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Analysis of Enabling and Inhibiting of Cloud Storage Restriction Policy Implementation in Higher Education: A Systematic Literature Review

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Abstract. This study examines enabling and inhibiting factors affecting the implementation of cloud storage restriction policies (e.g., quotas, retention/archiving, data classification, and exceptions) in higher education institutions. A PRISMA-guided systematic literature review was conducted using Scopus and complementary manual searches in Google Scholar, covering English-language publications from the last ten years. Following de-duplication and staged screening, 30 studies were included for synthesis. Findings were analyzed using the Socio-Technical Systems (STS) framework and mapped across People, Structure, Technology, and Process dimensions to capture the interplay between policy design, implementation practices, and technical enforcement. Results indicate that implementation success is driven by human readiness and governance capacity, especially continuous training and mentoring, clear communication, and leadership support that helps balance cost control with user acceptance and compliance. Technological enablers include adequate infrastructure, platform/service integration, and strong access control and information security mechanisms to ensure consistent enforcement. Key barriers include limited digital and data literacy, resistance to change and concerns about data deletion, uneven IT capacity across units, weak SOPs, siloed coordination, complex bureaucracy, vendor dependence, and budget constraints. The study recommends a holistic approach combining strengthened governance, standardized processes, targeted technology investment, and structured change management.

Keywords: cloud storage restriction; higher education; systematic literature review; socio-technical systems; data governance

1. INTRODUCTION

Digital transformation in higher education has accelerated institutions' reliance on cloud computing—particularly cloud storage—for core activities such as managing academic records, supporting administrative workflows, enabling teaching and learning collaboration, and preserving research data. As both data volumes and the diversity of cloud-enabled activities expand, universities and colleges increasingly face governance pressures that go beyond "moving to the cloud." These pressures include escalating subscription costs, finite storage capacity, fragmented data across multiple platforms, heightened security and privacy risks, and growing regulatory compliance obligations. Systematic literature reviews (SLRs) on cloud adoption in educational settings consistently show that institutional decisions are shaped by socio-technical factors spanning human, organizational, technological, and process dimensions. Recurrent themes—such as infrastructure readiness, cost constraints, privacy and security concerns, and regulatory compliance—directly inform how higher education institutions design cloud-use policies and operational procedures [1].

In practice, many institutions attempt to manage these risks and costs through cloud storage restriction policies. Such policies typically translate governance objectives into operational rules—for example, account quotas, retention periods, permissible data classifications for storage, and mechanisms for archiving, deletion, and exception handling. The regulatory dimension is especially consequential because higher education routinely handles data that may be legally regulated (e.g., student information, personnel records, research data involving human subjects), requiring careful alignment with applicable laws and institutional context [2]. Compliance requirements have become more complex with modern data-protection regimes: the GDPR and UK GDPR, for instance, impose obligations that can affect storage location decisions, access controls, retention schedules, and data minimization practices—each of which has direct implications for how restriction policies are formulated, communicated, and enforced [3].

Recent research has mapped barriers and enablers of digital transformation in universities, yet much of this work remains at a general level and seldom examines cloud storage restriction policies as concrete governance artifacts that reshape everyday user practices. For example, an SLR identified twenty barriers to digital transformation

grouped into environmental, strategic, organizational, technological, people-related, and cultural categories, emphasizing that cross-unit coordination and sustained institutional support are often decisive for implementation outcomes [4]. Complementary studies likewise underscore that transformation barriers are not purely technical; they frequently involve management capacity, workforce readiness, training needs, and uneven infrastructure or technical capability [5]. When applied to cloud storage restrictions, these barriers may appear as resistance to quotas or retention limits, limited data-governance literacy, inconsistent support structures (e.g., unclear SOPs, insufficient helpdesk capacity), and inadequate infrastructure for migration, archiving, or lifecycle management.

From the cloud computing perspective, education-focused adoption studies emphasize broad determinants—planning and strategy, cost, privacy, security, and compliance—rather than technology alone [1]. However, adoption-oriented syntheses often stop at questions such as "why adopt" or "what influences adoption," and comparatively fewer studies consolidate evidence on how restriction policies are designed, implemented, enforced, and accepted within the higher education ecosystem. This implementation gap matters because restriction policies are not abstract governance statements; they are operational interventions that affect storage behavior, collaboration practices, and administrative routines. Moreover, socio-technical analyses of cloud migration highlight that effective cloud management reflects an interplay among people, organizational structure and culture, skills, and governance arrangements—factors that strongly condition the success of policy execution and technology enforcement [6].

Against this backdrop, three research gaps emerge. First, while digital transformation research richly catalogs general barriers (strategy, culture, human resources, infrastructure, security), it provides limited policy-specific synthesis on cloud storage restriction policies as actionable data-governance mechanisms. Second, cloud adoption research foregrounds acceptance and adoption determinants but has not widely integrated the implementation realities of restriction measures (e.g., quotas, retention, archiving, and exception handling) that shape day-to-day work. Third, regulatory and privacy scholarship emphasizes compliance and data classification, yet it less frequently connects these requirements to end-to-end design and implementation processes for restriction policies in higher education settings.

