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National Repository Infrastructure and Open Access Challenges: The Croatian Perspective[1]

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Abstract

Repositories are one of the key infrastructure components in achieving the goals of open science. In response to legal obligations, emerging trends, and challenges in open science, several Croatian institutions jointly established a national digital repository infrastructure in 2015 – the DABAR system (Digital Academic Archives and Repositories). Its purpose is to provide a unified space for storing, preserving, and ensuring open access to the scholarly output of scientists and institutions within the Croatian science and higher education system.

After nearly a decade of operation, it is crucial to assess the role of this infrastructure today and evaluate whether it has successfully embodied the core principles of open science – openness, transparency, and visibility of scientific and Croatian scholarly output. This paper presents the Croatian national repository infrastructure as a case study, offering insights for comparison with similar national infrastructures.

The study employs a quantitative research approach, divided into two parts to provide a comprehensive overview of the current state and future development of repositories in Croatia. The first part analyses quantitative data and repository statistics. The DABAR infrastructure currently comprises 182 repositories and hosts over 249,000 digital objects, yet only slightly

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more than 50% of them are openly accessible. To investigate the reasons behind the high percentage of restricted or closed-access objects, a survey was conducted among institutions that primarily deposit such items.
The findings of this research contribute to a broader discussion on open science practices and repository management at both European and international levels. The results will serve as a foundation for further improvements to the infrastructure, the promotion of open science principles, and the development of systematic support mechanisms to encourage greater accessibility and transparency in scholarly communication.

Keywords: DABAR system; national repository infrastructure; open access challenges; open science; research visibility

1. Introduction

In the academic environment, where educational, professional, and scientific content form the foundation of higher education and research institutions, unrestricted, free and open access (OA) to these resources is both essential and necessary. To enhance scientific communication and address the challenges of open science, the establishment of repositories has been strongly encouraged. Institutional repositories, as part of the open science infrastructure, serve as platforms for storing publications, research data, and other outputs of scientific research, as well as the overall work of higher education and research institutions.

Repositories are considered a core component of the green OA model, providing researchers an essential platform to archive and disseminate their scientific and scholarly outputs independently of traditional publishing channels. Most global strategic documents related to OA highlight repositories as a key element in achieving openness in science.

The Budapest Open Access Initiative (BOAI), launched in 2002, was the first major global initiative advocating for unrestricted and free online access to scientific information, particularly scholarly articles. This groundbreaking movement emphasized two primary approaches for achieving OA. The first, known as the gold route, involves publishing research directly in OA journals. The second approach – the green route, recommends self-archiving,

whereby researchers deposit and publicly share their work through digital archives or repositories (Budapest Open Access Initiative [BOAI], 2017).

Based on the BOAI, many other initiatives with similar goals and aspirations have emerged. As early as 2003, the Bethesda Statement on Open Access Publishing and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities were adopted. Both documents reinforced and expanded the principles outlined in the BOAI, highlighting the critical role of repositories. According to these statements, repositories should be maintained and supported by academic institutions, scientific associations, government agencies, or other established organizations dedicated to advancing OA (Max Planck Society, 2003; Suber, 2003).

In addition to the declarations and strategic documents at the European, global, national, and institutional levels, numerous initiatives and international organizations actively support the development of repositories as a key mechanism for achieving OA.

The Confederation of Open Access Repositories (COAR) is an international association founded in 2009 specifically dedicated to connecting individual repositories and repository networks (such as aggregators) with the aim of strengthening their capacity, aligning policies and practices, and representing the repository community on a global scale. It currently has over 150 members worldwide (COAR, n.d). The Registry of Open Access Repositories (ROAR) is a registry that tracks open repositories worldwide and promotes their visibility. It is part of the EPrints.org network, hosted at the University of Southampton, United Kingdom (Registry of Open Access Repositories [ROAR], 2025). OpenDOAR is a global directory of OA repositories that tracks and promotes their visibility worldwide. It provides a comprehensive list of open repositories, offering valuable data and insights for researchers and institutions. OpenDOAR is managed by SHERPA, a service provided by the University of Nottingham and Lund University (OpenDOAR, 2017).

Plan S is an initiative that mandates all scholarly articles funded by public sources to be openly accessible. This includes the requirement to deposit publications in open repositories without embargo. cOAlition S, a group of research funders, supports this initiative and aims to accelerate the transition to OA by ensuring that publicly funded research is freely available to all (cOAlition S, 2018). The Open Access Infrastructure for Research in Europe

(OpenAIRE), in its strategic priorities (2023), emphasizes the necessity of modernizing repositories and other publication infrastructures to meet the evolving expectations of researchers.

While repositories have played a significant role in promoting open science, challenges remain, particularly regarding the extent to which research outputs are made openly available.

This paper examines the development and role of Croatia's national repository infrastructure, assessing whether it has successfully fulfilled the principles of open science, especially openess of scholarly work. Furthermore, it explores the reasons why a significant portion of research outputs in repositories remains restricted or closed. By addressing these questions, this research provides a case study that may serve as a reference for other national repository infrastructures while contributing to broader discussions on open science policies, repository management, and potential reforms to enhance the accessibility and impact of scientific knowledge in Croatia, as well as at the European and international level.

