IMPLEMENTATION OF THE *BRIN* ARCHIVES CLASSIFICATION POLICY AND ITS IMPACT ON RESEARCH ARCHIVES ACCESSIBILITY

Firnalia
Politeknik STIA LAN, Jakarta,
firnaliafirdaus@gmail.com;

Nurliah Nurdin
Politeknik STIA LAN, Jakarta;

Ratri Istania
Politeknik STIA LAN, Jakarta.

ABSTRACT

This study analyzes the implementation of the Archives Classification Policy based on the *Surat Keputusan Kepala BRIN Nomor 224 Tahun 2022* at the National Research and Innovation Agency (*BRIN*) and its impact on the accessibility of research archives. Using a qualitative approach through field studies, data was collected through in-depth interviews, observations, and document reviews, then analyzed using Janowski's Digital Government model (encompassing digitization, transformation, engagement, and contextualization) along with a SWOT analysis. The research findings indicate that policy implementation has not been fully effective. The main challenges are multidimensional, including: (1) Digitalization Stage: low human resource readiness in digital literacy and metadata management, despite the availability of technological infrastructure; (2) Transformation Stage: resistance in work culture and weak discipline and personal accountability related to archiving; (3) Engagement Stage: top-down dissemination with minimal active employee participation; and (4) Contextualization Stage: classification policies that are too rigid and do not accommodate the diversity of research fields. This condition directly hinders the accessibility of research archives, impacting research efficiency, institutional transparency, and potentially leading to the loss of national knowledge assets. Based on a SWOT analysis, this study formulates a holistic and synergistic optimization strategy, including: (1) Technology-Based Strategy: integration of the SINAR-TNDE-SRIKANDI system, implementation of AI-based automatic classification, and development of an open metadata portal; (2) People-Based Strategy: tiered training programs, formation of digital champions, and a reward and punishment system; and (3) Policy-Based Strategy: development of function-based classification, standardization of access procedures, and integration of archives management into the research cycle. This recommended implementation model is expected to create an effective, adaptive, and sustainable digital archiving system at *BRIN*, thereby supporting transparent and accountable national scientific knowledge governance.

Keywords: *Archives Classification, BRIN, Policy Implementation, Digitization, Janowski Model*

A. BACKGROUND

The National Research and Innovation Agency (*BRIN*), as a centralized research institution, is expected to improve its archiving system through coordination to prevent research duplication and optimize resource utilization to support national innovation. *BRIN* was established through the merger of several major research institutions in Indonesia, namely the Indonesian Institute of Sciences (*LIPI*), the National Institute of Aeronautics and Space (*LAPAN*), the National Nuclear Energy Agency (*BATAN*), and the Agency for the Assessment and Application of Technology (*BPPT*). This merger is regulated in the *Peraturan Presiden No. 33 Tahun 2021*, which aims to create a more integrated and efficient research ecosystem (Syafira, 2021).

In practice, integrating these institutions is not without challenges. The main challenge lies in archives management, which is a key element in documenting policies, research outputs, and institutional administration. Each institution previously had a different archiving system, with different recording methods, classification systems, and storage procedures. This inconsistency can lead to misclassification of archives, difficulties in document retrieval, and obstacles in the archiving process, ultimately impacting operational efficiency (Rumengan et al., 2021).

The *Surat Kepala Keputusan BRIN No. 224 Tahun 2022* was issued to harmonize the archives classification system across all *BRIN* units. This policy is designed to categorize archives based on facilitative and substantive functions, thus making document management more structured, efficient, and accessible. However, a brief observation at the *BRIN* Office reveals that the implementation of the archives classification system (*SKA*) faces various challenges. Current archival management still faces various problems, such as incorrect assignment of classification codes by staff due to a lack of understanding of its structure and principles, limited outreach and training, and a lack of integration between the official document management system and classification standards. These problems result in low consistency in archive organization, weak supervision by archivists and PICs, and hindered retrieval of archives needed for administrative and research purposes.

