



Application of Open Source Content Management Software in Academic Libraries: An Analytical Study

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DOI : <https://doi.org/10.5281/zenodo.23767330>

ARTICLE DETAILS

Research Paper

Received: 25-08-2026

Accepted: 24-09-2026

Published: 20-10-2026

Keywords:

Open Source Software, Content Management System, Academic Libraries, Digital Libraries, Library Automation, Institutional Repository

ABSTRACT

The development of information and communication technologies allowed to transform the libraries into digital information service centres. Today, academic libraries should be able to organise electronic information resources, institutional repositories of their research results, publications, and digital collections. Using open source content management software is an effective solution for their management, website creation, and access to research data. The current study was conducted using a descriptive and analytical research methods and based on the information found in the articles, scholarly sources, and the official websites of the CMS (content management system). In this article, general CMS include WordPress, Drupal, Joomla, and specific Koha, DSpace, Omeka for the library, institutional repository, and digital collections management systems. At the same time, the study identified several challenges, including the need for technical and professional skills, technical equipment, training, security, copyright, and maintenance. This study concluded that a library should choose the software based on specific needs, requirements, and goals.

1. Introduction

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Academic libraries have a key role to play in teaching, learning, research, and communication of scholarly information. Traditionally, their core functions comprised book and journal acquisition, organisation of print collections, maintenance of catalogues, circulation of materials, and assistance in retrieving information. However, developments in information and communication technology have fundamentally changed library functions. Contemporary academic libraries are now tasked with providing access to electronic books, journals, research databases, institutional publications, and other digital resources.

Students and researchers now demand that library services go beyond library premises and opening hours. Libraries need to invest in appropriate software, digital infrastructure, information management policy, and expertise to meet the demand.

Open source software has emerged as a viable option for institutions that desire to have digital services designed to their specifications.

The source code is made available to users under the terms of the licence, and it fosters collaboration among developers, institutions, and users. In academic libraries, open source software can be used to develop libraries' websites, automation systems, digital content organisation systems, institutional repositories, and online information services.

Nevertheless, open source software is not always free. Hosting, customisation, technical support, security, training, and upgrades can be very costly. Hence, libraries need to identify their needs and technical capabilities before selecting a particular platform.

This article examines the use of open source content management software in academic libraries, highlights its main benefits and challenges, and proposes strategies for successful implementation.

1.1 Significance of the Study

The study contributes to the knowledge base of librarians, information officers, and institutional administrators about the potential of open source software. It also differentiates between generic content management systems and those designed specifically for library automation, institutional repositories, and digital collections.

2. Review of Related Literature



The existing literature on digital libraries, institutional repositories, open access, and library automation demonstrates the centrality of technology in organising and sharing information.

Borgman (2007), in *Scholarship in the Digital Age*, investigates the relationships between scholarship, information infrastructure, and the Internet. Her work underscores the importance of digital infrastructure in contemporary academic communication.

Breeding (2015) looks at the emergence of library services platforms and the changing technological needs of modern libraries. His work provides a good background for this article by illustrating the role of software in providing integrated library services.

Lynch (2003) highlights the importance of institutional repositories as infrastructures for scholarship in the digital age. Institutional repositories enable universities to organise, store, access, and share outputs of research, including articles, theses, dissertations, and conference papers.

Suber (2012) articulates the principles of open access and their implications for scholarship. Digital repositories can help achieve the goals of open access if copyright policies and deposit terms are adhered to.

Witten, Bainbridge, and Nichols (2010) discuss digital library development and highlight the principles of information organisation, searching, and digital access. This knowledge is critical for academic libraries embarking on the creation of digital collections.

The documentation of features and capabilities of WordPress, Drupal, Joomla, Koha, DSpace, and Omeka sheds light on the strengths and weaknesses of each. A close examination of the literature reveals that a variety of platforms can be used to deliver digital services but none is perfect. This article builds on the existing literature by pointing out the applications, benefits, and challenges of using each of the platforms to deliver library services.

2.1 Research Gap

Content management systems, integrated library systems, and institutional repositories are often presented as distinct entities. However, academic libraries need to understand how the technologies can be combined to enhance their operations. This article examines the uses and benefits of the systems and discusses how they compare against one another.

3. Objectives of the Study

The following are main objectives:



1. To investigate the applications of open source software in academic libraries.
2. To identify suitable platforms for library websites, automation, repositories and digital collections.
3. To analyse the benefits of open source software for library services.
4. To identify technical, financial, organisational and professional challenges.
5. To recommend strategies for effective and sustained implementation.