2. Croatian National Repositories Infrastructure

Although certain institutional repositories in Croatia had existed for many years due to the initiative and enthusiasm of individuals, as well as the support of their higher education and research institutions, the national infrastructure was established in 2015.

Digital Academic Archives and Repositories (DABAR) is the national infrastructure for digital repositories in Croatia. It was developed by the University Computing Centre (SRCE) in collaboration with the National and University Library in Zagreb (NSK) and other higher education and research institutions (Ruđer Bošković Institute, Faculty of Humanities and Social Sciences and School of Medicine, both from University of Zagreb, and others). There are also the following working groups (WGs) composed of members from various higher education and research institutions in Croatia: WG for Master's Theses,[2] WG for the Description of Scientific Papers, Controlled Vocabularies, and Identifiers, WG for the Description of Image, Audio, and Video Materials, Controlled Vocabularies, and Identifiers, WG for Interoperability,

WG for Repository Policies Related to the Long-Term Preservation of Digital Materials, WG for User Functionalities, WG for Copyright, WG for Education and Support, WG for Data Sets, and WG for Educational Content (*Digital Academic Archives and Repositories*, 2021b).

Additionally, there is a Coordinating Committee, responsible for discussing and proposing development goals, tasks, and activities related to the development and maintenance of the DABAR system, including their content, scope, and expected implementation deadlines; proposing activities and work plans, including annual development plans for the DABAR system; and actively taking measures to ensure that plans are achieved and deadlines are met (*Digital Academic Archives and Repositories*, 2021a).

The DABAR infrastructure was primarily developed in response to a legal obligation. Since July 2013, the Republic of Croatia has enforced the Act on Amendments to the Act on Scientific Activity and Higher Education, which mandates that higher education institutions must permanently publish and store theses and dissertations in a publicly accessible online database of their home institution and NSK. DABAR enables higher education and research institutions, and libraries to store, manage, and disseminate all research outputs of an institution, such as theses and dissertations, scientific articles, proceedings, research data, and other scholarly materials. Aligned with international open science standards, it enhances the accessibility and visibility of academic and scientific work in Croatia while ensuring data interoperability and exchange.

Within the DABAR infrastructure, a system for tracking access statistics for all types of objects has been implemented. Additionally, national repositories monitor access through Google Analytics (Holub & Jertec, 2018). Great care is taken to enhance the visibility and promotion of repositories and their objects not only at the local but also at the international level, by participating in relevant global initiatives and services such as OpenDOAR, OpenAIRE, Research Data Alliance Europe (RDA), and the Catalogue of Data Repositories Re3data. Additionally, DABAR recommends the application of FAIR principles (Findable, Accessible, Interoperable, Reusable).

Two key national repositories are established – the Croatian Digital Theses Repository (ZIR) and the Croatian Digital Dissertations Repository (DR). ZIR was established at NSK in collaboration with SRCE in the summer of 2015.

It ensures the permanent storage and public accessibility of undergraduate and graduate theses defended at higher education institutions across Croatia, enhancing their visibility and availability. Later that year, DR was launched to provide long-term preservation and OA to dissertations and scientific master's theses. By aggregating content from all institutional repositories, DR serves as a centralized system for accessing advanced research outputs, supporting the dissemination and discoverability of scientific work in Croatia.

Currently, there are 182 repositories registered in DABAR, six aggregated repositories, including the two previously mentioned national repositories and four university repositories, and 176 institutional repositories (owned by public and private higher education institutions and departments, various institutes, libraries etc.). Most of these repositories are actively maintained, while some have only recently been established or have remained inactive for a certain period – either due to irregular deposition of objects or because they contain only a few (test) objects. Most repository administrators are also library staff from the institution. In the DABAR system, the storage process follows a bottom-up approach: objects are first deposited in institutional repositories, then aggregated in university repositories if the institution is part of a university, and finally, in the national repository in the case of theses and dissertations. This variability in activity highlights the dynamic nature of repositories and the differing levels of engagement across institutions.

Since 2021, DABAR implemented the central search so users can search all digital objects stored in any repository in DABAR in one place and download object files from the original repository.

Changes in the legislative framework could significantly impact the practice of publishing theses and dissertations in Croatia. According to the Act on Scientific Activity and Higher Education (Narodne novine, 2022), higher education institutions are required to publish theses and dissertations in the national repository or their own institutional repository. Furthermore, the WIPO (2021) explicitly states that a student cannot object to making their final thesis, created during any study at a higher education institution, publicly available in the online database of the higher education institution's library and/or the public online database of final theses at NSK. Unfortunately, there is still no mandatory requirement for the deposit of other scientific outputs of Croatian higher education and research institutions in OA on national level.

3. Previous Research

Institutional repositories emerged in the mid-1990s as essential components of scholarly communication infrastructure. Lynch (2003) emphasized their transformative potential for higher education institutions and scientific communities, identifying them as key tools for achieving various academic and societal goals.

Asadi et al. (2019), through a systematic review of literature from 2007 to 2018, observed that most of the research studies were concentrated on deployment and implementation challenges, with limited awareness of OA and inadequate technological infrastructure repeatedly cited as barriers. Despite extensive studies on repository growth, a clear understanding of how institutional characteristics shape access status remains incomplete.

