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DIGITAL LIBRARIES IN THE PERSPECTIVE OF EDUCATION POLICY: COMPARISON OF REGULATORY FRAMEWORKS AND IMPLEMENTATION IN VARIOUS UNIVERSITIES

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ABSTRACT

Digital libraries play a vital role in supporting digital transformation in higher education by expanding access to learning and research resources. Despite the existence of formal policies, universities vary significantly in the effectiveness of digital library implementation. This study analyzes differences in digital library practices across higher education institutions, focusing on regulations, budgets, human resource capacity, and digital literacy, as well as gaps between policy and practice and their implications for information access and academic equity. Using a qualitative comparative case study approach, data were collected through document analysis, in-depth interviews, and direct observation at four universities with differing institutional characteristics. The findings show that comprehensive regulations supported by sufficient budgets and trained personnel lead to more effective and inclusive digital library services. Institutions with limited policies and resources exhibit lower service utilization. Digital literacy emerges as a key driver of effective use, highlighting its importance in reducing information inequality in higher education.

INTRODUCTION

Digital transformation has become a global phenomenon, fundamentally changing how higher education institutions manage, produce, and distribute knowledge.

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Advances in information and communication technology have not only brought new devices and systems, but also encouraged a paradigm shift in academic governance, including in the management of university libraries. Libraries, which previously functioned as centers for physical collections, have now transformed into centers for digital resources that provide access to electronic journals, digital books, international scientific databases, institutional repositories, and online-based information services. Scopus-indexed international studies show that the existence of digital libraries significantly increases research productivity, scientific publication quality, and cross-institutional academic collaboration (Borgman, 2018; Tenopir et al., 2020).

This change is reinforced by global higher education policy demands that emphasize *open access to* information, *open science*, and accountability and visibility of research results. UNESCO (2021) emphasizes that access to digital scientific resources is a key prerequisite for creating an inclusive and sustainable higher education system. In this context, digital libraries are no longer seen as mere support units but as strategic elements within the university's academic ecosystem. Universities that fail to develop and manage digital libraries effectively risk falling behind in global academic competition, which is increasingly based on the speed of information access and knowledge production capacity.

In Indonesia, the phenomenon of digital library transformation is also occurring in line with various national policies in higher education. The Merdeka Belajar–Kampus Merdeka (Freedom of Learning–Independent Campus) policy, the obligation for lecturers and students to publish scientific papers, and the performance-based higher education accreditation system are encouraging universities to strengthen their digital infrastructure, including library services. Many universities have developed digital library systems, subscribed to international scientific databases, and built institutional repositories to disseminate the scientific work of the academic community. Formally, this development demonstrates higher education institutions' commitment to supporting digital transformation and improving academic quality.

However, empirical findings indicate that the development of digital libraries in Indonesian universities has not yet yielded optimal results. Research conducted at several universities shows significant variation in the use of digital libraries by students and lecturers. Although the infrastructure and systems are in place, use intensity is often low or fluctuates, influenced by factors such as information literacy, collection relevance, ease of access, and an academic culture that is not yet fully digital

(Setiawan & Nurhayati, 2021). This condition indicates that the main problem lies not only in the availability of technology but also in policy and institutional governance.

Furthermore, there are strong indications of a gap between the regulatory framework for digital libraries and actual implementation at the operational level. Most universities already have policy documents, management guidelines, and institutional regulations related to digital libraries. However, these regulations are often normative and have not been effectively translated into measurable, sustainable implementation strategies. A study by Abdullah et al. (2019) shows that many digital library policies in developing countries are designed to meet administrative and accreditation requirements, but are not accompanied by adequate mechanisms for evaluation, supervision, and human resource capacity building.

The gap between policy and practice becomes even more problematic when linked to demands for improved research quality and scientific publications. Institutional repositories, which should be the primary instruments for disseminating knowledge and enhancing universities' academic visibility, are often not optimally integrated with research and publication policies. As a result, the potential of digital libraries as drivers of an open and collaborative research ecosystem has not been fully realized. This situation has the potential to widen the gap in academic quality between universities, both nationally and internationally.

