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Innovative Research is a community based space for exploring new and creative ways of conducting, displaying and utilising academic research. This edited book includes many of the author's research papers which encourage sharing their original research work and getting new ideas for developing their research in application aspects.

### About the Editors



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INNOVATIVE RESEARCH IN  
MULTIDISCIPLINARY FIELD



Dr. Pralhad V Chengte  
Dr. Premila Kollur  
Dr. Manjunath G Deshpande



# Innovative Research in Multidisciplinary Field

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## Digital Library Using E-Granthalaya 4.0

–Kavitha J.N.<sup>1</sup>

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### ABSTRACT

The National Informatics Centre (NIC) created e-Granthalaya, a comprehensive digital library and administration system, to streamline library operations and facilitate user access to digital materials. It makes it possible for libraries to effectively handle a number of tasks, including user administration, acquisition, circulation, and cataloguing. Books, journals, research papers, and other multimedia forms are among the many types of digital information that the system supports and makes available in an easy-to-use online setting. By improving library resource access, storage, and retrieval, the e-Granthalaya hopes to support India's libraries' digital transformation. It provides a centralised platform for libraries to better manage their resources and provide better services to their patrons. It is made to be scalable, adaptable, and compatible with a wide range of digital formats. The system promotes knowledge sharing, facilitates collaborative learning, and guarantees quick access to information, all of which help to build a society that is driven by knowledge. Using e-Granthalaya 4.0 to create a digital library entails utilising its features and functionalities for organising, storing, and retrieving digital content, including books, research papers, and other educational resources. A library management system called e-Granthalaya 4.0 was created by the National Informatics Centre(NIC) with the goal of efficiently managing and distributing digital resources.

**Keywords:** Digital Library; Institution Repository; Web version; OPAC; e-Granthalaya 4.0

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## INTRODUCTION

A collection of digital content, including text, photos, audio, and video, that has been arranged, saved, and made available digitally – often over the internet – is called a digital library. It makes it simple for users to look up, access, and retrieve information from a distance without having to go to a typical library. Users can now connect with library materials in more effective, scalable, and easy ways thanks to digital libraries, which have completely changed the way people access information.

e-Granthalaya is one such technology that makes it possible to establish and run digital libraries in India.

### Goals for Digital Library

Modernising the administration and accessibility of library resources through automation, digitisation, and improved user accessibility is the primary goal of building a digital library with e-Granthalaya. The purpose of e-Granthalaya is to accomplish a number of important objectives that facilitate the effective administration and operation of digital libraries. The following are the main goals of an e-Granthalaya digital library:

1. Digitization of Library Resources
2. Automation of Library Management
3. Improved Accessibility to Resources
4. Enhanced Search and Retrieval of Information
5. Standardization of Metadata and Cataloguing
6. Preservation of Knowledge
7. Build an Institutional Repository

### e-Granthalaya Subscription

The Granthalaya was freely provided to all kinds of libraries nationwide between 2003 and 2013 in order to establish it as a common tool for library automation and networking and to gather input and comments from all kinds of libraries. Cloud Version 4.0 was introduced and made available for free in Government Libraries on NIC Cloud between 2014 and 2017. According to NIC's new policy, software version 4.0 will be free starting in 2018. However, each library will be required to pay Rs. 21,275 and receive help desk support for operating cloud services for a five-year period.

The NIC/NICSI Data Center/National Cloud for Ministries and Government Departments libraries, as well as those of State and Central Governments, as well as other government-funded organisations and

autonomous entities, are the only places to access e-Granthalaya Ver.4.0 (eG4). With their upkeep and assistance, the Indian Army, Indian Navy, and other paramilitary organisations would host the database and application on their own network, which is often INTRANET. There won't be any software on CD.

