritage materials in

Africa are often underrepresented in digital formats due to a lack of guidelines. Although their study focused on South Africa, the findings are relevant to the criteria for selection and uploading information resources in agricultural IRs. The absence of robust policies can hinder the effective management and utilization of invaluable information, such as knowledge related to traditional medicine. However, the study did not elaborate on how these policies could be leveraged to enhance service delivery in institutions.

Adam and Kiran (2021) emphasized the role of well-defined policies and frameworks in managing IRs. They argue that establishing IR content begins with developing clear service definitions and policy decisions tailored to the institution's goals. This involves identifying the types of content that will be accepted into the IR and determining who is authorized to deposit materials. These preliminary steps ensure the repository contains relevant materials that align with the institution's core mission, particularly in providing functional agricultural knowledge for agricultural research institutes (Barton and Waters, 2004). Conducting needs assessment surveys among community members and stakeholders can further clarify expectations and enhance the repository's relevance.

The selection and uploading of resources for agricultural IRs reflect varied perspectives across multiple studies, emphasizing critical factors such as alignment with institutional missions, research impact, diversity of content, and quality control mechanisms. González and Pinto (2017) stress the importance of aligning repository content with institutional strategic objectives to ensure it meets dissemination goals and promotes open access. This sentiment is echoed by Jones and Bozarth (2015),

who note that the mission statements of academic libraries often mirror these broader objectives, guiding the selection of relevant materials.

Many agricultural institutional repositories lack clear and comprehensive policies for resource selection and management, particularly regarding Indigenous knowledge and traditional practices. Research is needed to develop effective guidelines that address these challenges. Additionally, there is insufficient understanding of user needs in the resource selection process. The effectiveness of self-archiving policies in facilitating timely uploads of research outputs is also not well understood. Investigating the barriers that prevent researchers from using these options and improving the policies to increase participation is essential. While diversity in content is recognized as important, limited research exists on which specific types of materials benefit users in agricultural contexts. Future studies could explore the impact of including non-traditional outputs, like multimedia and grey literature, on user engagement.

Moreover, although some studies link repository use to citation rates, there is a gap in understanding how different materials contribute to research impact. Developing effective metrics to measure the influence of various content types is necessary. The implementation of quality control mechanisms is crucial for maintaining user trust, yet there is a lack of detailed studies on best practices in agricultural IRs. Research should focus on effective peer review and curation processes tailored to the needs of agricultural research.

Ensuring that repository content aligns with institutional missions is essential, but limited research exists on how to achieve this alignment in practice. Future studies could investigate strategies to ensure that selected materials meet both institutional goals and the needs of the broader academic community. Finally, resource selection criteria may vary significantly across different regions and contexts, highlighting the need for localized studies to examine how cultural, institutional, and disciplinary differences influence the management of resources in agricultural institutional repositories. Addressing these gaps will enhance the overall effectiveness and user satisfaction of these repositories.

### **2.3 User Needs and Satisfaction with Institutional Repository Resources**

User needs and satisfaction are critical components in evaluating the effectiveness of institutional repositories (IRs). Romary and Armbruster (2010) examined the policies governing IRs and argued that the subject matter encompassed by an institution's repository extends beyond the mere technical aspects of the software and the database housing the institution's digital collection. They contend that the quality of an IR is primarily defined by the quality of information compiled and deposited by content creators. Consequently, there is a pressing need for policies that specify the quality of content to be created and accepted into the repository. Although their study did not directly address the management of IRs within Agricultural Research Institutes, the implications suggest that managers in these settings should implement relevant policies to ensure the quality of uploaded content and the subsequent delivery of high-quality services. Thus, it is essential to have sound policies guiding the process of content creation for the IR, which is a vital

aspect of deliberate planning and regulation aimed at meeting the informational needs of end users.

Diversity of content is another significant indicator of a well-rounded institutional repository. Researchers and students rely on these repositories for a wide range of resources, including research papers, theses, datasets, multimedia content, and grey literature. In a study conducted by Salehi et al. (2019), which examined the diversity of materials in institutional repositories across Iran, the authors found that repositories with a broader variety of content types were more likely to attract users with diverse needs, thereby enhancing their value as resources for the academic community. This finding underscores the importance of repositories embracing diverse content types to better serve the research community.

Moreover, maintaining quality control mechanisms is essential to uphold the credibility and reliability of materials stored in IRs. Researchers particularly depend on these repositories for access to peer-reviewed research articles and trustworthy data. Therefore, ensuring the quality of deposited materials is paramount. Dawes and Hirsch (2012) explored the quality control processes in institutional repositories and found that rigorous peer review and curation procedures were associated with higher user trust and confidence in repository content. As such, quality control measures are indispensable in the selection and inclusion of materials within institutional repositories. Xia and Sun (2007) further emphasized that the success of an IR is closely linked to its self-archiving functions, which communicate a need and provide mechanisms to evaluate the repository's progress. This suggests that Agricultural Research Institutes should establish effective self-archiving policies to ensure that

every researcher and author of agricultural information uploads their work into the Institute's Repository within a specific timeframe. However, the responsibility for uploading institutional research outputs often falls to repository managers due to a lack of self-archiving policies, which are glaringly missing or poorly documented even among academic institutions. For instance, many Indian IRs do not empower faculty and researchers to self-archive their work, leading to a situation where repository managers are tasked with the responsibility of uploading materials. This dynamic can create hesitance among faculty members to share their research findings (Saini, 2018).

In addition to these factors, the alignment of IR mission statements with institutional goals plays a crucial role in user satisfaction. Jones and Bozarth (2015) investigated how academic libraries in the United States articulate their mission statements concerning institutional repositories. They found that these statements often emphasize open access, preservation, and knowledge sharing, reflecting the broader objectives of academic institutions. Such alignment ensures that the materials selected for inclusion resonate with the institution's overarching goals and values, as advocated by González and Pinto (2017).

The consideration of research impact in material selection has also been extensively researched. Piwowar et al. (2018) conducted a comprehensive study examining the citation advantage of open-access articles. Their findings indicated that open-access articles, frequently included in institutional repositories, tend to receive more citations than their non-open-access counterparts. This empirical evidence highlights

the importance of selecting materials that possess the potential to exert a broader impact on the academic community.

The diversity of content within institutional repositories has been explored from various perspectives. Pearce and Sutherland (2015) examined how repositories can incorporate non-traditional research outputs, such as creative works and multimedia materials. This diversity not only addresses the evolving needs of users but also contributes to a richer scholarly ecosystem. Similarly, investigations into the inclusion of grey literature in repositories (VanLeeuwen, 2019) have underscored the importance of incorporating a wide array of research outputs beyond traditional scholarly articles.

Quality control mechanisms remain a focal point of research, particularly regarding the integrity of repository materials. Zhao et al. (2017) investigated the role of peer review in open-access journals and repositories, emphasizing its significance in ensuring the quality and trustworthiness of content. They argued that rigorous peer review processes contribute significantly to the credibility of repository materials, further reinforcing the necessity of quality control in the selection and curation of materials.

The study conducted by Bamigbola (2021) aimed to examine the influence of awareness, anchor, and adjustment factors on the utilization of institutional repositories among researchers at agricultural research institutes in Nigeria. The scholarly literature has emphasized the widespread adoption of institutional repositories on a global scale and the considerable advantages they offer to many

stakeholders, particularly researchers. Nevertheless, previous research has demonstrated that educators exhibit limited utilization of institutional repositories. The primary objective of Bamigbola's study was to address the existing knowledge gap by investigating the elements that contribute to researchers' utilization of institutional repositories, focusing specifically on the awareness anchor and adjustment factors.

The researchers employed a descriptive survey methodology and adopted a purposive sampling technique to select Nigerian universities that had operational institutional repositories for a minimum of four years at the time of data collection. The research population comprised 857 respondents, and data were gathered through a questionnaire developed specifically for this research. The findings indicated that the utilization of institutional repositories by lecturers at Nigerian agricultural research institutes is influenced by awareness, with anchor factors including computer self-efficacy, perception of external control, computer playfulness, and computer anxiety. The adjustment factors identified were perceived enjoyment and objective usability, which determine perceived ease of use.

This research underscores the significance of users' awareness regarding the existence and potential benefits of institutional repositories in influencing their usage patterns. However, it is important to recognize certain limitations or gaps in the study. The material presented lacks sufficient detail regarding the specific anchor and adjustment elements investigated, making it challenging to fully comprehend their significance. Additionally, the article does not analyze practical usage rates of

institutional repositories by users or examine viable approaches to overcome the highlighted constraints.

In their study, Nunda and Elia (2019) investigated the utilization and acceptance of institutional repositories among the postgraduate student population at Muhimbili University of Health and Allied Sciences and Sokoine University of Agriculture. Utilizing a mixed methods descriptive research design, the data were obtained through interviews and questionnaires, employing a simple random selection method to choose a total of 55 respondents. The study's primary findings revealed that a significant proportion of the respondents, specifically 87.3% (48 out of 55 respondents), demonstrated awareness of the presence of institutional repositories. Nevertheless, 21 respondents (accounting for 38.2% of the sample) exhibited a moderate level of awareness. These findings indicate a comparatively limited degree of familiarity with institutional repository services among the postgraduate student demographic.

The study concluded that providing information literacy (IL) training is of significant importance in facilitating the acceptance and utilization of institutional repositories among postgraduate students. It is advised that academic libraries embed information literacy (IL) programs to increase the adoption and utilization of institutional repositories. Furthermore, the study posited the necessity of enhancing the quality of materials housed within institutional repositories to more effectively cater to the distinct needs of students, highlighting a contextual gap given that the research was conducted in Tanzania.

In their exploratory investigation, Adam and Kaur (2021) aimed to evaluate the extent of institutional repository implementation in African nations. To achieve this objective, they utilized two widely recognized resources: the global Directory of Open Access Repositories (OpenDOAR) and Transparent Ranking: All Repositories by Google Scholar. The study provided a comprehensive analysis of the operational status and performance of repositories within the African region. The researchers employed factor analysis and cluster analysis techniques to examine the operational levels of institutional repositories across various African countries.

The findings indicated that the performance of institutional repositories in African countries, on average, did not meet anticipated standards. The study highlighted several nations, including South Africa, Kenya, Nigeria, Algeria, Sudan, and Egypt, where the potential for establishing worldwide open access to research findings through institutional repositories was more favorable compared to other African countries. Despite considerable efforts by various organizations, institutions, and communities in Africa to promote open-access practices, the extensive establishment of institutional repositories is progressing at a sluggish pace.

Furthermore, the performance of the implemented repositories failed to meet expected standards. While the study enhances understanding of the current state of institutional repository implementation in Africa, it is important to acknowledge several limitations. The study relied on data from OpenDOAR and Transparent Ranking: All Repositories from Google Scholar, which may not comprehensively represent all institutional repositories in Africa. Additionally, the study does not thoroughly examine the underlying variables contributing to the sluggish adoption

and subpar performance of repositories, indicating a need for future exploration in this area.

Quality control remains a pivotal concern, as highlighted by Dawes and Hirsch (2012) and Zhao et al. (2017). Their findings advocate for rigorous peer review and curation processes to maintain the credibility of materials stored in these repositories, which is essential for fostering user trust and confidence. Despite these insights, critical gaps and areas for further investigation persist. For instance, Bamigbola (2021) points out that while awareness of repositories is crucial for their utilization, there is a need to better understand the specific factors that influence this awareness and usage among researchers in contexts such as Nigerian agricultural research institutes.

Similarly, Adam and Kaur (2021) suggest that while some African countries are advancing in establishing institutional repositories, the overall pace and effectiveness of these initiatives vary significantly, indicating a need for more detailed studies on the factors hindering broader adoption and impact. While there is a consensus on the importance of aligning repository content with institutional missions, enhancing research impact, ensuring diversity, and maintaining quality, disagreements arise regarding the pace and effectiveness of these initiatives across different contexts.

The literature review shows several critical gaps that permit further exploration. First, there is a need for a deeper understanding of the specific factors influencing user awareness and satisfaction with institutional repositories, particularly in the

context of agricultural research institutes. The existing studies often lack detailed analysis on practical usage rates and the effectiveness of self-archiving policies, which are crucial for enhancing user engagement. Furthermore, while quality control measures are recognized as vital for building user trust, there is insufficient exploration of how these processes can be effectively implemented to enhance user satisfaction.

Lastly, the varying effectiveness of IR initiatives across different African countries underscores the necessity for localized studies that consider unique contextual challenges and opportunities. Addressing these gaps is essential for improving the usability and overall impact of institutional repositories, ensuring they effectively meet the diverse needs of their users.

#### **2.4 Usability and Utilization Levels of Agricultural Institutional Repositories**

The usability and utilization of agricultural institutional repositories (IRs) are critical for enhancing research output and improving agricultural practices. In their study, Makate and Makate (2019) examined how access to agricultural extension services and the adoption of Drought Tolerant Maize (DTM) technology could improve livelihood outcomes for smallholder farmers in Zimbabwe.

Their research employed an instrumental variable regression model to analyze the relationship between DTM adoption and various outcomes, including maize yield, consumption, and sales. The findings revealed that agricultural extension services significantly strengthened the correlation between DTM adoption and positive outcomes like increased maize yield and consumption. However, the study also

noted a diminished association between DTM use and commercial maize sales, suggesting that while extension services enhance certain agricultural outcomes, they may inadvertently divert focus from market-oriented production.

Similarly, Ukwoma and Ngulube (2019) explored the barriers hindering the adoption of institutional repositories among researchers in Nigerian agricultural research institutes. Their findings identified key obstacles such as inadequate infrastructure, limited awareness, and a lack of technical skills among researchers. To address these challenges, the authors recommended developing clear institutional policies to guide the construction and utilization of repositories. They emphasized the importance of enhancing researchers' understanding of the benefits of IRs and promoting managerial involvement in repository projects. This collaborative approach aims to improve the effectiveness of institutional repositories and facilitate greater research output dissemination.

Both studies highlight the importance of support systems—whether through agricultural extension services or institutional strategies—in maximizing the utility of IRs. Makate and Makate (2019) emphasize the synergistic effects of integrating extension services with agricultural technologies, while Ukwoma and Ngulube (2019) focus on the institutional barriers that inhibit repository utilization. Their findings underscore the need for a comprehensive understanding of how various factors contribute to the effective use of agricultural IRs.

The push for open access to research outputs has also influenced the development of IRs. Magiri (2022) notes that the open-access movement aims to democratize access

to research findings, liberating users from subscription costs associated with traditional publishing. This shift is particularly relevant for agricultural research institutions, which are expected to make their outputs accessible to enhance productivity and service delivery. However, Koshiyama et al. (2015) point out that several factors can hinder the accessibility and usability of IRs, including the need for user-friendly interfaces and content that meets informational needs. These five usability features are crucial for evaluating the effectiveness of agricultural IRs.

Arndt (2014) further emphasizes that institutional repositories must remain accessible to the user community, especially in light of rising subscription fees and budget cuts. Bijan, Biswas, and Mukhopadhyay (2016) argue that IRs should be designed to enhance accessibility and utilization, incorporating quality assurance processes to ensure effective resource management. This perspective directs the current study to explore quality assurance policies implemented by agricultural research institutions to facilitate unimpeded access to their resources.

Despite significant advancements in the usage of IRs, challenges remain. Earlier studies indicated low interest and understanding of IRs among researchers (Kiambi, 2018), but there has been a growing recognition of the importance of open access. Magiri (2022) states that the primary goal of integrating IRs in research institutes is to enhance the visibility of research outputs, which should lead to better accessibility and utilization. Long-term preservation, organization, and distribution of scholarly content are also essential objectives for ensuring sustained access to knowledge.

Awareness of IRs is another critical factor influencing utilization. Bailey (2016) found that researchers expressed a strong desire to access IRs but were often unaware of their existence. This sentiment was echoed in a study by Nunda and Elia (2019), which reported low levels of awareness among postgraduate students regarding IR services in health sciences and agricultural disciplines. This lack of awareness directly correlates with low access and usage of IR content, highlighting the necessity for institutional managers to promote repository services effectively.

In summary, the studies on usability and utilization levels of agricultural institutional repositories reveal a complex interplay of factors influencing their effectiveness. While improvements have been made, significant gaps remain. These include the need for comprehensive policies to enhance awareness and usability, targeted interventions to overcome identified barriers, and strategies to ensure the long-term preservation and accessibility of research outputs. Addressing these gaps will be essential for maximizing the potential of agricultural IRs and improving overall research dissemination and utilization.

### **2.5 Indexing of Agricultural Institutional Repositories**

Indexing plays a crucial role in enhancing the visibility and accessibility of agricultural institutional repositories (IRs). A key aspect of effective indexing involves ensuring that repository materials are included in major search engines, such as Google Scholar. Arlappa and Surianarayana (2017) emphasize that this inclusion is vital for improving researchers' access to relevant materials, which can lead to increased citations and a greater research impact. The visibility provided by search engines is essential for disseminating research outputs widely.

Central to effective indexing is the quality of metadata. High-quality and comprehensive metadata significantly enhance the discoverability of repository content. Norris, Oppenheim, and Rowland (2008) conducted a study that demonstrated that repositories with superior metadata quality experienced higher success rates in terms of content discoverability and usage. This finding underscores the importance of meticulous metadata creation and management in successful indexing efforts. Furthermore, Van Tuyl and Recker (2012) found that repositories with rich, well-structured metadata enjoyed increased visibility and user engagement, reinforcing the need for institutions to prioritize metadata quality.

Subject indexing is another critical dimension explored in the literature. Kumaret et al. (2020) found that subject-based indexing improves the precision and relevance of search results, making it easier for researchers to locate specific materials within repositories. This strategy is particularly beneficial in multidisciplinary repositories, where diverse content types can lead to varied user interests. Kim, Park, and Park (2018) also highlighted that subject indexing significantly enhances the accuracy of search outcomes, allowing users to find materials that align closely with their research needs.

Interoperability, or the ability of repositories to integrate with external systems and databases, has gained attention as a strategy for improving indexing. Jones (2018) emphasized that interoperable repositories can extend their reach by connecting with discipline-specific databases and academic networks, thereby enhancing the discoverability of their content. This approach aligns with the open-access philosophy, which advocates for making research readily available to a global

audience. Pinfield, Middleton, and Wigzell (2014) further illustrated that interoperable repositories effectively participate in a broader scholarly communication ecosystem, thus amplifying their reach and impact.

Despite the benefits of these indexing practices, challenges remain. Smith (2015) noted that maintaining consistent and up-to-date indexing practices can be resource-intensive, requiring sustained effort and investment from institutions. The challenges of achieving high-quality metadata, implementing subject indexing, and ensuring interoperability necessitate a strategic approach and collaboration among various stakeholders within the institution.

The operational aspects of institutional repositories are also influenced by the technological platforms used for their management. Kounoudes et al. (2010) identified DSpace as a prominent open-source software for building IRs, noting its ability to capture various digital formats and its compatibility with the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). This compatibility allows DSpace to index, preserve, and distribute digital content efficiently. However, the study did not specifically address the management of IRs in the context of agricultural research or how DSpace's features could be leveraged to enhance service delivery.

Recent studies have highlighted the role of Information and Communication Technology (ICT) in managing research data at agricultural research institutes. Ng'eno and Mutula (2022) focused on the extent to which these institutes have adopted modern techniques for managing information resources, revealing a

significant gap in the availability of advanced technological interfaces. Kiambi (2018) similarly found that many African agricultural research institutions face challenges in utilizing ICT interfaces effectively, which hampers their ability to enhance research management.

The literature indicates that while there has been progress in the indexing of agricultural institutional repositories, substantial gaps remain. These include the need for improved metadata quality, effective subject indexing, and enhanced interoperability among repositories. Additionally, there is a critical need for institutions to invest in the necessary infrastructure and resources to maintain high-quality indexing practices consistently. The findings highlight the importance of strategic collaboration among stakeholders to address these challenges and fully realize the potential of agricultural IRs in disseminating research outputs effectively. The indexing of agricultural institutional repositories is essential for enhancing their visibility and accessibility. While existing studies underscore the significance of metadata quality, subject indexing, and interoperability, ongoing challenges require attention. Future research should explore targeted strategies for improving indexing practices, addressing technological gaps, and fostering collaboration among stakeholders to enhance the usability and impact of agricultural institutional repositories.

## **2.6 Strategies used to make Agricultural Institutional Repositories Visible and Accessible**

The visibility and accessibility of agricultural institutional repositories (IRs) are crucial for maximizing their impact on scholarly communication and research

dissemination. Ranasinghe and Chung (2018) explored the role of IRs as platforms for scholarly publishing, proposing a framework that emphasizes the importance of open-access distribution. Their study highlights that while IRs have traditionally been used to enhance access to conventional scholarly materials, they also have the potential to serve as venues for academic publishing. By maintaining control over their research outputs, institutions can promote wider availability of their findings, thereby contributing to the open-access movement.