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This study addresses these gaps through a PRISMA-guided systematic literature review focused specifically on cloud storage restriction policy implementation in higher education. It makes three contributions: (1) it synthesizes key enablers and inhibitors that influence implementation outcomes for restriction policies; (2) it maps these factors using a Socio-Technical Systems (STS) lens—People, Structure, Technology, and Process—while also linking common policy elements (quota rules, retention/archiving mechanisms, and data classification requirements) to the STS dimensions; and (3) it derives implementation-oriented recommendations that differentiate among policy design, implementation practices, and technology enforcement approaches to support practical adoption and compliance.

Accordingly, this review shifts attention from general cloud adoption decisions to the governance and operational realities of implementing cloud storage restriction policies—such as quotas, retention/archiving, data classification, and exception handling—in higher education institutions. The study aims to analyze the factors that enable and inhibit successful implementation, emphasizing the interdependence of technological, organizational, human, and process dimensions. The research question guiding this review is: What enabling and inhibiting factors do higher education institutions face when implementing cloud storage restriction policies?

2. METHODS

Literature review research is not only conducted to summarize findings from a body of prior studies; it is also conducted to identify differences among previous studies. In this study, we use the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method to ensure complete and transparent reporting [7]. To address this study, we analyze prior research that discusses the same topic namely, what enablers and inhibitors factors exist in implementing cloud storage restriction policies in higher education institutions. The analysis of reviews and findings from prior studies is expected to provide information and knowledge for future research.

2.1 Screening Maping

To strengthen the findings obtained from the screening stage, we conducted mapping using two tools: Publish or Perish and VOSviewer. Publish or Perish is used to collect and

analyze data from trusted, indexed sources, while VOSviewer is an application for bibliometric analysis and visualization that identifies structures, relationships, and patterns related to scientific publications.

In this study, journal searching via Publish or Perish was carried out using two databases, Scopus and Google Scholar, with the keyword query "enablers and inhibitors Factors in Implementing Cloud Storage Restriction Policies in Higher Education Institutions." As shown in Figure 1, there are clusters with different colors. The largest node is the item "Implementation" with 164 occurrences and the item "Factor" with 158. Besides the largest items, some items have fewer occurrences, including "higher education" (140), "restriction" (112), and "cloud" (106). The following figure presents the VOSviewer visualization results.

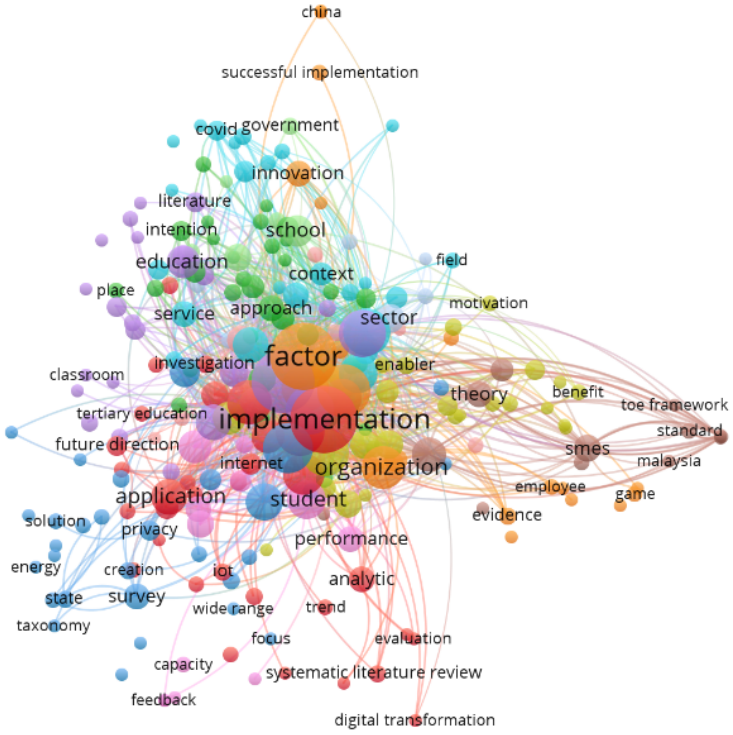

Figure 1. Enabling and Inhibiting Factors for Policy Implementation in Higher Education

Based on mapping results using Open Knowledge Maps, Publish or Perish, and VOSviewer, it is found that the research area related to enablers and inhibitors factors in implementing cloud storage restriction policies in higher education is still relatively limited. Therefore, research on "Analysis of enablers and inhibitors Factors in Implementing Cloud Storage Restriction Policies in Higher Education Institutions" is expected to provide new knowledge for future studies.

