Creative Education, 2025, 16(10), 1665-1679
https://www.scirp.org/journal/ce
ISSN Online: 2151-4771
ISSN Print: 2151-4755

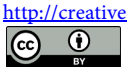
Leveraging Data Center Technology in the Design of a Digital University Archives Management System

Yufan Lin

Information Center, Zhejiang Open University, Hangzhou, China
Email: LYF19930811@126.com

How to cite this paper: Lin, Y. F. (2025). Leveraging Data Center Technology in the Design of a Digital University Archives Management System. *Creative Education, 16,* 1665-1679.
https://doi.org/10.4236/ce.2025.1610102

Received: August 25, 2025
Accepted: October 24, 2025
Published: October 27, 2025



Abstract

The purpose of this research is to develop a comprehensive set of methods and models that can accurately assess the value of corporate data and align with the coordinated support framework encompassing resources, processes, and other management elements. In this research, we have implemented the following elements: Talent Development, Resource Integration and Investment, High-tech Support, System Data Organization, and Enhanced Support Mechanisms. Ultimately, these measures are crucial as research outcomes for the future development of the system. The digital university archives management system was applied to five university scenario modules: Digital Party Building, Digital Library, Digital Campus Administration, Digital Research, and Digital Resources.

Keywords

System Data Organization, Digital University Archives Management System, Digital Research

1. Introduction

Amid rapid advancements in big data, the concept of the middle platform emerged in 2016. Traditional data warehouses primarily focused on collecting and organizing tables from various subsystems. However, challenges such as data exchange difficulties and due to significant differences in programming languages, inconsistent data definitions and metrics, and the initial emphasis on building isolated systems during information system development. Under the middle platform, small front end the core function of the data middle platform was further clarified: by implementing data service-oriented processes, it reduces redundant

data processing, enhances data sharing and reuse capabilities, and revitalizes data technology platforms and management systems (Yang & Zhang, 2022).

Initially, the data middle platform relies on big data infrastructures to collect foundational data and establish a comprehensive view of the R&D process. It incorporates data governance workflows involving cleansing and filtering, alongside data processing steps aimed at service-oriented enhancements. Using Alibaba as an example, the platform must support routine, multi-departmental, multi-business operations while also handling high-load scenarios such as the Double 11 and 618 shopping festivals. Through the integration of unified data center middleware, the middle platform coordinates vertical data centers, public data warehouses, and internal data centers to manage unified data models for core business entities within the system-such as e-commerce, marketing, promotion, logistics, and payment modules. As the data middle platform's data model management and process learning capabilities become more robust, data governance emerges as both an effective means of providing standardized data resources and the foundational technology for future large-scale data sharing and utilization. Data governance focuses on unlocking the value of existing system data by expanding its dimensions and scope through data cleansing, exchange, and analysis operations (Qiu & Li, 2022). Vertical data governance spans modules from the data link layer to the application layer, encompassing security policies, log analysis, system operations, platform maintenance, and project management. For example, in universities, deploying a unified data login portal provides one-stop access, facilitate "single-form" data reporting, and enables data-driven university information services, gradually integrating a unified campus-wide data sharing platform. A critical step in data governance is robust metadata management-overseeing metadata across all business system modules. Metadata must be planned and deployed strictly according to industry standards, serving as the foundational element for every subsequent data process and coding guideline.

The core objective of building a data middle platform is to achieve the digitization, transparency, and visualization of enterprise operations. Its essence lies in establishing an integrated mechanism that genuinely unlocks the value of enterprise data. This requires coordinated support through aligned human resources, standardized processes, and allocated resources to fundamentally enhance data quality, reduce operational costs at the source, and enable seamless integration with business systems through institutional mechanisms. This architecture surpasses other data strategies, such as modernized data warehouses, in addressing the unique challenges of university archives due to its ability to adapt to diverse and evolving data requirements. Unlike traditional systems, it prioritizes flexibility and scalability, enabling universities to efficiently manage both structured and unstructured data.

