

InRep Scholar: A User-Centred Institutional Repository Model for Rwandan Universities

Abdulhammed Isola Abdulazeez¹; John Henry Chukwudi²

¹Technical Librarian, African Leadership University, Kigali, Rwanda

²Department of Information Resources Management, Babcock University, Ogun State, Nigeria

¹[<https://orcid.org/0009-0009-4643-2806>]

²[<https://orcid.org/0000-0003-0960-6861>]

¹[a.abdulazee@alustudent.com]

Publication Date: 2026/07/11

Abstract

Universities' Institutional Repositories (IRs) in Rwandan higher education institutions are constrained by technical complexity, costs, and poor user participation, making them ineffective in ensuring access to knowledge. The current study designs and validates InRep Scholar, an IR platform that is simple and based on cloud computing technology to facilitate the management of institutional repositories in settings with limited resources. With a design science research methodology, the platform was evaluated at the *African Leadership University*. Results reveal significant enhancements in system performance and user participation: successful uploading of documents increased from 80% to 95%, search accuracy with metadata became 90%, the average response time with AI assistance decreased from 3.8 to 2.4 seconds, and user participation improved from 65% to 88%. These findings emphasise the significance of usability and simplicity in repository implementation. Despite the short period of evaluation and its limited scope, the study underscores the viability of low-complexity IRs in developing countries.

Keywords: Digital Libraries; Scholarly Communication; Repository Usability; Institutional Repositories; User-Centred Design; Technology; and Rwandan Universities.

I. INTRODUCTION

Access to knowledge is an issue of significant importance in the field of higher education, especially with the global push towards encouraging the participation of many in knowledge and learning activities. Institutional repositories have been recognised as one of the players in the digital environment regarding the dissemination of scholarly works and research outputs such as theses, dissertations, and student research works. With the emergence of free knowledge resources, institutional repositories play an important role regarding scholarly works and the democratisation of knowledge at the global level, as emphasised by Mahdavi-Zargari (2025) and Rothfritz, Matthias, Pampel, & Wrzesinski (2026). In the global space, institutional repositories have moved from being seen as archives of information to being an integral part of knowledge preservation and the open science movement, which seeks to create an environment where

openness is promoted in scholarly works and research activities to ensure transparency in scholarly works and activities. Through research, it has been noted that well-developed repository systems increase the visibility of scholarly works and knowledge, thus enhancing knowledge sharing among scholars, which is crucial in the advancement of research works and scholarly activities, as noted by Akidi, Benson, & Udensi (2025).

In the Global South, institutional repositories play an important role in bridging the gap in the dissemination of scholarly works and information. As noted earlier, there is limited access to scholarly works and information in many regions in the Global South, which shows the need for the establishment of institutional repositories to ensure the dissemination of scholarly works and information. Despite the need for institutional repositories, there are many challenges facing the establishment and adoption of institutional repositories in the Global South, which may

impede their uptake and implementation in university settings.

In Africa, institutional repositories have been identified as key players in the digital space in enhancing the visibility of scholarly works and knowledge preservation in the digital space. However, there is a need to develop repository systems that are flexible and user-friendly, as noted by Balogun (2026), Igboechesi, Adigun, Pobish, & Angulu (2023), and Okede & Owate (2021). Significant developments have been realised in the implementation of institutional repositories in Rwanda, especially through the implementation of the open-source repository platform known as *DSpace*. Among the institutions that have implemented the open-source repository platform in Rwanda are the University of Rwanda, Kigali Independent University (ULK), and the University of Lay Adventists of Kigali (UNILAK).

However, the development and sustenance of the repository systems in Rwanda depend on a number of factors. In the case of the *DSpace* platform, it requires a lot of technical expertise to set it up and maintain the server. This is a challenge to most university libraries, which may lack the technical expertise. Therefore, there is a new need to develop a repository that is easily manageable and can be easily institutionalised. In the context of the African Leadership University (ALU) in Kigali, the capstone projects undertaken by the students form a substantial body of academic and practical research works. Unlike the library systems of several other universities in Rwanda, which rely on the *DSpace* system, the ALU library system depends on the *Librarika* library management system, whereas the full-text documents are hosted on the *Google Drive* platform of the university. Even though this system is efficient in terms of the organisation of the data and its accessibility within the institution, it does not easily facilitate engagement with the external academic community. This could be a consequence of the nature of the ALU research works, which are mostly business plans.

➤ *Statement of the Problem*

The *InRep Scholar* system development is informed by the challenges identified in the study. In the context of the library systems of the ALU, the study identified several major limitations of the library systems, which are mostly related to the complexity of the systems, the usability of the systems, and the flexibility of the systems. This provides a context for the development of alternative repository systems that address the usability, accessibility, and flexibility of the systems in a resource-constrained environment. The *InRep Scholar* system is proposed as a user-centred model of the institutional repository. In particular, the *InRep Scholar* model proposes a user-centred institutional repository system. In the context of the proposed *InRep Scholar* model, the management of the repository systems is proposed to be simplified. In particular, the model proposes a no-code repository management system. In the context of the proposed *InRep Scholar* model, the management of the repository systems is simplified.

The present study focuses on Rwandan universities as a contextual framework to investigate and evaluate strategies for the redesign of institutional repositories to enhance usability, accessibility, and adoption. Utilising a case study of the African Leadership University and *DSpace*-based repositories as a comparative standard, this research will substantially enhance current discussions regarding the development of adaptable and contextually relevant repository models to promote knowledge dissemination and digital scholarship in higher education.

➤ *Research Questions*

- How does the no-code repository model make management better than current systems?
- How much does user-centred design improve usability, accessibility, and user engagement?
- How does easier repository management help Rwandan universities adopt open access?
- How does the model make it possible to build a scalable and affordable repository solution in Rwanda?

II. LITERATURE REVIEW

Institutional repositories (IRs) have been identified as critical infrastructure for the preservation and dissemination of scholarly output globally. They help to manage the storage of scholarly articles, data sets, and other research materials, thereby enhancing the visibility of scholarly output. They are crucial in the dissemination of scholarly output. They contribute to the achievement of the overarching goal of democratising knowledge globally, especially in regions where access to scholarly output is limited (Mahdavi-Zargari, 2025; Rothfritz et al., 2026). In the global community, the emergence of institutional repositories was informed by the changing nature of scholarly output management and the need to advance the concept of open science globally. They have evolved from being digital repositories to becoming critical infrastructures in the management of research data and digital scholarship (Akidi, Benson, & Udensi, 2025).

They are crucial in improving the discoverability of research products, collaboration, and the research impacts of institutions (Zibani et al., 2026). In the Global South and Africa, IRs have immense potential in improving access to research by the locals. There have been challenges, however, that have impacted the use and development of IRs, and they include technical, financial, and stakeholder engagement challenges. Research findings have, over the years, emphasised the importance of the balance between access and usability for the sustainability of IRs, especially in a scarce environment (Balogun, 2026; Igboechesi, Adigun, Pobish, & Angulu, 2023). This is crucial to the case of Rwanda because they touch on the issues of infrastructure and institutions.

➤ *Existing Institutional Repository Systems*

IRs vary in terms of design and implementation. Among all the IRs, *DSpace* is the most used across the globe. *DSpace* is an open-source software designed

specifically for managing, preserving, and providing access to digital scholarship content across the globe. The software's flexibility, compliance with metadata standards, and global research infrastructure have made it the most used *IR software* by many universities across the globe. In Africa, many universities have used *DSpace* software, including Makerere University, the University of Lagos, Babcock University in Nigeria, Sokoine University of Agriculture, and many more. In Rwanda, many universities have used similar software to enhance research visibility, including the University of Rwanda and Kigali Independent University (ULK).