At several locations, including the National Data Centre and National Cloud in Delhi, Pune, and Kolkata, the Indian government has established first-rate hosting facilities at NIC/NICSI. Additionally, NIC maintains the State Data Centres (SDCs) established by the State Government in each of the state capitals. According to NIC Hosting policy, government libraries can also host the e-Granthalaya software in the State Data Centre and NIC Data Center/National Cloud. Additionally, the Government of India's Ministry of Electronics and Information Technology has established a National Cloud known as "Meghraj," where hosting services are offered to all types of organisations for a fee (<https://cloud.gov.in>). Virtual Machines (VMs) and server co-location in the data centre are made available by the clouds on a pay basis. There are currently no fees associated with NIC Cloud.

### Key Features of e-Granthalaya 4.0

- **Multi-language Support:** It supports multiple languages, making it accessible to a wider range of users.
- **Barcode Generation:** It allows for barcode generation for physical books, which can be used in conjunction with the digital library for seamless library management.
- **Cloud Storage Integration:** Integration with cloud storage platforms can facilitate scalability and ensure that the system can handle large volumes of data.
- **Integrated User Management:** Manage user profiles, permissions, and activity logs.
- **OPAC (Online Public Access Catalogue):** This enables users to search and access resources online, even from remote locations.

### Digital Repository Using e-Granthalaya

A digital repository is a type of digital archive or storage system that is used to gather, arrange, maintain, and make accessible digital content—usually research, academic, or organisational documents. These repositories enable the systematic and easy sharing of digital data, documents, multimedia, and other resources by institutions, organisations, or people. They guarantee that digital resources are available to a large audience over time and are crucial for their long-term preservation and distribution.

e-Granthalaya 4.0 is an advanced library automation software used in India to digitize and manage library services.

- Digital Files of Books/ Books Chapters / Articles Files / News Clipping / Loose issues can be uploaded in eG4 while doing data entry of such reading materials.
- Digital files can also be uploaded during edit of records of book/ journals or any other materials also.
- Only copyrighted documents must be uploaded to avoid legal violation.
- E-Files must be compressed before uploading, compression may be achieved by commercial software from Adobe or other player.
- Image/tiff, pdf, media files formats are supported

### **Benefits of Using e-Granthalaya 4.0**

- ***Improved User Interface:***
  - Intuitive and User-Friendly Design
  - **Mobile Compatibility**
- ***Advanced Search and Retrieval***
  - Enhanced Search Features
  - Faceted Search
- ***Digital Repository Management***
  - Better Management of Digital Resources
  - Multi-Format Support
- ***Integration with External Systems***
  - Integration with Open Source Systems
  - API Integration
- ***Data Analytics and Reporting***
  - Advanced Reporting Tools
  - Data Analytics
- ***Cloud-Based Support***
  - Scalability and Flexibility
  - Remote Access
- ***Enhanced Security Features***
  - Role-Based Access Control (RBAC)
  - Data Encryption
- ***Interoperability with International Standards***
  - OAI-PMH Compliance
  - MARC and Other Standards



- ***Automated Library Operations***
  - Cataloging, Circulation, and Acquisitions
  - Barcoding and RFID
- ***Improved Resource Access for Users***
  - Online Access to Resources
  - Self-Service Portal
- ***Efficient Library Resource Management***
  - Centralized Library Management
  - Streamlined Acquisition Process
- ***Customization and Flexibility***
  - Customizable User Interface
  - Flexible Configuration

### **Advantages of e-Granthalaya 4.0**

e-Granthalaya is a comprehensive Library Management Software (LMS) developed by the National Informatics Centre (NIC) to automate the various functions of libraries in India. It facilitates the management of both physical and digital resources and provides several advantages for libraries and their users. Here are some key advantages of using e-Granthalaya:

- ***Automation of Library Operations***
  - ***Streamlined Processes:*** e-Granthalaya automates various library functions like cataloguing, circulation, acquisitions, and resource management, reducing the need for manual intervention and minimizing errors.
  - ***Efficient Workflow:*** Tasks like issuing and returning books, cataloguing new acquisitions, and managing overdue items are automated, which enhances operational efficiency and saves time.
- ***Improved Accessibility***
  - ***Online Access:*** Users can access library resources, both physical and digital, remotely via the internet. They can check the availability of books, reserve items, and renew books without needing to visit the library in person.
  - ***Digital Repository:*** e-Granthalaya supports digital content management, allowing users to access e-books, journals, research papers, and other digital resources through the library's online platform.
- ***Enhanced Search and Retrieval:***
  - ***Powerful Search Functionality:*** e-Granthalaya provides a user-friendly search interface that allows users to search for



library resources by author, title, publisher, ISBN, subject, or keywords. This significantly improves the ease of finding books or other materials.

