# CLOUD REPOSITORIES AND THEIR ROLE IN ENRICHING ARAB INTELLECTUAL PRODUCTION

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**ABSTRACT**

*Access to knowledge is an essential requirement for all aspects of human development. The technological development of information and the bursting of data and information across the Internet have led to the emergence of the importance of cloud computing and digital repositories that work to save data and information in all its different forms using computers and networks. This rapid development not only affected the size of data and information and methods of archiving, but also led to the emergence of different types of repositories. Thus, and in view of the importance of the subject of technologies for storing large digital data, this paper aims at achieving a major goal which is to enrich the specialized Arab intellectual production within the emergence of cloud repositories and the related concepts. Moreover, the paper seeks to achieve an important sub goal that is to identify the concepts of digital library, digital repository and institutional repository and highlight their goals, advantages and challenges and the most prominent digital repository systems. This is achieved through answering the study question that deals with the knowledge of cloud repositories and related terms and how important they are to institutions and individuals. The study depends on the critical and theoretical review and analysis of intellectual production. The researcher followed the documentary review method and content analysis to follow terms such as digital library, digital repository, institutional repository and digital repository systems.*

*The paper came out with several results through a review of intellectual production in this field including:*

- *The existence of an expulsive relationship between the availability of business and its ease of access and the frequency of quotes for scientific research.*
- *The existence of an institutional repository that encourages the institution employees to enrich the repository and raise the shares of the parent institution.*
- *The design of the repository portal has great importance especially if it is user friendly.*

*The researcher concluded that there is a need to consider all society sections and to work to establish a repository that serves people with special needs through investment in technology since we live in an era of technology and information. The study recommends the necessity to enrich intellectual production by creating cloud repositories that serve the category of the people with special needs. In addition, the study stresses the need to create a cloud repository for every university, government institution, and sector accompanied with policies to provide access as we live in an era of big data and digital transformation.*

***Keywords:*** *Digital repositories, cloud warehouses, cloud computing, institutional digital repositories, warehouse construction, warehouse software, digital libraries*

## INTRODUCTION

Access to knowledge is an essential requirement for various aspects of human development and in the era of information technology, the amount of data and information available on the Internet increases dramatically and files accumulate inside public and private computers. A large sector of society needs to obtain that information in a system that allows them to access and view it at any time. This concerns individuals seeking information as well as institutions including educational institutions (schools, institutes, universities, etc.). In fact, with the continuous increase in storage costs, organizations and institutions have been confronted with the challenges of data retrieval and back up which proves the importance of Cloud Computing that aims at protecting and managing data effectively, more efficiently and easily (Sorour, 2018)[1]. Among the means of storage, management and provision of digitally stored information is the digital repositories that can store several forms of data such as texts or multimedia such as movies or video. These can be accessed through local or international networks via computers.

Digital repositories arose to overcome the restrictions and obstacles that prevent access to knowledge through academic scientific publications in their traditional form throughout the world, especially in developing countries (Hassan, 2013)[2]. As well, the primary goal of the idea of a digital repository is digital saving, long-term web availability, and free access that makes it easy to retrieve information in contrast to traditional methods, Jain, Chhavi (2017)[3]. This digital development has led to the development of different types of digital repositories, especially those with a specific domain, institutional repository, or formula private repository (messages, reports, data, etc.). Repositories are an important and vital

topic for all organizations since they help them to deal with all intellectual resources as part of their information policy.

As a result, this paper targets to achieve a major goal, which is to enrich the Arab specialized intellectual production in cloud repositories and the related concepts. Besides, it seeks to achieve an important sub goal that is to identify the concepts of the digital library, the digital repository, and the institutional repository to highlight their goals, advantages, and the challenges they face in addition to the most prominent digital repository systems. Hence, the study tries to answer the question of identifying the cloud repositories and related terms and how important they are to institutions and individuals. It relies on the critical theoretical review of intellectual production and its analysis. The researcher used the approach of documentary review and content analysis to define terms such as digital library, digital repository, institutional repository and digital repository systems.

## LITERATURE REVIEW

This section presents various studies that have discussed models, situations, or experiences or have proposed and discussed the topic, its environment, and its techniques concerning the terms of this basic study or the related terms and concepts. We have opted to present samples of studies that dealt with these issues, which are briefly presented and arranged in time from the most recent to the oldest between 2020 and 2011.

There are models about user interactions across digital library collections and they are extensive in studies and writings that address the topic of digital libraries. However, the limited research reviewed by available studies that examine usage data directly because they are related to user behavior across mixed groups and interfaces of objects, made compiling a review of the existing literature a must to provide samples and models of the literature of digital libraries, digital repositories and cloud computing.

**The recent study by Babu, Harish (March 2020)[4] entitled: "Institutional Repository in Schools in Kerala",** explained that the concept of institutional repositories is very popular in academic institutions in India. However, schools that are considered the lowest link in the educational system have not explored the potential of institutional repositories in school environments. This was a study on the possibility of institutional repositories in schools and suggested a model for the institutional school repository, which is considered as a positive way of thinking in the general education stage.

**The study by Naikwadi, VA, PA Shinde, and RN Ingale (Feb2020)[5] entitled: Creation of an "Institutional Repository" of Mahatma Phule Krishi**

**Vidyapeeth,** confirmed the availability of institutional repositories to access research publications and other digital documents for concerned institutions in general. This concept is rapidly growing in popularity in higher education and research institutions to spread newly emerging knowledge and experience. In an era of technological advancement, it is easy to know, collect, organize, select and publish information. This paper discusses the meaning of the institutional repository, the goals, advantages / disadvantages, required software, types of materials, the planned institutional repository under the university library of MPKV, the role of Library and Information sciences specialists in the institutional repository and the Indian scenario and their experience. Here, pointing at the role of libraries and information specialists is noteworthy.