These repositories allow users to search, access, and download the information, which is a way of disseminating information through the concept of open access. However, there are challenges associated with the use of *DSpace* repositories. For example, the installation of *DSpace* is technical and may not be easily available in many universities. Literature shows that the complexity of the interface is a challenge to the use of *DSpace* repositories because of the technical requirements, which may limit the use of *DSpace* repositories, especially among non-technical users (Rothfritz et al., 2026). All the challenges and disadvantages of using *DSpace* repositories necessitate the use of simpler alternatives to *DSpace* repositories. At the African Leadership University (ALU), there is an alternative to the use of *DSpace* repositories. For example, *Librarika* is used to manage research output, while the documents are stored elsewhere. Although the use of *Librarika* is simpler and can be used to manage the metadata of the information, the use of *DSpace* is more comprehensive than the use of *Librarika*.

➤ *Usability and Adoption of Institutional Repositories*

The usability of the institutional repositories is another important factor that can influence the use and adoption of the repositories. Institutional repositories that are not user-friendly can discourage administrators from adopting the use of the repositories. Recent research emphasises the significance of user-centric design strategies to improve the usability and adoption of institutional repositories. According to Akidi, Benson, & Udensi (2025), the usability and adoption of institutional repositories can be improved through user-centric design strategies. The challenges that can influence the use and adoption of the institutional repositories can be attributed to factors such as low faculty engagement, lack of awareness, and integration into academic processes. These factors can be attributed to environments characterised by scarcity, which can limit the use of the repositories due to a lack of training. Moreover, the African environment will face more challenges, as the infrastructure and capacity will be a challenge. According to the literature, the success of the repositories will depend on the technology, as well as the institutions and users. Thus, the usability and technological issues must be improved to enhance the use and adoption of the repositories.

➤ *Theoretical Framework*

The current research is informed by two perspectives: one on technology adoption behaviour, known as the

Technology Acceptance Model (TAM), and another on designing effective user interfaces, known as *User-Centred Design (UCD)*. Combining these two models will help to overcome the usability and adoption challenges highlighted in earlier sections of this document. TAM highlights technology adoption behaviour in terms of perceived ease of use and perceived usefulness. UCD highlights effective system design in terms of iterative and usability-driven development.

The Technology Acceptance Model (Davis, 1989) is used to assess the effectiveness of a no-code institutional repository in terms of its contribution to user acceptance by librarians or faculty members. The model has empirical support regarding its applicability (Turner & Sauer, 2022), relates the use of the repository to its perceived usefulness, while Doty, Kowalski, Nash, & O'Riordan (2015) discuss the importance of usability and workflow as well. Rothfritz et al. (2026) also found user perception and usability as important factors in the adoption of a repository. Although it does not take into consideration institutional or social factors, it is a strong predictive model.

User-Centred Design (UCD) methodology (ISO 9241-210, 2019) is another model that can be applied alongside the TAM model to system development. Research evidence indicates that repositories with user-friendly designs promote user engagement (Akidi et al., 2025). Additionally, usability is a fundamental factor in the implementation of repositories (Zibani et al., 2026). In the African setting, user-friendliness is essential due to the lack of technological know-how (Nyambi & Maynard, 2012). In the study, the UCD methodology is applied to the design of the InRep Scholar through the use of simplified workflows.

➤ *Empirical Review of Literature*

There has been some research regarding the role and importance of IRs. The literature regarding IRs shows that the success of IRs depends on the users' behaviour, usability, and support structures. A study by Doty, Kowalski, Nash, and O'Riordan (2015) conducted on a large scale, based on data from cross-disciplinary sources, indicates that the overall awareness and usage of IRs are high, but the usage is inconsistent. The study indicates that the overall usage of IRs is inconsistent because of the overall 'workflow misalignment' and 'perceptions of time constraints' and 'benefits'. The study indicates the overall importance and need to design IRs that work within the overall 'workflows' and not in isolation.

Another study by Turner and Sauer (2022) indicates the overall importance and need for the 'perceived value' and 'usefulness' of IRs for the 'faculty' to adopt IRs. The study indicates the overall importance and need for the 'perceived value' and 'usefulness' of IRs for the 'faculty' to adopt IRs. Empirical studies centred on usability also further emphasise the above assertion. In a study conducted by Salau et al. (2021), the authors used task-based usability testing. In the study, the authors established that repository systems with guided workflows

and simple interfaces have a significant impact on user performance. This study is also in line with the general systematic study that established usability and interoperability as major determinants of repository success (Rothfritz et al., 2026).

Another empirical study done before the above study also validates the above statement. In a study done by Asadi et al. (2019), the authors did a systematic literature review on institutional repositories. In their study, they examined the trends of various studies done on the same issue. From their study, it is evident that technical complexities, lack of user-friendly interfaces, and lack of institutional support are still the major challenges facing institutional repositories globally. Although this study does not revolve around a single data set, it also offers empirical evidence on the challenges facing IRs.

In the case of Africa, there are more specific structural barriers, as proven through empirical research. For example, Nyambi & Maynard (2012) have proven the low level of utilisation of institutional repositories in different universities across Africa due to a lack of technical expertise among staff members. Additionally, Kodua-Ntim & Fombad (2020) have conducted survey research in different universities across Ghana, which proves that the use of repositories is influenced by different factors, such as strategies, awareness creation, and user engagement, as opposed to technological factors.

In addition, there have been more empirical studies carried out by Ukwoma & Okafor (2017), focusing on the application of the repositories in various universities in Nigeria. From the study, it was evident that the adoption of the repositories is on the increase in the universities, but the low level of participation and lack of awareness among the academics remain major challenges. Furthermore, there have been various case study findings, as demonstrated in the study carried out by Mugambi & Ongus (2016), which was a mixed-methods case study carried out in Dedan Kimathi University of Technology in Kenya. From the study, it was evident that there is a strong relationship between the application of the repository and knowledge management.

Moreover, the research findings of Igboechesi, Adigun, Pobish, and Angulu (2023) and Balogun (2026) also highlighted other challenges, which include governance, sustainability, and the application of digital repository standards in African countries. Even though there is a wealth of research findings, there is a lack of empirical research related to Rwanda, especially regarding the impact of usability, technological capacity, and institution-related factors on the adoption of a digital repository. In addition, though the above-mentioned research findings have highlighted the usability of the digital repository, there is a lack of empirical research findings related to zero-code repositories.

Overall, the empirical literature suggests the following three patterns:

- Repository adoption is influenced by usability, incentives, and workflow integration.
- Technical complexity affects usage, especially in resource-constrained contexts.
- There is a lack of context-specific and alternative model evaluation, especially in African and Rwandan contexts.

These patterns offer a robust empirical foundation for examining user-centric and simple repository models like *InRep Scholar*.

III. MATERIALS AND METHODS

The study design for the development and evaluation of the no-code IR model for Rwandan universities utilises a design science research approach and combines elements of mixed-methods research. The qualitative data collection involved interviews to identify usability issues and institutional challenges. Quantitative data collection involved usability surveys to measure the usability and usefulness of the *InRep Scholar*. This approach is in line with user-centred design and allows for the evaluation of the usability of the IR model based on user acceptance criteria.

The *InRep Scholar* IR model was developed using an agile and user-centred design approach, ensuring continuous improvement and development based on user input. This approach ensures the usability and non-technical nature of the IR model, addressing the challenges and limitations faced by existing IR systems, such as *DSpace*. The software development process had iterative phases that included needs assessment, prototyping, and evaluation. This ensured that the system's features matched the needs of the users and the institutions' needs.

➤ System Requirements and Design

The software was meant to be a scalable institutional repository in the cloud environment. The software's main functionalities will be its workflow, metadata, searching/retrieving, and controlling access. The software's design will be user-friendly, accessible, and cost-effective. This will be important in making sure the software will be effective in the Rwandese higher learning institutions' environment. The non-functional requirements of the software will be its performance, scalability, and security. This will be important in making sure the software has a good response time, is scalable, and is secure.

The system is designed to have a three-tier architecture. The tiers of the system are the presentation tier, the application tier, and the data tier. The presentation tier is the interface of the system, the application tier is the logic of the system, and the data tier is the storage of the research data. The system is designed to have a three-tier architecture. The tiers of the system are the presentation tier, the application tier, and the data tier. The presentation tier is the interface of the system, the application tier is the logic of the system, and the data tier is the storage of the research data.