The *Peraturan BRIN No. 12 Tahun 2023* concerning the Obligation to Submit and Store Primary Data and Research Outputs emphasizes that all research documents are national assets that must be preserved through scientific repository mechanisms. In this context, implementing an archive classification policy is crucial to ensure the traceability, security, and accessibility of research data. Without an adequate classification system, digital repositories risk failing to support scientific information transparency and research efficiency (Sari & Putra, 2024).

From a human resources perspective, digital literacy among employees remains a challenge. Competence in metadata systems, indexing, and electronic records management is not evenly distributed across units. Limited training and a lack of incentives also reduce employee motivation to implement the policy. Weaknesses in organizational culture are evident in the prevailing perception that records management is merely a technical task, rather than a strategic knowledge

management function. Such a passive attitude hinders institutional transformation towards data-driven governance (Friedewald et al., 2024).

Within the framework of digital governance, *BRIN* (National Agency for Research and Innovation) must be a pioneer in implementing adaptive and transparency-oriented digital records governance. Janowski's (2015) Digital Governance Model provides a relevant framework for analyzing the stages of digitalization of public policy, from digitalization, transformation, engagement, to contextualization. This model allows policy implementation to be evaluated not only from a technical perspective but also in terms of changes in organizational behavior, employee participation, and policy alignment with the context. This study found that *BRIN* is still in the transition stage from digitalization to transformation, where technological readiness is in place but not yet fully matched by the readiness of human resources and an adaptive bureaucratic structure.

In addition to internal factors, the success of archive classification policies also depends on regulatory support and leadership commitment. Without a measurable evaluation system, policies tend to operate administratively without generating substantive change. Weak oversight can create inconsistencies in the application of classification codes across units. In the long term, this condition can reduce the efficiency of national research due to slow and inaccurate archive retrieval processes. Furthermore, poor archive management can hinder public access to information, as mandated by the *Undang-Undang No. 43 Tahun 2009* concerning Archives Management.

Strengthening the archive classification policy at *BRIN* is not only an administrative necessity but also crucial for the sustainability of the nation's scientific knowledge. Research archives are authentic evidence of research achievements that can be utilized for innovation, policy evaluation, and public accountability. Without a reliable classification system, the risk of data loss and research duplication increases, negatively impacting institutional performance and the efficient utilization of the national research budget.

Based on these conditions, this study seeks to deeply analyze the factors hindering the implementation of the archive classification policy at *BRIN* and its impact on the accessibility of research archives. This study also aims to formulate an optimization strategy using a SWOT analysis and Janowski's (2015) Digital Government model. This approach is expected to produce a comprehensive strategy from the perspectives of technology policy, human resources, and institutions. By implementing the right strategy, *BRIN* is expected to build an effective, transparent, and sustainable archive management system, which will serve as a foundation for strengthening national knowledge governance.

B. METHOD

This research was conducted at the Archives Unit I of the National Agency for Research and Innovation (*BRIN*), located in Jakarta. This unit plays a strategic role as the center for managing the national archives system at *BRIN*, as well as supervising and mentoring other archives units across all work units. The research location was selected based on the unit's function, which is directly related to the development, guidance, and monitoring of the implementation of archives classification policies. In addition to Archives Unit I, this research also involved

several other archive-producing units, such as research units and administration units, to gain a more comprehensive understanding of the implementation process of archives classification policies at the National Research and Innovation Agency (*BRIN*), as stipulated in the *Peraturan Kepala BRIN Nomor 224 Tahun 2022*.

This research used a qualitative approach with a descriptive research design. Data sources consisted of primary and secondary data. Primary data were obtained through in-depth interviews with informants deemed to have a substantial and operational understanding of archives classification policies. Informants included structural officials of Archives Unit I, archivists, and archives management staff from several work units. Secondary data was obtained from official documents such as the *Surat Keputusan Kepala BRIN Nomor 224 Tahun 2022*, annual archival reports, archive classification guidelines, and relevant scientific literature. This combination of data sources aims to provide a comprehensive overview of policy implementation and the challenges faced in practice. Data collection techniques included in-depth interviews, observations, and document reviews. Interviews were conducted to explore the experiences and perceptions of policy implementers regarding the archive classification process. Observations were conducted to directly examine archive management practices in the field, including the use of application systems and employee work patterns. Document reviews were used to analyze the policy content, archive classification structure, and the results of previous implementation evaluations. According to Sugiyono (2018), the combination of these three techniques enabled researchers to obtain more valid data through triangulation.