A review of previous studies shows that research on digital libraries tends to be fragmented. Most studies focus on technical aspects of systems and technology, such as software quality, *usability*, and system security (Zhang et al., 2018). Other studies emphasize user satisfaction and perceptions of digital library services, highlighting the role of information literacy and user experience (Tenopir et al., 2020). Although these approaches make important contributions, they generally do not examine in depth the relationship between institutional policy and the implementation of digital libraries.

Studies that focus primarily on policy and governance aspects are still relatively limited, especially in the context of higher education in Indonesia. Several SINTA 1 and 2 studies have begun to address the importance of leadership and library management, but few have conducted comparative analyses across institutions to identify how differences in regulatory frameworks affect the successful implementation of digital libraries. Thus, there remains a gap in the literature that warrants a more in-depth and systematic study.

Based on these conditions, this study is novel in that it focuses on a comparative

analysis of the regulatory framework and the implementation of digital libraries. By comparing policies and practices at several universities with different characteristics, this study aims to identify the institutional factors that determine the effectiveness of digital library implementation. This approach not only contributes to the development of academic literature on governance-based digital libraries but also provides practical implications for policymakers in higher education in designing regulations that are more operational, adaptive, and have a real impact on improving academic quality.

Literature Review

The Evolution and Function of Digital Libraries

Digital libraries have undergone significant transformation since their inception, evolving from mere repositories of digital collections into dynamic platforms that support higher education activities. In their early stages, digital libraries primarily served as physical substitutes, providing online access to books and journals that were previously only available in print. Over time, digital libraries have not only provided access to a wider collection but also served as information service centers that support scientific collaboration and educational innovation.

According to Widiyanto (2023), in a bibliometric study, there has been a significant increase in publications on digital libraries in higher education, with topics ranging from technical and policy aspects to *open access* and big data. This transformation shows that digital libraries no longer function merely as places to store collections, but also as strategic instruments that support information literacy, academic collaboration, and democratic access to knowledge. This function is increasingly important in the era of globalization, which drives the need for more open and efficient knowledge sharing.

Digital libraries focused on higher education, as reflected in various related studies, provide access to students, researchers, and academics to explore large databases, conduct cross-country research, and collaborate on scientific projects. This concept is reinforced by technologies such as *cloud computing*, which allows for more flexible storage and access to information. Thus, digital libraries support a more interactive and data-driven teaching and learning process. In addition, digital libraries enable integration with other campus systems, such as learning management systems (LMS) and scientific publishing platforms.

In addition, major developments in information technology have also influenced the transformation of digital library functions. Previously, collections in digital

libraries were limited to text and static images. However, with advances in multimedia technology, digital libraries can now store and present content in the form of video, audio, and big data, further enriching information services in higher education institutions.

Challenges and Determining Factors in the Transformation of Digital Libraries

The process of transforming libraries into digital libraries faces several challenges that must be overcome for implementation to be effective and sustainable. **Infrastructure** is a major challenge, especially in developing countries. Procuring adequate hardware, maintaining network systems, and ensuring reliable storage systems often require large budgets. This is an obstacle for many universities with limited financial resources.

In addition, metadata management and data quality are important issues that cannot be ignored. In the digital library ecosystem, consistent, high-quality metadata management is essential to ensure easy, relevant access to information for users. Digital libraries must ensure that the data they manage is well-structured and can be quickly found through search.

Digital literacy is also a key factor in the success of transformation. Not only do librarians need to master the technical skills to manage digital collections, but users also need to understand how to access, evaluate, and use digital information effectively. Without adequate digital literacy, both librarians and users will find it difficult to make optimal use of digital library systems. A study conducted by Sari et al. (2021) shows that low digital literacy among students and lecturers can hinder the maximum utilization of digital libraries.

In addition to technical and human resource challenges, organizational culture and **structural** changes in higher education institutions pose another major obstacle. The shift in librarians' work from traditional tasks to more technology-based ones requires ongoing training and support. In addition, policies that support digital transformation at the institutional and national levels greatly influence the success of digital libraries. Without clear and coordinated policies, digital libraries can become stuck in suboptimal implementation.