• **Implementation Tools**

The system is implemented using a variety of modern tools to ensure the best user experience. A light-weight framework is used to handle the user interface, while a high-performance framework is used to handle the

backend of the system. A cloud-based database and storage tool is used to handle the storage and retrieval of the data. A variety of tools is chosen to ensure the system is cost-effective to implement and operate, with no code to be written.

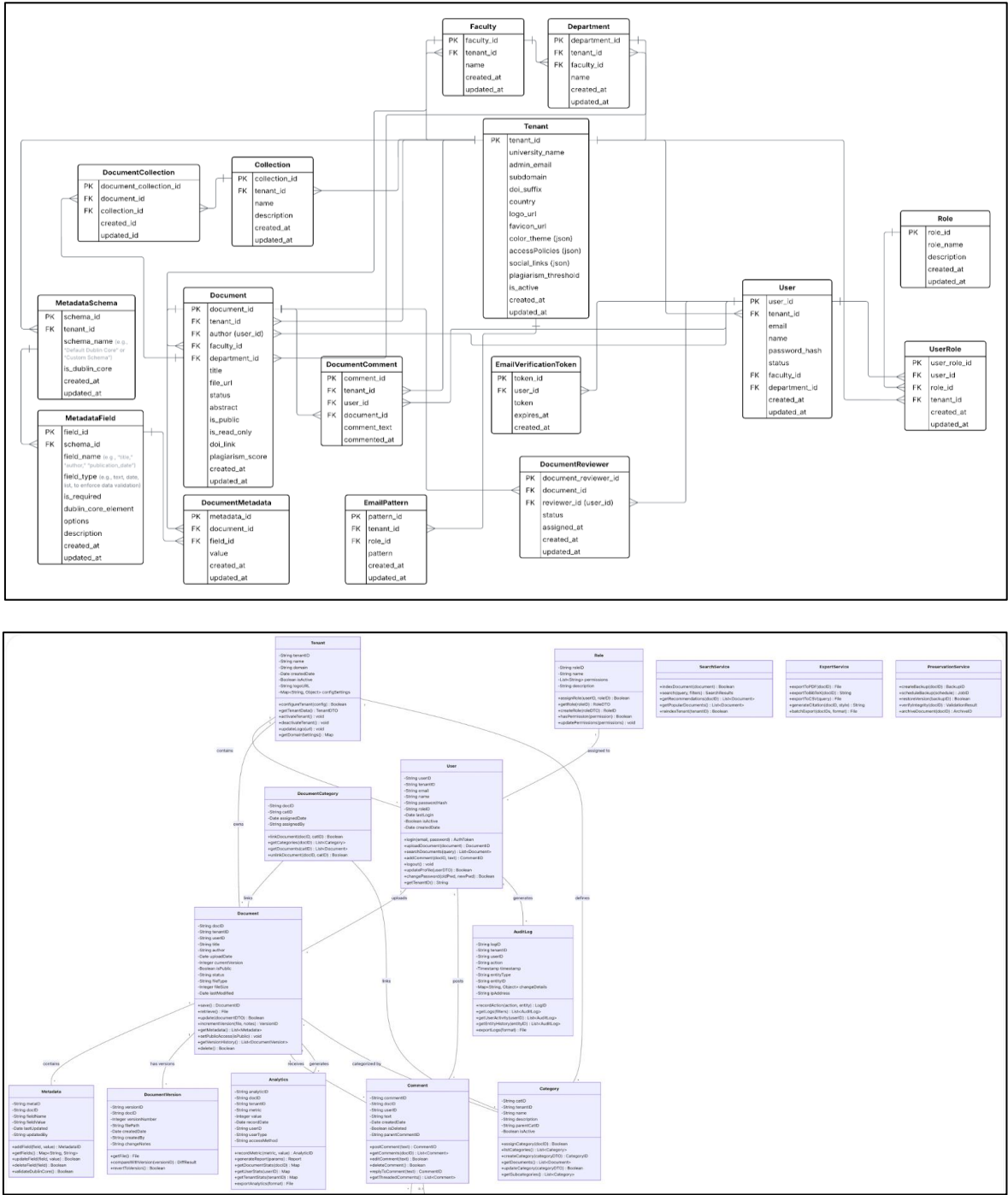


Fig 1 and 2 Illustrate the System Design ERD Diagram and the Class Diagram, Respectively

• **Limitations**

The study is limited in the sense that the study was conducted in a single institutional setting and was mainly focused on usability and acceptability, as opposed to long-term system performance. Additionally, the study was conducted with a small population size concerning user evaluation.

IV. IMPLEMENTATION AND CODING

In this section of the paper, the researcher discusses the implementation of *InRep Scholar*, highlighting the coding process, the development of the application's features, integration of the tool, and the application's deployment at the African Leadership University (ALU) pilot site. This section shows the application of technology in the development of the no-code institutional repository web application as required.

A. Description of Implementation Tools and Technology

InRep Scholar is a web application built using a variety of web technologies. It is used in the development of a *no-code* institutional repository system. *InRep Scholar* works with *Next.js* technology to develop a web application interface that is responsive and *SEO-friendly*. It also includes accessibility features like *WCAG 2.1* compliance. Additionally, *FastAPI* is integrated to create high-performance APIs with the help of *Langflow* to create features such as the use of artificial intelligence to create features such as the generation of metadata or the use of *chatbots*. Furthermore, the system utilises *Supabase* to create a multi-tenant database and storage system with authentication features to ensure the efficient retrieval of information from the system and to create a highly reliable system. Finally, the system utilises *Vercel* to deploy the *frontend* of the system and *Render* to deploy the *backend* system to create a highly scalable system suitable for resource-constrained environments. With the help of these tools, it was possible for the researchers to develop a low-cost, *no-code solution* for IRs, hosted on *cloud platforms*

with annual subscription costs ranging between \$1000 and \$2000, matching the resource constraints of Rwanda while promoting scholarly visibility at ALU (Cullen & Chawner, 2010).

B. Graphical View of the Project

The current subsection of the paper will feature screenshots of the important features of *InRep Scholar* developed during the pilot phase of the project at the African Leadership University (ALU). This will give an idea of how the researchers addressed the complexities of IRs of Rwandan universities, as well as low engagement issues, compared to *DSpace* and *EPrints* platforms. Along with screenshots of the important features of the project, a brief description of each feature will be provided, including codes, to give an idea of the implementation of the functional requirements discussed in the paper using *Next.js*, *FastAPI*, *Langflow*, and *Supabase*.

➤ Submission Interface

ALU

African Leadership University

Document Upload

My DashboardHome

1Upload & Metadata

2Quality Check

3Complete

Upload Document

Document File

✓

LinkedIn's 2024 Privacy Policy_ Navigating Professional Networking and Privacy Trade-Offs.pdf

0.13 MB

Remove file

✓

Abstract Extraction

Abstract successfully extracted! Please review and edit if needed.

Document Title *

Author *

Document Type *

Select type

Faculty *

Select faculty

Department *

Select department

Supervisor Name

Supervisor Email

Abstract *

✓ Auto-extracted from your document. Please review and edit if needed.

This thesis explores the application of machine learning techniques to predict agricultural yields in Rwanda. Using satellite imagery, weather data, and historical crop yield information, we developed models that can accurately forecast harvest outcomes. The research demonstrates significant improvements in prediction accuracy compared to traditional methods.

Keywords

Separate keywords with commas

Access Rights *

Open Access (Public)

Creative Commons License

Select license (optional)

☐ This document already has a DOI

Cancel

Submit Document

Fig 3 Submission Interface

The screenshot revealed a submission interface created with *Next.js*, which was used to upload a thesis by a librarian as part of the *ALU pilot*. The interface was designed to collect information such as title, author, date of publication, etc., with dropdown boxes and tooltips to ensure accessibility as per the *WCAG 2.1* guidelines. And a progress display bar was also included to help users complete the submission process, which is beneficial when faced with technical issues or low faculty engagement, thus helping to increase the submission (Turner & Sauer, 2022).