2.2 Research Term

Data searching in this study was conducted from three perspectives. First, we used the PICOC structure (Population, Intervention, Context, Outcome, and Comparison) to help formulate structured search terms or keywords relevant to the research questions [8]. Second, we searched for synonyms of the relevant components for each keyword identified. Third, we combined keywords using conjunctions and specific wildcards. The following is an example for Research Question (RQ).

1) First Step, Using the PICOC structure :
   a) Population : Higher Education
   b) Intervention : problem
   c) Context : Supporting and Inhibiting Factors
   d) Outcomes, Comparasion: -
2) Second Step, searching for keyword synonyms :
   a) Population : Higher Education
   b) Intervention: “Factor”, “Enabler”, “Inhibitor”
   c) Policy terms: “quota”, “retention”, “archiving”, “lifecycle management”, “storage policy”, “records management”, and “recordkeeping” (including related terms such as “cloud governance” and “information lifecycle management”).
3) Third step: combine keywords using OR, AND, and wildcards in the search string, including restriction-policy synonyms (e.g., quota OR retention OR archiving OR "lifecycle management" OR "storage policy" OR "records management" OR recordkeeping) alongside higher education and implementation/factor terms.

2.3 Data Collection

In this section, we searched for relevant topics in one knowledge database, Scopus, and manually searched for additional data via Google Scholar. Scopus and Google Scholar were selected because both databases have good credibility and quality. We used a categorization of several search keywords to obtain data that match the research question [9]. The predetermined keywords were expanded with appropriate synonyms, and finally the data search was conducted using conjunctions consistent with the search keywords. The research question is: “What enablers and inhibitors factors do higher education institutions face in implementing cloud storage restriction policies?” The keyword categories relevant to this topic are: Higher Education, Problem, Regulation,

Cloud Storage Restriction Policies. Keyword synonyms: Enabler, Inhibitor, Higher Education.

The inclusion criteria for this study are: (1) articles discussing higher education; (2) context of cloud storage/cloud governance or storage limitation policies (quota/retention/archive); (3) containing supporting or inhibiting factors for implementation; (4) indexed journal articles/proceedings; (5) within the last 10 years; (6) written in English; (7) full text accessible. The methodology used is qualitative or quantitative. The search parameters require the keyword to appear in the search, the publication must be in English, and the publication must be an academic journal article.

2.4 Selection Process

The search conducted on 28 December 2025 yielded 840 results from the Scopus database and 8 results from manual searching. 300 results were removed due to duplicate records; 100 results were removed because they were outside the context and content of the discussion. and 250 were removed because the publication year was outside the period expected in this study. The next screening step was performed on a total of 198 results, where 50 were removed because the titles did not match and 48 were removed because the reports could not be retrieved. Of the 100 results selected at this stage, 70 were removed due to mismatches in the abstract and conclusion. From this process, 30 results were included in our analysis. Screening (title/abstract and full-text) was conducted independently by two reviewers. Disagreements were resolved through discussion until consensus was reached. The process is shown in Figure 2.

After determining the appropriate journals and obtaining the full-text versions, we used socio-technical systems theory to analyze and map barriers across four aspects: people, structure, technology, and process. Enablers and inhibitors factors related to human resources were categorized under the people aspect. Factors related to organizational structure were categorized under structure. From the technical system, factors related to information technology and infrastructure were mapped under technology, and enablers and inhibitors factors related to business processes or tasks were categorized under process. The outcome of this literature review analysis is a mapping of enablers and inhibitors factors in four socio-technical aspects related to cloud storage restriction policies in higher education institutions.