Data analysis was conducted interactively, referring to the model proposed by Miles, Huberman, and Saldaña (2014), which involves three main stages: data reduction, data presentation, and conclusion drawing. Data reduction was carried out by selecting relevant information and simplifying it according to the research focus. Data presentation is presented in the form of a narrative description that illustrates the relationships between findings. Conclusions were drawn inductively, based on patterns emerging from the empirical data. This process occurred concurrently with data collection to ensure a strong relationship between field findings and conceptual interpretations.

Data validity was tested using source and method triangulation techniques. Source triangulation was conducted by comparing information from various informants holding different positions and responsibilities. Method triangulation was conducted by combining the results of interviews, observations, and document reviews to ensure consistency of findings. According to Moleong (2019), triangulation is an important strategy for maintaining the credibility of qualitative data by checking the consistency of results across various sources and techniques.

C. DISCUSSION

The implementation of the Archives Classification Policy at the National Research and Innovation Agency (*BRIN*) is a strategic effort to standardize archives management within Indonesia's national research ecosystem. Transforming a long-established bureaucratic culture into a digitally oriented and

knowledge-based management system is a multidimensional process that goes beyond regulatory compliance. The analysis in this section is structured around the four stages of Janowski's Digital Government Model: digitalization, transformation, engagement, and contextualization. A SWOT analysis is also applied to identify internal and external factors influencing the policy's effectiveness. Each stage reflects not only the technical dimensions of digital adoption but also the behavioral, institutional, and policy adaptation processes that determine the overall success of implementation.

Essentially, the archives classification reform at *BRIN* aims to unify the diverse legacy systems of its predecessor institutions, such as *LIPI*, *LAPAN*, *BATAN*, and *BPPT*, into a coherent national framework that ensures the accessibility, authenticity, and accountability of research archives. However, realizing this goal faces several interrelated challenges. Field observations and interviews revealed that digital transformation is hampered by uneven levels of digital literacy among employees, limited leadership commitment, and fragmented integration between archival systems. Although technological infrastructure is available through *TNDE*, *SINAR*, and *SRIKANDI*, these systems remain underutilized due to weak cross-unit coordination and a lack of user participation.

Cultural and structural inertia also play a significant role in shaping implementation outcomes. Many *BRIN* employees still view record-keeping as a purely administrative task, rather than a strategic component of institutional knowledge governance. This perception results in inconsistent archival practices, incomplete metadata classification, and delays in information retrieval, all of which hinder efficiency and transparency in research management. The lack of participatory communication during policy dissemination reinforces a top-down pattern that stifles innovation and diminishes ownership among staff. As a result, digitalization initiatives have not yet developed into a holistic transformation that changes organizational behavior and optimizes the knowledge management cycle.

The following discussion examines each stage of Janowski's Digital Governance Model in detail, highlighting the technical achievements and institutional constraints that impact *BRIN*'s efforts towards archival modernization. Through this analysis, this study seeks to explain how implementation dynamics interact with leadership, human resource capacity, and policy coherence, thereby providing a fundamental understanding of the challenges and opportunities in building a digitally adaptive archiving system for national research governance.

Digitalization Stage

The digitalization phase at the National Research and Innovation Agency (*BRIN*) reflects the initial phase of policy implementation, where archives management began to shift from manual record-keeping to a structured electronic environment. This phase demonstrates the organization's awareness of the strategic importance of information technology for preserving research data and supporting transparency. *BRIN* has developed and adopted several digital platforms, including the Electronic Office System (*TNDE*), the National Research Information System (*SINAR*), and the National Archives Application (*SRIKANDI*). These systems are designed to facilitate document storage,

classification, and retrieval. However, in practice, the digitalization process has not been fully integrated into daily operations. Many archivists still rely on manual input and inconsistent metadata tagging, resulting in limited efficiency and difficulties in cross-referencing research archives across various units.