4. Research Methodology

The study has a descriptive and analytical methodology based on secondary information. Books, professional publications, research literature, and official software documentation about open source software, library automation and digital libraries are utilised.

The selected platforms are examined according to their primary functions, suitability for academic library services, customisation possibilities, technical requirements, maintenance needs, and limitations. A qualitative comparative approach is used to understand their prospective applications.

The information is presented thematically in relation to software applications, benefits, challenges, comparative analysis, and recommendations. No survey, interview, or experimental investigation is conducted. As such, the findings do not reflect empirical results of a particular academic library.

5. Concept and Types of Open Source Content Management Software

5.1 Meaning and Definition

A content management system is a software to create, organise, edit, publish and maintain digital content. It generally provides facilities for managing webpages, documents, images, multimedia resources, user permissions, and website structures.

Open source content management software makes its source code freely available under an open source licence. Depending on the licence, users may modify and redistribute the software under specified conditions.

Although open source software may reduce licensing expenditure, associated services such as hosting, installation, technical support, training, and maintenance would incur costs. Libraries should, therefore, assess the total cost of ownership.



5.2 Major Types

Open source platforms relevant to academic libraries can be classified into four categories:

- General-purpose content management systems: WordPress, Drupal, and Joomla support website development and information publication.
- Integrated library management systems: Koha supports cataloguing, circulation, and patron management.
- Institutional repository software: DSpace supports the organisation and dissemination of scholarly outputs.
- Digital collection platforms: Omeka supports online exhibitions and specialised digital collections.

The categories show that academic libraries may require several complementary systems, rather than one platform for every function.

6. Applications of Open Source Software in Academic Libraries

6.1 Library Website Development

A library website provides information about opening hours, membership, borrowing rules, available services, contact details, and library policies. General-purpose content management system platforms allow librarians to create and update webpages without requiring programming expertise for every minor change.

Libraries can publish new arrivals, announcements, reading lists, research guides, orientation materials, and frequently asked questions. Websites can also provide links to online catalogues, electronic journals, research databases, and institutional repositories.

Responsive design and clear navigation improve accessibility across computers, tablets, and mobile phones.

6.2 Digital Content Management

Academic libraries manage newsletters, annual reports, bibliographies, institutional notices, teaching materials, and research guides. Content management system platforms can organise these resources through categories, tags, menus, and searchable webpages.

Effective management requires consistent file naming, descriptive metadata, appropriate permissions, and regular content review. These practices improve information retrieval and ensure that users receive accurate and relevant information.



6.3 Institutional Repository Development

Institutional repositories collect and disseminate scholarly outputs such as theses, dissertations, journal articles, conference papers, research reports, and datasets.

DSpace is a specialised open source repository platform that supports metadata management, submission workflows, searching, and access management. It can help academic institutions increase the visibility of their research outputs.

However, repository development requires clear policies concerning copyright, author permissions, deposit procedures, metadata quality, and long-term digital preservation.

6.4 Electronic Resource Management

Academic libraries provide access to electronic books, scholarly journals, research databases, and open educational resources. A content management system can organise links to these resources according to subjects, departments, courses, or user groups.

Librarians can publish instructions explaining how to access databases, search electronic journals, and locate relevant research materials. Subject-specific resource pages help students and researchers discover information efficiently.

However, a general-purpose content management system does not replace specialised systems for subscription authentication, licence monitoring, and electronic resource usage statistics.

6.5 Online Reference and Information Services

Content management system platforms can support online reference services through contact forms, frequently asked questions, research assistance pages, and subject guides. Librarians can give guidance on literature searching, citation practices, plagiarism avoidance, database use, and evaluating scholarly information.

These services extend professional assistance beyond the physical library premises. Libraries should establish procedures for responding to enquiries and protecting personal information submitted through online forms.

6.6 Communication and User Engagement



Academic libraries need to provide effective communication with students, teachers, researchers, and administrators. Content management system platforms can publish announcements about new books, workshops, orientation programmes, research events, and changes in library services.

Feedback forms and organised communication can help libraries understand user requirements. Information must be accurate, inclusive, accessible, and regularly updated to maintain user confidence.

6.7 Digital Archives and Special Collections

Academic libraries preserve historical photographs, manuscripts, archival documents, institutional records, and local cultural materials. Omeka can help organise and present such resources through online exhibitions and thematic collections.