In a complementary study, Ismail et al. (2021) investigated the visibility of IRs among research institutes in Malaysia. They employed webometrics indicators, such as external links and web mentions, to assess the online presence of various repositories. Their findings indicated that IRs affiliated with research-focused institutions, such as Universiti Malaya and Universiti Putra Malaysia, exhibited significantly higher visibility compared to those associated with non-research institutions. The authors suggested that non-research institutes could enhance their prominence by implementing strategies such as reciprocal hyperlink exchanges and increasing engagement on research social networking platforms. This underscores the necessity of active digital strategies to boost the visibility of IRs.

Balogun and Kalusopa (2021) addressed the importance of digital preservation of indigenous knowledge, noting that many heritage materials in Africa remain under-preserved due to a lack of digital preservation guidelines. Although their focus was on South Africa, the implications of their findings extend to agricultural research institutions, which must establish policies to safeguard valuable indigenous knowledge. The absence of sound policies can hinder effective management and

dissemination of this knowledge, highlighting the need for frameworks that facilitate quality service delivery.

Romary and Armbruster (2010) emphasized that the quality of an IR is not solely determined by its technical infrastructure but also by the quality of content created and deposited. They advocated for the establishment of policies to ensure that only high-quality content is accepted into repositories. This perspective suggests that agricultural research institutes should implement relevant policies to enhance the quality of uploaded materials, thereby improving the overall effectiveness of their IRs.

Additionally, Adam and Kiran (2021) stressed the importance of developing clear service definitions and policy decisions for IRs. They argued that repository managers should define the key objectives of their IRs and the types of content that will be accepted. This proactive approach ensures that IRs remain focused on their core mission, such as providing functional agricultural knowledge. Conducting needs assessment surveys prior to the development of an IR can also help align repository offerings with the expectations of stakeholders and users.

Saini (2018) highlighted the necessity of conducting needs assessment surveys to understand the requirements of potential users before establishing an IR. This step is crucial for ensuring that the repository meets the informational needs of its audience. Xia and Opperman (2010) further supported this by advocating for the inclusion of user input in the planning stages of IR development. Such collaborative planning is essential for creating repositories that effectively serve their communities.

Long-term digital preservation policies are also vital for the sustainability of IRs. Swan and Carr (2009) emphasized the need for mandatory policies that ensure the ongoing management of research outputs within repositories. Implementing these policies can provide a reliable source of knowledge for farmers, extension officers, and other stakeholders in the agricultural sector.

Despite the insights provided by these studies, gaps remain in the exploration of effective strategies for enhancing the visibility and accessibility of agricultural IRs. While the literature advocates for the adoption of open-access frameworks and active digital strategies, there is a lack of comprehensive guidelines on how to effectively implement these strategies in agricultural contexts. Furthermore, the role of national policies in shaping the management of IRs within agricultural research institutions has not been thoroughly examined.

In summary, the strategies for making agricultural institutional repositories visible and accessible involve a multifaceted approach that includes leveraging repositories for scholarly publishing, employing webometric indicators, and establishing sound policies for content quality and digital preservation. Future research should focus on developing practical frameworks for implementing these strategies, addressing the unique challenges faced by agricultural research institutions, and exploring the influence of national regulations on repository management.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter encompasses many components of the study, including the research design, study variables, study location, target population, sampling strategy, sample size, research instruments, data collection techniques, data analysis, and ethical issues.

#### **3.2 Research Design**

A study design is a comprehensive plan outlining the methodology for collecting and analyzing data on a certain subject (Kombo, 2018). This study utilizes a cross-sectional survey research design to ensure the inclusion of a representative sample from the three National Agricultural Research Institutes located in North West Nigeria. This design allows the study to collect a wide array of data from Institutional Repository Practitioners on the management of the repositories and service delivery from many different individuals at a single point in time by observing variables without influencing them (Lauren 2023).

Given the goal of evaluating the management of institutional repositories and service provision, the study deemed the descriptive research design because Cross-sectional studies can be used for both analytical and descriptive purposes as required data was gathered from an ample number of respondents within the scope of the study using questionnaires and interviews. The design enabled the study to explore and gather comprehensive data on digital librarian's material selection, evaluation methods, indexing techniques, users' perceptions and policies, processes, and

strategies employed to enhance the visibility and accessibility of respective repositories.

### **3.2.1 Study Variables**

Variables refer to the distinct features or characteristics of an individual or organization that are subject to measurement or observation by the researcher. These variables exhibit variation among the individuals or organizations under investigation. The researcher seeks information on these crucial features to address the purpose of the study (Creswell, 2013). It is generally assumed that the identified problem to be solved by the study lies in the overall interactions among the variables and scientific manipulation of the variables provides suitable means of solving the problem.

For instance, the current study seeks to understand how different practices in the management of institutional repositories impact the delivery of services among Agricultural Research Institutes in North Western Nigeria. The variables include different institutional repository management practices such as the selection and upload of resources, Subjects covered, IR management strategies, IR Indexing, IR utilization, and aspects of service delivery are the specific study variables. Even though there are usually several categories of variables depending on the nature of the problem under study, the current study involves three main categories including independent, dependent, and intervening variables.

### **3.2.2 Independent variables**

Independent variables refer to the conditions or traits that exert an influence on a dependent variable (Creswell, 2013). Independent variables are employed in order to

acquire understanding regarding the association and causality in the course of acquiring a basic understanding of the association between occurrences. That is, an independent variable is understood as the force or factor that may be acting individually or alongside other independent variables to bring about variation in the dependent variable. In the context of the current study, the factors that are conceived to affect the level of service delivery among Agricultural Research Institutes in North Western Nigeria include the four aspects of Institutional Repository management.

Therefore, the specific independent variables in the study include selection and uploading of information resources in the IR, techniques and considerations in the indexing of the IR's information resources, utilization and exploitation of institutional repositories by various users within and outside the Agricultural Research Institutes, and strategies being used to promote and enhance visibility of the IR resources among the current and potential users across the globe.

#### **3.2.2.1 Criteria for selection of IR resources**

The criteria for selecting resources for the agricultural research institutes' institutional repositories were measured in terms of how they lead to selecting resources relevant to the research institutes' mission and objectives. Additionally, the criteria were evaluated on whether they provided quality control mechanisms in selecting resources for the IRs.

#### **3.2.2.2 User Needs and Utilization of the uploaded IR resources**

The current study measured this variable from four (4) dimensions including the relevance of IR and its contents to the mission and vision of the Agricultural

Research Institutes, the impact of the IR on the institutes' research activities, the diversity of the IR content, and the quality control measures being applied in the management of the IRs.

#### **3.2.2.3 Techniques and considerations in the indexing of the IR's resources**

This variable is aimed at assessing the effectiveness of indexing in an institutional repository. It was measured in terms of how it facilitates access to scholarly and research resources, supports academic and research activities, and enhances visibility and impact of institutional outputs through various search engines and databases like Google Scholar, Scopus, Web of Science, and Research Gate among others. Other metrics for this variable included the inclusion of the IR contents of the Agricultural Research institutes in the popular search engines, the quality of the information resources' metadata, the extent of subject indexing, and interoperability of the IRs with other digital library systems.

#### **3.2.2.4 Utilization and exploitation of institutional repositories**

The specific metrics for the utilization variable included the extent to which managers of the IRs at the Agricultural Research Institutes engage users of their resources, the demographic scope of the users, and the volume of the IR content downloads.

#### **3.2.2.5 Strategies for the promotion and enhancement of the IRs**

To understand the overall effectiveness in the management of IRs, the study considered the strategies that are applied in their promotion and enhancement as a critical pillar. The strategies included means through which the IR managers ensure optimization of the search engines, exploration and taking advantage of social media

platforms, cross-platform promotion, and other means of reaching out to other stakeholders.

### **3.2.3 Dependent variables**

The dependent variable in this study is agricultural service delivery by research institutes. This refers to the overall effectiveness with which these institutes fulfill their core responsibilities of supporting farmers, livestock officers, extension agents, and other stakeholders with timely, relevant, and research-based agricultural information.

In practical terms, agricultural service delivery includes a variety of outcomes such as how quickly and accurately information is disseminated to the field, how well informed the technical officers are when making agricultural recommendations, and the extent to which the institutional knowledge housed in digital repositories translates into improved practices on farms and in livestock management. Good service delivery means that frontline workers and end users have access to updated research findings, policies, and techniques—leading to greater productivity, innovation, and problem-solving in the agricultural sector. This variable is the final output of the entire system the study is examining, and its quality depends heavily on how well the institutional repositories are managed and used.

The dependent variable is conceptualized and measured through four interrelated dimensions that reflect the real-world impact of institutional repository (IR) management on information access and utilization. The first dimension focuses on public awareness and knowledge sharing. This assesses how the management of IRs

contributes to educating the public and internal users by making research outputs more visible and understandable. It explores whether repository use improves general knowledge and promotes the practical application of findings among target users such as extension workers, researchers, and field officers.

The second dimension examines targeted information dissemination. It considers how effectively the institutions deliver agricultural information to users based on their specific needs. Because agricultural research institutes serve a diverse range of professionals—including livestock officers, veterinary doctors, and policy actors—this dimension evaluates how selective and strategic the flow of information is across various user groups. A third dimension involves capacity building and skill development. It investigates whether the utilization of agricultural research repositories helps users acquire new competencies or strengthen their professional skills. The presence of well-organized, relevant content within IRs can be a powerful educational tool when used consistently by field personnel and knowledge workers.

The final dimension concerns support for decision-making within the research institutes. Here, service delivery is measured by the extent to which repository content informs policies, strategic planning, and day-to-day decisions by administrators and researchers. If digital resources within the IR are regularly referenced in decision processes, it indicates a strong integration of digital knowledge tools into institutional operations.

### **3.2.4 Intervening variables**

The intervening variables are phenomena or characteristics that may cause positive or negative changes in the expected study outcome on the independent variable but

the dimensions are unknown to the study (Creswell, 2013). For instance, the expected effects of the four IR management practices on the delivery of services among agricultural research institutes may be boosted or limited by internal or external factors. Such factors therefore intervene in the interaction between IR management practices (Independent variables) and delivery of services at the research institutes (Dependent variable). The intervening variables in the current study included availability or absence of technical skills among the IR managers, contents of the uploaded resources, relevant government policies, and support from the top management of the sampled agricultural research institutes. It is assumed that the delivery of services by the sampled institutes is likely to experience positive change when these variables work in favor of the four independent variables.

### **3.3 Location of the study**

Seven states are included in Nigeria's North Western Geopolitical Zone. These states include Kaduna, Kano, Jigawa, Katsina, Zamfara, Sokoto, and Kebbi State. The research was conducted at three agricultural research institutes located in Northwestern Nigeria, specifically in Kaduna State shown in the geographical map in *Appendix VIII*. The exclusive agricultural institutes in North West Nigeria comprise the National Agricultural Extension Research and Liaison Services (NAERLS), National Animal Production Research Institutes (NAPRI), and Institutes for Agricultural Research (IAR). Given that agriculture continues to serve as the primary economic driver of the region, enhancing the service delivery of the aforementioned institutions would have a positive impact on its economy.

### 3.4 Target Population

The scope of this study is geographically limited to selected Agricultural Research Institutes (ARIs) in North-Western Nigeria, where institutional repositories (IRs) have been established and are actively used. This choice is justified by the strategic relevance of these institutes in disseminating agricultural research outputs to a wide range of stakeholders operating in rural and semi-urban farming communities. In terms of population scope, the study targeted the entire population of 291 key stakeholders directly involved in the management and use of institutional repositories across these institutes. As defined by Kothari (2014), a population refers to the complete group of individuals or elements relevant to the research problem. In this case, the population includes both repository managers (primarily librarians and digital information officers) and users of the repositories—such as veterinary doctors, livestock officers, extension agents, and agricultural researchers—who utilize the repositories for decision-making and knowledge dissemination. The distribution of this target population across institutions is provided in Table 3.1.

**Table 3.1 Total Population of Respondents (291 out of 291 was used)**

Respondents			NAPRI	IAR	NEARLS	Total Population
IR Managers	1	Chief Librarians	1	1	1	3
	2	Digital Librarians	5	6	4	15
IR Users	3	Extension Workers	28	20	22	70
	4	Veterinary Doctors	19	22	24	65
	5	Livestock/Agricultural officers	36	32	27	95
	6	Researchers	15	15	13	43
<b>Total</b>			<b>104</b>	<b>96</b>	<b>91</b>	<b>291</b>

**Source: Administrative Departments of the Research Institutes, 2023.**

The distribution in Table 3.1 indicates there are 104 stakeholders which comprise chief librarians (1), digital librarians (5), extension workers (28), veterinary doctors (19), livestock/agricultural officers (36), and researchers (15) from NAPRI while, IAR comprises of 96 stakeholders include chief librarians (1), digital librarians (6), extension workers (20), veterinary doctor (22), livestock/agricultural officers (32) and researchers (15). There are 91 stakeholders include chief librarians (1), digital librarians (4), extension workers (22), veterinary doctors (24), livestock/agricultural officers (27) and researchers (13) from NEARLS. Targeting at the six (6) categories of respondents was timely and appropriate because of their unique positions in managing, and experience over time in disseminating, and use of digital research outputs from the institutions.

### **3.5 Sampling Techniques and Sample Size Determination**

#### **3.5.1 Sampling Techniques**

The study utilized a purposive sample technique to pick three key National Agricultural Institutes in North West Nigeria that had operational institutional repositories. A census sampling method to select all 291 key stakeholders. Census sampling refers to a technique where data is collected from every member of the defined population, rather than selecting a subset or sample. This method is particularly useful when the population is relatively small, well-defined, and accessible, such as all digital librarians or repository managers within agricultural research institutes. Census sampling ensures complete coverage and eliminates sampling error, making it ideal for studies aiming for comprehensive insight across all units of interest. Census sampling involves collecting data from every unit in the

population. It is used when the population is small or when complete accuracy is required (Singh & Masuku, 2014).

The study aimed to account for any predisposition by focusing on key stakeholders from the three National Agricultural Institutes in North West Nigeria, where these categories of selected respondents are more likely to provide information that will help the study and enhance service delivery.

### 3.5.2 Sample Size Determination

The selection of sample institutions and the allocation from each stratum is determined using the mathematical formula of the Hayes model (Hayes, 2023) thus;

$$\frac{n}{\mu} \times \vartheta$$

Where;  $n$  = Sample size

$\mu$  = Population size

$\vartheta$  = Stratum size

The researcher is interested in sampling 291 out of 291 key stakeholders in the three agricultural research institutes.

Stratum 1 (NAPRI)

$$\vartheta_1 = 291/291 * 104 = 104 \text{ Respondents}$$

Stratum 2 (IAR)

$$\vartheta_2 = 291/291 * 96 = 96 \text{ Respondents}$$

Stratum 3 (IAR)

$$\vartheta_3 = 291/291 * 91 = 91 \text{ Respondents}$$

Thus; Sample  $n =$ ,  $\vartheta_1 = 104$ ,  $\vartheta_2 = 96$ ,  $\vartheta_3 = 91$

As earlier stated, a census approach was adopted, involving all 291 key stakeholders involved in the management and use of institutional repositories across the selected agricultural research institutes. This complete enumeration ensured full coverage and eliminated sampling bias. The sample distribution is shown in Table 3.2.

**Table 3.2: Sample Size**

Sample (n = 291)									
Respondents		NAPRI		IAR		NEARLS		Sample Size	
		N	%	N	%	N	%	N	%
1	Chief Librarians	1	0.96	1	1.04	1	1.10	3	1.03
2	Digital Librarians	5	4.81	6	6.25	4	4.40	15	5.15
3	Extension Workers	28	26.9 2	2 0	20.8 3	2 2	24.1 8	70	24.05
4	Veterinary doctors	19	18.2 7	2 2	22.9 2	2 4	26.3 7	65	22.34
5	Livestock/Agricultural officers	36	34.6 2	3 2	33.3 3	2 7	29.6 7	95	32.65
6	Researchers	15	14.4 2	1 5	15.6 3	1 3	14.2 9	43	14.78
<b>Total</b>		<b>104</b>	<b>100</b>	<b>96</b>	<b>100</b>	<b>91</b>	<b>100</b>	<b>291</b>	<b>100</b>

**Source: Researcher**

The sample distribution as shown in Table 3.2 indicates only 1(1.67%) chief librarian, 3(5.00%) digital librarians, 16(26.67%) extension workers, 11(18.33%) veterinary doctors, 21 (35.00%) livestock/agricultural officers and 9(15.00%) researchers were sampled for the study from NAPRI. In IAR, 1(1.82%) chief librarian, 3(5.45%) digital librarians, 12(21.82%) extension workers, 13(23.64%) veterinary doctors, 18(32.73%) livestock/agricultural officers and 9(16.36%)

researchers were included in the study. In addition, 1(1.89%) chief librarian, 2(3.77%) digital librarians, 13(24.53%) extension workers, 14(26.42%) veterinary doctors, 16(30.19%) livestock/agricultural officers and 8(15.09%) researchers were included in the study from NEARLS.

### **3.6 Research Instruments**

The study used closed-ended questionnaires and interview schedules as the main instruments for data collection. According to Dawson (2002), a combination of the two instruments is desirable as it enables one to overcome the different weaknesses inherent in either of them. The extension workers, veterinary doctors, IR experts, livestock officers and agricultural officers attended the items of the questionnaires, while the chief librarian provided opinion in an interview. The description and development of the instruments are as follows:

#### **3.6.1 The Close-Ended Questionnaire**

The close-ended questionnaire was administered among digital librarians, extension workers, researchers, veterinary doctors, livestock officers, and agricultural officers in the study area to gather data. The close-ended questionnaire comprised two sections namely; section A and section B. Section A: sorted respondents' demographic characteristics such as gender, age, education qualification, and duration of service while the study categorized section B into B1, B2, B3, B4, and B5 as follows: Sub-Section B1 contained eight items which targeted the selection and uploading of resources on the IRs. The responses obtained from these items were utilized to determine the standard practice on the selection and uploading of resources on the institutional repositories. Sub-Section B2 consisted of eight items, which covered the indexing techniques employed by IR experts and the responses

gathered from these items were utilized to ascertain the indexing techniques of the institutional repositories.

Sub-Section B3 comprises 10 items on the utilization level of IRs. The responses gained from these items were utilized to determine the extent of utilization of IRs. Sub-Section B4 contained nine questions on the strategies for improving the visibility and accessibility of IRs. The responses obtained from these items were used to determine ways of improving the visibility and accessibility of IRs while Sub-Section B5 contained two items on the quality-of-service delivery and responses obtained from these items were utilized to determine the quality of services offered by the institutional repositories. The Five-point Likert scale of Strongly Disagree (SD=1), Disagree (D=2), Not Sure (N=3), Agree (A=4) and Strongly Agree (SD=5) were used to rate the responses of the respondents (McLeod, 2008). The items were positively worded (Wolfe & Smith, 2007) to integrate a discrete outlook and ensure that respondents identify the items as a consistent construct.

The cost of administering questionnaires in a survey is considerably lower, with swift communication with respondents, genuine and assessment-based options, as well as checkboxes and free text replies. Despite the potential limitations associated with the use of questionnaires, such as the possibility of obtaining inadequate responses and the absence of direct researcher-participant discussion, this study addressed these concerns by employing a laborious participant inclusion process and enhancing the clarity of the questionnaire to elicit more opinions that are informed. Pantou (1990) observed that individuals have participated in surveys at various

stages of their lives, and such experiences do not evoke fear or apprehension. Consequently, the researcher concluded that the questionnaire was an acceptable and effective research instrument for the study.

### **3.6.2 Interview Schedule**

Data was gathered from chief librarians across the three agricultural research institutions in a structured face-to-face interview and then compared to data obtained using questionnaires on the IR experts, extension officers, veterinary doctors, livestock officers, agricultural officers, and researchers. The purpose of using interviews to collect additional data was to gain a deeper understanding of the subject matter and ascertain the alignment of the primary data if it supports or opposes the quantitative data obtained from the IR experts, extension officers, veterinary doctors, livestock officers, agricultural officers and researchers on the management of institutional repositories. The chief librarians are in leadership positions within libraries and are well suited for their roles, as they are responsible for overseeing and managing the institution repositories to ensure quality service delivery.

Fifteen interview items were administered to assess various aspects related to the management of institutional repositories and the quality-of-service delivery. These items included an evaluation of the types of resources included in their institutional repository and its scope, the current status of the institutional repository in terms of its content and growth, strategies for enhancing the visibility of the institutional repository, utilization of Search Engine Optimization techniques to improve its discoverability, specific metadata for increased visibility, social media platforms,

collaboration with other repositories for expansion and visibility and accessibility, barriers to IRs visibility and accessibility strategies for improvement. The responses were organized, categorized, and analyzed to support the findings obtained from the quantitative data.