- *Implementation Code:*

```
<form onSubmit={handleSubmit} className="space-y-6">
  { /* File Upload */ }
  <div>
    <label className="block text-sm font-medium text-gray-700 mb-2">
      Document File
    </label>
    <div className="border-2 border-dashed border-gray-300 rounded-lg p-6 text-center hover:border-blue-400 transition">
      { !file ? (
        <div className="text-4xl text-gray-400 mb-4"><div>
          <p className="text-gray-600 mb-2">
            Drag and drop your document here, or click to
            browse
          </p>
          <p className="text-sm text-gray-500">
            Supports PDF, DOCX (max 50MB)
          </p>
          <input
            type="file"
            accept=".pdf,.docx,.doc"
            onChange={handleFileUpload}
            className="mt-4"
          />
        </div>
      ) : (
        <div className="space-y-4">
          <div className="text-4xl text-green-600"><div>
            <p className="font-medium text-gray-900">{file.name}</p>
            <p className="text-sm text-gray-500">
              {(file.size / 1024 / 1024).toFixed(2)} MB
            </p>
            {uploadProgress < 100 && (
              <div className="w-full bg-gray-200 rounded-full h-2">
                <div
                  className="bg-blue-600 h-2 rounded-full transition-all duration-300"
                  style={{ width: `${uploadProgress}%` }}
                />
              </div>
            )}
            <button
              type="button"
              onClick={() => {
                setFile(null);
                setUploadProgress(0);
                setAbstractExtractionStatus(null);
                setExtractedAbstract("");
              }}
              className="text-red-600 hover:text-red-800 text-sm"
            >
              Remove file
            </button>
          </div>
        </div>
      )}
    </div>
  </div>
</form>
```

```
</button>
</div>
})
</div>
</div>

{ /* Abstract Extraction Status */ }
{file && (
  <div className="bg-blue-50 border border-blue-200 rounded-lg p-4">
    <div className="flex items-center space-x-3">
      <span className="text-2xl">
        {getStatusIcon(abstractExtractionStatus)}
      </span>
      <div>
        <h4 className="font-medium text-gray-900">
          Abstract Extraction
        </h4>
        <p
          className={text-sm $getStatusColor(
            abstractExtractionStatus
          )}
        >
          {abstractExtractionStatus === "extracting"
            &&
              "Analyzing document and extracting abstract..."
            &&
              {abstractExtractionStatus === "success" &&
                "Abstract successfully extracted! Please review and edit if needed."
              }
            &&
              {abstractExtractionStatus === "failed" &&
                "Failed to extract abstract. Please enter manually."
              }
            &&
              {!abstractExtractionStatus &&
                "Waiting for file upload..."
              }
          </p>
        </div>
      </div>
    </div>
  </div>
)}
})
```

➤ *Centralised Semantic Search*

The screenshot depicted the semantic search feature of the *InRep Scholar* frontend, as well as the results of the search query entered by the students during the *ALU pilot* (e.g., “*ALU thesis 2024*”). The results of the search query provided the students with a list of documents and document metadata (i.e., title, author, publication date, and category), as well as filters. This feature helped remove the barriers to engagement by assisting the students in accessing scholarly content.

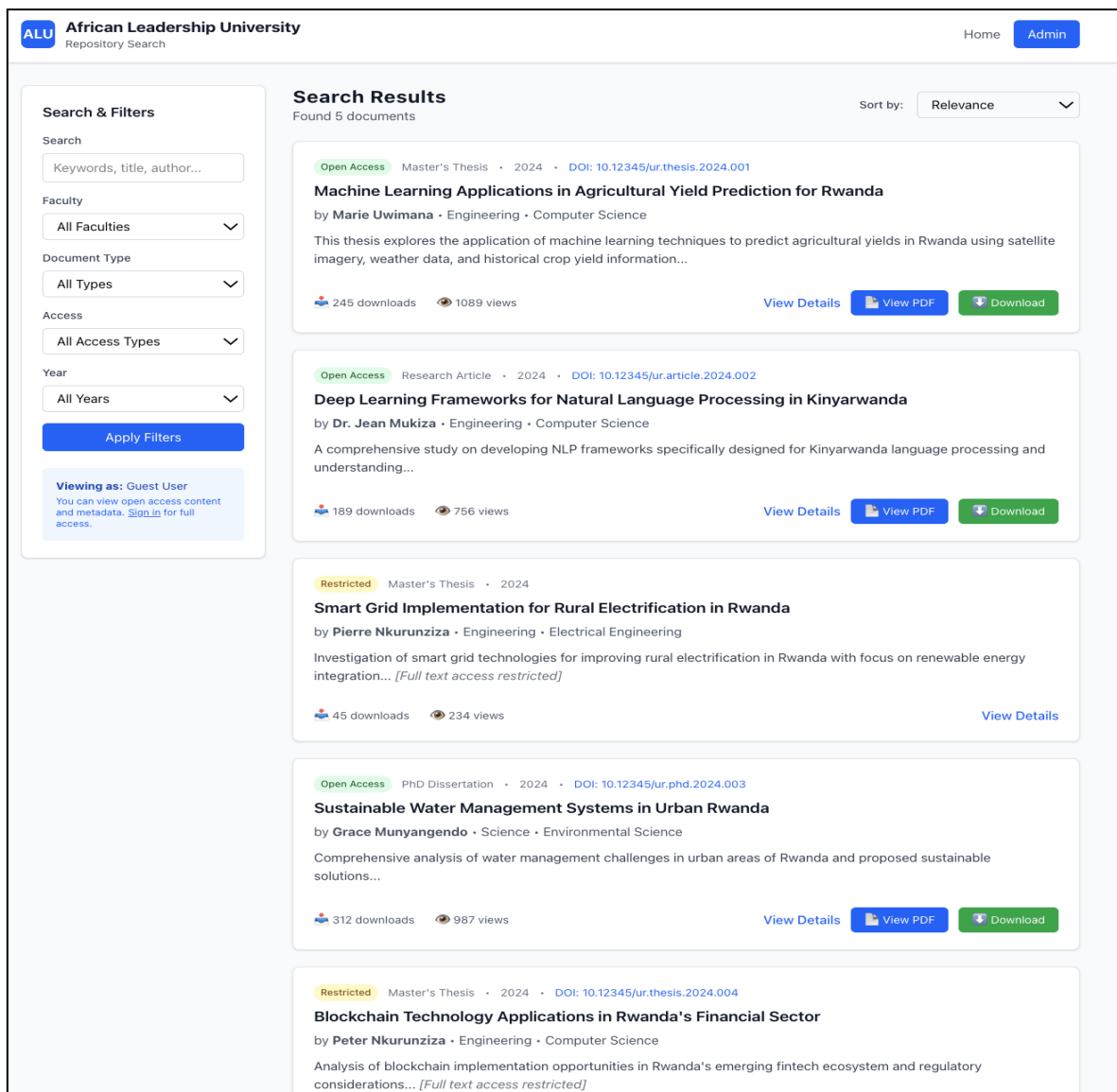


Fig 4 Centralised Semantic Search

- *Implementation Code:*

```

{ /* Filters Sidebar */
  <div className="lg:col-span-1">
    <div className="bg-white rounded-lg shadow border
p-6 sticky top-8">
      <h3 className="text-lg font-semibold text-gray-900
mb-4">
        Search & Filters
      </h3>

      <form onSubmit={handleSearch} className="space-
y-4">
        { /* Search Query */
          <div>
            <label className="block text-sm font-medium text-
gray-700 mb-2">
              Search
            </label>
            <input
              type="text"
              value={filters.query}
              onChange={(e) =>
                setFilters((prev) => ({ ...prev, query: e.target.value
            )))
          }
          placeholder="Keywords, title, author..."