2. Challenges in Managing University Archives

Archives management addresses critical challenges such as archival informatiza-

tion in the digital age, aiming to provide society with enduring, trustworthy, and continuous services for evidence-based records amid the surge of data and information. Archival information resources encompass valuable archival data obtained through various means, including but not limited to original archives and diverse processed archival information products (Liu, 2025). For archival departments, the governance and utilization of these archival information resources constitute core tasks in supporting the development of a strong archival nation and a robust cultural nation. This goal should be achieved by integrating modern, information-based data management models with informatized retrieval tools, enabling more precise, effective, and objective public access to archives. In university archives management, the initial phase of informatization development primarily focused on building classification systems. However, this focus, combined with low levels of data exchange and sharing between systems and significant barriers, has led to several issues. First, the ownership of archival data assets is unclear. This results in university archival data being scattered and disorganized across various schools and departments, with unclear information regarding the release date, quality, accuracy, responsible department, and responsible faculty member of the source data. For example, consider university Party-building activity data, which can be categorized into five major types: Themed Party Day, Three Connections, Volunteer Services, Organizational Activities, and Reporting Management. Each category has its own data attributes and corresponding types. For instance, in Volunteer Services, data types include varchar for service location, organization name, founder, activity progress records, and snapshots; datetime for activity start time and creation time; and int for release status and participant limits. During organization, this diverse foundational data is fragmented into individual information tables, with each branch serving as the smallest storage unit for separate management. This structure hinders university leadership from gaining real-time visibility into Party-building activities across the entire institution. Second, there is a lack of standardized archival data norms. This is evident in the absence of unified coding standards, procedural specifications, and data governance management systems within universities. For example, in campus OA systems, the lack of standardized archival data norms means there are no unified data workflow requirements. Consequently, each business department independently manages and maintains its own process-related data. This makes it difficult for decision-making departments to conduct detailed reviews of university business processes, often resulting in situations requiring manual intervention, such as chaotic electronic signature workflows and inconsistencies with offline processes. Third, inconsistent data quality is a significant problem. The absence of data quality admission and assessment standards, coupled with insufficient technical support for correction and enhancement, prevents archival data from meeting minimum usage requirements. For example, in the classification of module view tables in higher education institutions, portal management, activity management, meeting management, Party affairs, and learning management constitute the most fun-

damental functional modules. The data quality of submodules and subviews within these modules ultimately determines the quality of the view tables. Universities often face situations where functional module classifications are clearly defined, yet the archival data within submodules and subviews suffer from poor quality management, leading to unsatisfactory data quality in final presentations. Additionally, archival data sharing mechanisms are underdeveloped: traditional archival management practices persist, impeding the development and utilization of archival information resources. The circulation of archival data remains extremely limited, primarily shared passively with other departments, lacking both timeliness and accuracy. Awareness of the importance of archival data resource sharing and circulation has not been adequately promoted. From a systemic perspective, archival data sharing models and supporting data exchange services have not kept pace with the ongoing digital transformation. The practical challenge of overcoming institutional silos and resistance from departments relying on legacy systems is a significant hurdle that requires both strategic planning and cultural change within organizations. Many departments are entrenched in their traditional ways of operating, often viewing new data-sharing initiatives as disruptive or unnecessary. This resistance is further compounded by concerns about data security and the potential loss of control over sensitive information.

3. Research on the Model Elements of a Digital University Archives Management System Based on Data Middleware Platform Technology

In accordance with the requirements for establishing government archives information disclosure centers, the scope includes infrastructure development (facility construction, equipment resources, human and financial resources), institutional development (collection policies, management systems), and operational development (data collection, screening and preservation, circulation and sharing, publicity efforts). The data collection module aggregates information from multiple channels, including government portal submissions, public network data collection, and local data centers. The circulation and sharing module mandates public-facing archival digitization efforts, enhancement of open archives databases, and ensuring maximum public access to open archives websites for browsing and searching electronic archival information. Within this development framework, supported by data middle platform technology, the model elements of the Digital University Archives Management System can be categorized as follows: Talent Development, Resource Integration and Investment, High-tech Support, System Data Organization, and Enhanced Support Mechanisms.