### **3.7 Pilot Study**

Proceeding to rally crucial data, the researcher did a preliminary investigation of the instruments and analytical methodologies. According to Leddy (2001), this approach is believed to be efficient in assessing the feasibility of a research investigation. A pilot study was conducted to assess the strengths and weaknesses of the research instruments before their deployment in the main study. The study involved administering 17 copies of each sampled questionnaire to digital librarians, extension workers, veterinary doctors, livestock officers, agricultural officers, and researchers at the departments of agricultural sciences, veterinary medicine, and the directorate of library services Ahmadu Bello University Zaria. The selection of the piloted university is because the university is within the same study region and is also owned and funded by the federal government of Nigeria. Following the completion of the pilot study, the data collected was subjected to analysis for examination. The outcomes of the pilot testing aided in evaluating the reliability or limitations of the research instrument. The findings of the study indicate consistency in the instrument and the constructs measure the elements of evaluation in conformity with the standard IRs practices. Additionally, the number of items in each section of the instrument has been carefully determined. There were a few modifications to the interview questions in terms of the number of items, the nature

of questions asked, the arrangement of questions, and the transformation of questions into more inquisitive inquiries on the matters being investigated.

### 3.7.1 Validity

Validity in research according to Cooper and Schindler (2003) is the extent to which a study effectively captures and measures the intended constructs or variables. To ensure the validity of the study, the researcher conducted face and content validity using responses from a panel of five experts to determine the clarity, comprehensiveness, and representativeness of all aspects of the construct of measurement. The panel of experts consists of members from the Department of Computing and Information Science, School of Applied Sciences, Kenyatta University Nairobi. Members of the panel were ushered with the study objectives, instruments, and validity form. The validity form contained three columns: column 1 was the list of items to be validated; column 2 required a panel expert to identify if the instrument is essential for inclusion, while column 3 required a panel expert to identify if the item is not essential for inclusion.

The level of acceptance of expert rating an item essential was calculated to determine the content validity ratio (CVR) using Lawshe's (1975) method, thus;

$$CVR = \frac{ne - (N/2)}{(N/2)}$$

Where CVR = content validity ratio,

*ne* = number of experts indicating essential on an item,

N = total number of experts.

CVR was computed to be 1.00 and then approximated to .99 for ease of manipulation (Lawshe, 1975). The panel validated the interview schedule since it was not a semi-structured one and was needed to corroborate data gathered from the questionnaire. The CVRs obtained indicated a satisfactory level, and thus, the scale of questionnaires has achieved a satisfactory level of content validity. This means that the items on the questionnaires were valid. Lawshe (1975) recommended that the adjustment from proportion to CVR was significant, as it could be understood whether the degree of agreement among panel experts was beyond 50%. The value of CVR ranges between  $-1$  (faultless disagreement) and  $+1$  (impeccable agreement), with CVR values higher than zero, representing that more than half of the panel experts concur that an item is essential.

### **3.7.2 Reliability**

Reliability, according to (Saunders, et al, 2009), is the degree to which the approaches employed for data collection or analysis yield consistent findings. The preliminary study was conducted using 17 respondents as mentioned in sub-section 3.7 from the Department of Agricultural Sciences, Veterinary Medicine and the Directorate of Library Services, Ahmadu Bello University Zaria, which were not initially sampled as part of the sample for the study. The choice of the piloted institution was because it is located in Northwest Nigeria, established and funded by the federal government of Nigeria. The data was generated from the sample group and was subjected to statistical analysis to determine the reliability coefficient. The Cronbach Alpha method was applied because it is the most frequently used statistical technique for determining an instrument's homogeneity when it contains items with more than two alternatives (Glen, 2016). The reliability coefficients of

the various sections of the questionnaire yielded reliability coefficients of 0.83, 0.82, 0.77 and 0.80 for selection of resources and upload, indexing, usability and utilization and strategies. These reliability coefficients are considered adequate for the study as shown in Table 3.3.

**Table 3.3: Reliability Test**

<b>Variables</b>	<b>Items</b>	<b>Cronbach Alpha</b>
Selection of resources and upload	8	0.827
Indexing	8	0.815
Usability and Utilization	10	0.771
Strategies	9	0.803

### **3.8 Data Collection Techniques**

#### **3.8.1 Questionnaire Administration**

The sampled institutions were visited to physically present the researcher and the study's goal to relevant authorities and establish a schedule for administering the questionnaire for data collection. The questionnaires for digital librarians, veterinary doctors, extension officers, livestock officers, agricultural officers, and researchers were issued with clear instructions and collected by researchers and the research assistants selected and trained from each sampled institution (*See Appendix*). Respondents were consulted in their respective offices and points of duty. The researcher and assistants waited patiently for the respondents to complete the questionnaires and return them. This process took a minimum of 20-30 minutes for each participant. Overall, the data administration of questionnaires took the researcher 3 months to complete the process.

### **3.8.2 Administration of Interview**

The researcher contacted the chief librarians via telephone and introduced himself and the purpose of calling before the interview. Each of the chief librarians in the respective agricultural research institutions arranged a convenient time for the interview, which the researcher ensured was conducted at the same time as agreed by the respective chief librarians in the respective institutions. The interview was physical in their respective offices and lasted for 2 hours each. Some of the responses were written by the chief librarians while some were verbally expressed and recorded by the researcher using an audio device for ease of retrieval and analysis to corroborate the quantitative data from the questionnaire.

### **3.9 Data Analysis**

Kombo (2018) defines data analysis as examining and interpreting data collected from a survey or experiment. In this study, data analysis involved organizing and interpreting data from all respondents. The study utilized a quantitative statistical approach to analyze data collected from respondents using close-ended questionnaires. Data collected using questionnaires were analyzed using frequency counts (f) and percentages (%) and the findings were presented based on the study-specific objectives. Data from the interview (qualitative data) were transcribed, coded in themes, and analyzed alongside the quantitative data obtained. The qualitative data were used to corroborate, support, or refute the findings obtained from the quantitative data. MS Excel package was used to calculate data that answered research questions asked across all the study objectives while data presentation was done using graphs and tables. Kruskal Wallis at  $p \leq 0.05$  was used to As mentioned, establish a statistically significant relationship between the

variables under investigation through non-parametric statistics like the Kruskal-Wallis. The essence of establishing statistical significance was to ascertain the relationship between respondents' responses on managing institutional repositories and service quality. The result was interpreted in terms of p-value. P value less than equal to .05 indicates statistical significance.

### **3.10 Logistical and Ethical Considerations**

#### **3.10.1 Logistical considerations**

The researcher was provided with the letters of introduction after a successful presentation of a proposal from the Graduate School, Kenyatta University, Nairobi, Kenya, addressed to the Federal Ministry of Agriculture and Rural Development Garki Abuja, introducing the researcher and seeking permission to carry out the study. The permission was signed by the Permanent Secretary of the ministry and attached as evidence of adhering to the standard logistical practice of conducting research.

#### **3.10.2 Ethical Considerations**

To ensure this research adhered to the highest standards of ethical responsibility, the researcher obtained a formal clearance letter from the host institutions. This approval permitted the study to be conducted within their premises and affirmed institutional support for the research process. At the outset, participants were given a detailed consent and introduction letter (Appendix I), which clearly outlined the study's purpose, their selection criteria, and the voluntary nature of participation. Respondents were given the freedom to opt in or out of the study at any point, with no obligation or repercussions tied to their decision.

The researcher prioritized protecting respondent identity and personal information. All contributions were treated as strictly confidential, and responses were anonymized throughout the research process. This anonymity helped ensure participants felt safe and respected, fostering an environment of openness and trust. Furthermore, the researcher was transparent about the future use of the study's outcomes, informing respondents that findings would be shared with the participating institutions for possible implementation.

Academic integrity was maintained by consistently citing and referencing all external works used. The study results were presented truthfully and with fidelity to the data collected. No findings were manipulated, exaggerated, or fabricated to serve predetermined conclusions, regardless of how desirable or beneficial they may have appeared. The researcher remained committed to presenting a comprehensive and honest representation of the study's discoveries, with due respect to the contributions of each participant and the academic community at large.

## **CHAPTER FOUR**

### **PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION**

#### **4.1 Introduction**

The chapter presents findings on the management of institutional repositories of North Western Nigeria's agricultural research institutes. The chapter starts with the survey response rate and respondent demographics. Findings are then organized by the study's objectives: criteria for resource selection and uploading, User needs Satisfaction, indexing methods used, usability and utilization levels, and strategies for enhancing repository visibility and accessibility. Each section addresses a specific objective, providing insights into repository practices and their effectiveness.

#### **4.2 Response Rate**

Response rates are regularly used to gauge data quality, and low response rates could affect unresponsive predisposition. Frey (2018) noted that a response rate is the ratio of the number of respondents in a study to the number of mockups asked to participate and provide desired data for the study. The study administered a total of 288 questionnaires to the Digital Librarians, Extension Workers, Veterinary Doctors, Livestock/Agricultural Officers, and researchers within the selected agricultural research institutes. In addition, the Chief Librarians were administered with the interviews. The responses are shown in Table 4.1 below.

**Table 4.1: Response Rate**

<b>AGRICULTURAL RESEARCH INSTITUTES</b>									
<b>Respondents</b>	<b>NAPRI</b>		<b>IAR</b>		<b>NEARLS</b>		<b>Overall Response Rate</b>		
	Number Administered	Number Returned	Number Administered	Number Returned	Number Administered	Number Returned	Total Number Administered	Total number Returned	Percent
Chief Librarians	1	1	1	1	1	1	3	3	100%
Digital librarians	5	5	6	6	4	4	15	15	100%
Extension Workers	28	25	20	20	22	20	70	65	92.9%
Veterinary doctors	19	19	22	22	24	24	65	65	100%
Livestock/Agricultural officers	36	36	32	30	27	27	95	93	97.9%
Researchers	15	15	15	15	13	13	43	43	100%
<b>Total</b>	104	101(97.1%)	96	94(97.9%)	91	89(97.8)	291	284	97.6%

**Source: Research data 2023**

The response rates in all the selected agricultural research institutes were between (97% to 97.9%). The overall response rate was 97.6% which according to Recker (2021), is within the acceptable limits. Response for the respective categories of respondents: Librarians, Extension workers, Veterinary doctors, Livestock/agricultural officers, and Researchers was also above 97%.

### **4.3 General and Demographic Information**

According to Wamae (2023), demographics represent the social characteristics of a population and are essential for contextualizing research findings. In this study, demographic variables—such as gender, age, education level, departmental affiliation, role within the institution, and duration of engagement in agricultural research—provided vital insights into how respondents perceived and interacted with institutional repositories. These factors shaped expectations around repository functionality, access, and relevance, and were consistently referenced in discussions of each major theme.

For instance, roles such as librarian versus researcher were associated with differing priorities and usage patterns. Librarians tended to emphasize technical aspects, metadata accuracy, and system maintenance, while researchers focused more on ease of access, relevance of available content, and integration into their workflow. Similarly, departmental affiliation influenced the frequency and nature of repository interaction. Respondents in research-intensive departments reported higher usage and clearer expectations regarding repository contributions to knowledge dissemination, whereas administrative departments viewed repositories more through an institutional compliance lens.

Experience—measured by duration of engagement with agricultural research—played a critical role in shaping repository expectations. Those with over a decade of experience generally valued institutional repositories as tools for legacy preservation and scholarly impact, whereas newer entrants expressed concerns about usability, visibility of contributions, and support for collaborative knowledge sharing.

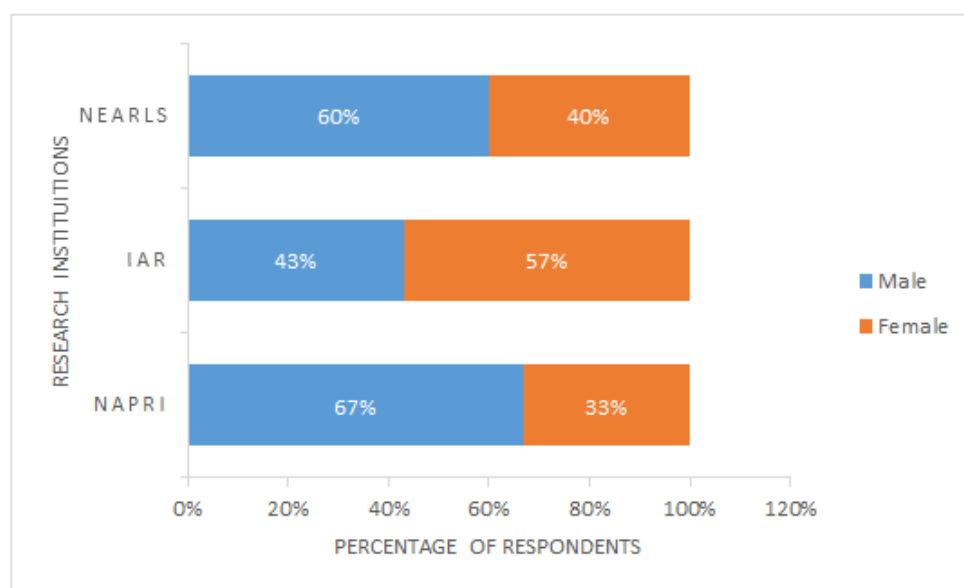
The figures in this section present the demographic characteristics of the sampled respondents across the agricultural research institutions. The representation of gender among librarians and repository users is outlined in the subsections that follow, providing further context to perceptions, expectations, and engagement patterns observed throughout the study.

#### **4.3.1 Gender of Librarians**

According to Wamae (2023), in his publication on gender and librarianship, gender plays a role in shaping the dynamics such as gender-responsive research priority and participatory decision-making, research adoption, and impact within repository

management including leadership roles and representation in managing IRs. All 18 librarians responded to the questions on gender. To capture data on the gender of the librarians the respondents were asked to indicate their sex based on male or female and the response is shown in Figure 4.1 below.

**Figure 4.1: Gender of Librarians**



**Source: Research data 2023**

Figure 4.1 shows apart from the IAR, 57% were female librarians the rest of the institutes males were the majority with over 60% the findings indicate that the proportion of male librarians is higher than that of female librarians in the management of agricultural research institutional repositories, this may likely influence male patronage.

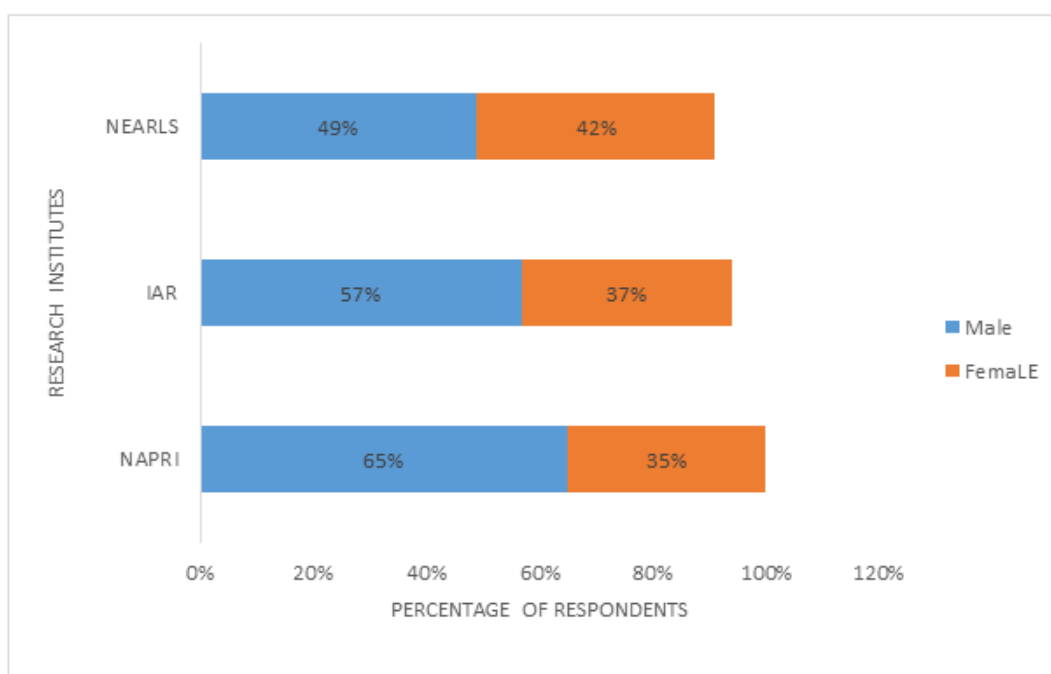
Gender distribution shows males are higher than females. The male dominance is likely to affect the roles of digital librarians and reflects broader industry trends or

specific institutional cultures. Conclusively, there is a need to increase the percentage of females for effective productivity.

#### 4.3.1.2 Gender of Institutional Repository Users

According to Wamae (2023), in a study, to determine the gender of a repository user posits that gender has a bearing on how users access information resources which is likely to affect research productivity. Utilization also has a bearing on how to effectively address the diverse needs of agricultural communities, especially addressing unique agricultural information needs and priorities, enhancing innovation, and relevance, and improving technology adoption. 266 responded out of 273 respondents. To capture data on gender respondents were asked to indicate sex in terms male and female as shown in Figure 4.2 below.

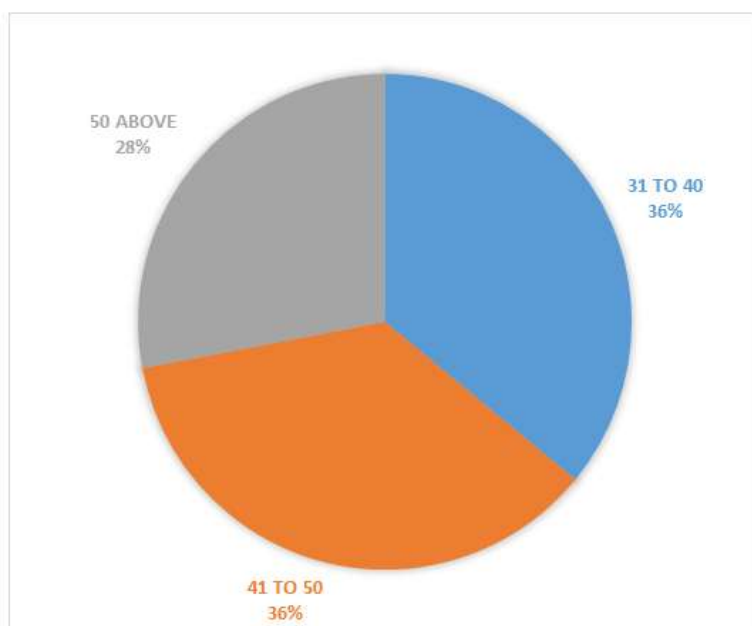
**Figure 4.2 Gender of Institutional Repository Users**



According to the findings, statistics show that NAPRI users are male (65%) were the majority female (35%). The finding is similar to those of IAR where there are (57%) male and (37%) female. while (49%) are male with females (42%) from NEARLS. Considering that most of the users were in the male category the utilization bias may likely lean toward electronic resources. Therefore, it is imperative to balance the gender for proper utilization. Conclusively, the tradition of one-gender dominance should be abolished.

#### **4.3.2 Age of Institutional Repository Managers.**

According to Recker (2021), in a study to determine the age of IR managers who are mostly librarians play a significant role in the management of agricultural research institutional repositories because it influences the skill sets, perspectives, and approaches that different age groups bring to the use of these repositories, moreover, institutional knowledge and subject expertise, user engagement and outreach, understanding user needs for leadership and mentorship among librarians were examined in this study. All 18 librarians provided their age information in response to the survey. The data revealed that the three chief librarians are over 50 years old. Additionally, the ages of the digital librarians range from 45 years to over 50 years, as illustrated in their responses shown in Figure 4.3.

**Figure 4.3: Age Class of Librarians**

**Source: Research data 2023**

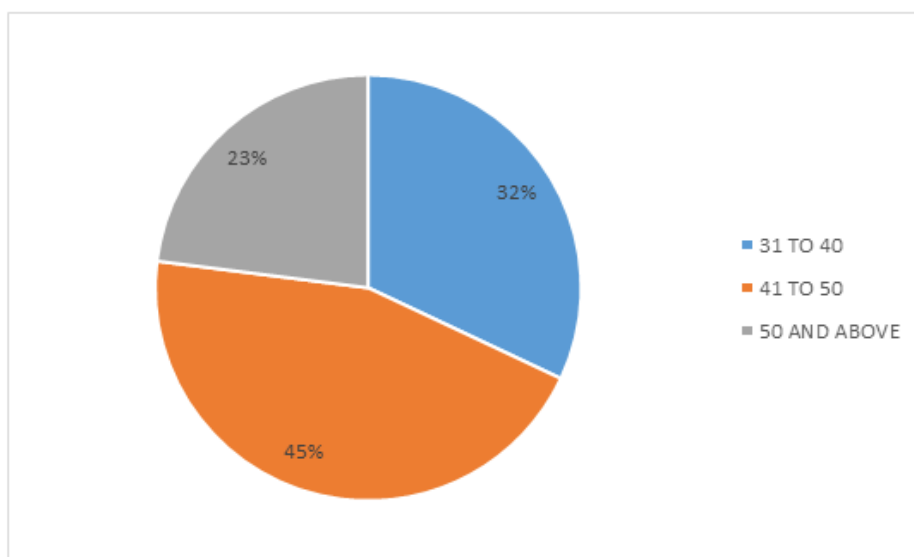
The age distribution of respondents according to the studied institutions indicates that the librarians across the three institutes namely NAPRI, IAR, and NEARLS with 50 years of age (28%). Therefore, the analysis shows that ages between 31- 50 years were the majority catering for (72%) which is likely to reflect a good build-up of skills and experience.