Digital Library Policy and Governance Models

Governance and appropriate policies play a crucial role in ensuring the success of digital library transformation. Good governance includes clear arrangements for who is responsible for managing the digital library, how decisions are made, and how

evaluation and improvement are implemented on an ongoing basis. According to Kassim (2022), the success of digital libraries in higher education institutions depends heavily on collaboration among stakeholders, including librarians, IT managers, academics, and other relevant parties.

A study by Prasetya (2022) shows that digital library policy models must align with national policies that support *open access* and scientific collaboration. This is important because universities do not operate in a vacuum and are closely linked to national-level education and research policies. Therefore, digital libraries must be integrated with national policies on open research and access to information.

In addition, data access rights and security policies are major focuses in digital library governance. According to Borgman (2018), data security and privacy issues are often a major concern in digital collection management, especially when the data includes sensitive or personal information. Clear policies on information access rights must be established to ensure that only authorized individuals can access certain materials.

Digital library governance also requires attention to user experience aspects. User interfaces and authentication mechanisms are important parts of policies that affect user accessibility and convenience. A study comparing login interfaces across international university digital libraries found that simple, accessible interface designs strongly influence the level of digital service use. This study also emphasizes the importance of policies that ensure interface design and authentication systems reflect institutional priorities regarding accessibility and user experience.

It is also important to pay attention to metadata management and interoperability standards. Without consistent metadata management standards, information in digital libraries will be difficult for users to find and use. Policies related to metadata standards implemented across institutions must support interoperability among systems, enabling collaboration and resource sharing among different digital libraries.

In the context of implementation, this study proposes a comparative policy approach to examine how regulations across universities affect the effectiveness of digital libraries. By conducting case studies on institutions with different characteristics, in terms of size, location, and level of technology adoption, we can identify key factors that influence the successful implementation of digital libraries.

METHOD

This study uses a qualitative approach with a multiple case study design (comparative case study) that aims to explore the implementation of digital libraries in higher education institutions with different characteristics. Through this design, the study will compare digital libraries across public and private higher education institutions, large and small, and across institutions that have implemented them. The main focus of the research is to understand how institutional-level digital library policies are implemented and the extent to which they relate to operational practices in the field. This case study allows researchers to explore in depth how various factors, such as internal policies, technical infrastructure, and organizational culture, influence the success or failure of digital library implementation.

The main object of research is digital libraries in higher education institutions, focusing on two aspects: regulation and the operational implementation of existing policies. This study focuses on how policies established by each higher education institution are implemented in practice, as well as the extent to which various factors, such as internal policies, technical infrastructure, and organizational culture, influence the successful implementation of digital libraries. The research subjects include four to five universities with different characteristics, such as public and private universities, large and small universities, and universities that have adopted digital library technology for varying lengths of time. The selection of institutions was conducted using purposive sampling, namely by selecting universities that have implemented digital libraries in their official policies and that have internal policies and access that allow for interviews and observations. Selecting institutions with these various characteristics enables the study to identify similarities and differences in implementation and the challenges faced by each institution.

The data collection process in this study used three main techniques: document analysis, in-depth interviews, and direct observation. Each of these data collection techniques helped explore information from various perspectives and enhance the reliability and validity of the research findings.

The data collected through document analysis, interviews, and observations will be analyzed using qualitative analysis methods. In this data analysis, researchers will conduct documentary content analysis to identify policy objectives, policy scope, and regulatory components contained in policy documents.

Furthermore, the researcher will conduct a comparative evaluation between the formal regulations listed in the documents and the operational practices observed in the field. This comparative evaluation aims to assess the alignment between the policies documented in the documents and their implementation across institutions. The researcher will also identify gaps between the expected policies and actual practices, as well as supporting factors or obstacles that influence implementation.

To improve the reliability and validity of the findings, this study will employ data triangulation. Triangulation is carried out by comparing and confirming findings obtained from documents, interviews, and observations. By using a triangulation approach, researchers can reduce potential bias and ensure findings are more consistent and accountable. In addition, triangulation helps deepen understanding of the context and institutional dynamics that cannot be reached through other methods.