3.1. Talent Development

Addressing challenges such as unclear ownership of archival data assets requires prioritizing the development of archival information professionals. In recent years, universities have expanded their IT workforce through internal training,

external recruitment, and multi-party collaborations. For educational training, faculty should receive practical instruction in archival informatization, archival security, data middleware technologies, and other relevant emerging technologies. This approach enhances faculty members' IT literacy and electronic archiving capabilities, fostering a well-rounded team of archival informatization specialists. For practical implementation, assign a project lead for each registered university project. This lead is responsible for confirming the system interface personnel for each business system and establishing dedicated database management accounts for those systems. Each business system must be registered and operated under the daily supervision of system interface personnel. Systems with higher security protection levels should also designate technical administrators, sub-business administrators, and database administrators from the relevant university technical departments. A formal data governance committee or structure should be established to oversee roles and facilitate cross-departmental collaboration for system success. This committee, composed of representatives from various departments, ensures that all perspectives are considered in decision-making. By setting up clear communication channels and holding regular meetings, it can promptly address challenges and promote shared responsibility.

3.2. Resource Integration and Investment

To address deficiencies in archival data standards and quality, resources must be reallocated, including investments in platform development and financial support. Following the unified planning and construction of the National Open Archives Information Resource Sharing Platform, further investments should be directed toward creating an interconnected, shared, and unified "one-stop" digital archival management service portal. For universities, leveraging relevant educational administrative departments and high-tech enterprises to build a university digital archival management resource-sharing platform (hereinafter referred to as the "Shared Platform") represents a viable approach for platform construction investment. The Shared Platform encompasses academic data such as course materials, student information, examination details, enrollment statistics, and exam scheduling, while also incorporating non-academic data, including news updates, survey questionnaires, admissions brochures, premium resources, flagship courses, and faculty-student interactions. Its backend should integrate decision-support modules such as unified identity authentication, data middleware, and big data analytics centers. The iterative reconstruction and optimization of the Shared Platform require integration and alignment with the existing foundational platform, achieving qualitative improvements in data services, functional expansion, and system security. Regarding financial investment, consideration should be given to leveraging support policies from higher authorities to secure funding through collaborative project models. Alternatively, expenditure planning can be advanced within the university's centralized special fund for information technology development.

3.3. High-Tech Support

Advancing the overall quality of archival data depends on leveraging advanced technological support, particularly cutting-edge data processing technologies such as data middleware. Processing archival data involves privacy encryption, access control, intrusion detection, big data analytics, cloud computing, and data middleware technologies (Shonhe, 2025). For university archival data, which contains sensitive personal information such as ID numbers and home addresses, privacy encryption at the source is the primary security measure. Before source data enters the data middleware platform, symmetric encryption methods (e.g., DES, 3DES) or asymmetric encryption methods (e.g., RSA, DSA) can be applied according to privacy classification levels. Post-processing using relevant technologies becomes critical once data enters the middleware platform. Building upon the collection of massive shared data, a series of data cleansing and targeted classification processes further expand the dimensions and scope of the middleware platform's data. Taking university Party building activity archives as a typical example: before entering the middleware platform, foundational Party building data is managed separately by each branch in multiple independent information tables. Through secondary processing by the middleware platform's data development module, Party building activity data can be transformed into highly visualizable, valuable, and analyzable information. This lays the foundation for subsequent Party building user profiling and faculty/staff behavior analysis.

3.4. System Data Organization

Based on fundamental organizational structures, system data can be categorized into three primary types: structured data, semi-structured data, and unstructured data. Data dictionaries, survey templates, and module views from various university business systems facilitate the initial collection of tables, resulting in the accumulation of vast amounts of unorganized source data. With the support of data model management, university archives can further plan metadata management and master data management. Metadata management serves as a preliminary step in the organization process and a foundational element for drafting guidelines, primarily aiming to perform basic automated classification of collected archival data. Reference can be made to university information data standards and norms, as well as archival work standards for higher education institutions. The advantage of master data management lies in ensuring data cleansing and preparation before master data is incorporated into middle-platform management. The organization process adheres to strict business specifications, guaranteeing that key field collection undergoes rigorous third-party data validation, thereby achieving system standards from the outset. University archival data must be transformed into data assets, made accessible externally via API interfaces, and integrated into university business systems to maximize its value. Once organized, this data becomes a service capability that, in turn, activates the entire data middle platform. Here, we use the "Student" entity as a concrete example within a uni-