#### **4.3.2.2 Age of Institutional Repository Users**

According to Adewumi (2018), determining the age of agricultural research institutional repository users is important, especially in targeting content appropriately, technology usage patterns, and tailoring training and outreach, furthermore, he posits that knowing the age demographics helps design training programs for repository use. The repository users are extension workers; veterinary doctors, livestock/agricultural officers, and researchers. 266 responded out of 273 respondents. To capture data on the age of the repository users, the respondents

were asked to indicate their age within one of the following categories: 20–30 years, 31–40 years, 41–50 years, and 50 years and above. Their responses are presented in Figure 4.3.

**Figure 4.4: Age of the Institutional Repository Users**



**Source: Research 2023**

The summary shows that repository users across the research institutes with 31-40 years were (32%) while those occupied 41-50 years were the majority (45%), and the users aged 50 years and above were (23%). Conclusively, these findings indicate that while newer users are continuously engaging with institutional repositories there is a substantial core of experienced users. Therefore, user education and mentorship should be given more priority as the aged users are likely to be more experienced.

#### **4.3.3 Education Level of Institutional Repository Managers and Users.**

According to Oguiche (2018), in a study to determine the educational level of Institutional Repository managers who are mostly Librarians play a significant role in the effective management of IRs, especially in agricultural research institutes.

Here are some reasons why their educational level matter: librarians managing an IR require an understanding of digital archiving technologies, metadata standards (e.g., Dublin core), open access policies, and data security protocols. Higher educational qualifications such as a master's degree in Library and Information Science (LIS) or digital curation, ensure that the librarian has the technical proficiency to oversee these tasks. A strong educational background allows librarians to effectively manage software like D-Space or E-Prints and ensure compliance with international standards. Users of Agricultural research institutes IRs such as researchers, veterinary doctors, livestock/agricultural workers, and extension officers need a fundamental understanding of how to access, contribute, and use the repository's content. Higher educational levels enable users to engage with metadata, properly cite data, and utilize repositories to advance their research. All 18 librarians responded to the question of educational qualifications. To capture data on the educational level of respondents were asked to indicate their qualifications on a scale of Certificate, Diploma, Degree, and Postgraduate.

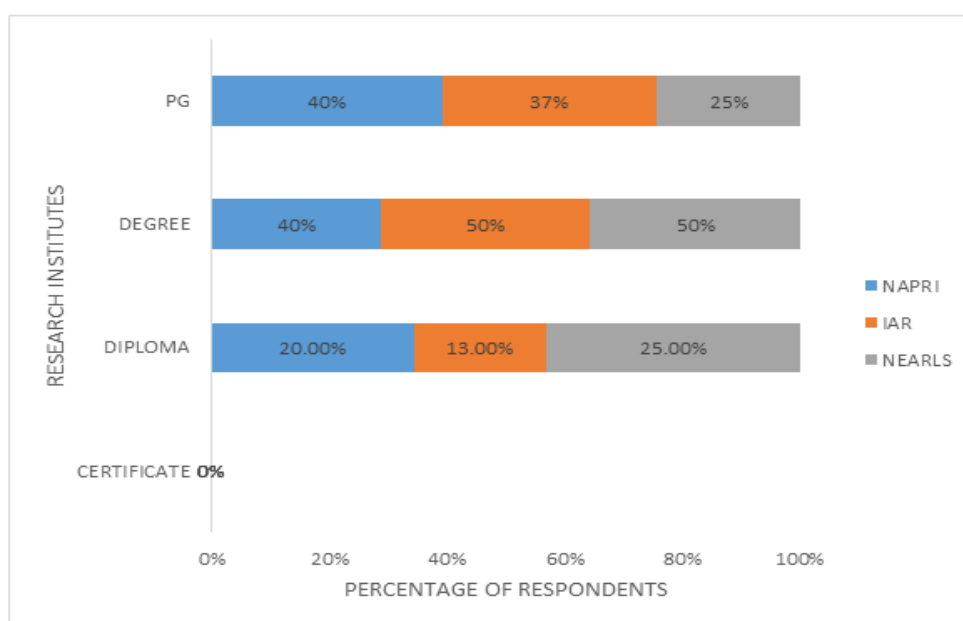
#### **4.3.3.1 Education Level of Librarians**

In a study, Hatab (2021) found that the educational qualifications of librarians play a vital role in library operations. The successful management of collections within agricultural research institutes hinges on the ability of librarians to understand and promote open access policies that are advantageous to the research community. In agricultural research institutes IRs sharing findings and dataset is critical for global knowledge exchange and also librarians with an advanced educational background understand how to implement and promote open access principles, ensuring compliance funder mandates and Institutional policies because training at Certificate

level focuses on basic cataloging, information organization, customer service and patrons' assistance skills.

Diploma and Bachelor's degrees focus on advanced cataloging and metadata management, research, reference, digital library management, and technology proficiency skills. A master's degree focuses on advanced information organization, classification, in-depth research and reference services, collection development, and curation skills. At the PhD, extra skills such as expert research and scholarly communication, Data science, analysis, and knowledge management skills. All 18 librarians responded to questions on the educational level. To capture data on educational level, respondents were asked to indicate their qualifications on a scale of Certificate, Diploma, Degree, and Postgraduate as shown in Figure 4.5 below.

**Figure 4.5: Education level of Librarians**

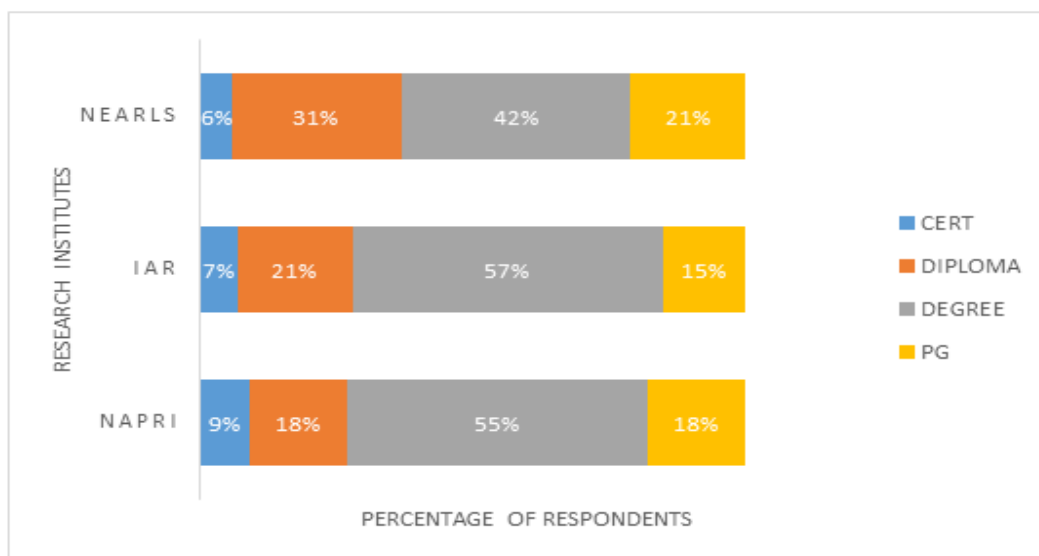


**Source: Research data 2023**

Findings indicate no staff with the Certificate in the respective institutions. Staffing levels of librarians with Diplomas ranged from (13% to 25%) in the respective institutions' while that of Degree level ranged from (40% to 50 %) in the respective institutions. Library staff with PG ranged from (25% to 40%) in the respective institutions. This shows that there are staff at all levels and hence the composite combined skills drawn from the consolidated staff are adequate for ensuring information organization, collection development, metadata management, and curation skills, and advanced skills such data science and knowledge management skills. Conclusively, provision for more training and capacity building should be provided to enhance the management of the repositories as the significant presence of PG qualification is missing because it provides librarians with skills like advanced information representation and data science.

#### **4.3.3.2 Education Level of Institutional Repository Users**

According to Ejikeme (2019), determining the educational level of agricultural research institutional repository users in a study is crucial for several reasons, as it directly affects how the repository is utilized, the quality of contributions, skills, and the overall impact of agricultural research. To capture data on educational levels, respondents were asked to indicate their qualifications, on the scale of Certificate, Diploma, Degree, and PG. Out of 273 questionnaires distributed 266 were returned. The findings on the education levels of the users are shown in Figure 4.6 below.

**Figure 4.6: Educational Levels of the Institutional Repository Users**

**Source: Research Data 2023**

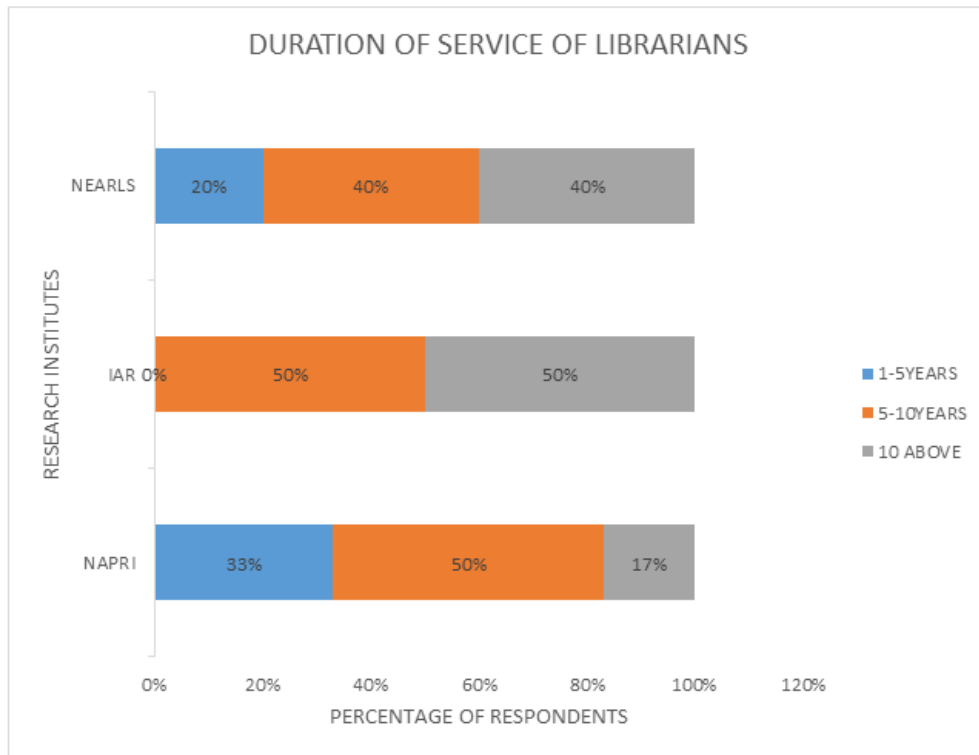
The Summary of the findings indicates that none of the repository users in NAPRI, IAR, and NEARLS are certificate holders. The findings show that diploma holders are between (18% to 31%) across the three institutes, and Degree holders are between the range of degree (42% to 55%) for a postgraduate degree within the range of (15% to 21%). These findings imply that most respondents possess the desired minimum education background suitable for reasonable interaction in providing the data needed for the study. This suggests a well-educated respondent pool, which could indicate a high level of competency, understanding, and utilizing institutional repositories, potentially influencing the quality and effectiveness of this system. Conclusively, findings indicated that the repository users across the research institutes possess the required educational level to use the IRs. likely, certificate holders may encounter difficulties due to their level of exposure.

#### **4.3.4 Duration of Service of the Repository Managers and Users**

According to Wamae (2023), a publication on the duration of service posits that the period an employee has spent in a given organization is described as the duration or length of service. Normally it is calculated from the day of enrollment in the organization. The analysis of the duration of service among the respondents in this study is essential for understanding the knowledge and skill base of the workforce involved in the management and utilization of institutional repositories. In this study, there were two categories of respondents namely repository managers (Librarians) and users of the repository who comprise other employees of the institution like extension workers, agricultural/livestock officers, and veterinaries. The findings on their duration of services are reported in the following section. 266 respondents answered the question on the duration of service out of 273 respondents. To capture data on the duration of service the respondents were asked to indicate their duration on a scale of 1-5 years, 5-10 years, 10 years, and above.

##### **4.3.4.1 Duration of Service of Librarians**

According to Bashir (2022), the duration of service of librarians has a significant impact on library practice for a variety of reasons, experienced librarians bring institutional knowledge, professional skills such as metadata management, digital library management, collection development, and a deep understanding of library user's needs, which contribute to the overall effectiveness of library services. All 18 librarians responded. To capture data on duration of service respondents were asked to indicate the duration of service on a scale of 1-5 years, 5- 10 years, and 10 years above which their responses are shown in Figure 4.7 below.

**Figure 4.7 Librarian's duration of service**

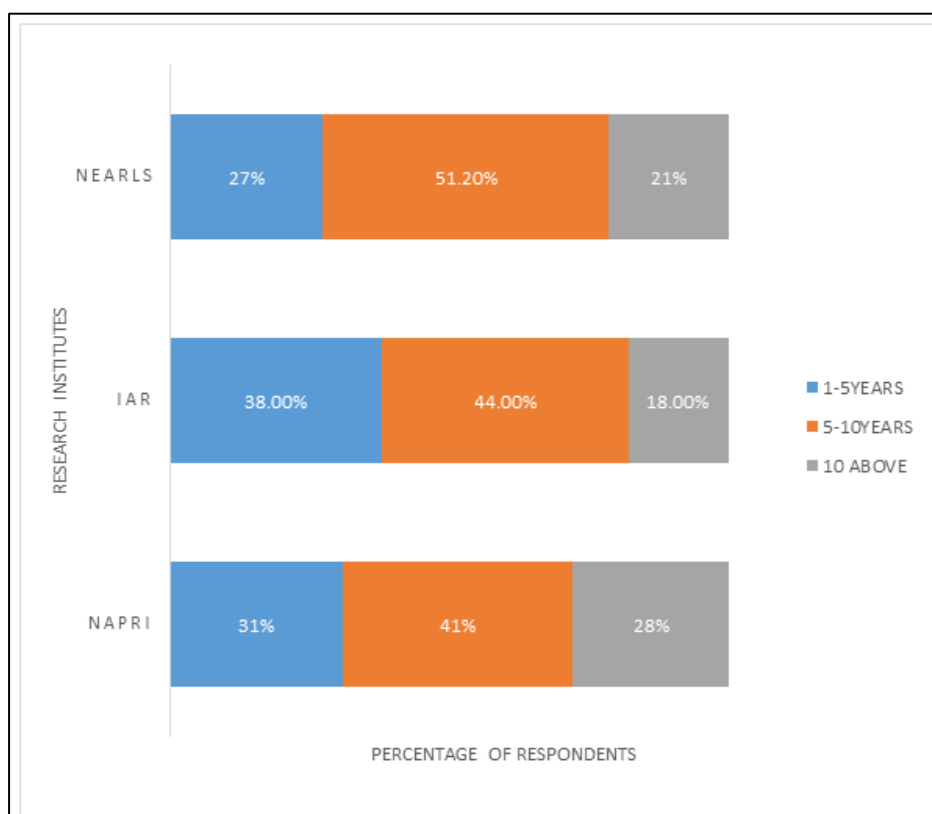
**Source: Research data 2023**

The findings indicate that the librarians across NAPRI, IAR, and NEARLS who have worked 10 years and above were between (17% to 50%) as employees at their respective institutions while (40% to 50%) of librarians also have been working for about 5-10 years, findings also indicate that only (20% to 33%) worked for 1-5 years across the respective research institutes. The findings show that librarians who worked for many years are likely to be experienced and skillful in managing existing repositories, especially in collection development, metadata management, and technology proficiency skills. Conclusively, the librarians across the respective research institutes have the required length of service to manage the repositories except those with a 1-5 years duration of service due to insufficient length of service to be exposed.

#### 4.3.4.2 Duration of Service of Institutional Repository Users

According to Bjork (2022), the duration of users' service in Agricultural Research Institutional Repositories is important for several reasons, as it reflects the effectiveness or otherwise, impact, and sustainability of these repositories, 266 responded out of 273 issued questionnaires. To capture data on service duration, the respondents were asked to indicate the duration of their service on a scale of 1-5 years, 5-10 years, and 10 years. Their responses are shown in Figure 4.8 below.

**Figure 4.8: Duration of Service of Repository Users**



**Source: Research data 2023**

The summary of findings indicates that users' repositories who worked for 1-5 years across the NAPRI, IAR, and NEARLS were between (27% to 38%), similarly, respondents who worked for 5-10 years were between (21% to 28%) while those

with 10 years above are between (41% to 51%). Therefore, the repository users have required years of experience to use the repository. Conclusively, these findings indicate that while newer users continuously engage with institutional repositories, there is a substantial core of experienced users.

#### **4.4 Criteria for Selection of Resources for the Institutional Repositories**

According to Oguche (2018), the criteria for selection of resources for agricultural research institute's institutional repositories is an essential step that involves careful consideration to ensure the resources are relevant, high quality, accessible, and valuable for researchers, stakeholders, and the academic community with regards to the institutional core mandate. This facilitates simple access to important intellectual materials, such as papers, theses, and databases, supporting research, education, and creativity. To capture data on the criteria for selection of resources respondents were asked to indicate whether the resources selected align with the mission and objectives of the agricultural research institutes. 15 digital librarians assessed this in a closed-ended survey, and three (3) interviews with chief librarians were held to get their feedback on the selection criteria and responses were 100%. As shown in Table 4.6 presents an analysis of the outcomes.

**Table 4.6: Criteria for Selecting Content for the Institutional Repositories**

Selection Parameters	Response	Research Institutes					
		NAPRI n=5		IAR n=6		NEARLS n=4	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
IR Relevance	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	1	20.00	1	16.67	0	0.00
	Agree	3	60.00	5	83.33	2	50.00
	Strongly agree	1	20.00	0	0.00	2	50.00
Adherence to IR standards	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	0	0.00	0	0.00	0	0.00
	Agree	4	80.00	3	50.00	3	75.00
	Strongly Agree	1	20.00	3	50.00	1	25.00
Technical requirement and File format.	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	0	0.00	0	0.00	0	0.00
	Agree	1	20.00	4	66.67	4	100
	Strongly agree	4	80.00	2	33.33	0	0.00
Up datedness of IR resources	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	0	0.00	0	0.00	0	0.00
	Agree	3	60.00	5	83.33	2	50.00
	Strongly agree	2	40.00	1	16.67	2	50.00

According to the data collected from digital librarians affiliated with the agricultural research institutions that constitute the study's home institutions. It indicates that one digital librarian from NAPRI (20.0%) expressed uncertainty regarding whether the resource selection aligns with the institution's goals and missions. All digital

librarians across NAPRI, IAR, and NEARLS unanimously expressed strong agreement that the resources chosen for the institutional repository align with the mission and objectives of their respective institutions. A substantial majority of NAPRI (60.0%), 80.0% from IAR, and 83.33% from NEARLS affirmed that the resources they selected and uploaded at their respective institutions were in alignment with the mission and objectives of the agricultural research institute.

The analysis presented in Table 4.6, item 2 indicates that all digital librarians serving as repository managers confirmed across NAPRI, IAR, and NEARLS that research institutes adhere to standards that guarantee the materials in the repository accuracy and relevance. For instance, a significant majority of 80.00% from NAPRI and 75.00% from NEARLS demonstrate consistency among the respondents. In contrast, half of the respondents strongly agreed with IAR, while the same proportion merely agreed that adherence to standards in the selection of repository materials frequently adheres to ensure that the resources selected and uploaded in the repository meet the standards for accuracy and relevance.

The findings outlined in Table 4.6, item 3, indicate that all digital librarians serving as repository managers across NAPRI, IAR, and NEARLS confirmed that the application of professional standards in the selection and uploading of repository materials motivates users to efficiently locate and access relevant materials within the institutional repository. A significant majority, 80.00% from NAPRI and 66.67% from IAR demonstrate consistency among respondents, strongly affirming that users of the repository find it easy to locate and access relevant materials. This ease is attributed to the adherence to standard practices in the selection and uploading of

repository materials. The findings from NEARLS indicate that all digital librarians involved have confirmed the same, thereby affirming the consistency among digital librarians from both NAPRI, IAR, and NEARLS.