**The study entitled: A Centralized Cloud Services Repository (CCSR) Framework for Optimal Cloud Service Advertisement Discovery from Heterogenous Web Portals by A.M. Alkabani, W. Husain and JYKim, (2019)[6]** addressed the central cloud service repository proposal which can be used by several institutions. The study started by defining the cloud services market as the first point for the consumer to discover, choose and configure different services. However, there are some markets for private cloud services, such as Microsoft Azure, that allow consumers to search for service assurance that belongs to a specific supplier. Nevertheless, and as the number of ads for cloud services increases, the consumer needs to find related services across the World Wide Web (WWW). The consumer mostly uses a search engine like Google or Bing, to discover service ads. However, these search engines are not sufficient to retrieve relevant cloud services ads on time. A framework is needed to effectively and efficiently discover the relevant service announcement for ordinary users. This paper addresses the problem by proposing an easy-to-use harvester and a central cloud service repository frame. The proposed central cloud service repository framework contains two modules - Harvest as a Service (HaaS) and a Service Repository unit. The HaaS module allows users to extract data in real time from the web and make it available for a different file format without having to write any code. The service repository module provides a central repository for cloud services that enables the consumer to efficiently and effectively discover cloud service. They validate and demonstrate the suitability of their framework by comparing its efficiency and relevance with three widely used open source harvesters. After this evaluation, they noted that when they harvest a large number of service ads, HaaS was more efficient compared to traditional harvesting tools.

**A study presented by Dasari, Rakesh Nag and G. Rama Mohan Babu (November 2019)[7] entitled: An Innovative Structure for Cloud Repository Adopting Binary Access Evidence** has confirmed the rapid progress in enthusiasm for HPC or mainstream imaging. Applications or professional

associations are found to be restricted to give Applications and organizations on the cloud. Encouraging important inspiration is to reduce costs in places that facilitate the framework, application sensitivity and the changing interest in application. It confirmed that from now onwards, messages are sent to the not far away cloud, and can provide support to application subscribers. The sending of applications in the same way can also lead to three basic difficulties such as system sensitivity, arithmetic collectability and information security. After pushing the application to the cloud, the additional impact of the security assessment must be combined to ensure the information. Various research endeavors are made to enable the salient points of assessment to cloud-based information by different specialists. On the other hand, the complexity of the audit procedure has proven to be the bottleneck in improving the implementation of the application because it consumes up the mathematical origins of a similar application.

The study concluded that the recognition of distributed computing is due to the idea that applications and administrations are versatile during the variation of requests. This trademark alone has increased much of its absolute presence and recognition of distributed computing. The recognition convinced a number of heritage applications to transfer them to the cloud. The study emphasized that from now onwards, the sending applications and departments create a great deal of information, and therefore the information needs security, which is a sensitive subject, especially in cases of historical or institutional nature. In this work, a new two-way security system has been proposed and compared with existing structures. This proposed technology not only improves safety efforts, but also shows time reduction based on the extent to which coding and decoding relates. This improvement will positively help scientists revisit the safety conventions used and anticipate the latest research metrics. Additionally, this research suggests further studies on safety factors during transmission across the system.

On the other hand, the following studies present models linking cloud computing to digital repositories. **A case study by Singhal R., Singhal A., Bhatnagar M., Malhotra N. (2019)[8] entitled: Design of an Audio Repository for Blind and Visually Impaired: A Case Study.** Showed that emerging cloud computing that enables everywhere access to shared sets of configurable system resources has strengthened the higher education system by reducing the cost of IT infrastructure via improving management and less maintenance. However, issues related to the modeling, design and evaluation of interfaces between humans and the computing system for the blind and visually impaired, and the use of cloud computing have not yet been fully explored. An easy-to-use interface is designed for visually impaired students in this paper, and thus embodies how advances in technology can remove barriers to equal access to information and services. The goal of the proposed Android-based design is to create a platform for sharing audio

files that includes creating a repository for frequently used lectures, and reading materials for these students. A case study is presented explaining the usefulness of the proposed design. The proposed model allows visually impaired students to access the audio repository both online and offline from cloud storage. The advantages of the proposed design, based on service models of cloud computing, are efficiency, scalability, error tolerance, and 24/7 access.

**With their study titled: An evaluation of U.S. municipal open data portals: A user interaction framework Zhu, X; Freeman, M.A. (2019)[9]** used a content analysis methodology to develop what they called the "user interaction framework", to analyze how users interact with open government data portals (OGD). The user interaction framework necessitated the following components:

- *Access*: data organization, portability, restriction fees, multilingual licensing, device manipulation, open formats, and permanent URI
- *Trust*: completeness, freshness, availability of data policy, and relevance of data
- *Understanding:* user support, application display, documentation, and metadata
- *Post engagement:* availability of analytics, API availability, quote format availability, personalization, download, online processing, online visualization, and comparative data sets.
- *Sharing:* proactive sharing, sharing readiness, and user feedback. This framework examined the abilities mentioned above in reference to a single digital group, and this UNT digital library had accessibility features to all individual digital collections and objects.

The interfaces for the UNT libraries digital collections are similar to what was adopted by the Europeana project. Europeana is based on the "cultural commons" model, with the aim of using associated data to break silos and allow users to create their own search context. This type of design as explained by **Concordia, C.; Gradmann, S.; Siebinga, S. (2010)[10]. Which titled: Not just another portal, not just another digital library: A portrait of Europeana as an application program interface**, with large groups of various materials that can be searched through contributors and different groups, became a complex system for mobility interactions. It is placed in context by the users rather than by the interface technology.

**The research paper titled: Cloud repositories for research data - addressing the needs of researchers**, **Waddington, S., Zhang, J., Knight, G. et al. (2013)[11]** described problems facing researchers and explored potential solutions for providing long-term storage and access to research outputs, with a primary focus on research data. The easy availability of cloud storage and computing

services provides a potentially attractive option for organizing and archiving research information. In contrast to deploying infrastructure within an organization, which usually requires long lead times and upfront capital investment, cloud infrastructure is available on demand and highly scalable. However, the use of commercial cloud services in particular raises issues of governance, cost-effectiveness, reliability and quality of service. Therefore, it described a set of in-depth case studies that were conducted with researchers in the sciences and humanities who do extensive research and possess data that explains issues that must be taken into account when storing data in the cloud. Then, it described the storage framework design that addresses these requirements. It uses the hybrid cloud framework, combining internal institutional storage, cloud storage and cloud-based archiving services in a single integrated repository infrastructure. The content is customized for storage providers using a rule-based approach.