versity setting. To standardize its data management, the entity is first defined with a clear set of attributes, such as student ID, name, department, and enrollment year. These attributes are then mapped to a unified data model that aligns with both internal university systems and external standards. This approach makes the entity easily searchable and usable across different platforms. Furthermore, to ensure consistency and accuracy, automated validation mechanisms are implemented to detect errors or discrepancies in real time. This structured method not only simplifies data retrieval but also enhances the overall efficiency of data operations within the institution. It addresses the problem of unclear ownership of archival data assets and the lack of standardized archival data norms.

3.5. Enhanced Support Mechanisms

For university archive data, implementing appropriate support mechanisms and proactively refining existing data protection frameworks promotes effective data circulation. Dynamic feedback and performance evaluation systems act as corrective safeguards for archive quality, enabling timely interventions at critical processing stages to reduce data handling costs. Data Security Processing and Emergency Mechanisms: Establish robust cybersecurity barriers to support online research and compilation activities. Trigger emergency server network disconnection upon detecting unknown IP attacks, while generating counterattack logs for subsequent review. Additionally, perform at least one full backup monthly and one incremental backup daily, based on the security classification level of the archives.

3.6. Potential Mitigation Strategy

It is recommended to use potential mitigation strategies, such as phased implementation, to better address the practical challenges of overcoming institutional silos and resistance from departments relying on legacy systems. This approach allows for gradual adaptation, minimizes disruptions, and fosters collaboration across departments. By introducing pilot programs in select areas, organizations can gather valuable feedback and refine the strategy before wider deployment. Additionally, incorporating training sessions tailored to different user groups helps alleviate concerns related to legacy system dependencies. Establishing clear communication channels and measurable objectives further ensures alignment with overarching organizational goals. Moreover, fostering collaboration and trust across departments is essential to breaking down these barriers and encouraging the adoption of more integrated archival data systems.

4. Model Scenario Construction for University Archive Systems Based on Data Middleware Platform Technology

Supported by the data processing capabilities of the data middle platform and its positive-feedback operational maintenance, the Digital University Archives Management System-coordinated in advance across technical, institutional, human,

and resource domains—can be progressively applied to the following five university scenario modules: Digital Party Building, Digital Library, Digital Campus Administration, Digital Research, and Digital Resources (Figure 1).