The findings outlined in Table 4.6, item 4 indicate that all digital librarians serving as repository managers at NAPRI, IAR, and NEARLS confirmed that regular assessments and updates are performed in the selection and uploading of materials at their institutions. This practice is essential to maintain the relevance and quality of the resources housed in their respective institutional repositories. A significant majority, 60.00% from NAPRI and 83.33% from IAR demonstrate consistency among respondents by strongly affirming that regular assessments and updates are conducted during their duties to ensure the ongoing relevance and quality of resources uploaded in their respective institutional repositories. All digital librarians from NEARLS have verified the alignment between the digital librarians from NAPRI and IAR.

#### **4.5 User Needs Fulfillment by the Agricultural Institutional Repositories**

According to Milimo (2018), Subject coverage according to user needs is crucial in agricultural research institutional repositories because it ensures that the repository effectively meets the needs of its diverse stakeholders. High-quality coverage of information resources that are uploaded to a repository is essential because they have a direct impact on the dependability and correctness of the data that is shared. When it comes to agricultural research, education, or making crucial decisions, for example, timely and reliable information is very important. High-quality resources make sure that users can access relevant and complete content. To gather data on

user needs related to agricultural institutional repositories, three interviews were conducted with chief librarians to obtain their perspectives on the quality of resources uploaded. Additionally, 273 respondents were given closed-ended questionnaires to assess user needs, out of which 266 completed and returned them. The results are presented in Table 4.7.

**Table 4.7: User Needs Fulfillment**

Parameters for User Needs	Response	Research institutes					
		NAPRI n=5		IAR n=6		NEARLS n=4	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
Subject coverage is adequate	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	0	0.00	0	0.00	0	0.00
	Agree	2	40.00	3	50.00	4	100
	Strongly agree	3	60.00	3	50.00	0	0.00
Diverse materials are provided	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	1	20.00	0	0.00	1	25.00
	Agree	2	40.00	2	33.33	2	50.00
	Strongly agree	2	40.00	4	66.67	1	25.00
Policy support and advocacy.	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	0	0.00	0	0.00	0	0.00
	Agree	5	100	4	66.67	3	75.00
	Strongly agree	0	0.00	2	33.33	1	25.00
The IRs have contributed to the development of the research and the task at work.	Disagree	0	0.00	0	0.00	0	0.00
	Uncertain	0	0.00	1	16.67	1	25.00
	Agree	3	60.00	3	50.00	0	0.00
	Strongly agree	2	40.00	2	33.33	3	75.00

The analysis in Table 4.7 presents responses from users affiliated with the participating agricultural research institutions. User needs fulfillment was assessed based on their perceptions of the relevance and adequacy of repository content. The results show that all respondents acknowledged a positive research impact, as reflected in subject coverage. Notably, 60.0% of respondents from NAPRI 3 strongly agreed, while 40.0% agreed, suggesting a high level of satisfaction with the information provided. This level of agreement is consistent with those reported at IAR (that 50.0%) of the respondents affirmed strongly with a similar percentage that merely agreed, the findings indicate consistency across the NAPRI, IAR, and NEARLS. Respondents in NEARLS unanimously expressed strong agreement that the research impact of the resources uploaded in their institutional repository is evident through citations and references in scholarly publications.

The findings in Table 4.7, present the data collected from respondents affiliated with the agricultural research institutions that constitute the study's home institutions. The second item indicates that all the respondents across the institutions confirmed the institutional repository features a diverse range of content types, including research papers, reports, datasets, and multimedia materials. However, few respondents were uncertain as to the content coverage for instance, only 1 (20.0%) from NAPRI did not share an opinion regarding the subject diverse content similar to NEARLS 1 (25.0%). The consistency in the level of agreement of respondents across the institutions indicates that their repositories feature a diverse range of content types, including research papers, reports, datasets, and multimedia materials which are beneficial to repository users.

The analysis presented in Table 4.7, item 3 indicates that the majority of the respondents serving as repository users confirmed across NAPRI, IAR, and NEARLS that the policy supports their institutional repository effectively, it also supports some of the research and information needs of the agricultural community. For instance, all the respondents from NAPRI hold a strong similar level of agreement with a significant majority of 66.67% from IAR and 50.00% from NEARLS demonstrating consistency. The consistency in the findings affirmed that the agricultural community benefits significantly from subjects uploaded in the institutional repository as they effectively support the research and information needs of stakeholders in the agricultural community.

The findings outlined in Table 4.7, item 4 indicate that all respondents serving as repository users at NAPRI, IAR, and NEARLS confirmed that the resources uploaded in their institutional repository contribute significantly towards the development of the research and the task at work frequently and enable informed decisions by the agricultural community. A significant majority, 60.00% from NAPRI and 50.00% from IAR demonstrate consistency by strongly affirming the frequency of citations in academic publications and reports. Respondents from NEARLS have verified the alignment between the respondents from NAPRI and IAR with a 75.00% level of agreement. However, only 1 (16.67%) respondent from IAR and 1 (25.00%) from NEARLS was uncertain.

In addition, the Chief Librarian was asked to describe the types of resources included in their respective institutional repository and its scope. The following responses were obtained:

*The types of resources included in the institutional repository are primarily research articles, conference papers, and some dissertations. However, our scope is somewhat limited due to resource constraints and a lack of robust collection development strategies. (CL-1)*

A conversation with another chief librarian on the status of the institutional repository in terms of its content and growth yielded the following reactions:

*Currently, the status of our institutional repository in terms of content and growth is rather stagnant. We have struggled to consistently add new materials, and the overall growth rate has been slow compared to our aspirations. (CL-2)*

The slow growth of institutional repositories is largely due to operational issues, not necessarily low research output. These include a lack of submission policies, limited staff or technical skills, backlog in digitizing older works, low researcher engagement, and poor infrastructure. Together, these bottlenecks delay consistent updates and limit repository expansion.

Following a discussion on the institutional repository's growth and content with another chief librarian, the following responses were obtained:

*As of right now, our institutional repository's growth and content are essentially flat. In comparison to our goals, the*

*growth pace has been generally sluggish and we have had difficulty adding new materials regularly. (CL-3)*

The findings shed light on the challenges and limitations faced by agricultural research institutes in North Western Nigeria in effectively managing and utilizing their institutional repositories. The Chief Librarian's responses corroborate these findings, highlighting the stagnant nature of the repositories' content and growth, primarily due to resource constraints and slow progress compared to the institutes' aspirations. Recent studies continue to affirm that institutional repositories (IRs) must prioritize content that reflects the intellectual output of their host institutions, ensuring legal ownership and alignment with institutional mandates. Obaro and Arumuru (2024) found that most African university repositories primarily contain staff-authored journal articles, theses, and conference papers—materials that clearly fall within the institution's intellectual property domain.

This reinforces the principle that repositories cannot host content that does not originate from or belong to the institution. Furthermore, Baro and Nwabueze-Echedom (2023) highlight persistent challenges in African IR development, including inadequate infrastructure, lack of repository policies, and difficulty collecting content from contributors. These findings support the current study's observation of slow repository growth and underline the need for stronger policy frameworks, content acquisition strategies, and quality control mechanisms to enhance repository performance and research visibility across the region.

To address these issues, agricultural research institutes in North Western Nigeria must prioritize strategies to enhance the relevance, diversity, and quality of their repository content, while also investing in user education and awareness initiatives to promote the effective utilization of these valuable resources. The findings align with existing literature on various factors influencing this process. The study revealed a perceived disconnect between the repository content and the institution's mission and goals, which resonates with prior research emphasizing the importance of aligning repository content with institutional objectives (González & Pinto, 2017).

Similarly, concerns about the visibility and impact of repository materials, as well as the lack of diversity in content types, align with findings from studies that emphasize the significance of research impact and content diversity in repository management (De Groote & Dorsch, 2011; Salehi et al., 2019). Additionally, the study highlighted concerns about quality control measures, consistent with the literature that emphasizes the importance of maintaining the credibility and reliability of repository materials through rigorous peer review and curation processes (Dawes & Hirsch, 2012; Zhao et al., 2017).

The Chief Librarian's reflections on the limited utilization of the Institutional Repository echo findings from Bamigbola (2021), who emphasized the importance of awareness, institutional support, and user engagement in driving effective repository use among researchers. The librarian's acknowledgment of barriers such as resource constraints and low user participation aligns with Bamigbola's observations, underscoring the need to improve repository visibility, simplify access,

and encourage active use within academic and professional communities. Similarly, Nunda and Elia's study (2019) underscored the significance of information literacy training in facilitating the acceptance and utilization of institutional repositories among students, suggesting potential strategies for enhancing repository utilization among stakeholders.

Moreover, the study's findings on the overall performance of institutional repositories in North Western Nigeria correspond to broader observations regarding repository implementation in African countries. Adam and Kaur's (2021) study on institutional repository (IR) management in African contexts revealed that despite growing support for open-access initiatives, the implementation and performance of IRs remain below expectations. The findings showed persistent challenges such as the absence of clear selection policies, inconsistent content acquisition practices, and limited institutional commitment to quality control.

This resonates with the current study's observation that respondents expressed a neutral stance toward the criteria used for selecting and uploading resources, suggesting ambiguity or lack of awareness regarding content standards. Such uncertainty may hinder the strategic development and effective utilization of IRs, ultimately affecting their role in preserving and disseminating institutional knowledge. (Adam & Kaur, 2021).

The study revealed that some users perceived a lack of coherence between the content hosted in the institutional repository and the core research priorities or thematic focus of the institution (González & Pinto, 2017). This does not suggest

that materials from external institutions were included, but rather that internally produced resources may not be effectively curated to reflect institutional goals. This observation aligns with prior studies emphasizing the need for strategic content selection and policy alignment to ensure that institutional repositories serve as accurate representations of an institution's scholarly identity and mission.

Similarly, concerns about the visibility and impact of repository materials, as well as the lack of diversity in content types, align with findings from studies that emphasize the significance of research impact and content diversity in repository management (De Groote & Dorsch, 2011; Salehi et al., 2019). Additionally, the study highlighted concerns about quality control measures, consistent with the literature that emphasizes the importance of maintaining the credibility and reliability of repository materials through rigorous peer review and curation processes (Dawes & Hirsch, 2012; Zhao et al., 2017).

The Chief Librarian's remarks on the underutilization of the Institutional Repository reflect broader concerns about user engagement and awareness. Rather than attributing the issue to content availability or repository growth, the responses point to systemic factors such as limited information literacy, lack of structured training, and insufficient institutional support. This coincides with Bamigbola's (2021) findings, which found the role of awareness and institutional adjustment in shaping repository use among researchers. Similarly, Nunda and Elia (2019) emphasize that information literacy training is essential for fostering acceptance and meaningful utilization of institutional repositories, particularly among students. These insights suggest that improving user capacity and institutional outreach may be more critical

to repository effectiveness than content volume alone. This aligns with the study's findings of a relatively neutral stance among respondents regarding the criteria used for the selection and uploading of resources, indicating potential challenges in repository management and performance (Adam & Kaur, 2021).

#### **4.6 Usability and Utilization Levels of Agricultural Research Institutional Repositories**

According to Jones (2018), the usability and utilization levels of agricultural research institutional repositories depend on several factors, such as the quality of the repositories, their visibility, the relevance of the content, and how effectively they meet the needs of their users. To capture data on utilization levels of agricultural institutional repositories, respondents were asked to indicate how accessible and utilized the institutional repositories are. 273 respondents were issued questionnaires, 266 responded and three interviews were conducted with chief librarians to measure this goal. The outcome is shown in Table 4.8 below

**Table 4.8: IR Usability and Utilization Levels of Institutional Repositories**

Usability and Utilization Parameters	Response	Research Institutes					
		NAPRI n=96		IAR n=88		NEARLS n=85	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
Friendly user interface.	Disagree	30	31.25	30	34.09	32	37.65
	Neutral	5	5.21	3	3.41	4	4.71
	Agree	8	8.33	8	9.09	8	9.41
	Strongly agree	5	5.21	5	5.68	5	5.88
IRs Information resources are frequently used	Disagree	27	28.13	29	32.96	38	44.7
	Neutral	5	5.21	2	2.27	4	4.71
	Agree	13	13.54	11	12.50	8	9.41
	Strongly agree	3	3.13	4	4.55	3	3.53
The IR's user number is increasing.	Disagree	36	36.46	30	34.09	36	42.35
	Neutral	3	3.13	8	9.09	7	8.24
	Agree	5	5.21	5	5.68	3	3.53
	Strongly agree	4	4.17	3	3.41	3	3.53
Easy navigation in searching for the resources needed.	Disagree	31	32.29	33	37.5	35	41.18
	Neutral	7	7.29	3	3.41	5	5.88
	Agree	6	6.25	6	6.82	6	7.06
	Strong agree	4	4.17	4	4.55	3	3.53
Query allows expanded search.	Disagree	33	34.38	31	35.23	27	31.76
	Neutral	4	4.17	3	3.41	10	11.76
	Agree	5	5.21	8	9.09	5	5.88
	Strongly agree	6	6.25	4	4.55	7	8.24

The findings on item 1 Table 4.8 indicate that a significant proportion of the respondents with a majority (31.25%) from NAPRI expressed dissatisfaction with the friendly user interface. This aligns with the findings collected and analyzed from IAR with optimal support from a significant majority of the respondents (34.09%) who equally presented a similar view of having a low usability and utilization rate.

Respondents from NEARLS with a substantial majority (37.65%) affirmed a low usability and utilization rate of the institutional repository. This means that the institutional repositories at the three agricultural research institutes investigated are not easily accessible hence the low utilization. However, a significantly low proportion of respondents from NAPRI (5.21%), IAR (3.41%), and NEARLS (4.71%) expressed uncertainty while some respondents (8.33%) in addition to 5.21% reported a high level of utilization at the NAPRI repository. Similarly, 9.09% of the respondents expressed a high level of utilization with optimal support from only 5.68% of the respondents from IAR while 9.41% of the respondents reported a high utilization rate from the NEARLS repository with optimal emphasis from 5.88% of the respondents.

The study findings on item 2 table 4.8 indicate that a significant proportion of respondents expressed non-usability and utilization of the institutional repository at NAPRI to access research materials with confirmation from approximately 28.13% of the respondents from NAPRI. Similarly, of the respondents reported non-utilization of the repository at the IAR with strong affirmation from 32.96% of the respondents reporting that they have never used the repository at IAR to access resources. This is consistent with of the respondents from NEARLS with optimal support from a substantial majority (44.07%) of the respondents. Comparable lower percentages of respondents across the institutions investigated specifically, 5.21% from NAPRI, 2.27% from IAR, and 4.71% from NEARLS were undecided and hence provided no opinion on the extent to which they have access to resources from their various institutional repositories. In contrast, 13.54% of the respondents from NAPRI affirmed with optimal support from 3.13% that they have accessed

resources from the NAPRI repository similar to 12.50% in addition to 4.55% of respondents from IAR. The result is not different from those obtained from NEARLS; 9.41% of the respondents agreed that they have accessed resources from the NEARLS repository with emphasis from 3.53% of the respondents surveyed in NEARLS.

The analysis of item 3, table 4.8 reveals that some respondents reported that the user number increase in the NAPRI repository is effective. This gained robust support from a significant majority (36.46%) of the respondents surveyed from NAPRI that the search user number is not increasing. The findings are consistent concerning IAR and NEARLS with 42.35% of the respondents in NEARLS and 34.09 in IAR addition affirming the user number in the repository at IAR is not increasing. Similarly, 3.13% of respondents from NEARLS affirm that there is an increase in the number of users of the repository interface. There is consistency in the number of respondents who failed to attend to the questions regarding the number of users specifically, 3.13% from NAPRI, 3.41% from IAR, and 2.35% from NEARLS. In contrast, the findings indicate that 7.29% of the respondents agreed that the user number at the NAPRI repository is increasing. The user number increase gained support from 3.13% surveyed from NAPRI affirming the increase of the user number at the IAR repository and 7.95% from NEARLS with optimal support of 3.53%.

The findings on item 4 Table 4.8 indicate that a significant proportion of the respondents with a majority (32.29%) expressed discontent with the repository at NAPRI providing a friendly navigating system. This aligns with those obtained from

IAR with optimal support from a significant majority of the respondents (37.5%) who observed that the interface of the repository during navigation at IAR is not user-friendly. Respondents from NEARLS with a substantial majority of 41.18% affirmed that the navigating system of the repository at NEARLS is not user-friendly. This means that the institutional repositories do not provide a friendly navigation system. However, a considerably low proportion of respondents from NAPRI (7.29%), IAR (5.88%), and NEARLS (3.41%) expressed uncertainty while some respondents (4.17%). In addition, a friendly user navigation system in the repository at NAPRI shows that 6.25% of the respondents in NAPRI with respondents from IAR which is 6.82%, and 7.06 of the respondents from NEARLS reported the navigation system of the repository is getting to an optimal level of being user-friendly.

Furthermore, it is worth noting that the findings on item 5 reported a significant proportion of respondents 34.38%, disagreed that the institutional repository contains a wide range of queries at the NAPRI. The result reveals that 35.23% of the respondents in IAR confirmed that the repository has queries during and 31.76% of the respondents in NEARLS also affirm that queries exist in the search. The findings indicated that approximately 4.17% of the respondents from NAPRI, 3.41% from IAR, and 11.76% from NEARLS did not attend to the items of the questionnaires and hence provided no opinion regarding the sufficiency of search queries in repositories across the research institutions. In contrast, 5.21% of the respondents agreed that there are research materials available at the NAPRI repository, in the same vein, 9.09% of the respondents affirmed the presence of research materials at the IAR.

This is consistent with the findings obtained from NEARLS which indicates that 5.88% agree to the availability of query in the search material.

A Chief Librarian was asked about the extent of utilization of institutional repositories by users on service delivery and responded that;

*Unfortunately, the utilization of our institutional repositories for service delivery has been rather limited. We've observed a lack of awareness among users and encountered challenges in promoting and facilitating access effectively. (CL-1)*

Another Chief Librarian (CL-2) responded that;

*Currently, the extent of utilization of our institutional repositories for service delivery is below our expectations. Users seem to face difficulties in accessing and navigating the repositories, which has impacted their overall. (CL-2)*

When asked how much users have used institutional repositories for service delivery, a chief librarian said:

*There has not been much use of our institutional repositories for service delivery. We have seen a deficiency in user awareness and faced difficulties in efficiently encouraging and enabling access. (CL-3)*

The responses from the Chief Librarians (CL-1, CL-2, and CL-3) indicate that the utilization of institutional repositories for service delivery in the agricultural research institutes has been suboptimal. CL-3 points out that there is a lack of awareness among users, suggesting that the institutes have not effectively promoted their repositories or educated users about their benefits and accessibility. Additionally, CL-2 highlights that users face difficulties in accessing and navigating the repositories, which has negatively influenced their overall utilization. These findings suggest that agricultural research institutes need to focus on improving user awareness, providing clear guidelines and support for accessing the repositories, and streamlining the user interface to facilitate easy navigation.

The findings highlight the significant challenges faced by users in utilizing institutional repositories within agricultural research institutes in North Western Nigeria, with the majority of respondents reporting difficulties in accessing the repositories and a lack of awareness about their existence. Despite a moderate level of utilization, concerns were raised about the effectiveness of search functionality, content diversity, ease of navigation, impact on research, regular updates, and support for research projects. The overall tendency towards disagreement regarding the utilization levels underscores the urgent need for agricultural research institutes in the region to address these challenges by focusing on enhancing repository accessibility, user awareness, search functionality, content diversity, and overall user experience, while also investing in regular updates and support for research projects. Addressing these issues requires a concerted effort from various stakeholders within the institutes to unlock the full potential of their institutional repositories, enabling

them to serve as valuable tools for knowledge sharing, research collaboration, and innovation within the agricultural research community in North Western Nigeria.

The findings from Makate and Makate (2019) resonate with the challenges identified in the utilization levels of institutional repositories within agricultural research institutes in North Western Nigeria. Makate and Makate (2019) highlight the importance of rejuvenating agricultural extension services to enhance the adoption of climate-smart agriculture technologies. Similarly, the findings regarding obstacles hindering the adoption of institutional repositories among researchers in Nigerian agricultural research institutes, as elucidated by Ukwoma and Ngulube (2019), underscore the need for revitalizing infrastructure and improving awareness and technical proficiency. Both studies emphasize the necessity of institutional policies, awareness enhancement, and technical skill development to overcome barriers to effective utilization.