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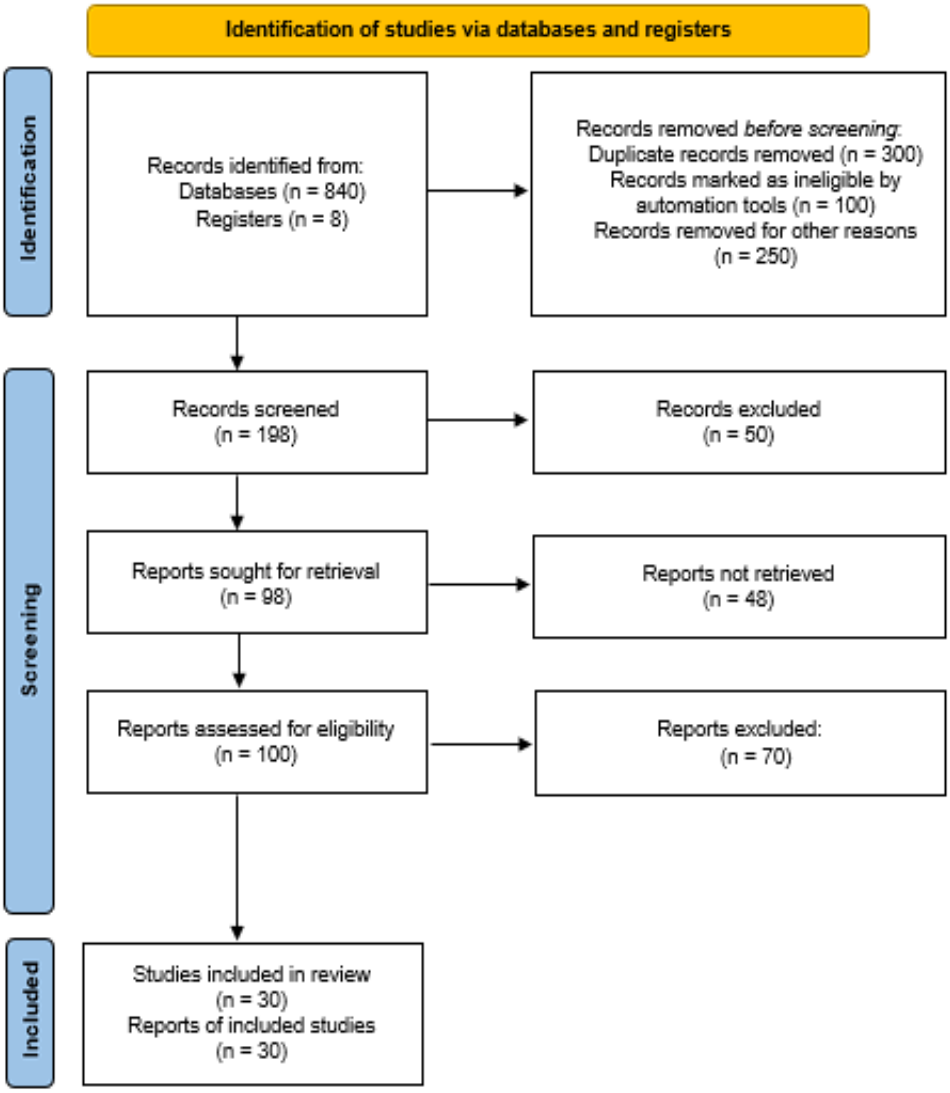

Figure 2. PRISMA Selection Process

3. RESULT AND DISCUSSION

In this section we answer the research question: What enablers and inhibitors factors do higher education institutions face in implementing cloud storage restriction policies? The factors identified are mapped based on social and technical aspects according to socio-technical systems theory [10]. We first explain the dimensions in socio-technical systems theory; next, we discuss the enablers and inhibitors factors found through the literature review method.

3.1 Social Technical System Theory

Socio-Technical Systems (STS) theory asserts that implementing a technology policy in an organization is a change that affects the entire work system, due to dependencies and interactions among social and technical components. In other words, a policy is more appropriately analyzed as a systemic change rather than merely a technical change, because change in one component can create "systemic effects" on other components [10]. Within the STS framework, a sociotechnical system can be mapped to the following four main dimensions:

1) People

This dimension refers to the actors involved in using and complying with the policy, including capabilities, work habits, and users' responses to change. In STS, people are part of the social subsystem that continuously interacts with processes and technology [10]. Policies such as quotas or retention require behavioral changes (e.g., sorting data, moving archives, complying with rules), so their success is strongly influenced by user acceptance and work practices. The complexity of recordkeeping practices in cloud environments also shows that digital information management is not only a system matter, but also involves human practices and organizational decision-making [11].

2) Structure

This dimension includes formal rules, governance, distribution of authority, and mechanisms of control and accountability. In STS, structure is also part of the social subsystem and helps determine how a policy is translated into rules that are understood and obeyed [10]. When institutions use the cloud, governance consequences arise such as access restrictions and contractual obligations imposed by service providers, which can affect institutional control over digital materials and how rules are applied [11].

3) Technology

This dimension refers to platforms, infrastructure, features, and technical mechanisms that enable the policy to operate (e.g., access control, quota configuration, audit logs, encryption, service integration). In STS, technology is part of the technical subsystem that must align with the social subsystem for the system to work effectively [10]. The technology dimension is also closely related to security issues. An STS perspective on cybersecurity emphasizes that security challenges are not merely technical matters, but

the result of interactions between social and technical elements in an organization. Moreover, restriction policies usually stem from the need to control privacy and security risks, but their effectiveness depends on the fit between technical controls and organizational structure and user behavior [12].

4) Process

This dimension refers to workflows, operational procedures, service mechanisms, and implementation steps that ensure the policy can be executed consistently. In STS, process is part of the technical subsystem and acts as an "operational bridge" that links structural policy with user practices and technological controls [10]. Policies such as retention/archiving require clear processes (e.g., classification procedures, migration procedures, exception mechanisms, and change management). If processes do not align with work needs, policies intended to control cloud-use behavior can become ineffective [11].

To make the relationship between typical cloud storage restriction policy elements (e.g., quotas, retention/archiving, classification, and exceptions) and the STS dimensions more explicit, Table 3.1 provides a concise mapping based on the synthesis in this review.