**The study of Blumer, E.; Hügi, J.; Schneider, R. (2014)[12] entitled The usability issues of faceted navigation in digital libraries.** has focused on the impact of port-side navigation or navigation on users, in full, usable, and direct studies. It revealed that their findings were related to interest and made recommendations on how to customize aspects that clarified how their log data was examined to understand user interactions across groups because user interactions in a digital library University students have identified and found it strongly influenced by the facet-integrated navigation. **As Hurst said already in 2008,** it was time to find innovative but understandable ways to extend the faceted model, while at the same time maintaining its usability for basic use. The subject of facial design and facial analysis is related to the semantic structure of any system. From what preceded, we can say that different designers are experimenting with this but there is no clear good idea **(JLIS.it. vol. 5, No. 2 (Luglio / July 2014).** Ease-of-use navigation features on faces have appeared in digital libraries so far, which does not mean anything else than that it should be used in every case. Nevertheless, it also implies that different solutions are required for different contexts and different users need different services. For this reason, emphasis should be placed on the ease of use of navigation in each case in order to satisfy a group Target users and place them at the center of the online service development.

In the evolving era of electronic publishing, academic institutions, including universities, are increasingly realizing that the institutional repository (IR) is an infrastructure for scientific publishing. The institutional repository is a digital research archive consisting of accessible groups of scientific works that represent the institution's intellectual capital. Institutional repositories are a means for institutions to manage the digital scholarships produced by their societies and contribute to maximizing access to research outputs before and after publication,

as well as to increase the vision and academic prestige of both the institution and the authors. This paper discussed the benefits and obstacles of establishing an institutional repository, and the roles of librarians and authors in the successful management of an institutional repository, given that the strength and advantages of DS can only be achieved to the maximum extent through the effective role of institutional repositories. The institutional repository is considered the main criterion for the digital grant as this is recommended by the scientific paper titled**: repository in digital scholarly by Oladiran, M.T., Bentley, G., & Jain, P. (2013)[13].**

On the other hand, **Meera, B.M.; Manjunath, M.; Kaddipujar, M. (2013)[14]. "Facets of digital data publishing: Value addition through" imprints collection"** used a facet navigation for linking digital archival objects at the Raman Research Foundation in Bangalore, India. Their primary goals have focused on strengthening their physical and digital collections, represented by a variety of media and different subject types and digitized it across sixteen communities. Repository designers have implemented a linked and designed list across Dreamweaver for specific fields to link objects via a repository that uses DSpace, based on this type of list based on scientific research databases to enhance object connectivity and access to multiple resources. These goals, though on a much smaller scale, was not different from the facet targets used in the UNT Digital Library.

**David Weinberger** summarized the problem about a lot of digital information and how people access them. He explained that these complex systems are "database science based." **Weinberger, D. (2012),** "but we can at least know how these systems work without fully understanding them." This is directly related to the reason why digital library designers seek to understand access behavior and patterns in the digital library interface[15].

From the side of institutional repositories, we find a study by **O.O. Adewumi and N.A. Ikhu-Omoregbe (2011)[16], entitled: Institutional Repositories: Features, Architecture, Design and Implementation Technologies**, that confirms that Europe is the leading continent in terms of adoption and effective use of digital libraries - especially institutional repositories. Africa has not performed poorly in this area with a steady continuous increase from 19 repositories in 2008 to 46 in January 2011, but there is a need to raise awareness and direct efforts towards making IRs easily accessible to Africans through ubiquitous channels such as mobile devices. The paper highlighted the applicable areas of research that African researchers can pursue in the field of digital libraries.

## THE STUDY ISSUE

Cloud repository or the repository of cloud as is sometimes called is a cloud storage location where tenants can store their own VM data. Tenants can also make use of the cloud repository as a target for backup, archiving and data recovery operations from the cloud repository. A cloud repository is a regular backup repository created from the backup infrastructure. These cloud-stored digital repositories are an important trend in saving the memory of the individual, the institution, libraries, document and archive institutions, and everyone who wants to invest saving in a safe environment without preoccupation with local server's maintenance, technical management, etc. Many of these points will be discussed here in this paper to know the cloud repositories and various terms such as digital libraries, digital repositories and institutional repositories which is the most famous types of digital repositories that have started to benefit from cloud computing and its services. The problem and the subject of the study can be formulated in the following important research question: What are the cloud repositories and related terminology, and what are their importance for institutions and individuals and their role in enriching Arab intellectual production.

## THEORETICAL FRAMEWORK OF THE ARTICLE

Through research on studies and sites of companies working in the field of cloud repositories, it is clear that with a simple connection to the Internet, the web, or the "cloud", it is possible to access projects stored in repositories in remote locations anywhere in the world and work on them, or access local repositories from these sites, using a specific installation such as Enterprise Architect on the user machine and so we get simply to the concept of cloud repositories. The advantages of working in this way include the following: **Sparxsystems (2019)[17].**

- The user does not need to install database drivers on his machine or to create a database connection, as he does directly on projects on a DBMS server; the recipient's system administrator sets up the driver and connects only once, while configuring the server.
- The http and https connections, in particular, apply a firewall and all the security facilities a web server provides - whether Apache or IIS - to the project work, such as URL delegation, domain authentication, and IP security.
- The cloud server can be configured to encrypt all connections using standard TLS / SSL protocols; it can also ensure that patron data is not intercepted during transmission over insecure networks.

Using the cloud can help reduce latency times for common tasks such as opening packages and editing form data. Requests are also stored temporarily and sent together, not individually, which reduces communication delays. Cloud server use is most useful when:

- The beneficiary and other users want to reduce the setup requirements for each user on their workstation.
- The beneficiary wants to identify and disclose forms outside his private network.
- The beneficiary and other users can access their forms via slow connections.

On the other hand, **Goscinski, A., M. Brock, (2010)**[18] stressed that since the emergence of cloud technologies, cloud service providers advertise their services online, and end users use public search engines like Bing and Google to discover cloud services **Goscinski, A., M. Brock, (2010).** The ability to explore cloud services ads across multiple websites has become a challenge for cloud consumers, especially when there is a huge market for these services. Many web portals contain updated cloud services ads such as getApp. These ads can be extracted and analyzed using different web-harvesting technology. Consumers are usually confused in the cloud because of the overwhelming number of search results that may be irrelevant due to keyword-based searches.