While Makate and Makate (2019) focus on agricultural extension services and DTM adoption, and Ukwoma and Ngulube (2019) concentrate on institutional repositories, the overarching themes of infrastructure enhancement, awareness promotion, and technical proficiency improvement align with the challenges identified in the utilization levels of institutional repositories in North Western Nigeria. However, the studies by Makate and Makate (2019) and Ukwoma and Ngulube (2019) primarily focus on specific settings such as Zimbabwe and Nigerian agricultural research institutes, respectively, potentially limiting the generalizability of their findings to the broader context of North Western Nigeria.

#### **4.7 Indexing of the Institutional Repository Materials**

According to Makate (2019), indexing agricultural research institutional repositories is important because it increases discoverability and high-quality metadata. Also, proper indexing ensures that research outputs are easily searchable and accessible through search engines, academic databases, and specialized agricultural platforms. To capture data on the indexing of agricultural institutional repositories respondents were asked to indicate how materials are effectively included in major search engines and the effectiveness of metadata. 15 digital librarians were issued with closed-ended questionnaires and Chief librarians were also interviewed on the indexing of materials uploaded in the agricultural institutional repositories their responses were 100% captured as shown in Table 4.9

**Table 4.9 Indexing of Institutional Repositories**

Indexing Parameters	Response	Research Institutes					
		NAPRI		IAR		NEARLS	
		n=5		n=6		n=4	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
Adherence to metadata standards	Disagree	0	0.00	0	0.00	0	0.00
	Neutral	0	0.00	1	16.67	1	25.00
	Agree	3	60.00	3	50.00	3	75.00
	Strongly agree	2	40.00	2	33.33	0	0.00
Adherence to subject heading standards.	Disagree	0	0.00	0	0.00	0	0.00
	Neutral	1	20.00	0	0.00	0	0.00
	Agree	2	40.00	4	66.67	4	100
	Strongly agree	2	40.00	2	33.33	0	0.00
Integration of IR with the retrieval system	Disagree	0	0.00	0	0.00	0	0.00
	Neutral	1	20.00	1	16.67	0	0.00
	Agree	2	40.00	3	50.00	4	100
	Strongly agree	2	40.00	2	33.33	0	0.00

The findings on item 1 Table 4.9 indicate that the majority of the respondents from NAPRI and NEARLS agree that the repository materials indexing adhered to metadata standards. This level of agreement of digital librarians aligns with 3 (50.00%) from IAR. The consistency in the findings showed that the institutional repository materials are in line with the metadata standards. However, only 1

(16.67%) digital librarian from IAR expressed uncertainty to the metadata standards of the repository.

Furthermore, it is worth noting that a significant number of respondents, 40.0%, confirmed that the standards of metadata associated with NAPRI repository materials is consistently high and accurate with emphasis by 40.0% of the digital librarians, on item 2 Table 4.9. The findings revealed a consistent application of subject heading standards across the institutional repositories, particularly among digital librarians at IAR and NEARLS. These institutions utilize DSpace, which is built upon the Dublin Core metadata schema—an internationally recognized standard for resource description and indexing. As a result, librarians affirmed adherence to subject heading protocols, ensuring uniformity and discoverability of repository materials. However, at NAPRI, one digital librarian (20.00%) did not respond to the questionnaire item related to subject heading standards, and therefore no opinion was recorded regarding their repository's indexing practices.

The study findings on item 3 Table 4.9 indicate that a noteworthy proportion of Participant 2(33.3%) expressed uncertainty regarding the availability of integration of the repository with the retrieval system to enhance the precision of search findings that would help users find relevant materials at ease from the IAR repository. However, the majority of the digital librarians 2(33.33%) and 2(33.33%) strongly agreed and agreed respectively that the retrieval system integration is enhancing the precision of search findings that would help users find relevant materials at ease from the IAR repository is in place. These responses aligned with those reported by all digital librarians from NAPRI and NEARLS respectively. The

flexibility of the retrieval system in enhancing the precision of search findings by helping users find relevant materials easily appears to be consistent in NAPRI and NEARLS as the result is considerably higher than those from IAR.

To buttress the findings obtained from the administration of questionnaires, the study interviewed three Chief Librarians on the indexing of materials included in their repositories respectively specifically on the specific metadata or keywords that they use to increase the visibility of the repositories. The interaction yielded the following outcomes:

*We have not focused much on specific metadata or keywords to increase the visibility of our repository. It is an aspect we have neglected, and it is something we should address moving forward. (CL-1)*

The responses from the Chief Librarian (CL-1) and another Chief Librarian (CL-2) reveal significant shortcomings in the indexing and metadata practices of the agricultural research institutes' Institutional Repositories. CL-1 acknowledges that they have not focused on utilizing specific metadata or keywords to increase the visibility of their repository, indicating a neglect of this crucial aspect. For better expression and claims, the study proceeded to interview the second chief librarians the following responses were gained:

*Our current indexing methods have not been as effective as we would like. They lack the depth and precision needed to ensure easy and accurate access to our resources. This limitation hampers our ability to*

*efficiently connect users with the information they need.*

(CL-2)

Similarly, CL-2 highlights the ineffectiveness of their current indexing methods, which lack the necessary depth and precision to ensure easy and accurate access to resources. The interaction between the researcher and the third librarian on the specific metadata or keywords that they use to increase the visibility of the repositories yielded the following opinion:

*The indexing techniques we now use have not yielded the desired findings. They are not as detailed or accurate as they should be to guarantee quick and precise access to our resources. This rest Information and communication technology interface ion makes it more difficult for us to effectively provide consumers with the information they require. (CL-3)*

In a similar vein, CL-2 emphasizes how inefficient their existing indexing techniques are, lacking the depth and accuracy required to guarantee quick and precise access to resources.

The findings of the study indicate that despite efforts to maintain quality metadata within institutional repositories, limited integration with major discovery platforms such as Google Scholar has hindered their visibility and accessibility. This suggests that metadata quality alone is insufficient if repositories are not properly configured for web indexing or lack interoperability with external aggregators. Moreover,

inconsistencies in subject-based indexing—such as the inconsistent use of controlled vocabularies or subject headings—may reduce the precision and relevance of search results for users seeking specific materials. These issues highlight the need for improved metadata practices, adherence to international indexing standards, and technical configurations that enhance repository discoverability through open-access search engines and harvesting protocols.

In addition, the repository's ability to seamlessly integrate with external systems, enhancing its usability and accessibility across different platforms and databases is limited with perceived inadequacy in the effectiveness of subject-based indexing for enhancing user-friendliness and discoverability and ease of use of the repository, uncertainty or limited effectiveness of interoperability in extending repository content reach. These findings suggest that the Institutional Repositories are not optimized for discoverability and accessibility, which can hinder their ability to connect users with the relevant information they seek.

A recent study by Majhi, Sahu and Behera (2023) supports this observation, noting that many institutional repositories in sub-Saharan Africa suffer from poor metadata quality, limited indexing in global search engines, and inadequate user interface design—all of which reduce discoverability and accessibility. The authors emphasize that without proper metadata standards and search engine optimization, repositories fail to connect users with relevant scholarly content. The lack of attention to metadata, keywords, and effective indexing practices can limit the visibility of the repositories, both within the institutes and to external users. To address these issues, the agricultural research institutes should prioritize the

development and implementation of robust metadata and indexing strategies, ensuring that their Institutional Repositories are properly optimized for search engines and user discovery.

This sentiment was echoed by the Chief Librarian's acknowledgment of neglect regarding specific metadata or keywords to increase repository visibility, emphasizing the need for improvement in indexing practices. Another librarian expressed dissatisfaction with the current indexing methods, highlighting the lack of depth and precision needed for effective resource access, further underscoring the study's findings regarding the limitations of current indexing practices within agricultural institutional repositories in North Western Nigeria.

The findings highlight significant challenges and limitations in the indexing practices of institutional repositories within agricultural research institutes in North Western Nigeria. The majority of respondents expressed concerns about the effectiveness of repository materials being included in major search engines, the quality of associated metadata, and the impact of subject-based indexing on visibility and search relevance. These issues collectively suggest that current indexing methods may be hindering the discoverability and accessibility of valuable research materials housed within these repositories. The relatively low mean score for indexing (2.06) further reinforces the general dissatisfaction among respondents regarding the current state of indexing practices. The Chief Librarian's acknowledgment of neglect in utilizing specific metadata or keywords to enhance repository visibility, coupled with another librarian's critique of the lack of depth and precision in current indexing methods, corroborates the study's findings and

highlights the urgent need for improvement. These findings align with the broader literature emphasizing the crucial role of accurate and comprehensive metadata, effective search engine inclusion, and subject-based indexing in enhancing the visibility, accessibility, and impact of repository materials.

The findings are consistent with the observations made by Arlappa and Surianarayana (2017), who emphasized the importance of indexing repository materials in enhancing visibility and accessibility, ultimately leading to increased citations and research impact. However, the study findings suggest potential limitations in achieving this goal, reflecting ongoing challenges in this aspect of indexing. Additionally, the study highlighted concerns about the quality of metadata associated with repository materials and its quality. This finding is consistent with the literature emphasizing the importance of accurate and comprehensive metadata in enhancing discoverability, as noted by Norris et al. (2008) and Van Tuyl and Recker (2012).

Similarly, Garg et al. (2020) found that subject indexing improved the precision and relevance of search findings, making it easier for researchers to locate specific materials within repositories, suggesting potential opportunities for improvement in this area. This finding aligns with the findings of Jones and Andrew (2017), who highlighted the importance of interoperability in extending the reach of repository materials by integrating with discipline-specific databases and academic networks. However, concerns were raised about the effectiveness of search engine inclusion and subject-based indexing in enhancing repository visibility and search relevance, suggesting areas where further attention and improvement may be needed.

The study revealed various insights into the effectiveness and perceived shortcomings of current indexing practices. The majority of respondents disagreed that repository materials were effectively included in major search engines like Google Scholar and others, expressing disagreement, indicating potential challenges in visibility and discoverability. Similarly, for the quality of metadata associated with repository materials, suggesting issues or inconsistencies with metadata accuracy and reliability that could impact search effectiveness. However, concerns were raised regarding the effectiveness of search engine inclusion and subject-based indexing in enhancing repository visibility and search relevance and high-quality metadata for discoverability and ease of use. This sentiment was echoed by the Chief Librarian's acknowledgment of neglect regarding specific metadata or keywords to increase repository visibility, emphasizing the need for improvement in indexing practices. Another librarian expressed dissatisfaction with the current indexing methods, highlighting the lack of depth and precision needed for effective resource access, further underscoring the study's findings regarding the limitations of current indexing practices within agricultural institutional repositories in North Western Nigeria.

The findings are consistent with the observations made by Arlappa and Surianarayana (2017), who emphasized the importance of indexing repository materials in enhancing visibility and accessibility, ultimately leading to increased citations and research impact. However, the study findings suggest potential limitations in achieving this goal, reflecting ongoing challenges in this aspect of indexing. Additionally, the study highlighted concerns about the quality of metadata associated with repository materials, with 63% of respondents disagreeing about its

quality. This finding is consistent with the literature emphasizing the importance of accurate and comprehensive metadata in enhancing discoverability, as noted by Norris et al. (2008) and Van Tuyl and Recker (2012). Similarly, concerns were raised about subject-based indexing, with 55% of respondents disagreeing. Garg et al. (2020) found that subject indexing improved the precision and relevance of search findings, making it easier for researchers to locate specific materials within repositories, suggesting potential opportunities for improvement in this area.

Furthermore, while respondents were divided on interoperability with external systems and databases, there was a relatively positive perception of the repository's ability to integrate with external systems, with 9% strongly agreeing. This aligns with the findings of Jones and Andrew (2017), who highlighted the importance of interoperability in extending the reach of repository materials by integrating with discipline-specific databases and academic networks. However, concerns were raised about the effectiveness of search engine inclusion and subject-based indexing in enhancing repository visibility and search relevance, suggesting areas for further attention and improvement.

#### **4.8 Strategies Used to Make Agricultural Research Institutional Repositories Visible and Accessible**

According to Ismail (2021), Strategies for making agricultural research institutional repositories are essential for maximizing their impact on research, policy, search engine optimization, and metadata optimization ensuring that research outputs in the repository are tagged with detailed and accurate metadata (e.g., title, author, keywords, abstracts) helps improve search engine rankings and visibility on

platforms like Googles, Google Scholar, and other search engines. To capture data on strategies used to make institutional repositories visible and accessible respondents were asked to indicate the effectiveness of search engines, keywords used, social media platforms, and engine discoverability. The quantified responses from three chief librarian interviews and closed-ended surveys were created using data from 284 staff members. The findings are in Table 4.10 below.

**Table 4.10: Strategies Used for Making Repositories Visible and Accessible**

Parameters of Strategies Used for Making IR Visible and Accessible	Response	Research Institute					
		NAPRI n=101		IAR n=94		NEARLS n=89	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
The ARIs identify and segment the audience for their IRs.	Disagree	22	21.8	25	26.7	29	32.6
	Neutral	11	10.9	13	13.8	9	10.1
	Agree	15	14.9	10	10.6	12	13.5
	Strongly agree	5	5.0	4	4.3	3	3.4
ARIs organize workshops and training sessions.	Disagree	37	36.6	38	40.4	37	41.6
	Neutral	2	2.0	4	4.3	3	3.4
	Agree	7	6.9	8	8.5	5	5.6
	Strongly agree	7	6.9	2	2.1	8	9.0
AIRs leverage social media and content marketing.	Disagree	35	34.6	36	38.3	34	38.2
	Neutral	4	4.0	3	3.2	5	5.6
	Agree	9	8.9	10	10.6	8	9.0
	Strongly agree	5	5.0	3	3.2	6	6.7
ARIs build partnerships and collaborations for IRs.	Disagree	30	29.7	31	33	34	38.3
	Neutral	11	10.9	8	8.5	6	6.7
	Agree	3	3.0	10	10.6	11	12.4
	Strongly agree	9	8.9	3	3.2	2	2.3
IRs optimized search engines.	Disagree	32	31.7	29	30.9	35	39.3
	Neutral	7	6.9	11	11.7	9	10.1
	Agree	11	10.9	10	10.6	6	6.7
	Strongly agree	3	3.0	2	2.1	3	3.4

Based on the research findings of item 1 presented in Table 4.10 on identification and segmenting of audience for their institutional repositories, it is observed that the respondents acknowledged the non-identification and segmentation of audience to improve visibility with an additional 21.8% of respondents from NAPRI. Explicitly, these respondents were noted for non-segmentation of audience to improve visibility in the process of providing users with the most efficient service delivery. However, the analysis shows that the respondents from IAR confirmed not actively engaged in improving the visibility of the materials in the repository. This affirmation gained solidarity from 26.7% of the respondents from IAR. In the same vein, 32.6% of respondents from NEARLS confirmed that this practice is not available in their institution. The survey among stakeholders at the various agricultural research institutions revealed the non-segmentation of the audience to improve the visibility of uploaded materials indicating a lack of functional repository operations.

The findings indicate that among the respondents, 10.9% of NAPRI respondents, 13.8% of IAR respondents, and 10.1% of NEARLS respondents, articulated ambiguity on the identification and segmentation of the audience. In comparison, it was observed that IAR displayed a higher percentage of respondents who were undecided in their response, contrary to NAPRI and NEARLS. According to the findings, 14.9% of the respondents agreed that in NAPRI, they often identify and segment audiences to improve the visibility of the repository, with optimal support by 5.0% of respondents who strongly affirmed the efficient segmentation of the audience. Based on the data collected, it has been reported that a noteworthy fraction, 10.6% of the respondents from IAR have expressed that the identification and segmentation are implemented in their repository to enhance visibility with

support from 4.3% of respondents. The analysis demonstrated that a significant proportion of respondents from NEARLS (13.5%) and (3.4%) reported active to improve visibility.

The findings on item 2 indicate that the respondents admitted that the research institutes in the NAPRI do not organize workshops and training sessions regularly findings with optimal confirmation from 31.7% of the respondents. It was observed that the respondents with a total backing from 30.9% of the respondents say that the workshop and training in the IAR failed to appear prominently in the findings. In the same manner, respondents with optimal support of 39.9% confirmed that the NEARLS declined from the threshold of workshop and training in the findings. However, there was no opinion from 6.9% of the respondents from NAPRI, 11.7% from IAR, and 10.1% from NEARLS. The evaluations reveal that NAPRI exhibited a modest 10.9% positive confirmation rate. In line with 10.6% of the respondents in IAR strongly affirmed the aforementioned submissions. This finding aligns with the NEARLS equivalent 6.7% confirmation rate, suggesting a consistent pattern of training and workshops that confirmed the training sessions in the NEARLS appear to be prominently according to the findings.

Based on the result of item 3, it was observed that a large proportion of respondents reported that social media and content marketing used in the NAPRI repository do not enhance its IR visibility with confirmation from 34.6% of the respondents. The data presented aligns with the reported percentages of respondents at IAR, with strong support of 38.3% suggesting the social media and content marketing used in the institutional repository fail to enhance its visibility. The finding is similar to

those recorded by respondents at NEARLS in that 38.2% of respondents affirm that social media and content marketing used by institutions cannot enhance their visibility. However, 4.0% of respondents from NAPRI, 3.2% from IAR, and 5.6% from NEARLS expressed uncertainty.

The findings demonstrated that 8.9% of the respondents agreed with the opinion obtained from reported positive feedback that the social media and content marketing used in the NAPRI repository enhanced its visibility. The findings indicate that a notable proportion of respondents 10.6% with a considerable affirmation from 3.2% of respondents from IAR expressed that the social media and content marketing used in the IAR repository enhance its visibility. The findings show similarity to those gathered from 9.0% of the respondents from NEARLS with optimal agreement with 6.7% suggesting the social media and content marketing used in the NEARLS repository enhance its visibility. The majority of respondents across the institutions under investigation exhibited a significant level of agreement that the social media and content marketing used in their various institutional repositories cannot enhance their visibility.

In a similar context to item 4, it is noteworthy to highlight that 29.7% of respondents indicated that the NAPRI repository does not actively promote its research materials through partnership and collaboration platforms. This affirmation gained support from the respondents suggesting the NAPRI repository does not actively promote its research materials through partnership and collaboration platforms. In addition, the respondents strongly agreed that the IAR repository does not actively promote its research materials through partnership and collaboration with optimal support from

33% of the respondents from IAR. In the same manner, the respondents were in disagreement and confirmed that the NEARLS repository does not actively promote its research materials through partnership and collaborations with affirmation from 38.3% of the respondents from NEARLS.

The findings show that 10.9% of respondents from NAPRI, 8.5% from IAR, and 6.7% from NEARLS declined to attend to the items of the questionnaires. In contrast, 3.0% of the respondents confirmed that the NAPRI repository actively promotes its research materials through collaborations and partnerships, which is consistent with reports obtained from 10.6% of respondents who agreed that the IAR repository actively promotes its research materials through collaborations and partnerships with optimal support of the respondents from IAR. However, a significant proportion of respondents (12.4%) with an additional 2.3% of respondents expressed satisfaction that the NEARLS uses collaboration and partnership platforms to promote its research materials. The findings of this study offer substantive claims that repository experts in agricultural institutions exhibit a significant inadequacy in using collaboration and partnership platforms to promote research materials.

Based on the findings on item 5, it has been ascertained that the respondents in the study expressed the inability of the NAPRI repository to engage with users and stakeholders through optimized search engines to increase and ease accessibility. A substantial proportion of the respondents, 30.7%, did not confirm this finding from NAPRI. On the other hand, the respondents from IAR 33% disagreed that the institutional repository increases accessibility by creating optimized search engines

that allow interaction between users and the repositories. Similarly, 4.0% affirmed that the repository at NEARLS provides users and stakeholders with optimized search engines to increase accessibility with emphasis on respondents.

However, 8.9% of respondents from NAPRI, 3.2% from IAR, and 12.4% from NEARLS expressed uncertainty. The result demonstrated that 4.0% of the respondents agreed that the institutional repository provides users and stakeholders with optimized search engines to increase accessibility with emphasis from 8.9% of the respondents from NAPRI. The finding is consistent across the institutions; a reasonable percentage of respondents (10.6%) in addition to 8.5% observed that the IAR provides users and stakeholders through search engines to increase accessibility. Similarly, 7.9% of respondents from NEARLS with support from 5.6% observed that the institution provides users and stakeholders with optimized search engine accessibility.