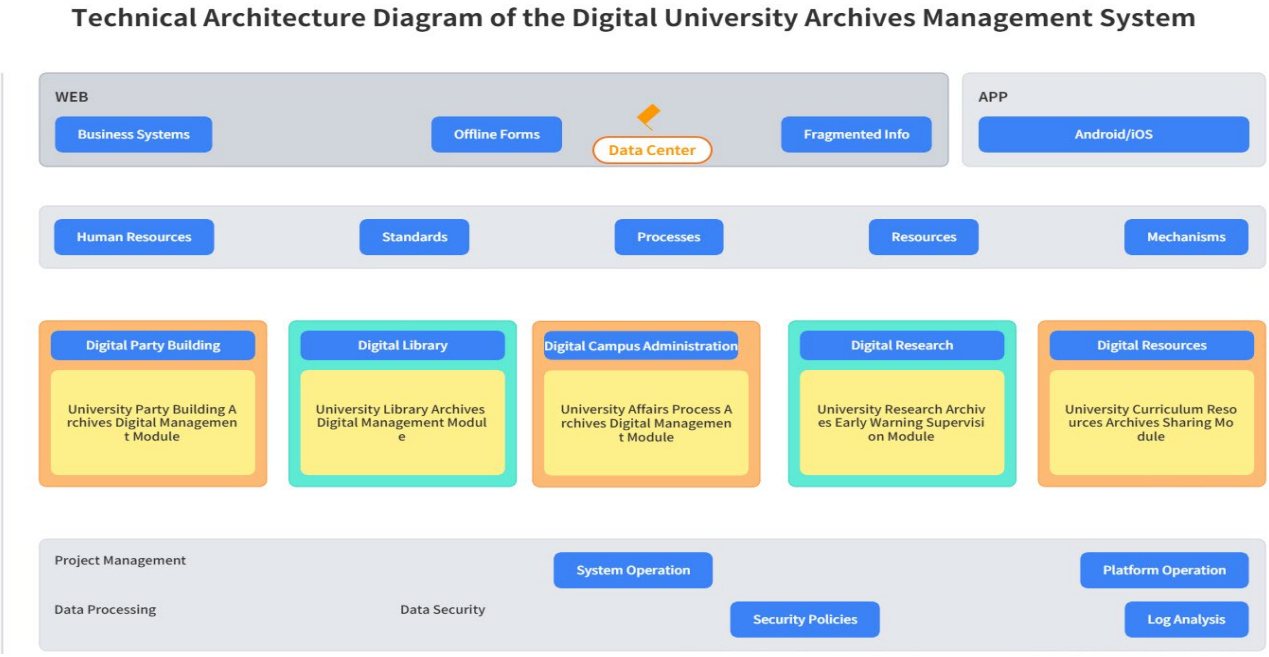


Figure 1. Technical architecture diagram of the digital university archives management system.

4.1. Digital Party Building: Digital Management Module for University Party Building Archives

Using the existing DingTalk Cloud Party Building platform as an example, the university Party building module primarily consists of portal management, activity management, meeting management, Party affairs operations, and learning management. The most prominent component for faculty, staff, and students is portal management, which integrates features such as recommendation management, the latest theoretical learning updates, Party building platforms, ideological and political education classrooms, and campus culture. Digital Party Building mainly establishes Party Committee spaces, General Branch spaces, Branch spaces, personal spaces, dashboard displays, data archiving, and corresponding backend support functions. Therefore, it is essential to establish and refine a comprehensive foundational data standard system for university Party building. This system should comply with big data standards while incorporating university-specific contexts, encompassing a multi-tiered data standardization framework that covers definitions, operations, and applications. It should be divided into foundational standards and application-oriented standards. Building on this foundational data standard system, the principle of "one data source" must be upheld to define rules for data ownership and usage. This will enhance the aggregation of Party-building themed data warehouses, enabling unified operation, maintenance, and sharing of Party-building data. A service mechanism for university

Party-building data sharing should be established to ensure effective aggregation, mutual use, and traceability. Regarding data statistics, collective Party building indices are generated from member scoring data, member development data, Party building activity data, Party building assessment data, and Party building sentiment data. For data analysis, the system supports correlation analysis, early warning analysis, and trend analysis. Universities can independently drag and drop statistical data for relevant analysis, intelligently predict recent trends in key indicators, issue early warnings for intervention, and achieve precise oversight of university Party building data. By pre-setting flexible data indicators, the backend leverages cloud computing and other advanced technologies to enable automatic alerts, proactive reminders, and timely feedback for various Party building tasks. Based on historical data of key indicators, Digital Party Building further establishes a profile database for grassroots Party organizations and members. This enhances the depth and scope of data mining, enabling automatic, precise profiling of grassroots Party organizations and individual members through data analysis, categorized into various personality tags. This repository effectively captures information on all Party members' ideological cognition, work style, competency levels, and Party spirit cultivation. It supports refined talent management models in higher education institutions and enables personalized Party member education and position assignments tailored to different personality tags. Digital Party Building also involves the development and management of a cadre archive database for mid-level and senior leaders, which is divided into a basic information database and a growth archive database. In addition to containing basic information similar to that of Party members, it includes highly confidential assessment data such as off-campus work experience, appointments and removals from positions, professional technical titles, daily performance evaluations, supervision and inspection records, assessment results, and awards and honors.