Further reinforcing the need for a holistic approach, Schöpfel and Prost (2013) observed that while institutional repositories offer new opportunities for disseminating scientific information, their effectiveness is often hampered by inconsistent content policies, low levels of researcher participation, technical challenges, and variability in the quality of deposited materials. Their study underlines that successful repository development requires not only technological solutions but also strategic institutional engagement and content standardization.

Existing studies suggest that repository access policies are strongly influenced by institutional profiles – type of institution and scientific discipline. Taubert et al. (2024) demonstrated that in Germany, the disciplinary orientation of universities, whether predominantly STEM or SSH, was a major determinant of OA repository uptake. Recent findings by Hadad and Aharony (2023) further emphasized disciplinary differences in self-archiving practices, showing that STEM researchers predominantly deposit pre-/post-print versions in subject-based repositories due to disciplinary norms and funding mandates, while SSH researchers tend to share links to published articles via academic social networks, often without full awareness of copyright restrictions.

Similarly, Baro and Nwabueze-Echedom (2022) highlighted that in English-speaking African universities, repositories were primarily shaped by available resources, institutional policies, and technical capabilities, with a focus on theses and dissertations. While these findings provide valuable insights

into the importance of disciplinary and resource-based factors, less is known about how national repository infrastructures, like Croatia's DABAR system, mediate these institutional differences. Gudelj et al. (2022) found significant variations in the accessibility of master's theses among SEA-EU Alliance universities, revealing that even within structured alliances, mandatory deposit policies were inconsistently applied. This suggests that national or alliance-level frameworks do not uniformly guarantee OA, raising questions about the effectiveness of broader repository mandates.

In Croatia, Holub and Jertec (2018) documented how the DABAR infrastructure provides automated workflows and interoperability, theoretically simplifying deposit and increasing OA potential. However, Čadovska and Milovanović (2019) revealed that many Croatian higher education institutions lacked the necessary documentation to support public deposit, indicating that institutional readiness was insufficient despite national infrastructure being in place. This highlights that while repository systems can enable OA, institutional characteristics such as policy completeness and administrative support critically determine actual access status. The findings should be interpreted with caution, as significant time has passed since the original research was conducted and its findings may no longer fully reflect the current institutional landscape.

The relationship between self-archiving options, institutional policies, and OA transitions has been a focal point of multiple studies. Recent comparative research by Roy et al. (2023) offers further insight into the challenges surrounding institutional OA self-archiving policies. Their analysis of 66 repositories listed in OpenDOAR, ROAR, and ROARMAP revealed significant deficiencies in key policy areas, including copyright and licensing, embargo management, access policies, and multilingual user interface development. The study found that most institutional repositories failed to clearly define copyright ownership, did not specify re-use licenses, and often tolerated embargo periods that undermined the principles of immediate OA. Moreover, policies concerning non-textual content and non-English resources were largely absent. Based on these findings, the authors advocate for the adoption of institute-specific policy frameworks aligned with best practice recommendations, emphasizing the necessity of comprehensive rights management, minimized embargo periods, and active promotion of repository use through clear self-archiving mandates. Their conclusions further underline the idea

that technical infrastructure alone is insufficient; well-developed, transparent, and supportive institutional policies are essential for achieving true OA.

Further, the effectiveness of institutional policies in promoting self-archiving appears uneven. Asadi et al. (2019) highlighted that without strong institutional commitment and user education, self-archiving remains underutilized. These findings collectively suggest that even where technical solutions are in place, institutional policies must be clear, enforceable, and accompanied by education and support mechanisms to foster genuine open access transitions.

Building on the importance of infrastructure and content management, Zhou et al. (2025) demonstrated that the quality of information, robust technological infrastructure, and repository usability are key factors shaping positive user perceptions of OA repositories. Their findings emphasize that beyond technical availability, ensuring high content quality and intuitive platform design are critical for fostering trust, satisfaction, and willingness to use OA repositories in academic research. However, as Turk et al. (2024) noted, despite robust repository development, the adoption of OA for certain object types remains limited, suggesting that technical capabilities alone are insufficient without supportive institutional incentives or mandates.

A significant body of research has also explored why repositories maintain closed or restricted access despite OA policies. Tmava (2022) found that faculty perceptions (including fears of plagiarism, concerns over copyright, unfamiliarity with repository goals, and doubts about repository prestige) act as strong deterrents to open participation. Baro and Nwabueze-Echedom (2022) similarly pointed to copyright restrictions and the absence of repository policies as major barriers in African universities, suggesting that legal and perceptual obstacles are not confined to resource-limited contexts but are structural issues across different regions. Similar findings were reported by Kakai (2021), who demonstrated that low open access levels in university repositories in Kenya, Tanzania, and Uganda were primarily caused by the absence of institutional policies, reliance on mediated rather than self-archiving practices, and limited researcher engagement, despite general support for OA principles.