- **Faceted Search:** Advanced search features, such as filtering by multiple parameters (like categories or formats), make it easier to locate specific resources.
- **Effective Resource Management**
  - **Centralized System:** Libraries can manage both physical and digital resources in a single, centralized system, making it easier to track inventory, monitor usage, and manage acquisitions.
  - **Barcode and RFID Integration:** e-Granthalaya supports barcode and RFID technology for better tracking, faster check-in/check-out processes, and efficient inventory management.
- **Time and Cost Efficiency**
  - **Reduced Manual Labour:** By automating manual tasks, e-Granthalaya saves library staff valuable time and effort. This reduces the overall operational cost, as fewer resources are needed for manual data entry and management.
  - **Faster Transactions:** The automated circulation and cataloguing systems allow for quicker transactions, reducing waiting times for library patrons.
- **User-Friendly Interface**
  - **Intuitive Design:** e-Granthalaya is designed to be user-friendly, with a simple and intuitive interface that both library staff and users can easily navigate.
  - **Self-Service Portal:** The self-service portal allows users to perform various tasks like searching for resources, renewing books, reserving materials, and checking due dates on their own, enhancing user satisfaction.
- **Data Analytics and Reporting**
  - **Detailed Reports:** e-Granthalaya generates detailed reports on circulation, acquisitions, cataloguing, and user activity. This helps librarians track the usage of resources and make informed decisions about resource allocation.
  - **Usage Patterns:** The software provides insights into the usage patterns of library materials, enabling librarians to better understand which resources are in high demand and plan future acquisitions accordingly.

- **Security and Access Control**
  - **Role-Based Access:** e-Granthalaya allows administrators to configure role-based access control (RBAC), ensuring that different types of users (e.g., staff, students, or faculty) have appropriate access to resources and features.
  - **Data Protection:** The software includes security features like encryption and backup protocols to protect sensitive library data from unauthorized access, loss, or damage.
- **Integration with International Standards**
  - **MARC and Other Standards:** e-Granthalaya supports international cataloguing standards like MARC (Machine-Readable Cataloguing), allowing seamless integration with other library management systems and metadata sharing.
  - **OAI-PMH Compliance:** The system supports the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH), making it compatible with other digital repositories and libraries worldwide.
- **Scalability and Flexibility**
  - **Cloud-Based Deployment:** e-Granthalaya can be deployed on the cloud, offering scalability and flexibility for libraries of various sizes. This cloud-based solution allows for easy expansion and access to the system from any location.
  - **Customization Options:** Libraries can customize e-Granthalaya to suit their specific needs, from modifying the user interface to configuring different modules for circulation, acquisitions, and catalogue management.
- **Better Reporting and Insights**
  - **Customizable Reports:** e-Granthalaya allows administrators to generate customized reports for circulation statistics, user activity, stock status, overdue materials, and more. These reports help in decision-making and library management.
  - **Resource Management Insights:** The system's data analytics features provide insights into resource usage, helping libraries determine which resources are most in demand and how to allocate budgets more effectively.
- **Multi-Language Support**
  - **Language Flexibility:** e-Granthalaya supports multiple languages, making it accessible to a broader audience, especially in multilingual regions of India. Libraries can offer services in different languages, catering to local user needs.