Cloud computing is a multi-domain environment that provides thousands of services over the Internet, which makes discovering cloud services a complex and multifaceted task. Given the fact that the requirements of end-users differ and that cloud service providers offer a set of cloud services with only slight differences, the choice of cloud service is a complex but vital problem that must be addressed. The cloud offers three types of service models: infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS).

However, to introduce the concept in a significant way we must first define the basic terms and concepts such as the digital repository and the institutional repository.

**Digital repository (DR):**

A Digital Repository is a tool for managing and storing digital content. It is referred to as digital repositories or digital archive institutions. Digital repositories provide an appropriate infrastructure for:

- Storage
- Management
- Saving
- reusing and supervision
- digital items

**Institutional repository:**

Before dealing with the concept of institutional repositories, it will be appropriate to examine the concept of digital repository. According to Wikipedia, "A repository is a central place in which data is stored and extracted. A repository can be a place where multiple databases or files exist for distribution over a network or the repository can be a site that the user can access directly without having to travel across the network." The Wikipedia encyclopedia emphasizes that the digital library, digital repository, or digital collection is an online database of digital objects that can include text, still images, sound, video, or other digital media formats. Objects can consist of digital content such as printing or photographs, as well as originally produced digital content such as word processor files or social media posts. In addition to storing content, digital libraries provide means to organize, search, and retrieve content in a collection. Digital libraries can vary greatly in size and scope, and can be maintained by individuals or organizations. Digital content can also be stored locally, or accessed remotely via computer networks. These information retrieval systems are able to exchange information with each other through interoperability and sustainability **(Wikipedia, 18 March 2020)[19].**

The concept of institutional repository (IR) first appeared in the scientific field around 2002 when **Ryam Crow (2002)** presented a paper that is a reference for SPARC that identifies the institutional repository (IR) as "digital groups that capture and save the intellectual production of a multi-university person or community". He also explained in the same paper that "the institutional repository is a digital archive of the intellectual product that was created by the faculty, research body, and institution students and can be accessed by users inside and outside the institution, with little if any some barriers of access." Solutions Foundation (PALS, 2004) has given the publisher and the Library / Learning a definition of the technical aspects of the institutional repository. It stresses that "an institutional repository is defined as a web-based database (repository) of institutionally defined scientific material (as opposed to an existing repository Subject); it is cumulative and permanent (set of records); open and interoperable (for example, the use of OAI compliant software); and thus, collects, stores and publishes (part of the scientific communication process). In addition, most of them will include material long-term digital saving as a primary function of independent actors." **(Shukla, Prachi, 2018)[20].**

There is another definition of institutional repository as a website on the Internet to collect, preserve and publish in a digital form the intellectual production of the institution, especially the research institution. This includes "digital archives of intellectual products created by faculty members, employees, and students in an institution or group of institutions within the reach of end users

inside and outside Enterprise." **Naikwadi, V A, P A Shinde, and R N Ingale (Feb. 2020)[5]** Institutional repositories provide access to research publications and other digital documents for the concerned institutions. This concept is growing in popularity in higher education and research institutions to spread the newly emerging knowledge and experience. It is useful for faculty, researchers, scientists, and students who provide them with an opportunity to access, communicate and publish their research. The concept can be applied in ministries, institutions, bodies, entities and companies to save and make available their production and memory. In fact, it is important for all institutions in all sectors to save their memories.

The term IR (institutional repositories) also refers to a set of services and technologies that provide media for collecting, dealing with, accessing, publishing, and archiving digital materials that are created in an organization. The institutional repository collects, organizes, maintains and publishes data for any organization or organization member. While the majority of digital repositories are located in colleges and universities, few may be present in government organizations, museums, companies, and other institutions. Now with the advent of new technology and internet facilities, all educational, research and governmental institutions are building an institutional repository for their users. **(Jain, Chhavi (2017)[3]**

An institutional repository is an online database of scientific materials for a particular institution. "It can be both collective and continuous (set of reports). It must be open and interoperable (using the OAI complaint program). Institutional repositories collect, archive, and publish digital assets, as well as saving Digital Materials for Long-Term Use of a Specific Organization **(Kumar, 2008)**. To effectively manage an institutional repository, it is very important that there is a strong coordination between data producers, regulators, managers and the IT department.

The institutional repository descriptions may vary greatly depending on the content and sometimes the artifacts or important items that will be stored in it. These materials may range from every digital material developed **(Lynch, 2003)** to a set of well-described materials. Institutional Repository is a type of digital library that "captures original research and other intellectual property resulting from the constituent community of an institution active in many fields". Independent libraries in the United States are usually sponsored by academic libraries in higher education institutions, and provide relevant study communities with an additional place to participate in open access via a procedure that may be known as open access archiving **(Burns et al. 2013)[23]**. The idea of an "institutional repository" corresponds to the concept of developing a "digital library". Institutional repositories (IRs), which are referred to either as digital

repositories or as institutional digital repositories as if they are a digital repository for the community and components' of this entity products to be saved and made available. The service provided by the entity to its students, professors and analysts is considered to deal with the digital materials that it developed and published.

**Objectives of the institutional repository:**

**Naikwadi, V A, P A Shinde, and R N Ingale (Feb. 2020)[5]**

- To create a global vision for the institution's scientific research.
- To gather content in one place.
- To provide open access to institutional research outputs by self-archiving.
- To store and maintain institutional digital assets, including unpublished or easily lost ("gray") publications (such as messages or technical reports).

**Benefits and advantages of the institutional repository:**

**Naikwadi, V.A., P.A. Shinde, and R.N. Ingale (Feb. 2020)[5]** Institutional repositories operate by obtaining, maintaining, and disseminating collective intellectual capital as meaningful indicators of the institution's academic quality. The institutional repository focuses on the institutional product approved by academic researchers or other institutions, making it easy to demonstrate its scientific, social and financial values. Consequently, institutional repositories complement existing standards to measure institutional productivity and prestige.