Milovanović and Matijević (2023) demonstrated that at the University of Zagreb, objects with restricted access often had higher view-to-download ratios than openly available ones, challenging assumptions that OA

automatically increases usage. This finding indicates that repository visibility and accessibility involve complex user behaviour, further complicated by access restrictions. Stubičan Ladešić et al. (2022) provided additional evidence of societal demand for OA by documenting high user interest in unavailable theses, particularly among non-academic users. This highlights a broader public need for accessible academic content, underscoring the societal cost of maintaining restricted access.

While substantial progress has been made in understanding repository development, adoption patterns, and barriers to OA, critical gaps remain regarding the influence of institutional characteristics, the real-world effects of self-archiving policies, and the complex motivations behind maintaining closed or restricted access. These insights formed the basis for the development of the research questions and methodological approach that will be presented in the following sections.

4. Research on DABAR System

The research was conducted in the first half of 2024, with quantitative data collected until May 27, 2024, from official DABAR system analytics – https://dabar.srce.hr/reports/. All data processing, calculations, and visualizations were performed using Microsoft Excel within the Microsoft 365 business cloud environment. At that time, the DABAR system contained 262,073 digital objects, including theses and dissertations, journal articles, conference papers and presentations, books and book chapters, research data, data management plans (DMPs), educational resources, audio, video, images, and virtual collections.[3]

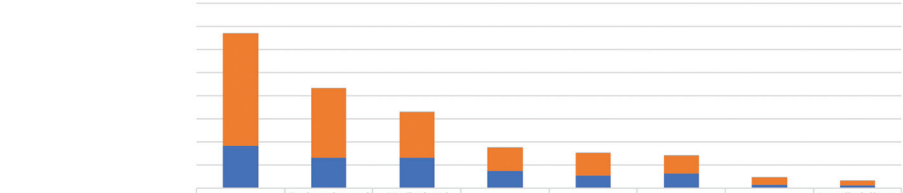
There are five types of access defined for stored objects in the DABAR system – Open Access (OA), Embargo, Restricted Access, Institutional Access, and Closed Access. Regardless of access type, the metadata is publicly available from the moment of deposit. OA allows unrestricted public availability of the full text. Embargo means that the full text remains inaccessible until a predetermined period expires. After a maximum of two years, all objects under Embargo are automatically made available in OA. Restricted Access provides full-text access only to users within the Croatian higher education and research system, and Institutional Access limits full-text availability to

staff and students of the institution that deposited the work. Closed Access means that the full text is entirely inaccessible to users. Of all the objects, only 51% were in OA at the time of the study, indicating a significant proportion of objects with restricted access.

The distribution of OA objects among various research areas reveals notable differences in accessibility (Figure 1). Social Sciences lead in the absolute number of published objects (96,972), with 37.82% available in OA. Engineering and Technology follow, with 59,889 published objects and a slightly higher OA percentage of 44.21%. Medical and Health Sciences demonstrate a significant commitment to OA, with 66.44% (26,168 out of 39,381) of publications freely accessible. Humanities and Natural Sciences show the highest OA percentages, at 74.25% and 79%, respectively. In Biotechnology, 65.93% of publications are OA. Arts and Interdisciplinary Sciences exhibit lower overall publication volumes, with OA percentages of 44.16% and 52.12%, respectively. These results suggest that while the volume of published objects varies significantly by field, disciplines such as Humanities, Natural Sciences, and Medical Sciences show a stronger inclination toward OA dissemination.

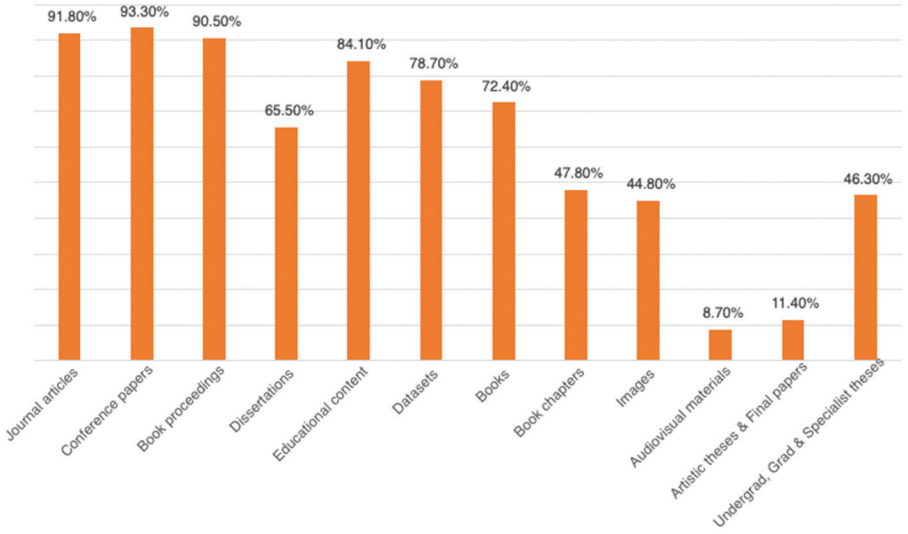
An analysis of access types for published objects in the DABAR system reveals significant variations depending on the type of object (Figure 2). Among the most accessible categories, journal articles have the highest proportion of OA – 91.8% (18,324 out of 19,965). Similarly, conference papers (93.3%) and book proceedings (90.5%) demonstrate a strong commitment to OA. Theses and dissertations also exhibit a high level of accessibility, with 65.5% (6,162 out of 9,403) in OA. Educational content (84.1%), datasets (78.7%), and books (72.4%) also show relatively high OA availability.

