

Bridging Global Standards and Local Contexts: A Hybrid Metadata Framework for ASEAN GLAM Institutions

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Abstract

This study addresses the persistent challenges of metadata interoperability and cultural inclusivity within Galleries, Libraries, Archives, and Museums (GLAM) institutions in the ASEAN region. It proposes a hybrid metadata framework that integrates international standards—such as Dublin Core, CIDOC-CRM, and EAD—with culturally responsive elements including indigenous protocols, multilingual support, and post-custodial metadata practices. Employing a mixed-methods approach, the research combined thematic analysis of existing metadata practices with case studies on Indonesian and Thai heritage collections. The resulting framework, implemented in the ASEAN GLAM Repositories prototype system, features modular metadata categories and technologies such as OAI-PMH, JSON API, and blockchain-based provenance tracking. Evaluation results indicate the framework preserves 98% metadata integrity, supports 47 minority languages across six scripts, and significantly enhances cross-institutional interoperability and user engagement. The findings demonstrate that ethical, context-aware metadata design is both feasible and impactful for digital heritage management. This study contributes a scalable model for inclusive and sustainable metadata practices, with broad applicability for global GLAM environments seeking to balance technical rigor with cultural sensitivity.

Keywords

Metadata Interoperability, GLAM Institutions, Hybrid Metadata Framework, Cultural Heritage Digitization, ASEAN Digital Repositories


1. Introduction

The digital transformation of cultural heritage institutions presents both opportunities and challenges, especially for the Galleries, Libraries, Archives, and Museums (GLAM) sector in ASEAN countries. While global metadata standards like Dublin Core and CIDOC-CRM enhance interoperability, they often fall short in capturing the cultural specificities of non-Western contexts. Consequently, this study addresses critical gaps in metadata integration by proposing

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a hybrid metadata framework tailored to ASEAN GLAM institutions, combining international standards with culturally responsive descriptors [1], [2], [3].

2. Methods

A mixed-method approach was adopted, incorporating systematic literature review, thematic analysis of metadata practices, and framework development. Metadata standards such as Dublin Core, EAD, FOAF, and CIDOC-CRM were analyzed alongside community-informed practices including indigenous protocols and post-custodial metadata. Case studies involving Indonesian colonial records and Thai multilingual archives informed the hybrid framework. The metadata model was implemented within the ASEAN GLAM Repositories system, utilizing OAI-PMH, JSON API, and blockchain for provenance tracking.

3. Results

The resulting metadata framework encompasses core categories (Title, Creator, Format), repository-specific elements (e.g., Art Style, ISBN, Provenance), and extended components (e.g., Accessibility, Legal, Cultural metadata). It supports 47 minority languages across six scripts and preserves 98% metadata integrity. The ASEAN GLAM Repositories prototype demonstrated improved discoverability, user engagement, and cross-institutional interoperability. Integration with FAIR principles (Findable, Accessible, Interoperable, Reusable) was achieved through persistent identifiers, semantic mappings, multilingual vocabularies, and provenance tracking using PREMIS and blockchain [4], [5], [6].

4. Discussion

This research advances current metadata scholarship by bridging the divide between standardized interoperability and cultural contextualization. Unlike prior works that focus solely on technical standards [7], [8], this framework operationalizes ethical and participatory approaches to metadata creation, informed by Caswell's liberatory metadata [9] and Cui et al.'s participatory archiving [10]. The modular design enables adaptation across GLAM domains while supporting user-generated content and local knowledge systems. However, challenges remain in scalability and institutional readiness, necessitating further empirical validation.

5. Conclusion

This study offers a replicable and scalable metadata framework that addresses both technical and cultural dimensions of digital heritage management. The ASEAN GLAM Repositories system illustrates how combining global standards with local innovations can promote ethical stewardship, inclusivity, and sustainable digital preservation. Future work should explore AI-assisted metadata tools and broader cross-regional validation to enhance applicability and impact.

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References

- [1] G. Candela, "Towards a semantic approach in GLAM Labs: The case of the Data Foundry at the National Library of Scotland," *Journal of Information Science*, 2023. [Online]. Available: <https://doi.org/10.1177/01655515231174386>
- [2] M. R. Hendrawan, A. M. Isa, and A. Z. H. Samsudin, "Metadata interoperability for cultural heritage digital repositories: A case study in Indonesian world heritage site memory institutions," *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 14, no. 8, pp. 545–561, 2024. [Online]. Available: <http://dx.doi.org/10.6007/IJARBSS/v14-i8/22226>
- [3] L. Laksmi, M. F. Suhendra, S. M. Shuhidan, and U. Umanto, "The readiness to implement digital humanities data curation of four institutional repositories in Indonesia," *Digital Library Perspectives*, vol. 40, no. 1, pp. 80–95, 2024. [Online]. Available: <https://doi.org/10.1108/DLP-04-2023-0031>
- [4] Q. Wang, F. Zhu, S. Ji, and Y. Ren, "Secure provenance of electronic records based on blockchain," *Computers, Materials & Continua*, vol. 65, no. 2, 2020. [Online]. Available: <https://doi.org/10.32604/cmc.2020.07366>
- [5] M. L. Zeng and J. Qin, *Metadata*. Chicago, IL: American Library Association, 2020.
- [6] R. Bettivia, Y. Y. Cheng, and M. R. Gryk, *Documenting the Future: Navigating Provenance Metadata Standards*. Cham: Springer, 2022.
- [7] M. Baca, *Introduction to Metadata*, 3rd ed. Los Angeles, CA: Getty Publications, 2016.
- [8] A. Massari and S. Peroni, "HERITRACE: Tracing evolution and bridging data for streamlined curatorial work in the GLAM domain," *arXiv preprint*, arXiv:2402.00477, 2024.
- [9] M. Caswell, *Urgent Archives: Enacting Liberatory Memory Work*. New York, NY: Routledge, 2021.
- [10] C. Cui, S. Pinfield, A. Cox, and F. Hopfgartner, "Participatory web archiving: multifaceted challenges," in *Proc. Int. Conf. on Information*, Cham: Springer Nature Switzerland, Mar. 2023, pp. 79–87. [Online]. Available: https://doi.org/10.1007/978-3-031-28035-1_7