4.2. Digital Libraries: Digital Management Modules for University Library Archives

With the advancement of information-related high technologies, the daily data throughput of libraries has surged dramatically, while the variety and formats of data have become increasingly diverse. Traditional library operational mechanisms clearly struggle to meet these demands, prompting the emergence of the digital library concept. A digital library is a multimedia-distributed data processing platform that utilizes cutting-edge digital technologies to process and filter various textual and graphic materials (Kostanyan, 2025). For university library archives, a digital library serves as a platform enabling efficient, large-scale data storage and allowing users to access resources quickly via the internet, transcending geographical and temporal constraints. Building upon the digital library infrastructure, the university library archive digital management module redefines its comprehensive functionalities from a data-sharing perspective. These include user access, data management, cataloging, resource retrieval, security operations,

and maintenance. User access can leverage the university's existing unified portal for single sign-on, enabling one-click login for internal network users, while external users undergo secure authentication via VPN devices. Data management primarily involves secondary processing, storage, and referencing of processed data resources for library archives. This entails two key aspects: converting physical archives into maintainable electronic versions and managing the storage, cataloging, and circulation of these digitized records. In compliance with national and university regulations, management also encompasses: maintenance, development, and data backup for library management systems and databases; construction and routine maintenance of database and network resources; development, daily updates, and operation of library web pages and mobile platforms Notably, with advancing data processing plugins, format conversion and adjustment of resource data have become increasingly common. Infringements on digital book archive copyrights-such as copying, modifying, or misappropriating electronic works-have become widespread. Therefore, implementing version control and clearly identifying copyright holders during initial data entry is crucial. Data editing should proceed only after obtaining electronic authorization, with explicit attribution to copyright holders and data entry supervisors. For cataloging and retrieval functions, reference should be made to existing university library cataloging rules, with the addition of keyword search sub-functions during cataloging. The retrieval system enables precise keyword management for electronic book archives, allowing users to locate closely related literature by searching relevant keywords. The module also provides online consultation services and CD-ROM retrieval services to maximize the accuracy of user searches for required data and literature.

4.3. Digital Campus Administration: Higher Education Process Archiving Module

The lack of detailed data organization and subsequent process archiving in university operations has resulted in chaotic electronic signature workflows and conflicts with offline processes. To support the "maximum one-visit" digital reform initiative, strengthen university governance systems and capabilities, complete campus functionalities, and enhance online service efficiency, the implementation of a Higher Education Process Archiving Module is essential. This module must establish seamless data and authentication integration with various business systems, including document management, online authentication, state-owned asset management, digital libraries, Party building systems, data reporting platforms and analytics systems. Interface design should maximize alignment with these systems, initially featuring sections for online service workflows, workflow approval items, total processing duration, campus announcements, weekly schedules, outgoing documents, and incoming documents. For example, in the "Daily Expense Reimbursement Approval" process, users must enter the reservation number, reimbursement amount, upload supporting documents and images, and provide the

reason for reimbursement. After determining whether a co-signature is required and whether physical goods were purchased, the request proceeds to review by the funding department head and financial audit, ultimately closing the loop by returning to the applicant for acknowledgment. Given the complexity of processes across university administrative departments, thorough preliminary research is essential to understand departmental requirements and map data flows. This ensures that electronic workflows genuinely replace manual processes and become reusable. Later stages involve storing data using faculty IDs as tags within the data middle platform. Within the data hub's management storage, similar processes can be grouped through data aggregation and standardized reporting. Backend exports can detail specific metrics such as the number of nodes in operational workflows or approval items, along with precise tracking of total processing hours. This enables process quantification and predictable workload estimation. Data analysis further provides precise workload control support for business departments, assisting university decision-making bodies in understanding the actual volume of external-facing processes and current operational priorities. This facilitates targeted adjustments to business focus and resource allocation. Simultaneously, for university administration, it is essential not only to ensure reliable PC-based operation but also to develop mobile capabilities and integrate with the DingTalk platform to meet the mobile office needs of faculty and staff. Through the DingTalk app on their phones, faculty and staff can directly access the mobile service platform without needing to download separate applications or plugins. This integration simplifies campus approval processes and facilitates access to internal announcements.