- A new and innovative channel for scientific communication.
- It enables the institute / university to collect, make available and publish research of all researchers.
- Facilitates electronic publishing and provides scope for innovations in the field of scientific communication.
- It supports the reading of scientific online publications rather than paper publications.
- By depositing search results in a repository, search results are available faster than publishing them in a newspaper article.
- By depositing your posts in a repository, there will be time for administrative tasks, such as maintaining lists of publications and posting your posts.
- Academic publications are found in high-ranking "repositories" in search engines such as Google Scholar and Yahoo and Scirus.

- Provides a long-term solution.
- Addresses the weakness of self-archiving, i.e. lack of adequate security, long-term saving, and wasting college time.
- Provides broader access and visibility to research outputs.
- Preserves the institution's heritage.
- Reduces deployment delay.
- A faster and effective scientific communication channel.
- Increases citation from publications and increase citation ratios. Strengthens and supports local research.

**The main objectives of owning a digital repository:**
**Mfula, Chama Mpundu (2017)[21]**

- Provides open access to institutional research.
- Creates a global vision for the institution's scientific research.
- Stores and maintains institutional digital assets, including unpublished publications.
- Digital repositories facilitate the search, retrieval and processing of information.
- Improves information exchange and cooperation facilities.

**When do you need a digital repository?**
**Mfula, Chama Mpundu (2017)[21]**

- When more exposure is needed to make documents accessible to many.
- Promote universal access.
- Easier discovery of information by opening content to service providers like Google, Google Scholar and OCLC.
- When new mathematical search techniques are available, for example extracting text, creating data and data links, and identifying and visualizing relationships.
- Constant access to digital repositories works because they contain static URLs, meaning no dead links. Business is available to whom and whenever needed.
- When you have a wide range of content collection like conference proceedings, photos and sometimes search data, allowing you to integrate a wide range of materials and provide access to them.
- When you need to keep in the long term as long as there is continuous maintenance and backups.

**What to consider when building a digital repository:**

- Clarity of the purpose of the repository.
- Staff training.
- The repository manager for the "human" side of the digital repository, content policies, advocacy, user training, and liaison with a wide range of institutional departments and external contacts.
- Repository manager for technical applications, allocation and management software, metadata, quality assurance, etc.

**Types of repositories:**

**Jain, Chhavi (2017)[3]:**

The digital world has led to the advancement of different types of digital repositories, especially the repository or specific domain, institutional repository, or repository harvest of formula (messages, reports, data, etc.). The repositories are crucial for all organizations to help deal with and collect intellectual resources as part of their information policy. Based on data and usage, digital content repositories and usage are divided into five types:

- The subject or field repository
- Hard copies reproductions
- Institutional Repository
- National Repository
- Data Repository

**Hardware / software infrastructure:**

- The digital repository software comes with minimum requirements or specifications such as storage capacity and processing speed of devices.
- The program depends on the warehouse needs and services, always evaluating the available software platforms.

**Software infrastructure options: Mfula, Chama Mpundu (2017)[22]:**

- *Open source:* Free to download, but requires some level of implementation and maintenance experience (CDSware, DSpace, EPrints, Fedora, Greenstone).
- *Commercial:* Licensed, may have optional or additional subscription or advisory fees. The software vendor owns, creates, and maintains the source code.

The software infrastructure options can be added and defined such as adding a service model: the software vendor owns, distributes, hosts and manages the software platform. The software vendor provides additional services for a fee,

controls and updates the program's source code (for example, electronic printing services, Open Repository, or be-press).

**Repository Policy Development Mfula, Chama Mpundu (2017)[22]:**

There are three policy areas that need to be addressed:

1. *Collection:* It must be determined according to the type of information in the library or digital repository.
2. *Management*: Requires general rights, responsibilities, types of metadata to be used and the saving activities to be performed.
3. *Access*: The privacy policies of registered users must be addressed to provide a more transparent access policy for library or repository users.

**What is the difference between bit bucket and Git?**

Bit bucket is more flexible than GitHub, while GitHub comes with lots of features and allows you to create your own workflow; Bit Bucket has more built-in flexibility. For example, Bit Bucket gives you more options about which version control system you use (Mercurial and Git integration)

Bit bucket is the Git repository management solution designed for professional teams. It gives you a central place to manage Git repositories, collaborate on your source code and guide you through the development flow.

While GitHub is Git's cloud-based deployment tool and hosting platform. It also has a desktop app to store projects locally. With GitHub, projects can be dynamic. Git repositories are hosted on GitHub and made "direct". This allows developers to publish a site or application while it is in development stages. Git is intended to manage a project or group of files, as they change over time. Git stores this information in a data structure called a repository. The Git repository contains, among other things, a set of compliance elements.

Cloud computing can be described as a model to enable on-demand network access to a common set of computing resources, which can be made available and launched with minimal management effort **Peter, M., Timothy, G. (2011).** Cloud computing has promised cost-effectiveness, scalability, and possibility of development for program requirements and Hardware for organizations **Han, Y. (2010)[23].**

**Benefits of Cloud Computing for digital repositories:**

**Mushashu Lumpa and Hussein Suleman.**

Digital repositories are software tools used to manage and share digital content and provide means to save this content on a long term basis. Digital repository tools are widely used by libraries and institutions such as universities

that constantly create original content through scientific publications and educational materials.

Moreover, if organizations can deploy digital repositories in cloud environments, they can take advantage of the benefits that cloud computing provides. Thus, enterprises can then devote more time to managing their digital content than computer infrastructure and software configuration for digital repositories. In terms of infrastructure, administrative functions will greatly benefit from the advantages of internal management of the cloud environment in addition to the effective use of its computer resources. Enterprise digital repository content is always growing, so infrastructures that expand and provide inherent flexible features are ideal for containing this content growth. Also, digital repositories are required to contribute to saving their content, and operating them in the cloud infrastructure has the benefit of being able to duplicate their data in a variety of storage options provided by the cloud environments.

For organizations to take advantage of the benefits of the cloud, it is important to have tools that simplify the deployment, management and monitoring of digital repositories. One option is to adopt a service like that provided by Bepress or Duraspace, where public infrastructure and public cloud are used as the basis for digital repositories. Whereas, private cloud computing, based on equipment that is hosted entirely within an organization, is an alternative as organizations increasingly adopt this technology for local infrastructure. It can be said that this can also serve as a platform for your organization's digital repositories.