Descriptions and contextual information improve the educational and research value of digital collections. Libraries must nevertheless consider copyright, privacy, cultural sensitivity, and publication permissions before making materials publicly available.

7. Major Open Source Platforms

7.1 WordPress

WordPress is a general-purpose content management system that is used to develop and maintain websites. Themes and plugins allow libraries to publish announcements, develop research guides, organise pages, and provide links to electronic resources.

It may be appropriate for libraries that require a manageable website. However, administrators must choose extensions carefully, restrict privileges, apply security updates, and maintain backups. WordPress is not a complete integrated library management system.

7.2 Drupal

Drupal supports structured content, user roles, permissions, and extensible functionality. It may be appropriate for academic libraries that require complex information portals, controlled publication workflows, and integration with institutional services.

Its flexibility can be valuable, although customised implementations may require considerable technical expertise and continuing maintenance.

7.3 Joomla



Joomla supports website development, content organisation, and user management. Libraries can use it to publish policies, notices, reading lists, and electronic resource links.

Its appropriateness depends on institutional requirements, staff familiarity, available extensions, security arrangements, and long-term technical support.

7.4 Koha

Koha is an open source integrated library system that is designed for library automation. Its functions include bibliographic cataloguing, circulation, patron management, and public access to catalogue records, depending on configuration and version. Unlike general-purpose content management system platforms, Koha focuses on library operations. Successful implementation requires appropriate bibliographic data, staff training, clearly defined procedures, and regular maintenance.

7.5 DSpace

DSpace is designed to manage and disseminate digital materials through institutional repositories. It is useful for research publications, theses, dissertations, datasets, and other scholarly outputs. Its effectiveness depends on suitable metadata, deposit policies, copyright compliance, access controls, and preservation planning.

7.6 Omeka

Omeka supports the publication and presentation of digital collections. Academic libraries can use it to develop online exhibitions featuring historical photographs, archival documents, manuscripts, and cultural resources. Proper descriptions, rights information, and responsible treatment of sensitive materials are essential for successful digital collection management.

8. Benefits of Open Source Software

8.1 Cost-effectiveness

Open source software can reduce expenditure on software licences, making digital services more accessible to institutions with limited budgets. However, hosting, infrastructure, technical support, training, security, and maintenance require financial resources.

8.2 Flexibility and Customisation



Open source platforms can be adapted to institutional requirements within the conditions of their licences. Libraries may customise layouts, categories, permissions, and selected functions. Customisations should be documented and tested to prevent compatibility problems during upgrades.

8.3 Improved Accessibility

Digital platforms enable users to access library information beyond the physical library premises. Mobile-friendly layouts, readable text, accessible forms, and clear navigation can improve usability. Accessibility must be evaluated, rather than be assumed, merely because open source software is applied.

8.4 Interoperability

Appropriate metadata practices, supported interfaces, and data exchange standards can help library websites connect with institutional portals, catalogues, and repositories. Libraries should verify compatibility before integrating different systems.

8.5 Community Support and Collaboration

Open source communities may provide documentation, technical guidance, and software updates. Collaboration can help libraries share knowledge and reduce dependence on a single supplier. Nevertheless, critical services should have dependable technical support and maintenance arrangements.

8.6 Research Visibility

Digital repositories and collection platforms can increase the discoverability of institutional research. When permissions allow, digital dissemination supports scholarly communication and open access while helping institutions preserve and communicate their intellectual contributions.

9. Challenges of Implementation

9.1 Technical Expertise

Installation, configuration, and maintenance may require knowledge of servers, databases, web technologies, and security. Libraries without dedicated technical personnel may encounter difficulties in resolving complex problems. Collaboration with institutional IT departments or qualified service providers can help in addressing these challenges.

9.2 Maintenance and Upgrading



Software requires regular updates to address defects, improve compatibility, and correct security vulnerabilities. Libraries should establish maintenance schedules, test updates before implementation, maintain backups, and document recovery procedures.

9.3 Security and Privacy

Library systems may host user accounts, circulation records, and personal information. Weak passwords, excessive privileges, and outdated software can create vulnerabilities. Access controls, secure connections, monitoring, backups, and incident response procedures are, therefore, essential.

9.4 Financial and Infrastructure Constraints

Open source software still depends on computers, hosting, storage, internet connectivity, technical support, and maintenance. Insufficient infrastructure can affect system performance and availability. Realistic budgeting is essential for long-term sustainability.