Fig. 1: Open Access objects in DABAR system by Research Areas.



	Social Sciences	Engineering and Technology	Medical and Health sciences	Humanities	Biotechnology	Natural sciences	Arts	Interdisciplinary sciences
Percentage of Open Access objects	37,82%	44,21%	66,44%	74,25%	65,93%	79%	44,16%	52,12%
Published objects	96972	59889	39381	20043	19361	15718	6369	4077
Open Access	36681	26480	26168	14883	10894	12364	2813	2125

Fig. 2: Percentage of Open Access Objects in DABAR System by Type.



However, certain categories remain predominantly restricted. Artistic theses and final papers have a significantly low OA rate, with only 11.4% (33 out of 289) available. Similarly, book chapters (47.8%), images (44.8%), and audio-visual materials (8.7%) have lower OA representation. The largest category, undergraduate, graduate, and specialist theses, includes 222,857 deposited works, of which 103,087 (46.3%) are in OA.

4.1. Research Methodology

This research aims to answer the following questions:

> RQ1: What institutional characteristics are associated with repositories predominantly storing objects under closed or restricted access?
>
> RQ2: To what extent do self-archiving options and institutional policies influence the ability to transition to OA within repositories that currently maintain predominantly closed or restricted access?

RQ3: What are the primary reasons for maintaining closed or restricted access?

An initial quantitative analysis, previously mentioned, was undertaken to identify repositories within DABAR system with a predominant share of objects under closed or restricted access. This analysis was based on publicly available data detailing the total number of objects in each repository, as well as their respective access conditions. Repositories in which more than 70% of the stored objects were classified as closed or restricted access were selected for further research, as they provided a relevant context for examining limitations in access and associated repository policies.

Repositories characterized by a high proportion of OA content were excluded from the study, as were repositories with negligible content or no content at all – defined as those either empty, containing only a small number of tentatively entered objects, or established within the past year. This exclusion process ensured a focused and representative sample, capturing repositories where access restrictions are prevalent and well-established. The final sample comprised 84 repositories meeting the inclusion criteria.

Following the selection process, an online questionnaire was distributed to repository administrators or editors responsible for the management and policy implementation within these repositories. The survey was distributed using email addresses publicly available on the websites of the individual repositories. The questionnaire itself was created using the free online tool Microsoft Forms.

The data collection period spanned from 23 May 2024 to 12 June 2024, during which a total of 50 completed responses were received, providing a substantial basis for subsequent qualitative and quantitative analysis.

4.2. Limitations

The analysed repositories span diverse disciplines and contain various types of objects, which may limit the comparability of findings. Future research could focus on a single scientific field or object type to yield more precise insights. Additionally, subsequent studies might prioritize repositories with a

higher proportion of OA content and include surveys of authors and repository users to provide a more comprehensive perspective.

4.3. Results

To address RQ1, which examines the institutional characteristics associated with repositories predominantly storing objects under closed or restricted access, the survey included several targeted questions.

Respondents were asked to specify the type of institution to which their repository belongs, with options including public university or college (90% of the sample), private university or college (6%), and scientific institute (4%) (Figure 3).

Additionally, participants indicated the scientific fields of their institution, categorized as follows: Natural Science (5%), Engineering and Technology (14%), Biomedicine and Health (5%), Biotechnology (10%), Social Science (31%), Humanities (13%), Art (7%), and Interdisciplinary fields of Science and Art (10%) (Figure 4).

To further contextualize repository practices, the survey collected information on the types of objects stored, with the following distribution: theses and dissertations (30%), journal articles (9%), conference proceedings (9%), conference and other presentations (5%), books and book chapters (10%), research data (7%), data management plans (9%), educational resources (7%), audio, image, and/or video material (4%), and virtual collections (3%) (Figure 5).

To address RQ2, which examines the extent to which self-archiving options and institutional policies influence the potential transition to OA within repositories predominantly characterized by closed or restricted access, several key variables were analysed based on survey responses.

Most repositories (54%) stated that they offer a self-archiving option, while 46% indicated that such an option is not available. Among those repositories where self-archiving is enabled, 74% allow self-archiving for all types of objects. However, 26% apply selective self-archiving policies, with restrictions primarily concerning theses and dissertations.

Fig. 3: Type of Institution.