Some countries, including the Kingdom of Saudi Arabia, require all government agencies to adopt local cloud storage to maintain privacy and security. They do not prefer the services of external suppliers, but they do not interfere with private sector institutions.

**Benefit of the institutional repository for institutions and researchers: Jain, Chhavi (2017)[24]**

In this era, information spread fast and a lot of information, research papers and scientific publications appear. The institutional repository does a crucial job in raising the image of organizations by ensuring the outcome of an investigation for a company that is very widespread and not limited to those who can provide subscriptions to expensive survey magazines, especially in times when high magazine subscription prices led to the "magazine crisis." **(Jones and Andrew, 2006)** The Institutional Repository is an attractive option to tackle the magazine's crisis. This emergence helps to improve the name of the organization and thus attracts researchers and high-quality search boxes. The institutional repository saves the intellectual product created by researchers at the university, thereby

facilitating its scientific, social and financial value **(Crow, 2002).** Moreover, the repository provides a vital location for storing survey results and the resulting metadata and provides an opportunity to claim search priority. The rapid spread of results in many areas of research is critical to setting priority in the field and providing comments in a timely manner.

Society as a whole benefit from not only open access via more effective access to information and an expanded and accelerated research cycle, but also the increase of the clarity, use, and impact of individual researchers' work **(Richardson, 2006).** The researchers have repeatedly indicated a positive relationship between the effect of quote and open access. **Houghton (2006)** showed that evidence is beginning to show that works available for free are cited more than works restricted by access fees. Articles with open access receive a minimum of 50% of bids compared to those that need subscriptions. Articles with open access are cited faster and more frequently compared to articles without open access.

Moreover, the institutional repository is suitable for all beneficiary partners in the following different ways: **Jain, Chhavi (2017).**

**For the contributor / author:**

- *More quote opportunities:* Research has indicated that articles that can be accessed without cost on the Internet are more frequently quoted compared to their paper equivalents.
- *Speed:* faculty and researchers publish their pre-copies immediately, with opportunities to get instant feedback.
- *Organized Group:* The organizational repository may include all academic study conducted by all teachers and analysts, which includes materials such as prepress, post press, presentations, and classroom materials (subject to copyright restrictions). Instead of publishing them to various computer databases, servers or hard drives, a user can find and review these materials easily in one place, and financier can easily reuse.
- *Save:* To ensure consistent access, digital files need to be updated and moved. Depositing a file in an institutional repository means that the burden of ensuring that the file is opened rests with the institution’s custodian, not the owner.
- *Permanent site:* saving an article in the enterprise repository indicates that it remains in the same site and maintains the same URL.
- *Unique permanent URL:* Each unique IR element is assigned a unique URL under "handle" in the case of a DSpace-based enterprise repository. For reference, the author can give a permanent "link" or URL for each item posted in IR.

**For the organization:**

- The analytical materials produced by the organization can be viewed in one place, displaying the organization's intellectual achievements and acting as a critical marketing tool.
- Records that show organizational history, whether academic or non-academic, are stored for use in future times, similar to traditional surveys archived.
- Materials that have not been traditionally printed can be part of the repository, which consists of records of non-print articles or book lessons, unprinted analysis, student studies, learning objectives and creative studies.

**For user:**

- The materials in the organizational repository can be discovered using a search engine.
- These materials can be accessed without subscription fee, and they will be completely free.
- IR includes materials that are displayed correctly in the initial digital format, including audio files, video files, animations, and information sets.

**Advantages of institutional repositories IRS Jain, Chhavi (2017)[3]**

- Open source and ownership
- Programs or Hosted services
- Support
- Content
- Descriptive Metadata formats
- User interface functions
- Advanced search
- Default theme categories
- Summaries
- User validation
- Web 2.0
- Statistical reporting
- Interoperability from one machine to another
- Admin functions

**Digital Repository Software: Mushashu Lumpa and Hussein Suleman**

There are various types of digital repository software tools available, and some of the popular ones include DSpace, EPrints, Fedora, Greenstone, Bepress

and many more in dozens. By a quick review of the Registry of Open Access Repositories guide and from the ROAR website (http://roar.eprints.org/), we find that there are nine institutional Saudi digital repositories belonging to universities, mostly four of which used DSpace, and we find that open software, most notably DSpace, is the most used Greenstone, Bepress, and EPrints. As shown in the figure quoted from the site:


***Figure 1.*** *Digital Repository Software (Source: RORA website)* [25]

These repository tools share similar features, and were somehow developed using the same techniques. A number of studies have been conducted to compare the different features that each of these software provides.

**STUDY RESULTS**

- This article used a selective review of periods that represent literature of previous foreign intellectual production in the field or that is related in a way or another to the field through reviewing (12) studies from the year 2011 to 2020 A.D and the figure below shows the reviewed studies that have been referred to by year.

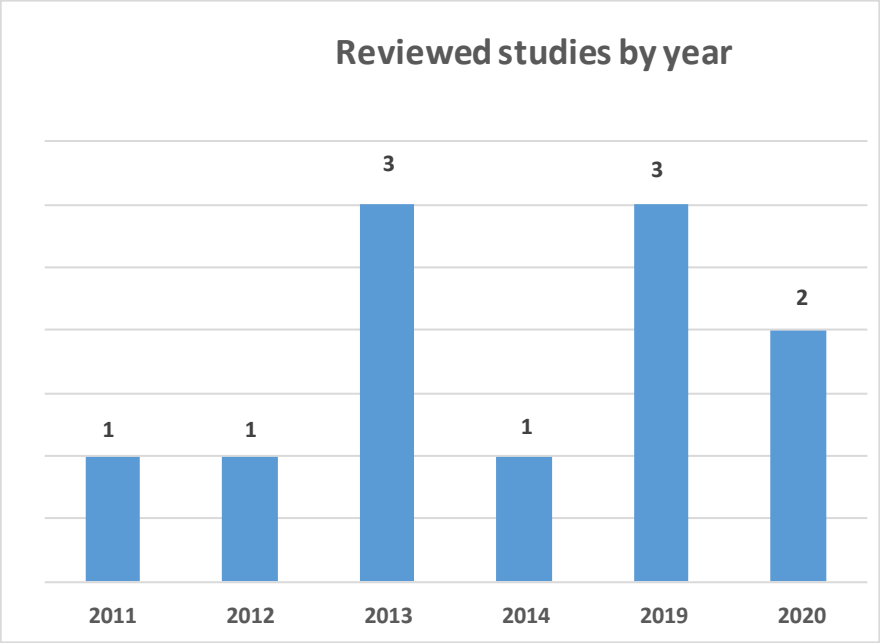


***Figure 2.*** *The reviewed studies by year*

- The studies were reviewed according to the main goal of the study, which is to enrich specialized Arab intellectual production with a theoretical review of the concept of cloud repositories and their branches of digital libraries, digital repositories and institutional repositories. Accordingly, the following figure shows the frequency that studies have been reviewed for concepts.