9.5 Staff Training

Inadequate training can result in inconsistent metadata, outdated webpages and underuse of available functions. Professional development is needed in content management, metadata standards, accessibility, copyright, privacy and basic troubleshooting.

9.6 Copyright and Digital Preservation

Libraries need to ensure copyright ownership, deposit permissions and licences before publishing digital materials. In addition, long-term preservation requires reliable backups, file integrity checking, appropriate metadata and strategies for dealing with obsolete formats.

10. Comparative Analysis

Software	Primary Purpose	Academic Library Application
WordPress	General-purpose Content Management System (CMS)	Library websites and information pages
Drupal	Structured content management	Complex library portals
Joomla	General-purpose CMS	Website content and resource pages
Koha	Integrated Library Management System (ILMS)	Cataloguing and circulation
DSpace	Institutional repository software	Research publications and theses



Omeka	Digital collection publishing	Online exhibitions and archives
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The comparison highlights that the platforms are complementary rather than interchangeable. WordPress, Drupal, and Joomla mainly cater to website content management, Koha focuses on library automation, DSpace supports institutional repositories, and Omeka facilitates digital collection presentation. A library that only needs a basic information website may not need every platform. Larger institutions may benefit from several integrated systems. The selection should consider the functionalities, expertise, accessibility, security, interoperability, and cost.

11. Findings and Discussion

The documentary analysis highlights several major findings.

First, open source software can support library websites, information services, automation, repositories, and digital collections; its effectiveness relies on the selection of appropriate platforms for the institutions' functions.

Second, no single platform may cater to every requirement of an academic library: general-purpose CMS platforms are suitable for publishing website content, whereas specialised systems are more appropriate for automation, repositories, and digital collections.

Third, open source software may ease licensing expenditure and provide customisation opportunities, but infrastructure, training, security, technical support, and maintenance remain crucial financial considerations.

Fourth, librarians have a central role in the implementation process through their responsibilities for metadata creation, content organisation, copyright compliance, digital preservation, and user support.

Finally, information security, privacy, and accessibility should be embedded into the system planning process. The findings are analytical conclusions based on the literature and software documentation, not results from an original field survey.

12. Suggestions and Recommendations

1. Conduct a needs assessment: identify the user requirements, collection types, infrastructure, staffing capacity, and service priorities before selecting the software.



2. Choose appropriate platforms: use general-purpose CMS platforms for website publication and specialised systems for library automation, repositories, and digital collections.
3. Provide staff training: train the librarians in content management, metadata creation, accessibility, copyright, privacy, and basic troubleshooting.
4. Establish security policies: implement regular updates, access controls, backups, monitoring, and recovery procedures.
5. Ensure copyright compliance: verify the permissions and licences before publishing theses, dissertations, articles, photographs, and other digital materials.
6. Allocate sustainable funding: include the hosting, storage, training, maintenance, security, technical support, and preservation in the institutional budgets.
7. Promote interoperability: evaluate the metadata standards, supported interfaces, and data export facilities before integrating different systems.
8. Evaluate services regularly: review the usability, accessibility, content accuracy, performance, and user feedback to identify the areas for improvement.
9. Encourage institutional collaboration: involve the librarians, IT professionals, faculty members, administrators, and researchers in the planning and implementation process.
10. Develop a preservation strategy: establish the procedures for file integrity, backups, metadata management, format migration, and continued access to the important digital resources.

13. Conclusion

The open source content management software provides valuable opportunities for the academic libraries to enhance the information organisation, online communication, digital access, and research dissemination capabilities. The general-purpose platforms, such as WordPress, Drupal, and Joomla, support library websites and information services, whereas the specialised systems, such as Koha, DSpace, and Omeka, address the library automation, institutional repositories, and digital collections.

The effectiveness of the platforms relies on the appropriate selection, careful planning, technical capacity, and continuing institutional support. Although the open source software may ease the licensing

expenditure and provide the flexibility, the implementation process requires the investment in the infrastructure, staff training, security, maintenance, and digital preservation.

The librarians remain a central element to the successful implementation since the technology cannot ensure the accurate information, accessible services, or responsible scholarly communication. Ultimately, the academic libraries should evaluate the software based on the effectiveness in catering to the students', teachers', researchers', and other users' needs. The sustainable funding, institutional collaboration, and regular evaluation can enhance the digital library services and support the teaching, learning, and research processes.

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