To buttress the existing findings from respondents obtained through the administration of questionnaires, the study through an interview with chief librarians on the strategies implemented to enhance the visibility of their respective institutional repositories, the responses obtained are as follows:

*We have not extensively utilized Search Engine Optimization techniques to improve the discoverability of our repository. This is an area where we have fallen short and could benefit from further exploration. (CL-1)*

Further interaction on the strategies employed to engage researchers, students, and other stakeholders with the institutional repository, the interaction yielded the following:

*Our strategies to engage researchers, students, and stakeholders with our institutional repository have been lacking. We haven't dedicated sufficient resources to this endeavor, and as a result, our engagement efforts have been minimal. (CL-2)*

On the barriers and challenges encountered in making the institutional repository visible and accessible by all stakeholders, with interaction a chief librarian yielded the following outcome:

*We have encountered numerous challenges and barriers in making our institutional repository visible and accessible. Limited resources, staffing issues, and a lack of institutional support have all contributed to our struggles in this regard. We have attempted to leverage social media platforms to promote our institutional repository, but our efforts have been sporadic and not particularly effective. We utilize a few social media channels, such as Twitter and Facebook, but our engagement with users through them is infrequent due to limited staffing and resources. (CL-3)*

Based on the responses from the Chief Librarians (CL-1, CL-2, and CL-3), it is evident that the agricultural research institutes are facing significant challenges in

enhancing the visibility and accessibility of their repositories. The chief librarians acknowledge that they have not effectively utilized Search Engine Optimization (SEO) techniques to improve the discoverability of their repositories, and their engagement efforts with researchers, students, and stakeholders have been minimal due to a lack of dedicated resources. Furthermore, the institutes have encountered numerous barriers, including limited resources, staffing issues, and insufficient institutional support, which have hindered their efforts to promote their repositories.

The findings from this study reveal significant shortcomings in the strategies employed to enhance the visibility and accessibility of institutional repositories within agricultural research institutes in North Western Nigeria. The overall dissatisfaction among respondents, as indicated by the low mean score and high standard deviation, suggests that the current approaches are not effectively meeting the needs of users or achieving the desired outcomes. The disagreement with the effectiveness of search engine optimization techniques, metadata and keyword usage, social media promotion, collaboration efforts, resource sharing, active engagement, and workshop organization highlights the need for a comprehensive review and overhaul of the strategies being used. These findings align with the literature emphasizing the evolving role of institutional repositories and the importance of diverse content, collaboration, and engagement efforts in enhancing visibility and accessibility. However, the specific challenges identified in the North Western Nigerian context underscore the need for targeted interventions and a concerted effort from various stakeholders within the agricultural research institutes to address these shortcomings and develop more effective strategies for promoting the visibility and accessibility of their institutional repositories.

The findings regarding strategies for enhancing the visibility and accessibility of agricultural institutional repositories in North Western Nigeria align with several aspects highlighted in the literature. Ranasinghe and Chung (2018) emphasize the evolving role of institutional repositories beyond conventional scholarly access, advocating for their potential as platforms for scholarly publishing. Similarly, the study by Jones (2018) underscores the importance of repositories in broadening their scope to include unpublished materials and datasets, aligning with the need for diverse content highlighted in the findings. However, the studies by Ismail et al. (2021) and Jones (2018) address the visibility and collaboration aspects more directly, suggesting techniques such as reciprocal hyperlink exchange and collaborative endeavors among institutions to enhance visibility. These suggestions resonate with the findings indicating a lack of effective SEO techniques, collaboration, and engagement efforts observed in North Western Nigeria's agricultural research institutes.

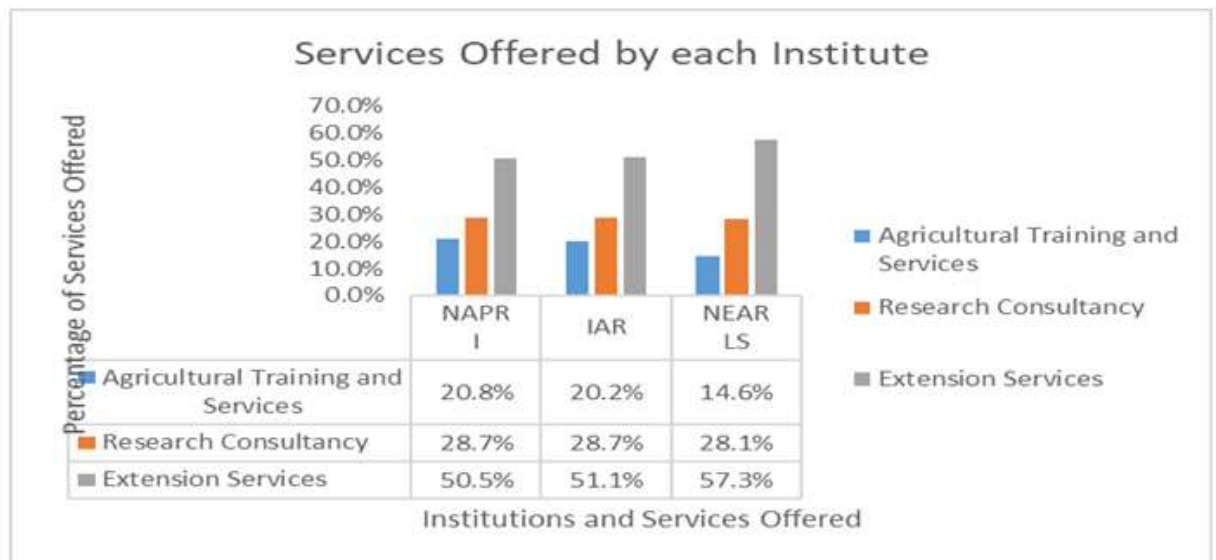
#### **4.11 Repository Service Delivery in Agricultural Research Institutes**

##### **4.11.1 Available Service Delivery**

Stauss (2005) defined service delivery as an outlined or statutory transaction conducted by institutions based on specialized skills and knowledge to update user satisfaction. This study examines three key aspects of the institutional repository interface, which agricultural institutions are responsible for managing. One of these aspects is the repository's core function: meeting the information needs of the communities they serve. To capture data on agricultural information service delivery, the respondents were asked, based on their respective institutions to

indicate the nature of services and training received from the institutes their responses are shown in Figure 4.9 below.

**Figure 4.9: Service offered by Agricultural Research Institutes Northwest Nigeria**



**Source: Research data**

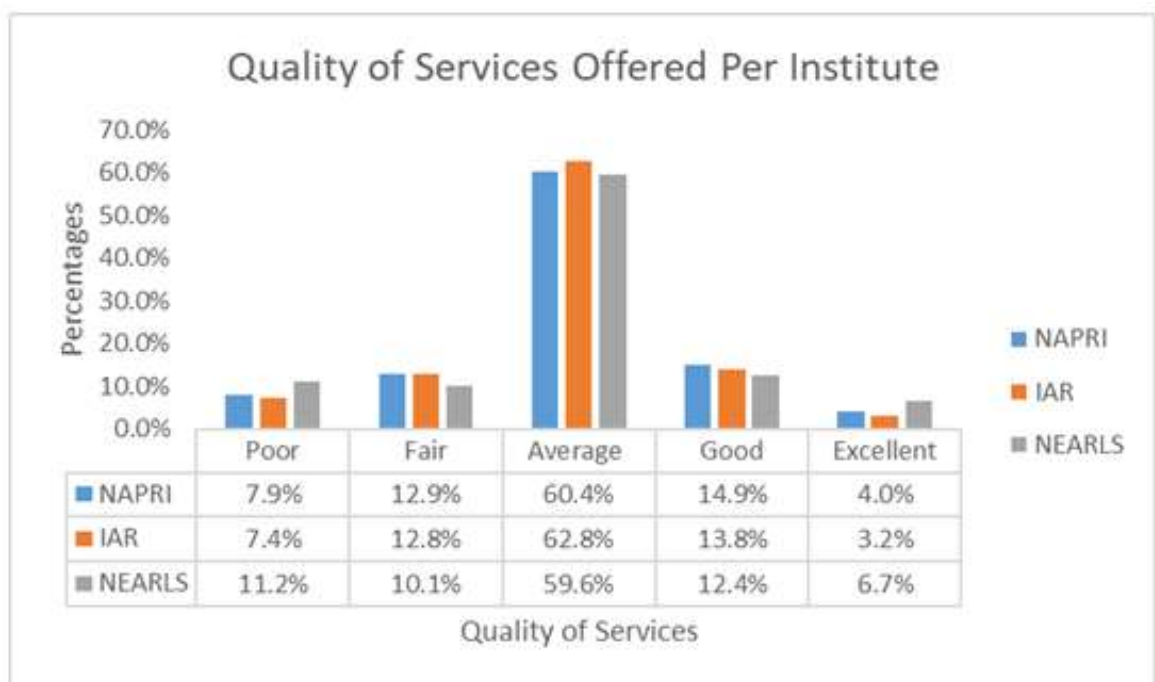
The findings in Figure 4.6 demonstrate that a significant portion, 20.8%, indicated the provision of agricultural training and services as one of the fundamental services provided by NAPRI similar to 20.2% from IAR and 14.6% from NEARLS in Northwest Nigeria. The investigation yielded the following findings of other services provided by the institutions such as research consultancy where many respondents 28.7% confirmed availability in NAPRI similar to those from IAR (28.7%) and 28.1% from NEARLS. Furthermore, 50.5% agreed that NAPRI offers extension services similar to those from IAR (51.1%) while 57.3% affirmed that NEARLS also offers extension services. This suggests a strong emphasis on outreach and engagement with the community or relevant stakeholders beyond the institute's immediate sphere indicating a notable but comparatively lower focus on

providing expertise and support for research endeavors, and agricultural training for farmers.

#### 4.8.2 Quality of Services Offered

In addition, to capture data on the quality of services offered respondents were asked to indicate the rate at which the services are offered by the agricultural research institutes. The respondents provided varying rates regarding the services offered as shown in Figure 4.10 below.

**Figure 4.10: Quality of Services Offered**



**Source: Research data**

The findings indicate that a significant majority of respondents, approximately 7.9%, rated the quality of services offered by NAPRI as poor while 12.9% considered the service quality as fair. However, 60.4% of the respondents from NAPRI repository service quality is average, 14.9% affirmed the quality of services is good while only 4.0% agreed NAPRI provides excellent repository services to

users. Additionally, a notable percentage of respondents (7.4%) in IAR, rated the services as poor while 12.8% affirmed the repository services are fair; however, the majority of the respondents 62.8% rated the quality of repository services as average. some percentages of respondents (13.8%) agreed the service is good while 3.2% affirmed the repository at IAR is excellent. Furthermore, 11.2% provided that service quality in NEARLS is poor although, some respondents (10.1%) considered it to be fair while, majority of the respondents (59.6%) were in agreement that the repository service quality is average. However, certain respondents (12.4%) rated the service quality as good while 6.7% rated the service quality as excellent.

The findings suggest that there are aspects of the institute's services that are meeting or exceeding expectations, but these may be limited in scope or impact yielding a moderate level of satisfaction among users, but still leave room for enhancement to achieve higher levels of service quality and user satisfaction. Agbana (2023) indicates that agriculture remains the backbone of the economy in Northwestern Nigeria, a region marked by its vast arable land, diverse agro-ecological zones, and a predominantly rural population reliant on farming for their livelihood. In this context, the role of agricultural research institutes is paramount. These institutes are tasked with generating innovative solutions, disseminating knowledge, and improving agricultural practices to enhance productivity and sustainability (Giagnocavo et al., 2022) Evaluating the quality of the agricultural services they provide is essential to understanding their impact and identifying areas for improvement.

Giagnocavo et al. (2022) indicates that the core function of agricultural research institutes is to conduct research that addresses the challenges faced by farmers. In Northwestern Nigeria, these challenges range from pest infestations and soil degradation to climate change and market access issues. The quality of research output can be assessed through the relevance, innovation, and impact of the studies conducted. Institutes like the Institute for Agricultural Research (IAR) in Zaria have made significant contributions in developing high-yield and pest-resistant crop varieties (Shehu 2022). However, the extent to which these innovations are aligned with the immediate needs of local farmers is crucial. Research that addresses specific regional issues, such as drought-tolerant crops in arid areas, reflects high quality and relevance.

Effective extension services are vital for translating research findings into practical applications on farms (Ragasa, 2020). The accessibility, effectiveness, and coverage of these services determine their quality. Agricultural research institutes in Northwestern Nigeria, such as the National Agricultural Extension and Research Liaison Services (NAERLS), play a pivotal role in providing training and advisory services to farmers. These services include on-field demonstrations, workshops, and the distribution of informational materials. High-quality extension services are characterized by their ability to reach a wide demographic, including remote and marginalized communities, and their success in improving farming practices and productivity. The feedback mechanisms in place to gather farmers' responses and adapt services accordingly are also indicative of quality.

According to Omotesho et al. (2021), another function of agricultural research institutes includes capacity building among the farmers and all the agricultural stakeholders. It involves equipping farmers, extension workers, and other stakeholders with the knowledge and skills necessary to adopt new technologies and practices. Agricultural research institutes in Northwestern Nigeria offer various training programs aimed at enhancing the technical know-how of respondents. The quality of these programs can be evaluated by their comprehensiveness, relevance to local farming systems, and the extent of follow-up support provided (Omotesho et al., 2021). Effective capacity building not only imparts knowledge but also ensures that respondents can apply what they have learned to achieve tangible improvements in their agricultural activities.

Additionally, agricultural research institutes strive to update their stakeholders with information about relevant technological information. The dissemination of new agricultural technologies and practices is a critical service provided by research institutes (Kumar et al., 2020). The adoption rate of these technologies among farmers is a key indicator of dissemination quality. In Northwestern Nigeria, institutes have introduced various innovations, such as improved seed varieties, sustainable soil management practices, and mechanized farming tools. The relevance and suitability of these technologies to the local context, including considerations of local resources, climate, and socio-economic conditions, determine their effectiveness. High-quality dissemination efforts are those that facilitate easy adoption, provide necessary support systems, and result in noticeable improvements in productivity and sustainability.

Accordingly, the quality of agricultural services is also reflected in the level of stakeholder engagement (Reimer et al., 2023). Effective engagement involves collaborative projects, active participation of farmers and other stakeholders in the research process, and transparent communication channels. Agricultural research institutes in Northwestern Nigeria engage with a variety of stakeholders, including local communities, government agencies, NGOs, and international organizations. High-quality engagement ensures that the research and services provided are inclusive, participatory, and responsive to the needs and inputs of all stakeholders involved.

Ultimately, the quality of agricultural services is measured by their impact on agricultural productivity and sustainability (Lankoski & Thiem, 2020). High-quality services lead to significant improvements in crop yields, livestock productivity, and farmers' incomes. They also promote sustainable agricultural practices that protect the environment and ensure long-term productivity. Documented evidence of such impacts, supported by data and case studies, provides a clear indication of the effectiveness and quality of the services offered.

Despite the positive contributions of agricultural research institutes in Northwestern Nigeria, several challenges persist (Camillone et al., 2020) Limited funding and resources, inadequate infrastructure, and insufficient collaboration among stakeholders can hinder the quality of services. Moreover, the adoption of new technologies is often slow due to cultural barriers, lack of awareness, and inadequate support systems.

Prain et al. (2020) noted that getting suitable solutions to these challenges requires a multi-faceted approach. Increasing investment in agricultural research and infrastructure, fostering stronger collaborations with local and international partners, and implementing robust monitoring and evaluation frameworks are essential steps (Prain et al., 2020). Additionally, enhancing the capacity of researchers and extension workers through continuous training and professional development can significantly improve service quality.

Conclusively, Camillone et al. (2020) point out that agricultural research institutes in Northwestern Nigeria play a crucial role in advancing agricultural productivity and sustainability in the region. Evaluating and enhancing the quality of their services is essential to maximize their impact. By focusing on relevant and innovative research, effective extension services, comprehensive capacity building, appropriate technology dissemination, and inclusive stakeholder engagement, these institutes can significantly contribute to the agricultural development and economic prosperity of Northwestern Nigeria (Ifeanyi-Obi et al., 2022). Addressing existing challenges through strategic investments and collaborations will further enhance the quality and effectiveness of the agricultural services offered.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This section provides an overview of the chapter's content and its relevance to the research endeavor. It also summarizes and interprets the research findings in accordance with the research questions. The chapter also includes recommendations for management practices and a conclusion. It equally provides policy recommendations and recommendations for further research.

#### 5.2 Summary of the Findings

The study's first objective was to investigate the criteria used for selecting and uploading resources to institutional repositories within agricultural research institutes in North Western Nigeria. The findings reveal some variation in perceptions regarding the connection between repository content and institutional goals. Among digital librarians, the majority across NAPRI, IAR, and NEARLS expressed strong agreement that the resources selected for their institutional repositories align with the mission and objectives of their respective institutions. For example, 60.0% of respondents from NAPRI, 80.0% from IAR, and 83.33% from NEARLS affirmed this connection. However, one digital librarian from NAPRI (20.0%) expressed uncertainty, leaving the item unanswered. In contrast, responses from repository users indicated a more neutral or even critical perspective, with many disagreeing that the repository content effectively reflects their institution's core research priorities. This contrast suggests a potential disconnect between repository managers' intent and users' perceptions of content relevance. The

repository covers the relevant material; however, it was expressed that users don't have adequate literature for retrieving all the information required.

The study objective aimed to assess the User needs for the Satisfaction of the agricultural information resources that were covered and uploaded into the agricultural research institutes' repository, The majority of the respondents from NAPRI 3 (60.0%) strongly agreed which differs slightly from those who merely agreed 2 (40.0%). This level of agreement is consistent with those reported at IAR (50.0%) of respondents affirmed strongly with a similar percentage of NEARLS that merely agreed, the findings indicate consistency across the NAPRI, IAR, and respondents in NEARLS unanimously expressed strong agreement that the research impact of the resources uploaded in their institutional repository is evident through citations and references in scholarly publications.

The third objective assessed the Usability and utilization levels of institutional repositories by users within agricultural research institutes in North Western Nigeria. The findings in Table 4.9 indicate that a significant proportion of the respondents (10.42%) with a majority (20.83%) from NAPRI expressed dissatisfaction with the friendly user interface and utilization rate of the institutional repository. This aligns with the findings collected and analyzed from IAR 34.0%), who equally presented a similar view of having a low-friendly user interface and utilization rate. Respondents from NEARLS with a substantial majority of 37.65% affirmed the institutional repository's low usability and utilization rate. This means that the institutional repositories at the three agricultural research institutes investigated are not easily accessible hence the low utilization.

However, a significantly low proportion of respondents from NAPRI (5.21%), IAR (3.41%), and NEARLS (4.71%) expressed uncertainty while some respondents (8.33%) in addition to 5.21% reported a high level of utilization at the NAPRI repository. Similarly, 9.09% of the respondents expressed a high level of usability and utilization rate with optimal support from only 5.68% of the respondents from IAR while 9.41% of the respondents reported a high utilization rate from the NEARLS repository with optimal emphasis from 5.88% of the respondents. The respondents who affirmed a higher level of utilization attributed it to the ease of accessing the various institutional repositories.

The fourth objective aimed at examining the quality of indexing institutional repositories within agricultural research institutes in North Western Nigeria. A majority of respondents (60%) agreed that repository materials adhere to metadata standards, indicating potential user-friendly metadata. Similarly, for the quality of metadata associated with repository materials, a significant number of respondents (40%) disagreed, suggesting issues or inconsistencies with metadata accuracy and reliability that could impact search effectiveness. While respondents were divided on interoperability with external systems and databases, with a considerable proportion expressing disagreement, there was a relatively positive perception of the repository's ability to integrate with external systems, as a small number of respondents strongly agreed. However, concerns were raised regarding the effectiveness of search engine inclusion and subject-based indexing in enhancing repository visibility and search relevance, with a significant majority of respondents disagreeing.

Conversely, respondents largely agreed on the importance of high-quality metadata for discoverability and ease of use. The findings indicated a disagreement among respondents, reflecting concerns or dissatisfaction with current indexing methods by the Chief Librarian's acknowledgment of neglect regarding specific metadata or keywords to increase repository visibility, emphasizing the need for improvement in indexing practices. Another librarian expressed dissatisfaction with the current indexing methods, highlighting the lack of depth and precision needed for effective resource access, further underscoring the study's findings regarding the limitations of current indexing practices within agricultural institutional repositories in North Western Nigeria.

The fifth objective based on the research findings as presented in Table 4.10 on the strategies used for making IR visible and accessible observed that 81.8% across the research institutes acknowledged the non-utilization of the IRs. Explicitly, these respondents were noted for non-utilization of social media and content market with 34.6% of respondents in NAPRI affirming low utilization, 38.3 in IAR, and 38.2 in NEARLS. This affirmation gained agreement from 19.2% of the respondents from IAR, which conformed to 10.1% of respondents from NEARLS validated by 22.5% of respondents from the same institutions who confirmed this practice is not available in their institution. The survey among stakeholders at the various agricultural research institutions revealed the non-utilization of search engine optimization to improve the visibility of uploaded materials indicating a lack of functional repository operations.