Interviews with several officials and system administrators revealed that the main obstacle at this stage is not a lack of infrastructure, but rather uneven levels of digital literacy and motivation among human resources. Some employees view digital systems as merely additional administrative tools, rather than as transformative instruments that can streamline workflows and ensure the long-term preservation of scientific knowledge. The lack of metadata training and standardized technical guidance leads to inconsistent document classification, which in turn impacts data integrity. Leadership commitment also plays a crucial role; without clear oversight and regular evaluation, digital initiatives tend to stagnate and lose momentum over time.

Another issue is the fragmentation between systems that ideally operate within a unified framework. Existing platforms function separately without seamless interoperability, leading to data redundancy and duplication. For example, documents stored in *TNDE* are not automatically synchronized with *SINAR*, and the link between *SRIKANDI* and *BRIN*'s internal repositories remains partial. This lack of integration not only undermines the goal of centralized archives management but also weakens institutional accountability. From an analytical perspective, this situation reflects the early stages of digital government evolution, where digitization has occurred but has not been accompanied by procedural transformation.

To strengthen the digitalization phase, *BRIN* must prioritize several strategic actions such as developing comprehensive metadata standards, integrating all archival systems into a single digital platform, and implementing ongoing digital literacy programs for employees. The implementation of these initiatives will help ensure that the digitization process does not stop at converting paper archives into electronic files, but develops into a reliable digital ecosystem that supports the accessibility, security, and sustainability of information for future research governance.

Transformation Stage

The transformation phase is a critical phase where digitalization should begin to transform institutional processes, work behaviors, and organizational culture. In the context of *BRIN*, this phase has not yet demonstrated a full transition from procedural change to behavioral adaptation. The archives classification system has been formally implemented through regulations and digital tools, but the daily practices of many staff remain rooted in manual routines inherited from their previous institutions. The transformation, which was expected to create a more agile, data-driven, and collaborative work environment, still faces obstacles due to monotonous bureaucracy and limited awareness of the long-term value of digital archives.

Field observations and interview data indicate that most employees view classification activities as an additional burden, rather than an integral part of institutional accountability. This perception results in low consistency in data

input and delays in document verification. A culture of compliance has not been fully replaced by a culture of innovation and responsibility. Furthermore, the supervision and evaluation mechanisms that should reinforce behavioral change remain weak. Unit-level leaders tend to focus on administrative reporting, rather than on performance outcomes related to archive accuracy and accessibility. As a result, the transformation process is procedural, insubstantial, and fails to produce significant improvements in efficiency and service quality.

Another challenge identified at this stage is the absence of a structured reward and punishment system that can motivate behavioral change. Employees who actively contribute to digital adaptation rarely receive recognition, while those who ignore digital protocols face no tangible consequences. This imbalance dampens collective enthusiasm and diminishes the sense of ownership of the digital system. Consequently, the transformation process becomes heavily reliant on individual initiative, rather than institutional direction. This type of dependency risks sustainability, as it can collapse when key individuals are transferred or retire.

From a theoretical perspective, these findings confirm Janowski's argument that digital transformation requires not only technological or procedural modifications, but also fundamental shifts in organizational values and leadership styles. Without fostering digital discipline and shared responsibility, archive classification reform will remain superficial. To advance this stage, *BRIN* needs to institutionalize ongoing mentoring, encourage digital leadership at all levels of management, and align human resource policies with digital performance indicators. This alignment will ensure that the transformation is embedded not only in systems and documents, but also in the organization's collective mindset, forming a solid foundation for further engagement and contextualization in the next stage of digital government maturity.

Engagement Stage

The engagement stage reflects the extent to which stakeholders are actively involved in the process of implementing and improving archive classification policies. In the case of *BRIN*, this stage demonstrates a significant gap between policy design and practical participation. Engagement is still largely driven by top-down directives, rather than collaborative mechanisms that empower employees to contribute ideas and feedback. The dissemination of policy guidelines, training sessions, and system usage instructions tends to be one-way, focusing on compliance rather than shared learning. As a result, many staff implement classification procedures mechanically without fully understanding their relevance to broader research governance and institutional transparency goals.