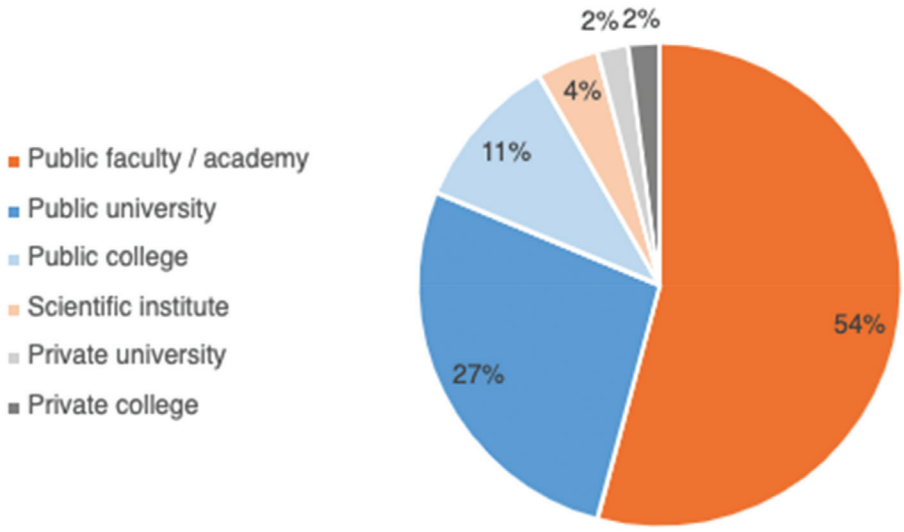


Fig. 4: Institution's Scientific Field.

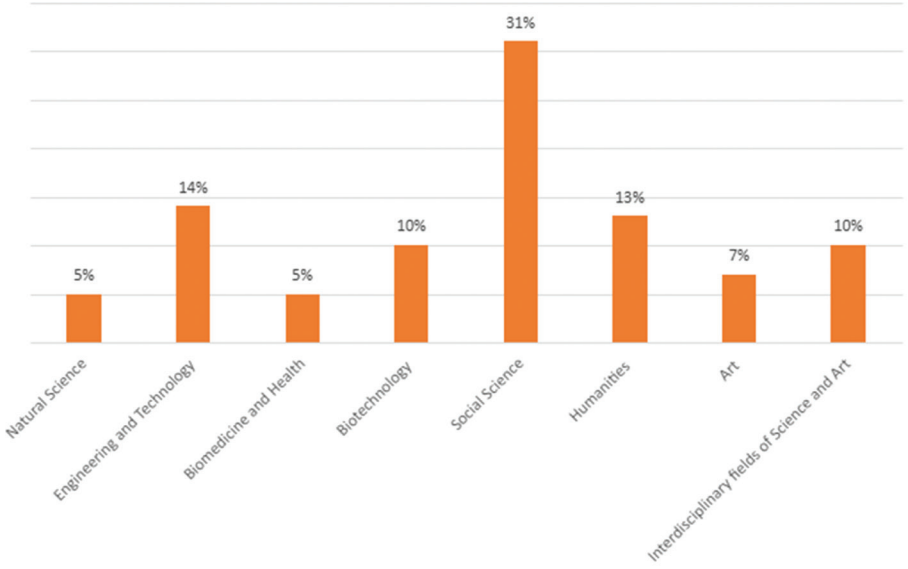
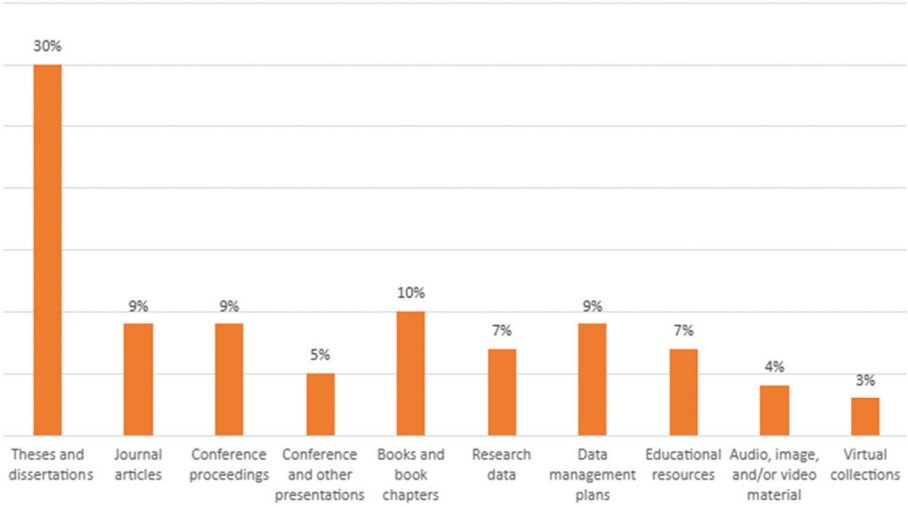


Fig. 5: Types of Objects stored in Repositories.

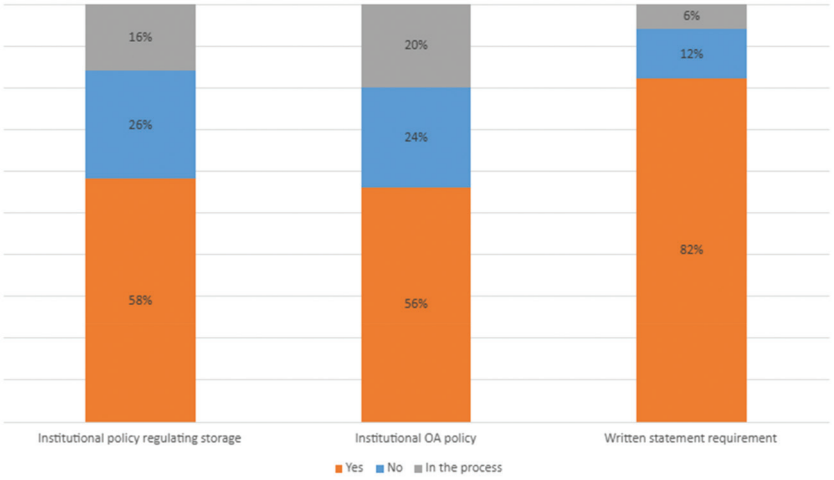


Regarding the user groups authorized to perform self-archiving, 67% of repositories reported that self-archiving is permitted for institution employees, including scientists, teachers, and administrative staff. In contrast, only 33% extend this option to students, suggesting a controlled approach particularly for student-authored content.