```

```

        className="w-full border border-gray-300 px-3
py-2 rounded-md focus:outline-none focus:ring-2 focus:ring-
blue-500"
    />
</div>

    { /* Faculty Filter */
    <div>
    <label className="block text-sm font-medium text-
gray-700 mb-2">
        Faculty
    </label>
    <select
        value={filters.faculty}
        onChange={(e) =>
            setFilters((prev) => ({
                ...prev,
                faculty: e.target.value,
            }))
        }
        className="w-full border border-gray-300 px-3
py-2 rounded-md focus:outline-none focus:ring-2 focus:ring-
blue-500"
    >
        <option value="">All Faculties</option>
        <option
value="engineering">Engineering</option>
        <option value="science">Science</option>
        <option value="medicine">Medicine</option>
    </select>
    </div>

    { /* Document Type */
    <div>
    <label className="block text-sm font-medium text-
gray-700 mb-2">
        Document Type
    </label>
    <select
        value={filters.type}
        onChange={(e) =>
            setFilters((prev) => ({ ...prev, type: e.target.value
            }))
        }
        className="w-full border border-gray-300 px-3
py-2 rounded-md focus:outline-none focus:ring-2 focus:ring-
blue-500"
    >
        <option value="">All Types</option>
        <option value="master's thesis">Master's
Thesis</option>
        <option value="phd dissertation">PhD
Dissertation</option>
        <option value="research article">Research
Article</option>
    </select>
    </div>

    { /* Access Rights */

```

➤ Repository Admin Dashboard Function:

From the screenshot provided, it is clear that it is the admin dashboard for the repository, which the librarian used during the ALU pilot. The different sections have been categorized into document management, user management, and settings. The WCAG 2.1 compliance makes it easy to navigate the pages and the presentation of the data. This feature helped in solving the technical complexity because it provided the librarian with an easier tool to work with.