4.4. Digital Research: University Research Archive Early Warning and Supervision Module

In accordance with the requirements of the "Research Security" Research Funding Supervision System Data Specification 1.0 (Trial) for Higher Education Institutions, Digital Research has further expanded its system data organization efforts. Building upon the research archive management system, an early warning and supervision module for research archives has been integrated. By interfacing with financial, procurement, and human resources management systems, a digital research data resource pool has been established, enabling seamless data connectivity, interoperability, and sharing. A data supervision platform has been incorporated into the research archive management system, featuring purpose-built early warning models for data analysis and historical comparison. The system refines issue resolution workflows by categorizing and escalating anomalies to the appropriate university departments based on jurisdiction and severity for verification and resolution. This creates a comprehensive research archive management and supervision platform that covers the entire digital research lifecycle. The data consolidation process adheres to the "Four Comprehensives" principle: comprehensive personnel (researchers, administrators, supervisors), comprehensive scope

(individual research projects, research funds, reimbursement vouchers), comprehensive timeline (pre-event, during-event, post-event), and comprehensive elements (data collection, processing, analysis, and early warning). This approach integrates campus research, financial, and procurement data while simultaneously advancing oversight and human resources information sharing. The digital research data repository should include the following foundational data elements: research institutions, project personnel, and specific project information. Specific project information encompasses project budget details, revenue, expenditure, and related data. This repository supports the development of the research archive's early warning and supervision module by identifying oversight requirements, establishing alert rules, continuously enriching the issue requirement list, and building a robust cluster of early warning models. The initial development of early warning models requires identifying causal relationships between university research activities and disciplinary violations. A three-color display system ("red-yellow-blue") can be employed to establish these models. The early warning model list must be customized to the institution's specific circumstances and include data elements such as model name, warning rules, underlying data relationships, and corresponding handling units. Reason: Improved clarity, readability, and technical precision by restructuring sentences, enhancing vocabulary, and correcting grammar and punctuation. The revision ensures consistent tense usage and clearer expression of complex processes while maintaining the original meaning.

To standardize the use of the research archive early warning supervision module, universities should establish a credit information databases for researchers as part of the detailed rules within their research integrity management systems. This database issues three-color warnings to the relevant departments for researchers with violations, providing credit-based evidence to support the approval processes of responsible units. Additionally, refining data-sharing and encryption mechanisms for research archives is essential to ensure the security and integrity of digital research. Refining data sharing and encryption mechanisms for research archives is crucial for digital research. Research archive data should be transmitted to the central repository through the university's DSC big data link system, as mandated by higher-level authorities, and protected by robust encryption methods to ensure secure storage and transmission. This module offers advantages such as auditability, traceability, scalability, and ease of maintenance. It strictly enforces a hierarchical and decentralized management model, limiting users at different levels to specific operational permissions and data access scopes, while allowing flexible adjustments based on the institution's actual needs. The system architecture is designed to support upgrades driven by business changes, providing user interfaces and operational workflows tailored to the preferences of various user types.

4.5. Digital Resources: Course Resource Archive Sharing Module for Higher Education Institutions

The logical design of the course resource archive sharing module can draw inspi-

ration from exemplary models such as the Hangzhou National Version Library. Launched in August 2022, this library integrates functions including book materials, artworks, archival versions, and exhibition promotion. Its primary responsibilities encompass collecting, organizing, preserving, and promoting outstanding version resources from both within and outside the province (Han & Zhou, 2021). In terms of data security, the repository also serves as the off-site disaster recovery backup for the Central Repository and functions as the version archive convergence center for the Jiangnan region. A key functional platform within the Course Resource Archive Sharing Module is the Resource Archive Center. This center provides digital resource archive support for university learners, encompassing diverse resources, multi-terminal courses, multimedia instruction, and personalized learning. Its scope includes talent development plans, course registration, student enrollment, academic record management, student photo management, academic data statistics, and graduation outcome statistics. Course registration processes both curriculum-defined courses (as specified in talent development plans) and non-curriculum courses, enrolling them into the central archive. Building upon course and student registration, academic record management enables the storage and retrieval of student enrollment information within the Resource Archive Center. Student photo management employs batch importing of enrollment and graduation photos for categorized archival storage. Academic record statistics and graduation outcome statistics analyze the center's enrollment and graduation data from various dimensions and levels. Technologically, the module unifies the learning portal and standards framework, providing standardized interfaces for functional integration with diverse digital resource platforms. This facilitates data aggregation and archive consolidation, enabling shared access to archives, resources, and data. Regarding advanced technologies in the module's data platform, research focuses on rule-based personalized recommendation techniques and collaborative filtering-based data analysis technologies. The former employs data mining techniques to record learner profiles, browsing patterns, and keyword-based resource searches, continuously refining predefined rules. This enables the recommendation of matched learning resources based on learner engagement metrics such as focus state and browsing interests, which are then incorporated into the archive data platform's management. Simultaneously, as the archive data platform's rules evolve, it can automatically push personalized learning resources to other similar learners. The latter proactively records learners' engagement metrics through the resource repository, including login duration, effective study time, forum participation, teacher-student interactions, and credit accumulation. By integrating cross-spatial and temporal data into the repository platform and applying collaborative filtering analysis, deeper insights into learner behavior can be obtained (Smallwood, 2022). This approach enables personalized recommendations to enhance online learning experiences and supports decision-making for improving existing digital resource utilization models. In terms of support mechanisms, universities are committed to exploring