A total of 58% of respondents confirmed the existence of formal institutional policies or documents governing the storage of objects in their repositories, while 26% reported the absence of such regulations, and 16% stated that policies are currently in development. Similarly, 56% of repositories indicated the existence of an official institutional OA policy, whereas 24% reported no OA policy in place, and 20% noted that the policy was under preparation at the time of the survey.

Furthermore, the survey explored the presence of written statements concerning the storage and publication of objects in the repository, specifically for documents such as theses and dissertations. Most repositories (82%) require a written statement, typically signed by students, confirming consent for storage and publication, and decision about access. Only 12% reported that no such statement is required, while 6% indicated alternative arrangements (Figure 6).

Fig. 6: Institutional Policies and Requirements.



To address RQ3, which seeks to identify the primary reasons for maintaining closed or restricted access in repositories, respondents were asked to select from a predefined list of reasons, with the possibility of indicating more than one option. At the end, respondents were also given the option to provide their own answer.

The most frequently selected reason was the author's decision, reported by 26% of respondents. This suggests that individual authors often choose to limit access to their works, possibly due to personal, legal, or professional considerations. Following this, confidentiality concerns related to the content of the stored objects were identified as a significant factor – 20% of respondents noted that objects contain confidential data or data that cannot be made publicly available, such as cases where commercialization of research results is expected.

Institutional policies were also influential, with 18% of repositories citing institutional mandates or regulations as the primary reason for restricting access. Concerns over content quality, particularly in relation to student works (such as theses), accounted for 10%, reflecting scepticism regarding the academic rigor or reliability of certain submissions. Similarly, 10% of respondents mentioned fears of unauthorized use or copyright infringement as a factor influencing access restrictions.

Table 1: Reasons for storing objects in restricted and/or closed access.

Reasons for storing objects in restricted and/or closed access	
The institution's policy	18%
Author's decision	26%
No benefit from OA storage	0%
Distrust in quality (e.g. in students' papers and theses)	10%
Fear of unauthorized use and copyright infringement	10%
Fear of violation of the author's personal data	4%
Objects/works contain confidential data or data that may not be used publicly (e.g. commercialization of research results is expected)	20%
Storing objects in OA takes too much time (e.g. researching copyright, terms of use/ license, version that can be stored, filling in metadata, etc.)	2%
Other reasons	7%

Less frequently reported reasons included fear of violation of personal data protection laws (4%), the perception that storing objects in OA requires excessive time and effort (e.g., due to copyright clearance or metadata entry) (2%), and various other reasons (7%). Notably, none of the respondents indicated that the absence of benefits from OA influenced their decision (Table 1).

Among the respondents who selected other reasons for maintaining closed or restricted access, some provided specific explanations. Several respondents indicated that the access restrictions primarily apply to older objects, particularly theses and dissertations deposited prior to policy changes. For example, some noted that since 2022 or 2023, their institutions have adopted OA as the default for newly submitted theses, while older objects remain under restricted access due to previously applied policies or outdated consent forms that limit access to institutional users only. Additionally, one respondent reported that decisions on access settings are determined individually by the thesis defense committee, reflecting an institutionally decentralized approach to access control.

One respondent cited authorial overestimation of the value of their work, a perception that their results might be stolen, as a subjective factor influencing restricted access. This reason highlights the role of personal attitudes and academic culture, where concerns about intellectual property and originality can lead to more conservative access policies, even when institutional frameworks permit openness.

4.4. Discussion

The findings of this study provide insights into the repository practices and policies shaping access conditions within institutional repositories in DABAR system predominantly characterized by closed or restricted access. The analysis of institutional characteristics, self-archiving options, and reasons for access restrictions reveals both organizational and cultural factors influencing repository openness.

Regarding institutional characteristics, the overwhelming representation of public universities and colleges (90%) suggests that repository practices in the observed sample largely reflect public sector policies and priorities. Moreover, the diversity of scientific fields indicates that repositories are not confined to a single disciplinary practice but instead serve a broad academic community with varying needs and sensitivities. Notably, the predominance of certain object types, particularly theses and dissertations, underscores the importance of understanding access policies related to student works.

The results related to self-archiving practices and institutional policies highlight both progress and limitations in fostering OA in these institutions. While more than half of the repositories (54%) offer self-archiving functionalities, the fact that a substantial proportion (46%) do not suggests ongoing technical, legal or administrative barriers. Even among repositories that allow self-archiving, the data reveals a cautious approach – 74% permit self-archiving for all object types, but restrictions persist, particularly for theses and dissertations. This reflects a broader trend of treating student-authored content differently, possibly due to concerns over quality, copyright and/or privacy.