- ***Efficient Acquisition Management***
  - ***Simplified Acquisition Process:*** The software streamlines the process of acquiring new resources, from vendor management to cataloguing, making it easier to update the library's collection with the latest materials.
  - ***Vendor Integration:*** e-Granthalaya supports vendor integration, enabling libraries to manage procurement efficiently and track acquisition details directly through the system.
- ***Inter-Library Loan Management***
  - ***Resource Sharing:*** e-Granthalaya supports inter-library loans, allowing libraries to borrow or lend resources to other institutions. This helps in sharing resources and expanding access to materials that might not be available in the local library.
- ***Support for E-Resources***
  - ***Managing E-Journals and E-Books:*** Libraries can manage a wide range of e-resources like e-journals, e-books, databases, and multimedia content. This helps libraries provide broader access to digital information resources.
  - ***Access Control for Digital Resources:*** The software allows the library to control access to digital resources, ensuring that only authorized users can view or download content, thereby protecting intellectual property.

## Disadvantages of e-Granthalaya 4.0

Granthalaya 4.0 offers several advantages such as scalability, remote access, and reduced infrastructure costs. However, it also comes with specific disadvantages that may impact some libraries or institutions.

- ***Dependence on Internet Connectivity***
  - ***Reliability of Internet Connection:*** Since the cloud version relies on internet connectivity, libraries in areas with unstable or slow internet connections may face difficulties in accessing the system. Frequent connectivity issues can lead to interruptions in library operations.
  - ***Bandwidth Limitations:*** Libraries with limited bandwidth might experience slower performance, especially when accessing large digital repositories or generating complex reports.

- ***Data Security and Privacy Concerns***
  - ***Data Vulnerabilities:*** While cloud providers generally implement robust security measures, storing sensitive library data (such as user information, transaction history, and catalogue details) on third-party servers can raise concerns about data privacy and security. Data breaches, cyber-attacks, or unauthorized access could potentially compromise the confidentiality of library resources.
  - ***Compliance Issues:*** Some libraries, particularly those in government or research sectors, may face challenges complying with data privacy laws or regulations when storing data on third-party servers, especially if the cloud provider is outside the country or region.
- ***Lack of Full Control over Data and Infrastructure***
  - ***Limited Control:*** With the cloud-based version, libraries must depend on the service provider for maintenance, updates, and server management. This reduces the level of control libraries have over their data and infrastructure, potentially causing delays in resolving issues or making configuration changes.
  - ***Customization Limitations:*** Libraries may find it difficult to fully customize or configure the system to their exact needs since certain changes may require vendor intervention, which could be time-consuming.
- ***Subscription Costs Over Time***
  - ***On-going Costs:*** While e-Granthalaya itself is free, libraries using the cloud version will incur on-going subscription costs to maintain access to cloud infrastructure and services (e.g., cloud hosting, storage). These recurring costs may become significant over time, especially for large libraries with extensive digital collections.
  - ***Hidden Costs:*** Additional costs may arise for data backup, storage expansion, or technical support, which could be unpredictable or vary based on usage patterns.
- ***Data Backup and Recovery Challenges***
  - ***Data Backup Dependency:*** While cloud service providers typically offer data backup solutions, libraries are dependent on the provider's backup policies and infrastructure. If the cloud provider does not implement adequate backup protocols or suffers from technical failures, data loss may occur.