Interviews with archivists and researchers indicate that there are limited opportunities for two-way communication between policymakers, system administrators, and end-users. Suggestions for system improvements, metadata standards, or workflow simplification are rarely followed up with formal evaluation or feedback. This creates the perception that the system belongs solely to administrative leadership, rather than to the entire organization. As a result, employees become passive participants following orders, rather than active

collaborators shaping innovation. The absence of participatory dialogue also reduces the system's adaptability to meet specific field needs, particularly across research areas where archival materials vary in format, volume, and confidentiality.

This lack of engagement is further exacerbated by limited socialization and visibility of archival achievements within the organization. Success stories, digital milestones, or exemplary practices are rarely publicized, leading employees to underestimate the strategic importance of the classification system. This weakens collective motivation and isolates archives management from *BRIN*'s broader digital transformation narrative. Conversely, effective engagement must foster ownership and accountability through consistent communication, collaboration among employees, and recognition of best practices.

Based on these findings, this study emphasizes that engagement is a crucial determinant of sustainability in digital reform. Technology systems cannot function effectively without human commitment and shared values. To strengthen engagement, *BRIN* should adopt participatory communication strategies such as focus group discussions, user-centered system evaluations, and collaborative design workshops. These initiatives will foster dialogue between technical and non-technical personnel, bridge hierarchical gaps, and ensure that archival policies evolve in line with the organization's operational realities. Increased engagement will transform employees from passive implementers to proactive agents of change, ensuring that the digital archival ecosystem continues to evolve through collective ownership and shared learning.

Contextualization Stage

The contextualization stage marks the point at which digital governance and policy implementation are adapted to *BRIN*'s specific institutional context. At this stage, the archives classification policy should operate not merely as a technical regulation but as a living system that evolves with the organization's research priorities, structural complexity, and digital maturity. However, findings from interviews and document analysis indicate that *BRIN*'s contextualization efforts remain limited. This classification system, while comprehensive in its legal framework, remains rigid in practice and poorly responsive to the dynamic and multidisciplinary nature of *BRIN*'s research environment. The uniform coding structure applied across all research units often fails to accommodate the unique characteristics of different scientific fields, resulting in metadata inconsistencies and misclassification of research outputs.

This rigidity is partly due to the centralization of policy design, which prioritizes administrative standardization over contextual flexibility. While centralized control ensures procedural compliance, it often limits innovation at the operational level. For example, researchers working on emerging interdisciplinary topics struggle to categorize their projects within existing classification schemes, forcing them to choose codes that do not accurately represent their research focus. This situation diminishes the analytical value of the archival database and hinders information retrieval, as the classification does not fully reflect the true diversity of *BRIN*'s research portfolio. Furthermore, limited integration between digital

archives and existing research management platforms creates duplication of data entry and undermines institutional learning from previous projects.

Another contextual issue arises from the varying levels of digital readiness across *BRIN*'s regional and thematic research centers. Units located outside Jakarta often face infrastructure challenges such as unstable internet connections, limited server access, and inadequate technical support. This disparity complicates the uniform implementation of digital archival policies and risks creating unequal access to institutional knowledge. Therefore, a uniform classification and digitization approach cannot effectively support *BRIN*'s diverse research infrastructure ecosystem. Instead, a contextualized implementation must consider the heterogeneity of resources, capacities, and knowledge practices within the organization.

To strengthen contextualization, *BRIN* needs to revise its archival policy by adopting a modular and adaptive framework that allows each research domain to customize metadata categories while maintaining interoperability with the central repository. Regular policy evaluations involving representatives from various disciplines will ensure that revisions remain aligned with administrative needs and scientific developments. Furthermore, the integration of artificial intelligence tools for automatic classification and cross-referencing can help bridge the gap between standardization and flexibility. By instituting these adaptive mechanisms, *BRIN* will move beyond compliance-based digitalization to a responsive and sustainable knowledge governance model capable of supporting Indonesia's evolving research landscape.