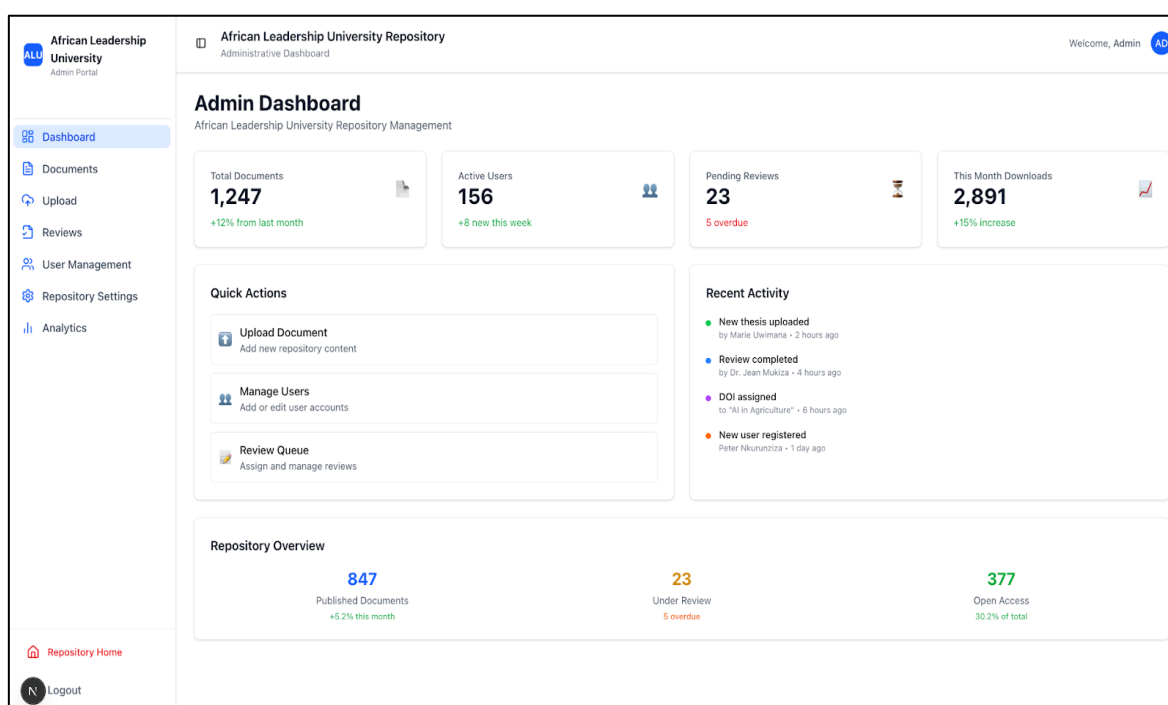


Fig 5 Repository Admin Dashboard Function

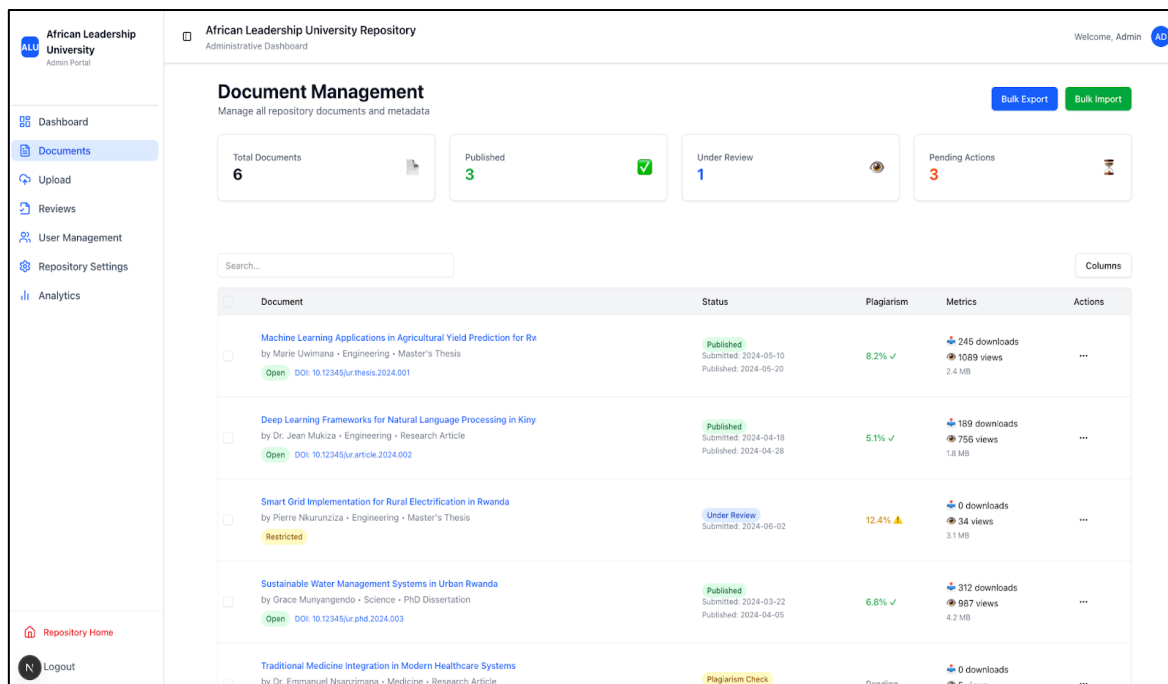


Fig 6 Repository Admin Dashboard Function

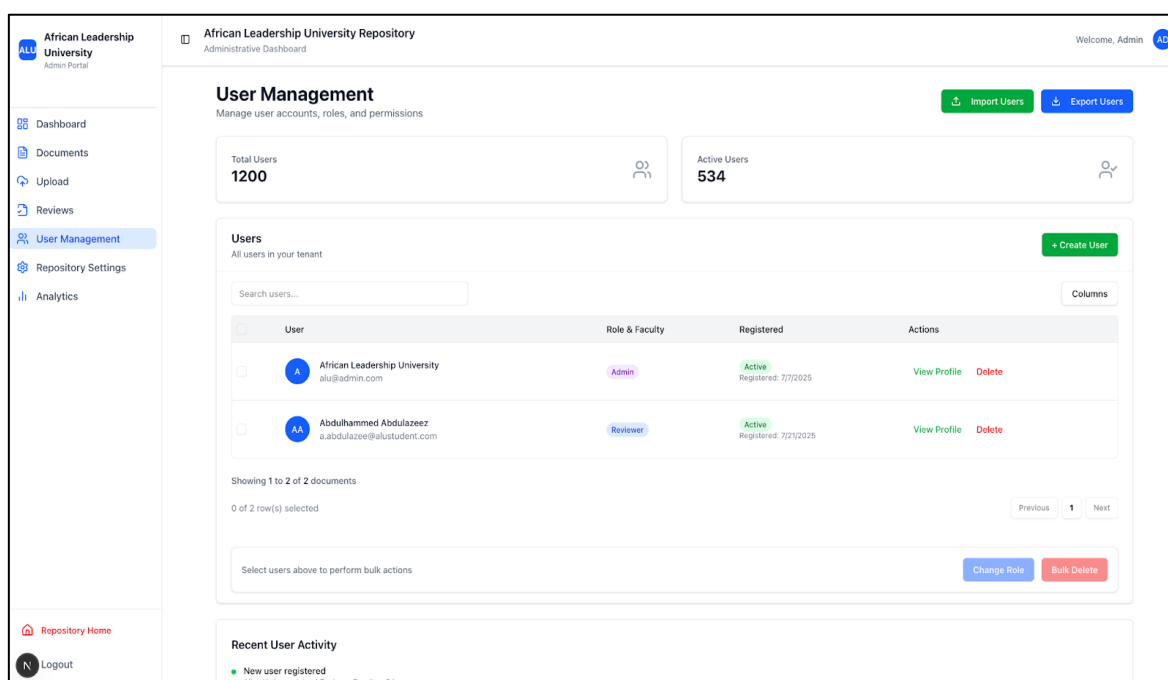


Fig 7 Repository Admin Dashboard Function

C. Testing

The discussion in this section will cover the testing phase of the functionality, usability, and performance of InRep Scholar. The researcher conducted different types of tests, which included unit, validation, integration, functional, system, acceptance, and others, to determine whether the system meets the requirements as described in Section 3.3 of the research, as well as the complexities and engagement issues as compared to other systems, such as DSpace and Librarika, which was described by Körber & Suleman (2014). The topics that will be covered under this section include the objectives, approaches, and results of the tests conducted, as well as the major features, which include the system's ability to guide users through the submission process, semantic search, admin dashboard, and others.

➤ Functional and System Testing Results

The researchers carried out the functional and system testing for the African Leadership University (ALU) pilot to test the *InRep Scholar's end-to-end workflow* and the performance of the system, which will ensure that the *InRep Scholar* meets the functional requirements (Section 3.3) and will help overcome the technical complexities and engagement issues faced by other *IR systems*, such as *DSpace*, *EPrints*, and *Librarika*, as identified by Körber and Suleman (2014). The InRep Scholar will undergo functional testing, which will test the user workflow, and the system testing will test the scalability, accessibility, and multi-tenancy in the resource-constrained environment in Rwanda. The testing will involve the guided submission tool, semantic search, admin dashboard, and AI chatbot.

Table 1 Functional and System Testing Results of InRep Scholar

Testpe	Test Scenario	Description	Result
Function Testing	Document Upload to Retrieval	End-to-end workflow: thesis upload via guided interface, metadata generation, and retrieval through semantic search	Passed. Documents retrieved in < 2 seconds; accessible interface for non-technical users
Function Testing	Admin Dashboard Management	Approval of submissions and update of institutional settings (logo, theme)	Passed. Updates reflected in < 1 second; efficient administrative control
Functional Testing	AI Chatbot Assistance	User query support for tasks such as document upload and search	Passed. Accurate responses in < 3 seconds; improved user guidance
System Testing	Data Integrity (Multi-Tenant)	Verification of data separation across institutions	Passed. No cross-tenant data leakage; queries returned results in < 1 second
System Testing	Low-Bandwidth Performance	System performance under constrained network conditions (100 kbps)	Passed. Pages loaded in < 5 seconds; maintained accessibility compliance

A summary of the results of the functional and system testing of InRep Scholar is provided in Table 1. From the test results, it is evident that the major functional workflows, the overall performance, and the scalability of the *InRep Scholar* were satisfactory. From the test results, it is evident that the test scenarios were fully completed, and the response time of the different functions of the *InRep Scholar*, such as document retrieval, administration, chatbot, data integrity, low bandwidth, etc., was very efficient. This ensured the functionality, scalability, and usability of the *InRep Scholar*, which outperformed the

existing platforms in terms of usability and cost-effectiveness (Doty et al., 2015).

➤ Acceptance Testing Report

Acceptance testing, according to the researcher, was conducted by the researcher in the ALU pilot to check the usability and alignment of InRep Scholar with the needs of the users. The feedback collected from the librarians and students aimed to confirm that the product meets the specifications, covering the technical and engagement barriers (Zibani, Rajkoomar, Naicker & Marimuthu, 2026).

Table 2 Acceptance Testing Report

Category	Test Activity	Outcome
Test Method	Tasks performed by 2 librarians and 5 students (upload, search, dashboard management) with usability survey	Successfully completed; system evaluated on ease of use, usefulness, and accessibility
Usability (Librarians)	Guided submission and admin dashboard	Rated 4.5/5; enabled easy upload and management without technical expertise
Usability (Students)	Semantic search and document retrieval	Rated 4.3/5; relevant results retrieved in < 3 seconds with intuitive interface
AI Support	Chatbot assistance for user queries	Rated 4.3/5; accurate guidance with minor delays resolved through optimisation
Overall Satisfaction	General system usability and comparison with existing tools	90% of users preferred system; improved access and engagement
Issues Identified	Dashboard delays and limited search filters	Minor delays resolved; additional filters planned for future updates

Table 2 below indicates a summary of the results obtained from the acceptance testing, which focused on the performance, satisfaction, and usability of the users. The results indicate a high rating for the application's features, with minor problems being identified and addressed, thus confirming the application's effectiveness and potential.

V. THE DESCRIPTION OF THE SYSTEM RESULTS

The performance of InRep Scholar was tested through a 5-day pilot project with two librarians and five students at the African Leadership University (ALU). The results section presents the results obtained from implementing the InRep Scholar system, which includes the guided submission interface; metadata-based search using *FastAPI*, *admin dashboard*, and *AI chatbot*, developed using *Supabase*, *Langflow*, *Next.js*, *FastAPI*, and *Vercel/Render* technologies, respectively. The results,

as indicated by the output obtained from the functional, system, and acceptance testing, indicate the efficiency of the InRep Scholar as a user-friendly and cost-effective IR system. The results are presented in the following sub-sections, showing the metrics in graph form.

➤ Document Upload Success Rate:

A line graph showing the percentage of successful thesis document uploads using the guided interface in the 5-day pilot project at the ALU. The x-axis represents the days in the pilot project (Day 1, Day 2, Day 3, Day 4, and Day 5), and the y-axis represents the success rate. The success rate rises from 80% on Day 1 to 95% on Day 5 in the pilot project. This reflects the improvement in the stability of *Supabase* storage and *Langflow* metadata generation stability after the optimisation. This demonstrates the reliability of the interface in solving the problem of technical complexity among librarians.