diversified, market-oriented models for digital resource archiving and sharing. To further improve archive quality and reduce resource costs, greater emphasis is placed on the open sharing of courses and resources. Premium resources are packaged for market release while maintaining version control and permission backups within the resource archives.

5. Conclusion

Under the background of "big data", the data middle platform relies on its infrastructures to collect foundational data and establish a comprehensive view of the R&D process. As models and processes become more robust and comprehensive, the university archival system model built on the data middleware platform provides new insights and pathways for future university archival governance. This approach leverages data to advance the informatization of university archives, aligning closely with national informatization strategies. By integrating advanced data analytics and AI-driven tools, the Digital University Archives Management System can unlock insights from archival data that were previously inaccessible. This capability not only fosters innovation in academic research but also enables personalized support services tailored to students' needs. For example, by analyzing patterns in student engagement with digital resources, universities can refine their offerings to better align with learning objectives and preferences. Furthermore, streamlined access to comprehensive datasets empowers both faculty and students to explore interdisciplinary connections, driving collaboration and expanding the boundaries of traditional academic inquiry.

Acknowledgements

My thanks to the anonymous reviewers for reading and commenting on the early drafts of this article.

Funding

This work was supported by Zhejiang Open University General Project "Research on the Construction and Operation Mechanism of Inclusive Education Public Service System from the Perspective of Human Capital" [project number XKT2023Y17]; 312 Talent Training Project of Zhejiang Open University; Zhejiang Provincial Education Science Planning Party Building Special (Colleges and Universities) Project "Innovation and Practice of Intelligent Party Building and Network Civic and Political Integration Mode in Colleges & Universities Empowered by Digitization" [project number 2024DJG017]; Zhejiang Provincial Archives Science &Technology Project "Exploring the Construction Path of College Archives Wisdom Service Platform Based on the Threshold of Data Co-construction, Sharing & Integration Development" [project number 2024-51].

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Han, Y. H., & Zhou, F. (2021). The Construction of Theoretical System for Electronic Archives Data Security Governance: Under the Background of the Implementation of the Newly Revised Archives Law and Data Security Law. *Zhejiang Archives, 11,* 44-47.

Kostanyan, K. (2025). Innovative Approaches in Global Education: Developing New Educational Programs Based on Multiple Intelligences and Sensory Integration. *Creative Education, 16,* 1004-1016. https://doi.org/10.4236/ce.2025.167063

Liu, D. (2025). Artificial Intelligence in Archive Management. *Intelligent Information Management, 17,* 103-116. https://doi.org/10.4236/iim.2025.174006

Qiu, K., & Li, D. C. (2022). Research on Countermeasures of University Data Governance Driven by Data Service. *Experimental Science and Technology, 20,* 75-81.

Shonhe, L. (2025). Integration of Artificial Intelligence in Archives and Records Management. In *Advances in Computational Intelligence and Robotics* (pp. 85-126). IGI Global. https://doi.org/10.4018/979-8-3693-9795-4.ch004

Smallwood, E. E. (2022). Impression-Based Advertising: A Cross-Platform Solution. *American Journal of Industrial and Business Management, 12,* 1761-1787. https://doi.org/10.4236/ajibm.2022.1212096

Yang, S., & Zhang, R. T. (2022). Research on the Construction of University Data Middle Platform. *Office Informatization, 27,* 27-29+36.