- **Backup Delays:** In the event of data loss or corruption, restoring data from cloud backups might take time, potentially leading to prolonged library downtime.
- **Limited Offline Access**
  - **Dependence on Cloud Availability:** When using the cloud version of e-Granthalaya, the library's ability to operate offline is limited. If there is an internet outage or connectivity issue, library operations such as checking out books, searching catalogues, or accessing digital resources may be disrupted.
  - **Offline Solutions:** Libraries that require offline access to data for remote locations or during internet downtime may find the cloud version inconvenient, as cloud-based solutions generally require an internet connection to function.
- **Performance Issues with High Traffic**
  - **Scalability Concerns:** Although the cloud version is scalable, during periods of high traffic (e.g., many users accessing the system simultaneously), the cloud infrastructure may experience performance degradation, such as slow response times or delays in retrieving information.
  - **Server Overload:** If the cloud service providers servers are not adequately provisioned or experience unexpected traffic spikes, library staff and users may face interruptions or delays in accessing resources.
- **Vendor Lock-In**
  - **Dependency on Cloud Provider:** When using the cloud version of e-Granthalaya, libraries may become dependent on a specific cloud service provider (e.g., AWS, Azure, or NIC's own cloud infrastructure). This can result in vendor lock-in, where switching to another provider or platform becomes costly or technically challenging.
  - **Migration Challenges:** If a library wants to switch to another system or cloud provider, the data migration process could be complex, time-consuming, and costly.
- **Technical Support and Maintenance**
  - **Limited Support:** While NIC offers support for e-Granthalaya, cloud-based versions may experience delays in obtaining immediate technical assistance, particularly during peak hours. The support may not always be as responsive as an on-premise solution.

- **Cloud-Specific Issues:** Cloud platforms may have unique issues related to infrastructure that libraries cannot troubleshoot or resolve themselves, necessitating reliance on the cloud service provider for resolution.
- **Integration and Compatibility Issues**
  - **Integration with Local Systems:** Cloud-based systems can sometimes have difficulty integrating with existing on-premise applications or other legacy systems used by libraries. Integrating the cloud version of e-Granthalaya with other local systems for accounting, HR management, or other library-specific functions may require extra effort.
  - **External Software Integration:** Libraries may face challenges in integrating the cloud version with external systems (e.g., publisher databases or content management systems), which could limit the ability to share or retrieve data from other platforms.
- **Limited Control Over Updates and Upgrades**
  - **Forced Updates:** In cloud-based systems, updates and upgrades are often pushed automatically by the service provider. While updates can bring improvements, they may also introduce new bugs or changes to the user interface and functionality that users are not accustomed to. Libraries may not have the option to delay updates based on their own preferences or timelines.
  - **Compatibility Issues:** New versions or updates may occasionally cause compatibility issues with existing workflows or user practices, leading to temporary disruptions until users adapt or further fixes are made.
- **User Experience Variations**
  - **Inconsistent Performance Across Devices:** Accessing e-Granthalaya 4.0 cloud version from different devices (e.g., smartphones, tablets, desktops) may result in an inconsistent user experience. Some devices may experience slower performance, or the layout may not be as optimized for smaller screens.
  - **Mobile Access:** The mobile version of e-Granthalaya may not be as feature-rich or responsive as the desktop version, limiting users' ability to fully utilize the system on the go.

## Conclusion

### Cloud Version of e-Granthalaya 4.0

The cloud version of e-Granthalaya 4.0 offers several key advantages that make it an appealing choice for many libraries, particularly those looking to streamline operations and provide better access to resources. Its scalability, remote access, and cost-effective infrastructure make it an ideal solution for libraries that want to minimize the need for physical servers and reduce maintenance costs. Additionally, the cloud version facilitates collaboration, centralized resource management, and access to digital content, which are essential for modernizing library services.

However, like any cloud-based solution, it comes with certain limitations. Libraries must rely on internet connectivity, and issues with bandwidth or connectivity could disrupt operations. Data security and privacy are significant concerns, especially when dealing with sensitive user information and resource management. Furthermore, subscription costs and dependence on a third-party provider for technical support and updates may create challenges, particularly for libraries with budget constraints or those located in regions with less reliable internet access.

Despite these drawbacks, the cloud version of e-Granthalaya 4.0 remains a powerful tool for digitizing library operations, enhancing user experience, and improving resource management. It is especially beneficial for libraries in educational institutions, government organizations, and other sectors where a centralized, automated system can improve efficiency.

Ultimately, libraries considering e-Granthalaya 4.0 in the cloud should carefully evaluate their specific needs, infrastructure, and long-term goals to determine if this solution is the right fit for their operations. If the potential drawbacks—such as internet dependency and on-going costs—can be managed effectively, the cloud version of e-Granthalaya offers a robust and future-ready platform for modern library management.

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