Table 1. Mapping of Restriction-Policy Elements to STS Dimensions

Policy element	People (acceptance & behavior)	Structure (governance & ownership)	Technology (controls & tooling)	Process (workflows & SOPs)
Quota rules (limits/allocations/exceptions)	awareness; clean-up behavior; perceived fairness	authority to set quotas; policy ownership; exception decision rights	quota configuration; usage monitoring	quota request flow; exception-handling procedure
Retention & archiving rules (lifecycle & deletion)	willingness to archive/delete; concerns about deletion	accountability for retention; compliance responsibility	retention/lifecycle configuration; archiving support	archiving SOP; user communication/notifications
Data classification	data-governance	roles (data owner/steward);	classification/labeling and	classification procedure;

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Policy element	People (acceptance & behavior)	Structure (governance & ownership)	Technology (controls & tooling)	Process (workflows & SOPs)
rules (allowed storage & regulated data)	literacy; correct classification behavior	classification governance	access-tier support	approval steps; training routine
Enforcement & monitoring	security awareness; compliance behavior	audit responsibility; accountability mechanisms	access control; logging/audit trails; service/identity integration	periodic review; incident linkage; continuous improvement

Accordingly, STS is used in this study as a basis for assessing the implementation of cloud storage restriction policies as a sociotechnical system change that simultaneously affects People, Structure, Technology, and Process. STS-based analysis helps explain that policy success is determined not only by technical controls, but also by alignment with governance structures and work processes, as well as user acceptance and behavior. Changes in one dimension can produce systemic impacts on other dimensions [10], [11], [12].

3.2 What enabling and inhibiting factors do higher education institutions face when implementing cloud storage restriction policies?

Based on the literature review, the implementation of cloud storage restriction policies in higher education shows that enablers and inhibitors factors emerge across dimensions and cannot be explained solely from a technical perspective. To strengthen interpretation and reduce repetition in the discussion, we distinguish three related categories of factors: (1) policy design factors that define the restriction rules (e.g., quota levels/allocations, retention and archiving rules, data classification rules, and criteria for exceptions); (2) policy implementation factors that shape how the policy is introduced and adopted (e.g., communication, training, support desks, SOPs, and change management); and (3) technology enforcement factors that determine how rules are technically enforced and monitored (e.g., quota and retention configuration, access control, logging/auditing, and service/identity integration).

Using the Socio-Technical Systems (STS) perspective, these categories can be understood as interactions between the social system (People and Structure) and the technical system (Technology and Process) that jointly determine policy success [10]. In this paper, Structure refers to governance arrangements such as roles, authority, and policy ownership (including decision rights for quotas, retention/archiving, classification, and exceptions), while Process refers to operational workflows such as SOPs, service-desk routines, communication routines, and exception-handling procedures that translate the designed policy into day-to-day execution. When presenting "dominant" enablers and inhibitors, this SLR follows a qualitative thematic synthesis approach: factors are treated as dominant when they are repeatedly emphasized across the included studies and explicitly linked to user acceptance/compliance or enforcement outcomes. More detailed explanations of the factors in each STS dimension (People, Structure, Technology, and Process) are presented in the following subsections.

3.3 Enablers and inhibitors Factors in the People Aspect

In implementing cloud storage restriction policies in higher education, the people aspect becomes decisive because the policy essentially changes the behavior of the academic community: selecting approved platforms, complying with retention or storage rules, managing folders and sharing access, and performing data sorting and deletion. From the factor-category perspective described above, People-related factors in this review primarily reflect policy implementation factors that shape user acceptance and day-to-day compliance (e.g., communication, training, and continuous mentoring).

The literature on digital transformation in universities emphasizes that human factors often distinguish successful implementations from stalled ones, because technological and policy changes require user acceptance, readiness, and capacity to execute new rules consistently [4]. On the enabling side, the literature shows that strengthening human capacity through "continuous training and ongoing assistance" is an important driver so that users understand how the platform and new rules work, including education and outreach efforts that emphasize training or workshops as strategies for coping with digital change [5]. Support also strengthens when higher education institutions have "clarity of roles and accountability" in data governance for example, data steward and data owner roles and arrangements regarding data access and lifecycle. This framework helps ensure that cloud storage restriction policies do not stop at the level of rules, but

have responsible parties who guide implementation and compliance [13]. In addition, a culture of "privacy and security awareness" reinforces policy acceptance, because cloud storage management intersects with privacy and security policy issues, including attention to access control, third-party management, and data deletion, all of which are relevant to storage limitations and strengthened compliance [14].

Conversely, the literature describes that technology-based policy implementation is often hindered by "gaps in digital literacy and data literacy." This barrier arises because not all users have sufficient skills to use digital services effectively, while the need for data-related capabilities continues to increase, creating a data literacy gap [13], [15]. In cloud restriction situations, such gaps can be seen in difficulties sorting data, organizing storage structures, understanding access/sharing implications, and applying retention and deletion in accordance with rules. Another strong barrier is "resistance to change," especially when users feel they are losing control over their data. Digital transformation barrier literature notes concerns about loss of control over data, which can trigger rejection or attempts to circumvent new rules [5]. In addition, "low privacy awareness" also becomes a barrier because when users do not understand the urgency and consequences of privacy and security, compliance with storage rules and data management tends to weaken [14].