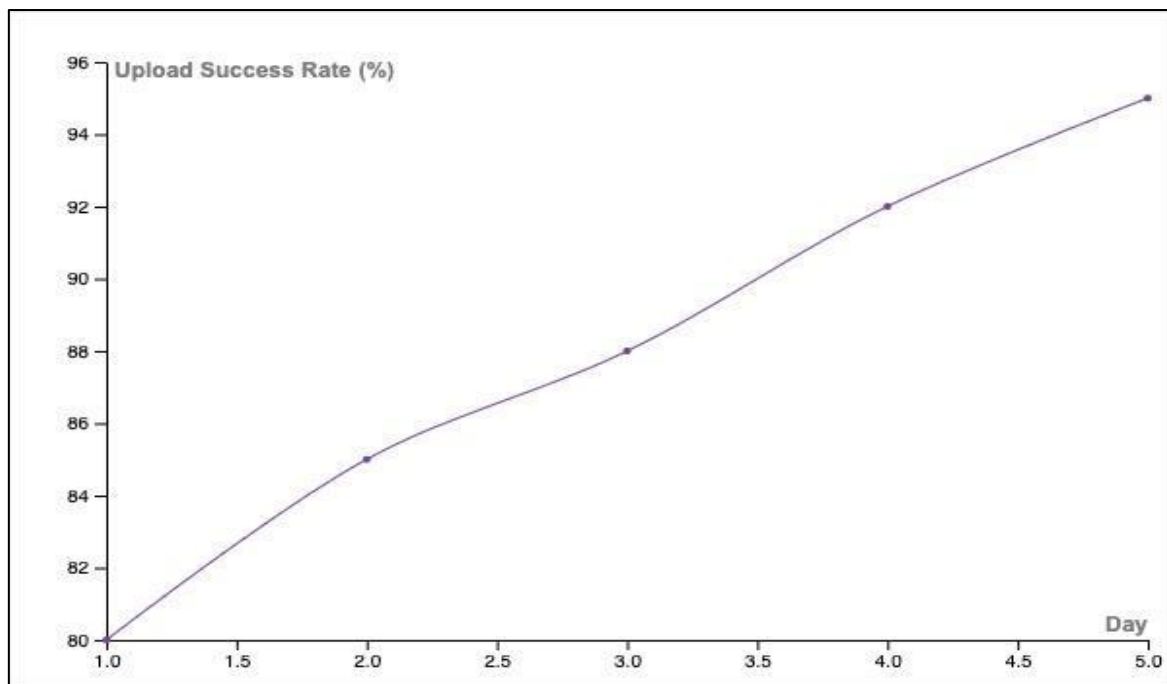


Fig 8 Document Upload Success Rate

➤ Metadata Search Accuracy

A bar graph showing the accuracy of metadata-based search queries, like title search and author search, using *FastAPI* technology. The accuracy of the search query increases over a 5-day pilot project timeline. The accuracy of the search query increases from 87% to 93% over a

period of 5 days, from Session 1 to Session 5. The average accuracy of the search query is 90%. This indicates the efficiency of *InRep Scholar* in increasing the visibility of students compared to the search query functionality of Librarika.

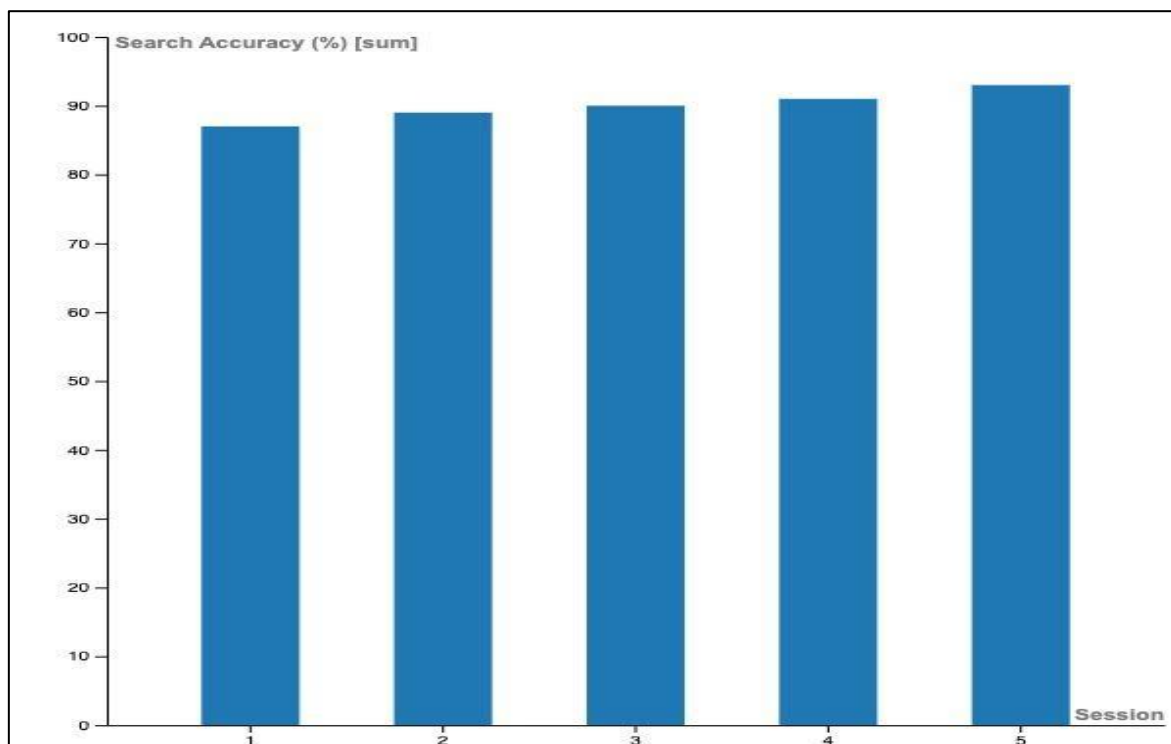


Fig 9 Metadata Search Accuracy

➤ AI Chatbot Response Time

A line graph illustrating a trend of the average response times of an AI chatbot system using *Langflow* and *FastAPI* technology in answering users' queries like "How do I increase the number of reviewers in the repository?" over a period of 5 days, with the x-axis representing days

and the y-axis representing the response times in seconds. The average response times of the chatbot system were 3.8 seconds on Day 1 and 2.4 seconds on Day 5, with improvement made to API calls, which must be less than a target of 3 seconds. This shows the efficiency of chatbots in engaging users (Balogun, 2026).

