A Multivocal Literature Review of Metadata Governance: Conceptual Foundations and Research Gaps

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***Abstract*—As digital ecosystems grow and cross-organizational data sharing intensifies, metadata governance has become increasingly important. It plays a critical role in supporting interoperability, accountability, and sustainable data ecosystems. However, metadata governance remains conceptually fragmented and insufficiently structured as a distinct research domain. This study conducts a multivocal literature review (MLR) that integrates academic publications with authoritative non-academic sources, including international standards, governance frameworks, and regulatory instruments. A systematic review process was applied to identify governance constructs, recurring patterns, and conceptual gaps across heterogeneous evidence sources. The findings show that no peer-reviewed studies explicitly integrate metadata governance with formal conceptual structuring. This finding should not be interpreted as a limitation of the search process, but rather as an empirical indication of a structural gap in the literature. It provides a methodological justification for extending the analysis to multivocal evidence. The results further indicate that existing studies predominantly emphasize metadata management and technical interoperability. In contrast, governance-level constructs—such as decision rights, accountability mechanisms, oversight structures, and lifecycle coordination—remain underdefined and inconsistently formalized. This study synthesizes fragmented knowledge into a coherent conceptual understanding of metadata governance, clarifies its distinction from metadata management, and identifies critical research gaps. These findings provide a structured foundation for advancing metadata governance as a cumulative research domain and support future conceptual and methodological research.**

***Keywords*—Metadata governance; multivocal literature review; data governance; metadata management; conceptual synthesis**

I. Introduction

As digital ecosystems expand and cross-organizational data exchange intensifies, governance-related issues concerning metadata have become increasingly important. However, metadata governance remains insufficiently established as an explicit and formally articulated research domain.

Metadata plays a foundational role in enabling semantic interoperability, as discussed by Foulonneau and Riley [1] and further emphasized in subsequent studies on metadata practices [2], [3]. With the acceleration of digital transformation and platform-based ecosystems, metadata has evolved beyond technical documentation into a strategic asset influencing reliability, regulatory compliance, and long-term sustainability of data infrastructures [4], [5].

Despite its strategic importance, metadata practices remain predominantly governed by schemas, registries, catalogs, and interoperability standards. Governance concerns - such as decision authority, accountability allocation, policy enforcement, risk management, and lifecycle oversight - remain weakly articulated, fragmented across technical practices, or embedded within implementation-specific contexts. Widely adopted interoperability and registry standards emphasize syntactic and structural alignment rather than formal governance architectures [6], [7], [8], [9], [10], [11], while regulatory instruments on security and personal data protection impose compliance obligations without establishing explicit governance models for metadata [12], [13], [14], [15].

From an academic perspective, metadata research largely concentrates on metadata management, interoperability engineering, repository architectures, and domain-specific applications, whereas governance dimensions remain under-theorized and inconsistently implemented [1], [3]. Practitioner frameworks and empirical studies typically provide operational checklists, maturity models, and tooling guidance but rarely define governance structures that clarify decision rights, accountability mechanisms, and control models [16], [17]. Consequently, metadata governance has not yet emerged as a consolidated scientific domain supported by shared conceptual frameworks or validated structural models.

At the policy and infrastructure level, international organizations consistently identify inconsistent metadata standards and weak cross-organizational coordination as major barriers to interoperability and data reuse in digital government and open data ecosystems [18], [19], [20]. Similar governance challenges are evident in both national and global contexts. Empirical studies in Indonesia report persistent difficulties in metadata harmonization, interoperability, and institutional coordination despite regulatory mandates [21], [22], while international assessments highlight metadata governance capability as a critical determinant of interoperable data ecosystems [23].

Conceptually, the absence of integrated frameworks and formal metamodels further exacerbates fragmentation in metadata governance research and practice. To clarify the analytical scope of this study, conceptual structuring refers to the explicit representation of governance constructs and their relationships in a systematic and formalized manner.