Strategic Recommendations

Based on the four-stage analysis of Janowski's Digital Governance Model, the implementation of *BRIN*'s Archives Classification Policy can be strategically strengthened through a comprehensive approach that integrates technology, human resources, and policy dimensions. The SWOT analysis conducted in this study identifies key strengths, weaknesses, opportunities, and threats that collectively shape the direction of reform. Understanding these internal and external conditions provides the basis for designing practical recommendations that are not only corrective but also transformative in building a sustainable digital archival ecosystem.

In terms of strengths, *BRIN* has a solid legal framework that legitimizes its archives classification system. The issuance of Regulation No. 224 of 2022 and its alignment with national digital governance policies demonstrates the institution's formal commitment to reform. Furthermore, *BRIN* has operated several advanced digital infrastructures, such as *SINAR*, *TNDE*, and *SRIKANDI*, which provide a technical foundation for electronic archive storage and information sharing. These systems demonstrate the institution's technological readiness, although their potential has not yet been fully utilized.

The weaknesses identified in this study are primarily human and organizational. Limited digital literacy among archivists, inconsistent understanding of classification procedures, and lack of motivation hinder the effective use of the system. Leadership commitment remains uneven across units, resulting in fragmented implementation. Furthermore, weak oversight

mechanisms and the absence of performance indicators for digital compliance contribute to slow progress. These weaknesses demonstrate that technology availability alone is insufficient without cultural and managerial transformation.

Regarding opportunities, *BRIN* operates in a conducive national context, marked by government initiatives promoting digital transformation and open data policies. The integration of artificial intelligence and machine learning into archival systems offers new possibilities for automated classification, metadata analysis, and predictive search. Collaboration with universities, research institutions, and the National Archives of Indonesia can also enhance capacity building and policy harmonization. Furthermore, growing public demand for transparency and open science creates momentum for *BRIN* to position itself as a leader in digital knowledge governance.

However, several threats remain that could undermine policy sustainability. Bureaucratic inertia and persistent manual work habits continue to hamper reform. Concerns about data security and intellectual property rights have made some researchers hesitant to fully adopt digital repositories. Budget constraints for system maintenance and training further limit scalability, while frequent institutional restructuring risks undermining the long-term sustainability of the policy. These threats, if not addressed through proactive measures, could lead to stagnation in digital reform.

Summarizing the findings from this SWOT analysis, this study proposes an integrated strategy encompassing three main pillars. First, technology integration should prioritize interoperability between *TNDE*, *SINAR*, and *SRIKANDI* to ensure a unified data ecosystem supported by AI-based automated classification and cloud security standards. Second, human resource development should focus on ongoing digital literacy programs, competency-based training, and the creation of digital champions in each research unit who can act as local innovators and mentors. Third, policy reform should emphasize revising rigid classification codes into a more flexible, modular system that reflects the multidisciplinary nature of *BRIN*'s research, while also instituting clear evaluation mechanisms and incentive structures for compliance.

D. CLOSING

Conclusion

The implementation of the Archives Classification Policy at the National Research and Innovation Agency (*BRIN*) reflects both progress and ongoing challenges in Indonesia's broader transition to digital governance. The study concludes that the policy has built a solid institutional and technological foundation, but has not yet reached its full transformative potential. These findings suggest that *BRIN*'s digitalization efforts remain focused on system implementation, rather than building a culture of accountability, collaboration, and innovation among employees. Ultimately, the problem lies not in the lack of infrastructure, but rather in the uneven adaptation of human resources and organizational norms that must accompany technological change.

Analysis of the four stages of Janowski's Digital Governance Model demonstrates clear progress, but also highlights structural limitations that hinder

progress. The digitalization stage shows that although digital systems such as *SINAR*, *TNDE*, and *SRIKANDI* are operational, their use remains inconsistent due to limited digital literacy and metadata management skills. The transformation stage highlights the dominance of procedural compliance over behavioral change, suggesting that digital tools have not reshaped institutional habits or accountability structures. The engagement stage demonstrates a lack of participatory mechanisms and bottom-up feedback, resulting in minimal employee ownership of the digitalization agenda. Finally, the contextualization phase emphasized that the policy framework remains too rigid to accommodate the complexity and interdisciplinary nature of *BRIN*'s research landscape.