RESULT AND DISCUSSIONS

Variations in Regulatory Frameworks and Policy Schemes

Formal regulations regarding digital libraries in higher education institutions play a key role in determining the success or failure of implementing this technology. Based on findings from the institutions studied, there is significant variation in regulations. Institutions with comprehensive regulations—such as Institutions A and B—have a broader scope, including digital collection management, access rights, digital preservation, remote services, and metadata. This shows that comprehensive regulations cover not only the procurement of technology or collections, but also how these collections can be accessed and used effectively by the entire academic community.

In this case, open access and digital curation policies are part of regulations that not only support information accessibility but also ensure that digital collections remain relevant and well-maintained. For example, several universities abroad, such as Harvard University and the University of California, have implemented very detailed policies on open access and digital preservation to support broader research objectives (Borgman, 2018). Research by Widiyanto et al. (2023) shows that universities with clear, structured regulations can improve global access to information for students and researchers, thereby enhancing the quality of research and scientific publications.

However, not all universities show the same level of commitment. At Institutions C and D, regulations are limited to digitization of theses/dissertations and institutional repositories, with no provisions regarding remote access or commercial e-resources. These limited regulations indicate that the policy has not yet fully adopted a more holistic approach. There is no specific unit responsible for managing the digital library, so there is no adequate oversight of the quality of services provided.

Several studies show that without robust policies, the development of digital libraries is often limited to the procurement of technology without a well-defined management plan, leading to irregular implementation (Kassim, 2022). Research by Prasetya (2022) also shows that without clear policies and adequate funding, many digital libraries in higher education institutions fail to realize their potential to provide universal access to users fully.

Supporting Factors for Implementation: Human Resources, Budget, and Leadership

The effective implementation of digital libraries depends not only on regulations but also on supporting factors such as human resources, budget, and leadership. Institutions A and B, which have effective implementations, demonstrate a strong commitment from university leaders to support this transformation. Active leadership in supporting digitization policies enables sufficient budget allocation for the procurement of e-resource licenses, librarian training, and the integration of digital libraries into various academic processes, such as curriculum and research.

This strong leadership is reflected in institutional strategies that include the use of digital libraries to support academic collaboration and open access. An adequate budget is essential for purchasing the e-resources needed to support learning and research. Borgman's (2018) research states that proper budget allocation is a key factor in the success of digital transformation in higher education. Training librarians is also very important, as trained librarians can help users make optimal use of digital library services.

However, institutions C and D face limited budgets and a lack of trained human resources. Librarians at both institutions do not yet have sufficient digital competencies, and there are no specific units handling library digitization. As a result, digital services at these institutions are often underutilized. These findings are consistent with national research showing that limited human resources and

budgets are two major obstacles faced by universities in implementing digital transformation in libraries (Setiawan & Nurhayati, 2021).

Digital Literacy and Institutional Culture as Catalytic Factors

Digital literacy and institutional culture play an important role in accelerating the adoption and utilization of digital libraries. At Institutions A and B, information literacy and digital literacy programs for students and faculty have been successfully implemented. These programs include training on the use of e-resources, repository tutorials, and open-access campaigns. This has led to a significant increase in the use of digital services, which in turn supports the transformation of digital libraries from mere repositories to centers of learning and research.

With technological developments, universities are now required to integrate digital literacy into their curricula better. A study by Tenopir et al. (2020) found that effective user training can improve information literacy skills and enable students to better how to use digital libraries in their academic activities. Without digital literacy, even with a good digital library system, access to information will not be optimally utilized. At Institutions C and D, limited digital literacy has led students and lecturers to prefer physical collections or to seek resources from external sources, even though digital services are available.

The Gap between Regulation and Practice → Implications for Access, Inclusion, and Academic Fairness

One of the most significant findings in this study is the gap between regulations and practices that can have implications for access, inclusion, and academic fairness. Although many universities have policies that support digital libraries, in reality, there are still significant differences in the implementation of existing regulations. Institutions A and B, which have more comprehensive regulations, provide broader access to students and lecturers to global collections, international journals, institutional repositories, and various research services. This increases opportunities to access broader scientific knowledge, which is very important in supporting research and learning in higher education.