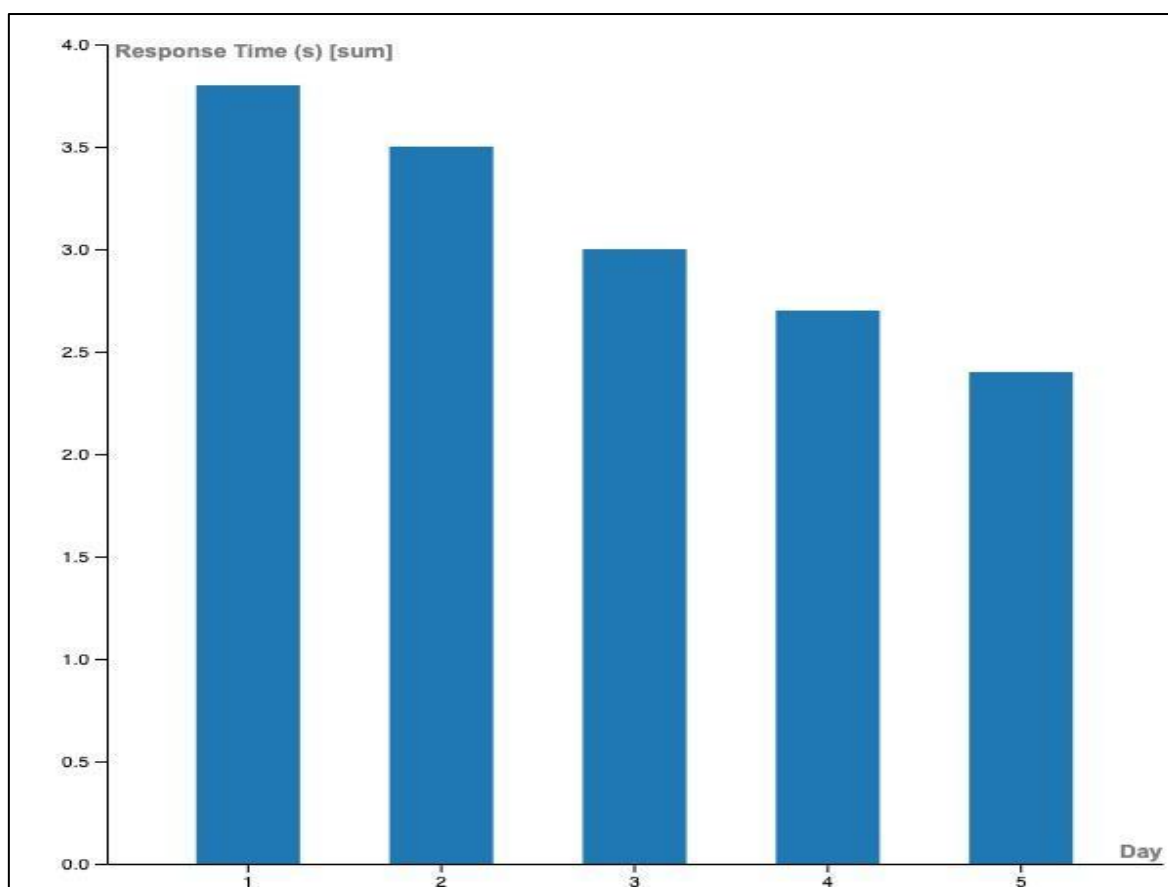


Fig 10 AI Chatbot Response Time

VI. SUMMARY

This study created and tested a model of a cloud-based institutional repository, named *InRep Scholar*, specifically aimed at addressing issues of usability, cost, and adoption of this model in Rwandan universities. The pilot results at the ALU showed promising results in terms of user engagement and system performance, suggesting a strong match between the usability of the system and its adoption results. These findings are also in line with recent research on the adoption of repositories that highlighted usability and perception as major influencers of adoption (Rothfritz et al., 2026; Zibani et al., 2026). The simplicity of workflow and infrastructure offered by a cloud-based solution removed technical and financial barriers to accessing institutional research outputs. However, the short study period and sample size should be taken with caution and further investigation should be conducted to validate these findings across multiple institutions. This study also highlights that a simpler model of a repository can be a viable option in resource-constrained environments.

RECOMMENDATIONS

This is in line with recent research that has identified usability and user perception as important factors influencing the adoption of repositories. The simplicity and integration of the intuitive workflows and cloud infrastructure have removed some of the technical hurdles and cost issues in accessing research within the institutions. Although the study is limited by the short period and sample size, it has shown that user-centric, low-

complexity repositories offer a viable option to traditional repositories in resource-poor settings.

ACKNOWLEDGEMENT

The author gratefully acknowledges the support and ethical oversight provided by the African Leadership University (ALU) Research Ethics Committee in facilitating this study. Appreciation is also extended to the librarians, students, and institutional stakeholders whose participation, feedback, and cooperation contributed to the successful development and pilot testing of this research. Their support, directly and indirectly, made this work possible.

➤ Contributors

- Abdulhammed Isola Abdulazeez – Department of Software Engineering and Digital Librarian, African Leadership University, Kigali, Rwanda. Research interest: software engineering, digital libraries, and system development. Sole contributor to the conception, design of the study, system design, technical development, and manuscript drafting.
- John Henry Chukwudi – PhD Researcher and Lead, Digital Library Services, African Leadership University, Kigali, Rwanda. Research interest: digital libraries, institutional repositories, and digital humanities. Contributor to research conception, institutional repository workflow design, data gathering, analysis, and manuscript writing.

- Pelin Mutanguha – African Leadership University, Kigali, Rwanda. Research interest: library systems and knowledge management. Contributor to user validation, validation, and institution-specific alignment of the institutional repository model.
- David Nii-Okai – Head, Readers and Circulation, Sam Jonah Library, University of Cape Coast, Ghana. Research interest: academic librarianship and information services. Contributor to manuscript review and validation.

REFERENCES

- [1]. Akidi JO, Benson OV, Udensi FI. (2025). Journal of Applied Information Science and Technology 18(2) 2025. Journal of Applied Information Science and Technology, 18(2). <https://www.jaistonline.org/18vol2/13.pdf>
- [2]. Asadi S, Abdullah R, Yah Y, Nazir S. (2019). Understanding institutional repository in higher learning institutions: A systematic literature review and directions for future research. IEEE Access, 7, 35242–35263. <https://doi.org/10.1109/ACCESS.2019.2897729>
- [3]. Balogun T. (2026). Preserving digital heritage: Assessing the compliance of digital repositories in South Africa with OAIS and TDR standards. Records Management Journal, 36(1), 19–36. <https://doi.org/10.1108/RMJ-11-2024-0047>
- [4]. Davis FD. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. <https://doi.org/10.2307/249008>
- [5]. Doty J, Kowalski MT, Nash BC, O’Riordan SF. (2015). Making student research data discoverable: A pilot program using Dataverse. Journal of Librarianship and Scholarly Communication, 3(2), eP1234. <https://doi.org/10.7710/2162-3309.1234>
- [6]. González-Pérez LI, Ramírez-Montoya MS, García-Peñalvo FJ. (2021). User-centered design of institutional repositories: Enhancing usability and adoption. Education and Information Technologies, 26, 6131–6150. <https://doi.org/10.3390/ei13110282>
- [7]. Igboechesi GP, Adigun TA, Pobish PS, Angulu RK. (2023). Sustaining the relevance of institutional repository in academic libraries in Nigeria: A University of Jos perspective. International Journal of Library and Information Science Studies, 9(6), 46–60. <https://doi.org/10.37745/ijliss.15/vol9n64660>
- [8]. ISO. (2019). ISO 9241-210: Ergonomics of human-system interaction – Human-centred design for interactive systems. <https://www.iso.org/standard/77520.html>
- [9]. Kodua-Ntim K, Fombad MC. (2020). Strategies for the use of open access institutional repositories at universities in Ghana. Library Management, 41(6/7), 515–530. <https://doi.org/10.1108/LM-02-2020-0023>
- [10]. Mahdavi-Zargari S. (2025). The role of institutional repositories in the democratization of knowledge. Mexican Journal of Educational Research and Intervention, 5(1), 104–112. <https://pablolatapisarre.edu.mx/revista/index.php/rmiie/article/view/277>
- [11]. Mugambi CW, Ongus RW. (2016). Analysis of the implementation of an institutional repository: A case study of Dedan Kimathi University of Technology, Kenya. IIARD International Journal of Information and Communication Studies, 2(1). <https://shorturl.at/CWzd5>
- [12]. Nyambi E, Maynard S. (2012). An investigation of institutional repositories in state universities in Zimbabwe. Information Development, 28(1), 55–67. <https://doi.org/10.1177/0266666911425264>
- [13]. Okede GW, Owate CN. (2021). Institutional repositories and copyright law issues in Nigeria. Federal University of Technology, Minna Institutional Repository. <http://irepo.futminna.edu.ng:8080/jspui/handle/123456789/11378>
- [14]. Rothfritz L, Matthias L, Pampel H, Wrzesinski M. (2026). Current challenges and future directions for institutional repositories: A systematic literature review. Journal of the Association for Information Science and Technology, 77(1), 301–322. <https://dl.acm.org/doi/abs/10.1002/asi.70016>
- [15]. Salau SA, Abifarin FP, Alhassan JA, Udoudoh SJ. (2021). Usability effectiveness of a federated search system for electronic theses and dissertations in Nigerian institutional repositories. Federal University of Technology, Minna Institutional Repository. <http://irepo.futminna.edu.ng:8080/jspui/handle/123456789/11378>
- [16]. Turner ME, Sauer J. (2022). Faculty awareness and use of an institutional repository at a master’s granting university. Journal of Librarianship and Scholarly Communication, 10(1). <https://doi.org/10.31274/jlsc.13875>
- [17]. Ukwoma SC, Okafor VN. (2017). Institutional repository in Nigerian universities: Trends and development. Library Collections, Acquisitions, & Technical Services, 40(1–2), 46–57. <https://doi.org/10.1080/14649055.2017.1331653>
- [18]. Zibani P, Rajkoomar M, Naicker N, Marimuthu F. (2026). Navigating research data management challenges in an academic landscape: A framework for a university of technology research repository context. Digital Library Perspectives, 42(1), 5–31. <https://doi.org/10.1108/DLP-08-2024-0127>