Based on the above, although various factors exist in the people aspect, for the context of implementing cloud storage restriction policies in higher education, the most important enabling factor can be emphasized as "continuous training and ongoing assistance," because restriction policies demand practical capability and changes in users' work habits. Meanwhile, the most critical inhibiting factors are the "digital literacy and data literacy gap" and "resistance driven by concerns about losing control of data," because both directly affect users' ability and willingness to carry out data sorting, organization, and retention/deletion practices that are central to cloud storage restrictions [5], [14], [15].

3.4 Enablers and inhibitors Factors in the Structure Aspect

In the structure aspect, several points can be observed. From the policy-factor categorization, Structure-related factors mainly represent policy design governance, including roles, authority, and policy ownership (e.g., who sets quota/retention rules and

approves exceptions). On the enabling side, the literature shows that "top management support" is a key lever because leadership plays a major role in setting the direction of implementation, encouraging end-user adoption, and ensuring the policy is an institutional decision rather than merely an IT-unit initiative. This aligns with findings that top management "determines initiation and implementation strategies" and motivates users, thereby strengthening the legitimacy of cloud restriction policies across all units [16]. This support is also relevant because organizational change in higher education requires commitment and consistent management backing as an enabler. In addition, having a "data governance structure" for example, formal rules, roles/authority, and data-management policies helps institutions translate cloud storage restrictions into operational practices, including access arrangements and restrictions on data use. Structural support is also seen when the organization has administrative mechanisms that allow role-based access control, such as user grouping and access levels for documents, which in practice can be used to enforce storage or access limits within cloud-based platforms [17], [18].

Conversely, the most prominent structural challenge is "lack of coordination across departments or units," which creates silos so that policies are not synchronized across faculties/units and are difficult to implement consistently at the institutional level. The literature emphasizes that weak coordination and the existence of silos hinder holistic and equitable adoption [4]. These structural barriers are often exacerbated by the typically decentralized nature of universities: unit autonomy can make institutional strategies less coherent and cause policy implementation to fragment. In addition, overly vertical/bureaucratic structures can slow decision-making and reduce organizational agility, making cloud storage restriction policies (which usually affect many cross-unit processes) slow to implement. The literature also notes that such structures can encourage resistance to change and inhibit comprehensive transformation. In the context of cloud adoption/implementation, this barrier intersects with organizational inertia, when organizations struggle to move from old practices to new rules even after policies are set [4].

In conclusion, for the structure aspect of implementing cloud storage restriction policies in higher education, the most dominant enabling factor is "top management support" because it determines legitimacy, implementation direction, and cross-unit consistency

[16]. Meanwhile, the most dominant inhibiting factor is "lack of coordination or synchronization across units" (silos among departments or faculties), because storage restriction policies are inherently cross-organizational and require uniform governance; without coordination, implementation tends to fragment and becomes difficult to control institution-wide [4].

3.5 Enablers and inhibitors Factors in the Technology Aspect

In the technology aspect, on the enabling side, first, the implementation of cloud storage restriction policies is more realistic when higher education institutions have adequate "IT infrastructure availability" (networks, devices, and platform support), because capacity restriction and usage monitoring depend heavily on infrastructure readiness and management. From the factor-category perspective, Technology-related factors in this review mainly represent technology enforcement of the policy through platform controls and monitoring (e.g., access control, logging/auditing, and integration).

The literature on digital transformation readiness in higher education emphasizes the importance of infrastructure readiness/technology support and the presence of units or structures capable of managing IT infrastructure as part of institutional readiness [5]. Second, "data access control and information security controls" are crucial enablers, because cloud storage restriction is not only about reducing space, but also about organizing who may store, modify, share, and recover data. Research on cloud data breaches shows that privacy and data protection issues must be seriously reviewed before adoption (e.g., confidentiality, integrity, availability, and privacy policies), making access control, cryptography, and other security mechanisms foundational to maintaining compliance and user trust [19]. Third, policies are easier to implement when the selected cloud service provides "reliable services and good integration" (e.g., integration with campus identity portals, academic systems, or document repositories), because service availability strongly influences adoption: minor disruptions or performance degradation can directly affect use [19]. Studies of barriers to adopting learning technologies also place aspects such as access to resources, technical support, and complexity as influential factors logically aligned with integration and reliability needs when campuses implement storage restriction policies [20].

Conversely, on the inhibiting side, first, there is the risk of "limited IT capacity in some units" (e.g., bandwidth, devices, or system management capability), which can make cloud restriction policies unevenly implemented. Cloud adoption studies in higher education note that the need for fast and reliable communication and the high cost of bandwidth can be real issues; this is relevant when storage restrictions require stable monitoring and usage management across units [21]. Second, "low levels of adaptation" often occur not simply because of unwillingness, but because the technology is perceived as complex, incompatible, or disruptive to workflows. In the context of cloud adoption in higher education, aspects such as compatibility and complexity are understood as factors affecting usage decisions; when a service is perceived as misaligned with needs or existing processes or as too complicated, adoption is impeded [22].