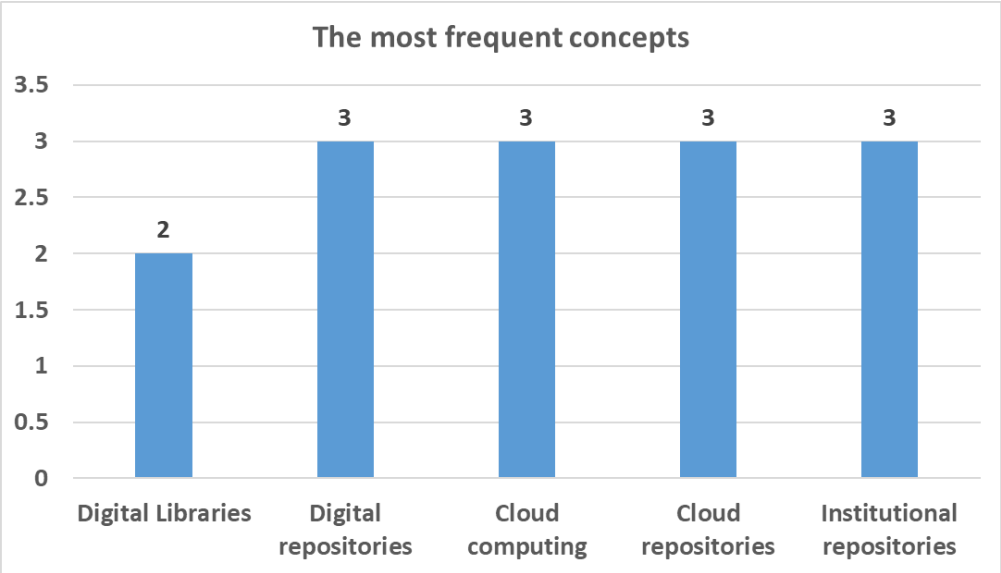


***Figure 3.*** *The most frequent concepts*

It is clear from the above figure that the concepts were dealt with equally in studies due to their importance and relevance directly to the topic. The concept of digital libraries is also the least frequent in the studies reviewed.

- The following figure shows the most important concerns that the cloud repositories seek to achieve for institutions and individuals, according to the studies reviewed. The most prominent were chosen from the researcher's point of view and then their number of iterations was measured:

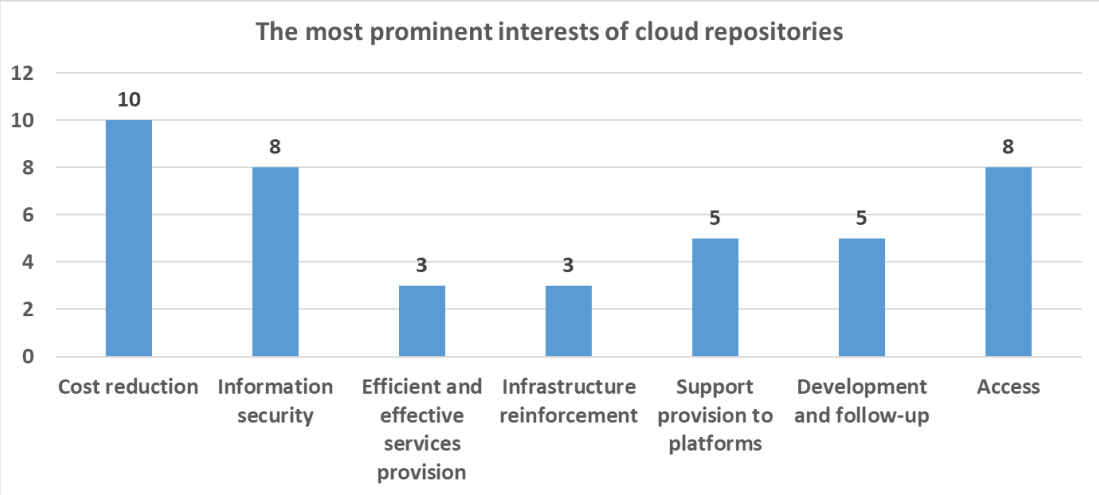


***Figure 4.*** *The most prominent interests of cloud warehouses*

We notice from the above figure that cloud repositories are primarily concerned with reducing costs and then providing information security and access to users, and the rest of the interests were within the reach.

## CONCLUSIONS AND RECOMMENDATIONS

This paper aimed at achieving the primary goal of seeking to enrich intellectual production by researching the concept of cloud repositories and related terminology. The paper also worked on the pursuit of sub-goals as well, which focus on reviewing the concept of digital repositories, digital libraries and institutional repositories by reviewing the most important goals and challenges and highlighting the most famous repositories. Accordingly, the following conclusions were reached:

- Studies in 2019 D.A dealt with the concept of cloud repositories. However, before that, they covered the term cloud computing, institutional repositories, digital libraries.
- The term institutional repository appeared for the first time in 2002

- The study showed that intellectual production dealt with the concepts of digital and institutional repositories and cloud computing in a similar manner until the year 2020 A.D, but the concept of digital libraries is limited to the old intellectual production until 2017 A.D, according to the researcher's knowledge and through what was referred to from the literature.
- There is a direct relationship between the availability of work and its ease of access and the frequency of quotes for scientific research.
- A cross-sectional study in 2019 recommended the need to invest technology to create an audio repository for students with visual needs. Thus, the researcher concluded the need to consider all sections of society and work to create a repository that serves the different needs of the people with special needs through investment in technology, especially as we live in the era of technology and informatics.
- An institutional repository encourages employees of the institution to enrich the repository.
- The repository gate design is of great importance especially if it is user friendly.
- Reducing expenditures, information security, and free access to information in cloud storage are of great importance and focus.
- The researcher recommends that intellectual production should be enriched with regard to establishing cloud repositories that serve the category of people with special needs.
- The necessity of establishing a cloud repository for every university, government institution and sector, while setting policies to provide access.