The general conclusion from these findings is that effective digital archival governance cannot rely solely on technology implementation. It requires simultaneously strengthening human capacity, leadership commitment, and an adaptive policy framework. For *BRIN* to achieve a mature digital governance, it must bridge the gap between regulation and practice by integrating digital literacy, participatory engagement, and contextual flexibility into its daily operations.

Practically, there are three strategic priorities critical for future improvement. First, technology integration must unite all archival systems under an interoperable digital ecosystem that ensures smooth data flow, AI-powered classification, and metadata consistency. Second, human resource empowerment must be pursued through continuous professional development, performance-based incentives, and the institutionalization of digital champions who can lead innovation at the unit level. Third, policy refinement should include regular reviews of classification schemes and the implementation of adaptive mechanisms that accommodate disciplinary diversity while maintaining standardization.

By implementing these strategies, *BRIN* will not only improve the accessibility and reliability of its research archives but also strengthen its institutional credibility as a model for digital public administration. More broadly, this transformation can serve as a model for other government institutions in Indonesia seeking to align technological modernization with the principles of good governance, transparency, and knowledge sustainability.

Recommendation

Based on the conclusions drawn from this study, several recommendations can be formulated to improve the implementation and sustainability of the Archives Classification Policy at the National Research and Innovation Agency (*BRIN*). These recommendations aim to strengthen institutional readiness, ensure policy adaptability, and optimize the contribution of digital governance to national research management.

First, for *BRIN* institutional leaders, strategic commitment to digital transformation needs to be strengthened by establishing clear performance indicators, regular supervision, and measurable targets related to the accuracy and accessibility of archives. Leaders need not only to issue regulations but also to actively foster a culture of discipline and innovation among employees. Incentive systems, both financial and non-financial, need to be introduced to reward staff who demonstrate excellence in digital compliance and creative problem-solving in archives management. Furthermore, leaders should encourage inter-unit

collaboration to reduce fragmentation between research divisions and administrative departments, thus ensuring the digital system operates as an integrated ecosystem.

Second, for the archives and information management unit, efforts should focus on improving human resource competency through ongoing professional training. Digital literacy programs should be mandatory and phased in according to the level of responsibility and technical complexity of each employee's role. Training should encompass more than just technical skills, but also an understanding of metadata logic, data ethics, and information security. Equally important is the establishment of internal digital leaders or mentors in each unit who can provide hands-on guidance and troubleshoot operational issues. Such initiatives will gradually build a culture of learning and accountability that supports long-term digital governance.

Third, for policymakers and system developers, the recommendation is to adopt a more adaptive and participatory approach to policy design. Archive classification codes need to be reviewed periodically to accommodate emerging research disciplines and interdisciplinary studies. Policymakers need to involve practitioners, researchers, and system users at every stage of revision to ensure that regulations remain contextually relevant and operationally practical. From a technical perspective, system developers should prioritize interoperability, ensuring that *TNDE*, *SINAR*, and *SRIKANDI* can function within a unified platform with a synchronized database and standardized metadata structure.

Finally, for future researchers, it is recommended to expand the analytical framework by incorporating comparative studies with other government agencies or research institutions that have successfully implemented digital archival reforms. Such studies will contribute to a broader understanding of the institutional, cultural, and technological variables influencing digital transformation in the public sector. Future research could also focus on the socio-technical dimensions of archival policy, examining how user behavior, organizational identity, and technological innovation interact to shape a sustainable digital ecosystem.

Collectively, these recommendations aim to position *BRIN* as a leading example of digital governance in Indonesia's research sector. The integration of technology, human resources, and policy reforms will not only ensure effective archival management but also strengthen the institution's role as a hub of scientific knowledge supporting national innovation and accountability.

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