In conclusion, although many technology factors can influence the success of cloud storage restriction policies, the most decisive enabling factors to emphasize are "IT infrastructure availability" and "data access control and information security controls," because both are prerequisites for enforcing quotas, monitoring usage, and running backup or retention mechanisms consistently and with user trust [5]. Meanwhile, on the inhibiting side, "limited IT capacity" and "low adaptation" are most critical because restriction policies ultimately require technical readiness across units and users' ability to shift to new governance practices; without these, restrictions tend to remain "on paper" or be implemented inconsistently [20].

3.6 Enablers and inhibitors Factors in the Process Aspect

In the process aspect, the implementation of cloud storage restriction policies in higher education is determined by how well the institution manages the sequence of implementation activities from drafting procedures, execution in units, and user support, to evaluation and continuous improvement. From the factor-category perspective, Process-related factors mainly represent implementation workflows that operationalize the designed policy and technical controls (e.g., SOPs, support routines, communication, and exception handling). In the context of digital change in higher education, strong implementation processes are generally supported by the institution's ability to identify needs, deploy new technology, and ensure transitions occur with adequate support [5].
On the enabling side, implementation processes tend to be effective when there are "formal communication and coordination mechanisms across units," for example, clear

institutional communication channels to align rules, manage change, and ensure consistent implementation across faculties or units [23]. Process strengthening is also evident when IT governance encourages communication and knowledge sharing between IT units and academic or business units so that policy decisions and execution do not operate in isolation [24]. In addition, policies are easier to run when processes emphasize "user empowerment and continuous improvement," because storage restrictions often require changes in work habits (reorganizing files, classification, retention/deletion). A gradual change-management approach helps prevent the policy from becoming merely a document [23].

Conversely, process barriers most often arise when there are "limitations in formal governance" at the execution level for example, the absence of a clear cloud governance structure, which can cause confusion and slow decision-making [25]. Another barrier is dependence on "vendor policies" (e.g., vendor lock-in risk) and trust issues toward cloud service providers, which can reduce institutional flexibility in enforcing restriction rules consistently. Finally, "budget constraints" also hinder process quality because they can weaken essential elements such as communication, assistance, and capability building required for stable cross-unit implementation [26], [27]. In summary, in the process aspect, cloud storage restriction policy implementation will be more successful when higher education institutions can build an implementation process that is coordinated (formal communication and knowledge sharing), adaptive (continuous improvement), and supported by governance. Conversely, processes stall when formal governance is weak, when they depend on vendor policies or trust, and when they are constrained by resources and budgets [6], [28], [29].

3.7 Analysis of enablers and inhibitors Factors for Cloud Storage Restriction Policies in Higher Education.

To consolidate the discussion above and reduce repetition, Figure 3.1 summarizes the dominant enablers and inhibitors synthesized from the included studies across the four STS dimensions. In this review, a factor is treated as "dominant" when it is repeatedly reported across multiple included studies and/or emphasized as critical to implementation outcomes within the higher education context. Overall, Figure 3 indicates that successful implementation depends on alignment between policy design (clear quota/retention/classification rules and transparent exception criteria), policy

implementation (communication, training, support services, and SOPs), and technology enforcement (access control, logging/auditing, and service integration). The mapping also suggests systemic effects across dimensions: for example, unclear exception criteria can increase service-desk workload and reduce user acceptance, while weak enforcement controls can undermine compliance even when governance and SOPs exist.