**REFERENCES**

1) Sorour, Noura. (2018). Cloud computing the future of e-learning, importance and challenges. Retrieved from: https://www.new-educ.com/ cloud-computing-e-learning (8/8/1441 AH).
2) Hasan, Suhair. (2013). Digital repositories. Retrieved from: https:// ivsllibrary.blogspot.com/2013/12/blog-post.html (8/8/1441 AH).
3) Jain, Chhavi (2017). Evolving a Model for National Digital Repository of Indian Government Publications using Institutional Repository Infrastructure; Chapter 3 Institutional Repository: State of the art review. Available at: https://shodhganga.inflibnet.ac.in/bitstream/ 10603/190797/11/11_chapter%203.pdf (20/3/2020)

4) Babu, Harish (March 2020). Institutional Repository in Schools in Kerala: A Proposal. Research Gate. Available at: https://www.researchgate.net/publication/339998640_Institutional_Repository_in_Schools_in_Kerala_A_Proposal (22/3/2020)
5) Naikwadi, V A, P A Shinde, and R N Ingale (Feb. 2020). Creation of an "Institutional Repository" of Mahatma Phule Krishi Vidyapeeth, Rahuri. Research Gate. Available at: https://www.researchgate.net/publication/339528977_Creation_of_Institutional_Repository (20/3/2020)
6) A. M. Alkalbani, W. Hussain and J. Y. Kim, (2019). "A Centralized Cloud Services Repository (CCSR) Framework for Optimal Cloud Service Advertisement Discovery from Heterogenous Web Portals," in IEEE Access, vol. 7, pp. 128212-128223.
7) Dasari, Rakesh Nag and G. Rama Mohan Babu (November 2019). An Innovative Structure for Cloud Repository Adopting Binary Access Evidence Rakesh Nag. International Journal of Computer Science and
8) Singhal R., Singhal A., Bhatnagar M., Malhotra N. (2019) Design of an Audio Repository for Blind and Visually Impaired: A Case Study. In: Mandal J., Bhattacharyya D., Auluck N. (eds) Advanced Computing and Communication Technologies. Advances in Intelligent Systems and Computing, vol 702. Springer, Singapore.
9) Zhu, X.; Freeman, M.A. (2019). An evaluation of U.S. municipal open data portals: A user interaction framework. J. Assoc. Inf. Sci. Technol., 70, 27-37.
10) Concordia, C.; Gradmann, S.; Siebinga, S. (2010). Not just another portal, not just another digital library: A portrait of Europeana as an application program interface. IFLA J., 36, 61-69.
11) Waddington, S., Zhang, J., Knight, G. et al. (2013). Cloud repositories for research data - addressing the needs of researchers. J Cloud Comp 2, 13. https://doi.org/10.1186/2192-113X-2-13
12) Blumer, E.; Hügi, J.; Schneider, R. (2014). The usability issues of faceted navigation in digital libraries. Ital. J. Libr. Arch. Inf. Sci., 5, 85–100.
13) Oladiran, M.T., Bentley, G., & Jain, P. (2013). The role of institutional repository in digital scholarly
14) Meera, B.M.; Manjunath, M.; Kaddipujar, M. (2013). Facets of digital data dissemination: Value addition through "imprints collection". Libr. HI Tech., 31, 308-322.
15) Weinberger, D. (2012). Too Big to Know: Rethinking Knowledge Now That the Facts aren't the Facts, Experts Are Everywhere, and the

Smartest Person in the Room Is the Room; Basic: New York, NY, USA.Wikipedia, (18 March 2020). Digital Library.

16) Adewumi, A.O. and Omoregbe, N.A. (2011) Institutional Repositories: Features, Architecture, Design and Implementation Technologies. Journal of Computing, 2 (8).
17) Sparxsystems (2019). Cloud Based Repositories. Available at: https://www.sparxsystems.com.au/resources/user-guides/14.0/repository/cloud-based-repositories.pdf. (20/3/2020)
18) Goscinski, A., M. Brock, (2010). "Toward dynamic and attribute based publication Discovery and selection for cloud computing", Future Gener. Comput. Syst., Vol. 26, No. 7, pp. 947-97.
19) Wikipedia, (18 March 2020). Digital Library. Available at: https://en.wikipedia.org/wiki/Digital_library (21/3/2020).
20) Shukla, Prachi, 2018. Implication of Institutional Repository (IR) on Libraries a Study on select IRs Science and Technology Institutes of Northern India. Available at: https://shodhganga.inflibnet.ac.in/bitstream/10603/212993/7/4.chapter-%201.pdf (21/3/2020)
21) Oladiran, M.T., Bentley, G., & Jain, P. (2013). The role of institutional repository in digital scholarly.
22) Mfula, Chama Mpundu (2017). Creating Digital Repositories. Available at: ifla.org/files/assets/services-for-parliaments/preconference/2017/chama-mpundu-mfula-creating-digital-repositories.pdf
23) Han, Y. (2010). On the clouds: a new way of computing. Inf. Technol. Librar. 29 (2), 87-92. https://search.proquest.com/docview/325033464/fulltextPDF/A52FC66FB8DE4D9BPQ/1?accountid=14500
24) Jain, Chhavi (2017). Evolving a Model for National Digital Repository of Indian Government Publications using Institutional Repository Infrastructure; Chapter 3 Institutional Repository: State of the art review. Available at: https://shodhganga.inflibnet.ac.in/bitstream/10603/190797/11/11_chapter%203.pdf (20/3/2020).
25) ROAR Repository Software (http://roar.eprints.org/)(20/3/2020).