The study findings indicate that among the respondents, 10.9% of NAPRI respondents, 13.8% of IAR respondents, and 10.1% of NEARLS respondents, articulated ambiguity on the utilization of search engine optimization techniques. In comparison, it was observed that IAR displayed a higher percentage of respondents who were undecided in their response, contrary to NAPRI and NEARLS. According to the findings, 14.9% of the respondents agreed that in NAPRI, they often utilize search engine optimization techniques to improve the visibility of the repository, with optimal support by 5.0% of respondents who strongly affirmed the efficient usability and utilization of search engine optimization techniques. Based on the data collected, it has been reported that a noteworthy fraction, 10.6% of the respondents from IAR have expressed that the search engine optimization technique is implemented in their repository to enhance visibility with support from 4.3% of respondents. The analysis demonstrated that a significant proportion of respondents from NEARLS (13.5%) and (3.4%) reported active utilization of search engine optimization techniques to improve visibility.

### **5.3 Conclusions**

In this concluding section, the study synthesizes the key findings on the management of institutional repositories in agricultural research institutes, with particular focus on their role in enhancing service delivery across Northwestern Nigeria. The section also explores the broader implications of these findings for institutional repository practices, particularly in facilitating the dissemination of agricultural knowledge and supporting improved agricultural productivity within similar developing contexts. The conclusions are presented in alignment with the research objectives:

### **5.3.1 Criteria for Selection of Resources for the Institutional Repositories**

The study concludes that the current approaches to content selection in institutional repositories are fragmented and inadequately aligned with institutional mandates. Challenges include weak alignment between repository content and organizational priorities, insufficient diversity of research outputs, lack of systematic quality control mechanisms, and limited responsiveness to researchers' information needs. These shortcomings contribute to underrepresentation of key institutional knowledge and hinder the repositories' potential to support strategic research visibility and policy influence.

### **5.3.2 User Need Satisfaction of the Uploaded Resources in the Institutional Repositories**

The findings affirm that users place high value on access to domain-specific content that directly supports their daily research and extension duties. However, repository uploads often fall short of meeting these expectations. The study concludes that resource selection processes should be guided by structured needs assessments and data-informed frameworks—such as a subject-content upload matrix. This matrix would align uploaded materials with both institutional goals and dynamic user demands, enabling repositories to serve as more relevant, user-driven information hubs.

### **5.3.3 Usability and Utilization Levels of Institutional Repositories**

While some level of utilization was reported, the study highlights persistent usability barriers that limit the effectiveness of institutional repositories. These include suboptimal system navigation, inadequate search functionality, irregular content updates, and insufficient user support. Coupled with a widespread lack of awareness

about repository existence and functionality, these issues suppress active engagement and reduce institutional impact. The findings call for targeted interventions to enhance system usability and visibility, including user training and sustained public enlightenment efforts.

#### **5.3.4 Quality of the Indexing of Institutional Repositories**

The study concludes that current indexing mechanisms lack standardization and robustness. Although some integration with external digital systems exists, challenges remain in terms of metadata accuracy, comprehensiveness, and subject indexing practices. These factors limit discoverability, reduce information retrieval efficiency, and weaken the global visibility of institutional research. The findings suggest an urgent need to adopt global best practices in metadata creation and indexing policies, tailored to local infrastructural capacities.

#### **5.3.5 Strategies Used to Make Institutional Repositories Visible and Accessible**

The study reveals widespread dissatisfaction with the strategies employed to promote repository visibility and access. Despite the use of tools such as SEO techniques, metadata tagging, and collaborative platforms, respondents perceive these efforts as ineffective. Key weaknesses include poor stakeholder engagement, underutilized social media presence, and limited inter-institutional partnerships. The conclusion stresses the importance of a multi-pronged outreach strategy—grounded in collaboration, training, and targeted promotion—to improve both national and international discoverability of repository content.

## **5.4 Recommendations**

The following recommendations emerge directly from the key findings of the study and are organized according to the specific objectives. They offer actionable pathways for strengthening institutional repository management, fostering greater user engagement, and improving knowledge dissemination across agricultural research settings.

### **5.4.1 Based on Objective One – Resource Selection for Institutional Repositories**

The study recommends that agricultural research institutes in Northwestern Nigeria adopt internationally recognized standards for selecting and uploading materials to their institutional repositories. It is vital that repository content consistently aligns with each institute's mission and research priorities to ensure relevance and strategic value. To maintain content quality and usability, institutions should introduce rigorous quality control measures that screen for accuracy, originality, and relevance prior to upload. Furthermore, to enhance repository participation and comprehension, institutions should implement regular information literacy programs targeting both researchers and support staff, equipping them to evaluate, contribute to, and retrieve repository content effectively.

### **5.4.2 Based on Objective Two – Satisfaction of User Needs**

In response to the need for user-centered repositories, institutions are advised to periodically assess the information needs of their staff and stakeholders and use those findings to guide content development and thematic coverage. The selection of repository content should reflect subject-specific demands and practical relevance. Establishing a content upload matrix that considers both institutional mandates and

users' thematic interests would ensure balanced and comprehensive coverage. To further extend the repository's relevance and visibility, efforts should be made to ensure interoperability with external research systems, while collaborative relationships with other repositories can broaden the content base and improve subject depth.

#### **5.4.3 Based on Objective Three – Usability and Utilization Improvement**

This study recommends that agricultural research institutes invest in improving the usability of their repository platforms. This includes refining the user interface, improving search functionalities, streamlining content organization, and enhancing the general user experience. In addition, institutions should conduct awareness campaigns and orientation sessions to sensitize researchers and staff on the importance, availability, and usage of the repository. Technical training programs focusing on metadata application, submission protocols, and IR navigation should be offered periodically. Strengthening infrastructure and technical support services will ensure smoother access, promote increased utilization, and foster a stronger research culture.

#### **5.4.4 Based on Objective Four – Indexing Quality**

To improve content discoverability and ensure alignment with global indexing standards, institutions should adopt comprehensive metadata protocols and subject-based indexing schemes. The indexing process should be standardized and evaluated regularly to maintain the accuracy and completeness of repository records. Institutions should also integrate their repository systems with academic search engines and scholarly databases to improve the visibility and accessibility of their content. Ongoing staff training focused on indexing practices will strengthen

consistency and facilitate improved information retrieval across internal and external platforms.

#### **5.4.5 Based on Objective Five – Repository Visibility and Promotion**

Finally, the study recommends that agricultural research institutes enhance their institutional repository visibility through intentional and targeted promotional strategies. This includes designing intuitive and visually accessible interfaces, creating comprehensive user manuals, and conducting regular training sessions to encourage effective usage. Greater engagement with stakeholders—through institutional emails, webinars, faculty meetings, and digital platforms—can enhance awareness and promote repository adoption. Social media outreach and partnerships with academic communication networks should also be prioritized to maximize content dissemination and stakeholder interaction.

#### **5.5 Suggestions for Further Research**

This study aimed to investigate management challenges in agricultural research institutional repositories and their service delivery in Northwestern Nigeria, suggesting further research on different aspects of agricultural research institutional repositories.

Further research could explore the effectiveness of specific interventions aimed at addressing the challenges identified in this study, such as improving metadata quality, enhancing search capabilities, and increasing user engagement with institutional repositories.

Additionally, comparative studies across different regions or types of agricultural research institutes could provide valuable insights into the factors influencing repository utilization and effectiveness. Longitudinal studies tracking changes in repository usage and impact over time could also contribute to a deeper understanding of the evolving role of institutional repositories in supporting agricultural research and innovation.

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**APPENDICES****Appendix I: Introduction letter**

Dear Respondents

My name is Auwal Magaji Abubakar, a PhD Information Science student from the Department of Computing and Information Science, School of Pure and Applied Sciences, Kenyatta University Nairobi, Kenya. I am here to seek your opinion and request your assistance in answering the questions in the attached questionnaire. The questionnaire is intended to facilitate the collection of relevant data on my research topic, “*Management of Institutional Repositories and Service Delivery in Selected Agricultural Research Institutes in North Western Nigeria*”. This is academic research that requires your response to enable me to complete my PhD in Information Science at Kenyatta University Nairobi, Kenya. In addition, be assured that all information provided was used exclusively for academic purposes with utmost confidentiality.

Thank you.

Auwal Magaji Abubakar

08063215874

[auwalabubakar47@gmail.com](mailto:auwalabubakar47@gmail.com)

**Appendix II: Questionnaire for Digital Librarians****SECTION A: GENERAL INFORMATION**

1. Gender of respondents (Tick as appropriate)

Male

Female

2. What is your age bracket? (Tick appropriately)

Below 20 years

21-30:

31-40:

40-50:

Above 50:

3. Level of education? (Tick one)

i) Certificate [  ]      ii) Diploma [  ]      iii) Degree [  ]      iv) Post Graduate

[  ]

4. How long have you been conducting research using this Institution's Repository?

ii) Less than 1 Year

iii) 1 - 5 Years

iv) 5 - 10 Years

v) 10 years and above

5. Please indicate your designation.....

## **SECTION A: Selection and uploading of resources for Institutional Repositories**

The questionnaire includes statements regarding the selection of materials for Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
The resources selected and uploaded for our institutional repository align well with the mission and objectives of our agricultural research institute.				
The agricultural research institutes are adhering to agricultural research institutional repositories standards.				
The agricultural research institutes consider technical aspects and file formats during the selection of materials for agricultural institutional repositories.				
The resources selected and updated in the agricultural research institutional repository are current.				

### SECTION B: Usability and Utilization Levels of Institutional Repositories

The questionnaire includes statements regarding the Utilization Levels of Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree,

Statements	1	2	3	4
The Institutional Repository at the Agricultural Research Institute has a friendly user interface.				
The institutional repository resources are frequently used.				
The agricultural institutional repository user number is increasing.				
The navigation system of our Agricultural Institutional Repositories makes it easy to search for resources needed.				
Our Agricultural Institutional Repository query allows an expanded search.				

### SECTION C: Indexing of Institutional Repositories

The questionnaire includes statements regarding the indexing of Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 2=Neutral, 3=Agree, 4=Strongly Agree,

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Our agricultural research institutional repositories adhere to metadata standards.				
Our agricultural research institutional repositories adhere to subject-based indexing.				
Our institutional repository is integrated with a retrieval system.				

**SECTION D: Strategies Being Used To Make Institutional Repositories Visible and Accessible**

The questionnaire includes statements regarding the strategies being used to make Institutional Repositories visible and accessible in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Our Institutional Repository of agricultural research identifies and segments the audience.				
Our Agricultural Research Institutional Repository organizes workshops and training sessions regularly.				
Our agricultural research institutes leverage social media and content marketing for IR sources.				
Our agricultural research institutes build partnerships and collaborations for institutional repositories to enhance visibility.				
Our agricultural research institutes optimized search engines for their IRs to enhance accessibility.				

**Section C: Service delivery**

14. What are the services offered by your institute?

- i) Research consultancy [ ]
- ii) Extension services [ ]
- iii) Agricultural training for the farmers [ ]
- iv) Production of agricultural products [ ]
- v) Others (Specify):.....

15. Rate the quality of the services offered by your institute;

- i) Excellent [ ]
- ii) Good [ ]
- iii) Average [ ]
- iv) Fair [ ]
- v) Poor [ ]

**The End**

**Thank you**

**Appendix III: Questionnaire for Repository Users.****Instructions**

Kindly respond by putting a tick (√) on your preferred choice.

**Section A: Biodata**

**Please anonymously provide the under-listed information about yourselves;**

1) What is your Gender? (Tick one)

i) Male [ ]      ii) Female [ ]

2) What is your age bracket in years (Tick one age group?)

i) 18-24 [ ]      ii) 25-31 [ ]      iii) 32-38 [ ]      iv) 39-45 [ ]      v)

Above 45 [ ]

3) Level of education? (Tick one)

vi) Certificate [ ]

ii) Diploma [ ]

iii) Degree [ ]

iv) Post Graduate [ ]

4) For how long have you been working at your current station?

Less than 1 Year

1 - 5 Years

5 - 10 Years

5) Please indicate your designation.....

### **SECTION A: Selection and uploading of resources for Institutional Repositories**

The questionnaire includes statements regarding the selection of materials for Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
The resources selected and uploaded for our institutional repository align well with the mission and objectives of our agricultural research institute.				
The agricultural research institutes are adhering to agricultural research institutional repositories standards.				
The agricultural research institutes consider technical aspects and file formats during the selection of materials for agricultural institutional repositories.				
The resources selected and updated in the agricultural research institutional repository are current.				

### **SECTION B: User Needs Satisfaction of the Institutional Repositories**

The questionnaire includes statements regarding the subject covered by the Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Our institutional repository covers an adequate range of subjects and aligns well with our agricultural research institute's mission and objectives.					
Our institutional repository features diverse content types, including research papers, reports, datasets, and multimedia materials.					
The institutional repository materials support the research needs of its users.					
The institutional repository contributes to the development of research and the task at work.					

### **SECTION C: Usability and Utilization Levels of Institutional Repositories**

The questionnaire includes statements regarding the Utilization Levels of Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree 2=Neutral, 3=Agree, 4=Strongly Agree.

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
The Institutional Repository at the Agricultural Research Institute has a friendly user interface.				
The institutional repository resources are frequently used.				
The agricultural institutional repository user number is increasing.				
The navigation system of our Agricultural Institutional Repositories makes it easy to search for resources needed.				
Our Agricultural Institutional Repository query allows an expanded search.				

### SECTION D: Indexing of Institutional Repositories

The questionnaire includes statements regarding the indexing of Institutional Repositories in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

Statements	1	2	3	4
Our agricultural research institutional repositories adhere to metadata standards.				
Our agricultural research institutional repositories adhere to subject-based indexing.				
Our institutional repository is integrated with a retrieval system.				

### SECTION E: Strategies Being Used to Make Institutional Repositories Visible and Accessible

The questionnaire includes statements regarding the strategies being used to make Institutional Repositories visible and accessible in selected agricultural research institutes in North Western Nigeria. Kindly fill appropriately, where 1=Disagree, 2=Neutral, 3=Agree, 4=Strongly Agree.

Statements	1	2	3	4
Our Institutional Repository of agricultural research identifies and segments the audience.				
Our Agricultural Research Institutional Repository organizes workshops and training sessions regularly.				
Our agricultural research institutes leverage social media and content marketing for IR sources.				
Our agricultural research institutes build partnerships and collaborations for institutional repositories to enhance visibility.				
Our agricultural research institutes optimized search engines for their IRs to enhance accessibility.				

**Appendix IV: Interview Guide for Chief Librarian**

1. Can you describe the types of resources included in your Institutional Repository and its scope?
2. What is the current status of the Institutional Repository in terms of its content and growth?
3. What strategies have you implemented to enhance the visibility of your Institutional Repository?
4. Have you utilized any Search Engine Optimization techniques to improve its discoverability?
5. Are there specific metadata or keywords that you use to increase the visibility of your repository?
6. How do you leverage social media platforms to promote your Institutional Repository?
7. Which social media channels do you utilize, and how frequently do you engage with users through them?
8. Have you collaborated with other repositories to expand the visibility and accessibility of your Institutional Repository?
9. Can you describe any benefits or challenges you have experienced through these collaborations?
10. What strategies do you employ to engage researchers, students, and other stakeholders with your Institutional Repository?
11. Have you organized any events, workshops, or training sessions to promote the repository?
12. How do you gather feedback from users and incorporate their suggestions into repository management?
13. How do you assess the effectiveness of your visibility and accessibility strategies? Do you use any success indicators or metrics?
14. What challenges or barriers have you encountered in making your Institutional Repository visible and accessible?
15. Are there any plans or strategies you are considering to further improve the visibility and accessibility of the repository?

***“Thank you for your participation”***

**Appendix V: Research Authorization from Graduate School**

KENYATTA UNIVERSITY  
GRADUATE SCHOOL

E-mail: [kubps@yahoo.com](mailto:kubps@yahoo.com)  
[dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)  
Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 8710901 Ext. 57530

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Our Ref: E83F/27176/2018

Date: 29<sup>th</sup> November, 2023

The Director General,  
NAPRI, IAR and NAERLS  
Ministry of Agriculture and Natural Resources  
NIGERIA

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR AUWAL MAGAJI ABUBAKAR REG. NO. E83F/27176/2018

I write to introduce Mr. Auwal Magaji Abubakar who is a Postgraduate Student of this University. The student is registered for a Ph.D. degree programme in the Department of Computing and Information Science in the School of Pure and Applied Sciences.

Mr. Abubakar intends to conduct research for Ph.D. thesis entitled, "Management of Institutional Repositories and Service Delivery in Selected Agricultural Research Institutes in North Western Nigeria"

Any assistance given will be highly appreciated.

Yours faithfully,

A handwritten signature in black ink, appearing to be 'E. Kimani', written over a stylized signature line.

PROF. ELISHIBA KIMANI  
EXECUTIVE DEAN, GRADUATE SCHOOL

**Appendix VI: Research Approval from the Ministry of Agriculture and Rural Development**



**FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT**

FCDA Secretariat, P M B 135, Area 11, Garki, Abuja, Nigeria.

FMARB/147/S/84

8<sup>th</sup> February 2024

The Dean,  
Graduate School,  
Kenyatta University,  
P.O Box 83844, 00100,  
Nairobi, Kenya.

Dear Sir,

**RE: APPROVAL FOR RESEARCH FOR AUWAL MAGAJI ABUBAKAR**

This is to notify you that Mr. Auwal Magaji Abubakar with registration number E83F/27176/2018 has conducted his data collection at the three (3) research institutes (NAPRI, IAR and NAERLS under the ministry of agriculture and rural development on research thesis titled "Management of Institutional Repositories and Service Delivery in Selected Agricultural Research Institutes in North Western Nigeria".

All the necessary assistance has been given to him during the data collection as requested.

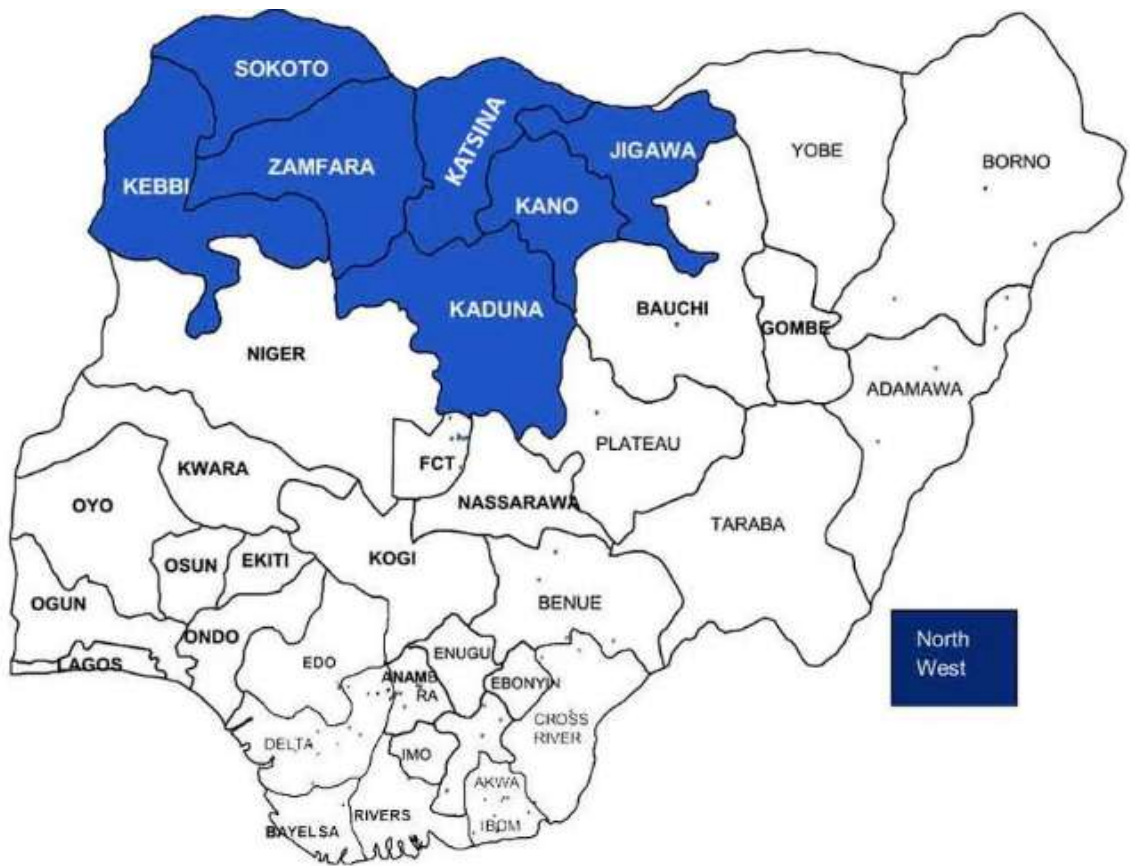
Please accept the warm regards of the Honourable Minister.

A handwritten signature in black ink, appearing to read 'Ernest Afilabi Umakhihe'.

Ernest Afilabi Umakhihe

Permanent secretary

**Appendix VII: Research location map**



**Map of Nigeria showing the Northwestern Region**