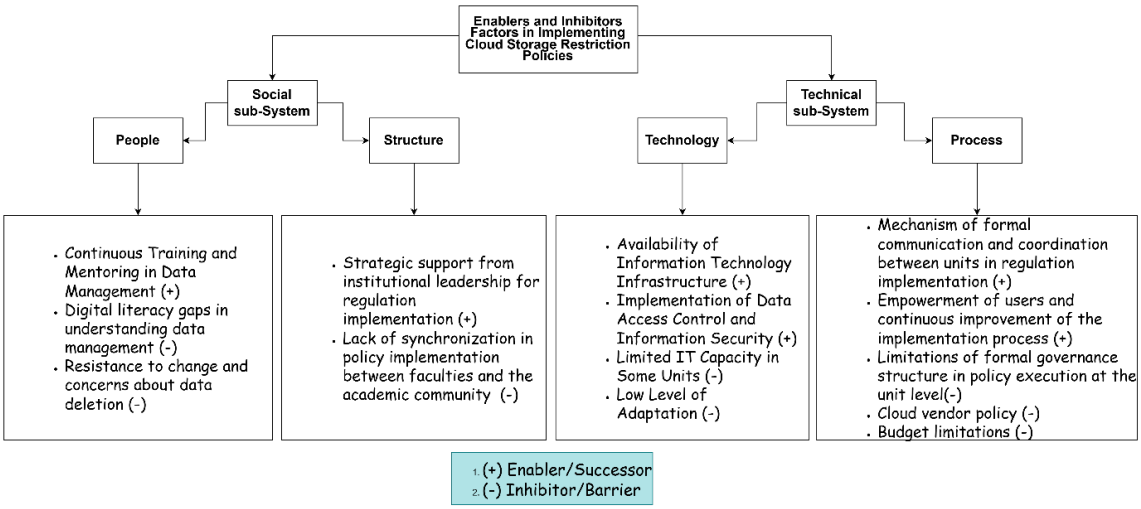

Figure 3. Analysis of Enablers and Inhibitors Factors in Each Aspect

Additional supporting evidence from broader literature further reinforces the factor grouping used in this study. Clear decision rights, stewardship roles, and accountability are central in data governance design, aligning with the "Structure" dimension in the STS mapping [30], while recent systematic evidence shows governance mechanisms are strongly tied to sustainable data quality practices [31]. At the cloud-governance level, unified frameworks also emphasize aligning cloud management controls with IT governance mechanisms to strengthen policy ownership and implementation consistency [32]. From a technology-enforcement perspective, access-control policy models remain foundational for restricting access, enabling auditing, and reducing misuse in cloud environments [33], and CASB-based controls are increasingly discussed as an enforcement layer to apply consistent policy compliance across cloud applications [34]. Implementation outcomes also depend on change management and resistance handling among users [35], as well as organizational security-policy compliance drivers that combine motivation and deterrence mechanisms [36]. Cloud compliance surveys also emphasize that enforcing regulatory requirements in cloud environments is challenging

and requires consistent governance and technical controls (e.g., auditability, accountability, and shared-responsibility clarity) [37]. Finally, because cloud services follow pay-per-use models and storage demand can grow rapidly, cost modelling and optimisation research highlights the importance of structured cost governance to maintain financial sustainability [38], while vendor lock-in can become a practical constraint that must be anticipated in migration and policy enforcement planning [39]. For transparency and reproducibility, these reporting practices are consistent with updated systematic-review reporting guidance such as PRISMA 2020 [40].

4. CONCLUSION

This study identifies several enablers and inhibitors factors in implementing cloud storage restriction policies in higher education, covering the structure, people, technology, and process aspects. In the people aspect, the enabling factor is continuous training and ongoing assistance in data management. The inhibiting factors are the digital literacy gap in understanding data management, resistance to change, and concerns about data deletion. In the technology aspect, the enabling factors are the availability of IT infrastructure and the implementation of data access control and information security. The inhibiting factors are limited IT capacity in some units and low adaptation levels. On the process side, the enabling factors are formal communication and coordination mechanisms across units in implementing regulations, user empowerment, and continuous improvement of implementation processes. The inhibiting factors are limited formal governance structures at the unit level, cloud vendor policies, and budget constraints. Meanwhile, in the structure aspect, the enabling factor is top management support or strategic leadership backing for regulatory implementation, and the inhibiting factor is the lack of synchronization of policy implementation across faculties and the academic community.

The conclusion of this study indicates the need for a holistic and integrated approach to address these enabling and inhibiting factors. Policy makers need to improve communication and training to reduce fear and increase lecturer and staff support for change. Investment in better technological infrastructure and increased financial support will be key to implementing cloud storage restriction policies. In addition, process reform across units or departments in higher education will enable more efficient and

collaborative implementation, ensuring the restriction policy can be implemented smoothly and have a positive impact on the institution.

This study contributes to a deeper understanding of the dynamics of implementing cloud storage restriction policies in higher education and provides a foundation for better policy recommendations to support organizational transformation. Nevertheless, this SLR has limitations: (1) the search relied primarily on Scopus with complementary manual searching via Google Scholar, so relevant studies in other databases or grey literature may have been missed; (2) inclusion was limited to English-language publications within the last ten years; and (3) the synthesis is based on secondary literature and therefore does not directly evaluate policy outcomes. Future research can address these limitations through empirical case studies and longitudinal policy evaluations (e.g., measuring cost-control outcomes, user acceptance, compliance, and data-security impacts), as well as cross-country comparisons. Future studies can also examine the role of leadership or organizational culture in promoting the implementation of cloud storage restriction policies in higher education. Because each institution will have different enablers and inhibitors, universities can manage more specific strategies and more innovative solutions to address them and evaluate the impact of the proposed improvement measures. In the long term, successful implementation of this holistic policy approach can improve campus financial sustainability (by controlling cloud subscription costs and optimizing storage use) and strengthen institutional data security and regulatory compliance through consistent retention and access controls. In the future, further research should explore enablers and inhibitors factors in other countries or in aspects not covered in this study. Future studies can also examine the role of leadership or organizational culture in promoting the implementation of cloud storage restriction policies in higher education. Because each institution will have different enablers and inhibitors, universities can manage more specific strategies and more innovative solutions to address them and evaluate the impact of the proposed improvement measures.

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