On the other hand, Institutions C and D, which have limited regulations and weak implementation, only provide limited access, even to basic digital collections. This gap has implications for unequal access to scientific information, which in turn can create academic inequality. Previous research shows that open access to scientific information can expand academic opportunities, but uneven

implementation prevents this potential from being fully realized (Borgman, 2018; Widiyanto, 2023).

Criticism of the Current Implementation Model

Although many universities have adopted digital libraries, the existing implementation models still have many shortcomings. Many institutions adopt digital libraries with an overly technical approach, focusing only on digital collections and digitization without considering other aspects such as governance, user training, and service sustainability. In addition, digital services are often provided passively, without active promotion or integration with the curriculum and research, leading to low utilization.

Existing regulatory policies are often too general, allowing broad interpretation. This causes a gap between policy and practice in the field. Research by Prasetya (2022) shows that without clear standards for what should be included in digital library policy, many institutions fail to meet user expectations for access and the quality of digital services.

CONCLUSIONS

This study reveals that although many universities have formal regulations regarding digital libraries, the successful implementation of effective and inclusive digital services depends heavily on factors such as policy coverage, budget allocation, human resource capacity, digital literacy, and institutional commitment. Some universities, such as Institutions A and B, have more comprehensive regulations that cover key areas, including digital collections, remote services, metadata, digital preservation, and digital literacy. This shows that policies that not only regulate the procurement of digital collections but also govern access, use, and maintenance of these collections can result in more effective and inclusive digital services. On the other hand, some institutions, such as Institutions C and D, which have limited policies covering only the management of thesis digitization and institutional repositories, without regulations on remote access or commercial e-resources, show that narrow regulations are insufficient to encourage comprehensive implementation.

In addition, the implementation of digital libraries also depends heavily on the commitment of university leaders and the allocation of adequate resources. Institutions A and B, which demonstrated strong implementation, had strong

leadership commitment, reflected in budget allocations for the purchase of e-resources, librarian training, and the development of technological infrastructure. This shows that proactive leadership is crucial in ensuring that digital library services are not only formally available but also accessible and usable by the entire academic community. Conversely, institutions C and D face budget constraints, a shortage of trained human resources, and the absence of a dedicated unit to manage the digital library, resulting in the implementation of digital services being stuck at the declarative stage without effective management.

This study also revealed that digital literacy is a major factor driving the successful utilization of digital library services. Institutions A and B have comprehensive information literacy and digital literacy programs for students, lecturers, and librarians. These programs include training on e-resources, repository tutorials, and open-access campaigns that help improve users' understanding and skills in accessing and using digital services. These programs have been proven to increase the use of digital services, which, in turn, supports the transformation of digital libraries from mere repositories into active learning and research centers. On the other hand, at Institutions C and D, the lack of digital literacy has led students and lecturers to prefer physical collections or external resources, even though digital services are available. These findings indicate that digital literacy is a crucial catalyst for ensuring that digital libraries are accessible and utilized to their fullest potential.

However, even though many universities have adopted digital library regulations, these findings show a significant gap between regulations and practices in the implementation of digital services. Institutions with more comprehensive policies and good implementation, such as Institutions A and B, provide broader access to students and lecturers to global collections, international journals, institutional repositories, and research services. This shows that broader access to information provides greater academic opportunities for the academic community. Conversely, at Institutions C and D, limited access to even basic collections leads to inequality in academic and research opportunities, creating a gap in access to scientific knowledge. Thus, these findings emphasize the importance of consistent and equitable implementation so that digital libraries can play a significant role in democratizing access to information and academic equality.

Criticism of the current implementation model shows that many universities focus only on technical aspects and the digitization of collections, without considering governance, user training, and sustainability. Most available digital services are passive and not actively integrated into the learning or research process, resulting in low utilization rates. Therefore, universities must develop more holistic and integrated policies that not only address technology procurement but also good management, continuous training, and regular evaluation of the implementation of digital library services. With the right strategic steps, digital libraries can be effective instruments in expanding access to information, supporting research, and encouraging academic innovation in universities.

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