The analysis also reveals that institutional policies significantly shape repository practices. Although most repositories (58%) report having formal policies regulating object storage, and 56% have official OA policies, the presence of repositories where such policies are either absent or under development suggests an uneven policy landscape in Croatian institutions. The widespread use of written statements, particularly for theses and dissertations (required by 82% of repositories), further reinforces the controlled nature of access decisions, especially regarding student works.

Deeper insight into the motivations behind maintaining closed or restricted access reveals that authorial decisions emerged as the most frequently stated

reason (26%), highlighting the considerable influence of individual preferences and perceptions. Confidentiality concerns, particularly related to sensitive data or anticipated commercialization of research outputs (20%), institutional mandates (18%), and doubts regarding content quality (10%) collectively point to a cautious and risk-averse approach. Fears related to copyright infringement (10%) and data protection (4%) further suggest that legal and ethical considerations are central to repository administrators' decision-making processes.

Qualitative responses further illuminate these trends. Several administrators indicated that restrictions primarily apply to older objects, often governed by outdated policies or written consents. This temporal factor suggests that while repositories are increasingly shifting toward OA, the legacy of past practices continues to impact current access conditions.

Subjective factors, such as authors perceived risks of intellectual property theft, underscore the role of academic culture and attitudes in shaping repository openness. Even in institutions with supportive policies and technical infrastructure, cultural barriers may persist, limiting the full realization of OA principles. Improving repository openness requires a multifaceted approach – updating legacy policies, simplifying consent and self-archiving procedures, fostering trust in OA, implementing education and training both for students and stuff, and addressing both institutional and individual-level concerns.

5. Conclusion

Institutional repositories represent an essential role in promoting transparency, visibility, and accessibility of scholarly outputs. Thay are one of the most important pillars of OA and open science movement. This study of institutional repositories within Croatia's DABAR system provides brief research of the factors contributing to large percentage of closed or restricted access, despite institutional and policy-level support for openness.

While most repositories are situated within public higher education institutions and cover a wide range of scientific disciplines, access limitations persist due to a combination of structural, procedural, and cultural factors. Legacy policies, selective self-archiving permissions, particularly for theses

and dissertations, and concerns over confidentiality, copyright and content quality contribute to a fragmented and cautious approach to repository openness. The uneven implementation of OA practices suggests that technical infrastructure alone is insufficient.

Addressing these challenges requires a multifaceted approach involving the updating of outdated institutional policies, the establishment of clear self-archiving procedures, and active engagement with researchers to foster trust in OA practices. Improvements in repository openness are not only essential for fulfilling the goals of open science but are also critical for maximizing the impact and visibility of national and institutional research outputs.

5.1. Implications and Further Research

Findings of this study highlight several implications for repository management, institutional policies, and the broader development of OA practices in Croatia and potentially across Europe.

Institutional policies regarding repository content management and access must be updated and standardized to minimize the persistence of legacy practices that contribute to closed or restricted access. Clear mandates for self-archiving, particularly concerning student theses and dissertations, should be introduced and consistently enforced. Policies should explicitly address embargo periods, licensing terms, and authors' rights to encourage greater openness.

Furthermore, institutions managing repositories should consider implementing more systematic and centralized workflows for content deposit and access management. By developing harmonized procedures across institutions, including clear guidelines for repository administrators and authors, the overall efficiency, compliance, and openness of national repository systems can be significantly improved.

Presented Croatian experience offers broader lessons for European OA repositories. The fragmentation observed within repository practices, even under a unified infrastructure like DABAR, suggests that aligning institutional practices with European and global OA standards remains a critical challenge. Lessons learned from this case study could inform regional and international

efforts to harmonize repository policies, enhance metadata interoperability, and strengthen OA compliance mechanisms.

Further research should include comparative analyses involving repositories with a higher proportion of OA content to identify successful practices and models. Longitudinal studies could track the effects of newly implemented policies over time, offering insights into the most effective strategies for fostering repository openness. Incorporating the perspectives of authors, repository users, and administrative staff would provide a more comprehensive understanding of socio-cultural and institutional factors influencing access decisions. Investigating disciplinary differences in self-archiving behaviour and repository usage patterns could further refine institutional and policy interventions aimed at enhancing open access practices.

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Notes

[1] Paper is based on the broader research of nearly a decade of Croatian Repositories Infrastructure. Smaller part of the research was presented as a poster presentation at the LIBER Annual Conference 2024 (Limassol, Cyprus University of Technology (CUT)).

[2] In this case, the term "Master's theses" refers to all works that lead to the attainment of an academic title or degree, regardless of the level of study (undergraduate, graduate, specialist, postgraduate studies). In the following text of this article, the terms "theses" will be used for final papers (undergraduate, graduate, specialist),

and “dissertations” as well as “scientific master’s theses” for postgraduate works. Exceptionally, in the literature review, the terms used by the authors of the articles will be employed.

[3] Research data and results are archived in the institutional repository and are openly accessible under a Creative Commons license at: https://repozitorij.nsk.hr/islandora/object/nsk:386.