Although conceptual frameworks and metamodels are widely used in enterprise architecture and information systems to structure domains and enable traceability [24], their systematic application in metadata governance remains limited. Existing standards and professional guidance address isolated components - such as registries, schemas, stewardship roles, or compliance controls - without consolidating them into coherent governance architectures or formalized conceptual models. This fragmentation hinders validation, reuse, cross-context comparison, and cumulative theoretical development.

Preliminary systematic searches indicate a significant lack of peer-reviewed studies explicitly integrating metadata governance with formal modeling or metamodeling approaches. This gap motivates the inclusion of authoritative grey literature capturing standards, industry frameworks, and regulatory instruments [25], and justifies the use of a multivocal literature review (MLR) to synthesize academic and practice-driven knowledge. This is particularly relevant because governance constructs are often institutionalized in standards, regulatory frameworks, and professional practices rather than in peer-reviewed academic publications.

Despite the increasing recognition of metadata governance in both academic and practitioner domains, there is still a lack of measurable and formally defined structures that characterize its maturity as a research domain. Existing studies do not provide 1) formally defined governance structures, 2) explicit decision-right models, and 3) clearly articulated conceptual representations of metadata governance.

This limitation is empirically supported by the systematic review results presented in Section IV, where zero eligible peer-reviewed studies were identified that explicitly integrate metadata governance with formal conceptual modeling or metamodeling approaches. The absence of formal conceptualization, combined with fragmented terminology and inconsistent articulation of governance constructs across sources, suggests limited theoretical consolidation rather than mere publication scarcity. This absence indicates not only a research gap, but also a lack of conceptual consolidation and methodological rigor within the field. This outcome was consistent across multiple query formulations and databases, indicating robustness of the search process rather than query bias.

Accordingly, this study conducts a multivocal literature review integrating scholarly publications and grey literature to examine the conceptual foundations of metadata governance. The study is guided by the following research questions:

RQ1. What thematic areas and research focal points have been explored in studies related to metadata governance and associated metamodeling perspectives?

RQ2. How thoroughly do current studies address the governance aspects of metadata, encompassing domain scope, process structures, and conceptual components?

RQ3. To what extent are validation approaches reported in studies related to metadata governance and its conceptual representation?

RQ4. What conceptual and methodological gaps remain in advancing metadata governance as a coherent research domain?

The remainder of this paper is structured as follows. Section II presents the conceptual background. Section III describes the research methodology. Section IV reports the findings and synthesis. Section V discusses implications and future directions, followed by the conclusion in Section VI.

This study contributes by synthesizing dispersed governance evidence through a multivocal literature review, clarifying the conceptual boundaries between metadata governance and metadata management, and providing a structured conceptual foundation for future research on metadata governance.

II. Conceptual Background

A. Governance and Management

Governance is commonly defined as the system through which organizations are directed and controlled, encompassing the allocation of decision authority, accountability structures, and oversight mechanisms that guide strategic outcomes. The G20/OECD Principles of Corporate Governance frame governance as the institutional arrangement through which objectives are set, performance is monitored, and accountability relationships are structured among governing bodies, management, and stakeholders [26].

A fundamental distinction in governance literature separates governance from management. Governance focuses on setting direction, allocating decision rights, and ensuring oversight, whereas management concerns the planning and execution of operational activities within that direction [27]. In the data domain, Khatri and Brown conceptualize governance as the allocation of decision rights and accountabilities across key decision areas, emphasizing who has authority to decide and who is responsible for outcomes [28].

This distinction is further operationalized in IT governance standards. ISO/IEC 38500 defines governance as the system by which organizational use of technology is directed and controlled, positioning governance as a leadership function responsible for evaluating strategic options, directing management, and monitoring outcomes [29]. Similarly, COBIT distinguishes governance from management through the Evaluate–Direct–Monitor (EDM) domain, which represents the responsibilities of governing bodies in evaluating strategic needs, directing priorities, and monitoring performance and compliance [30], [31].

Together, these perspectives establish governance as a hierarchical and oversight-oriented function concerned with decision authority, accountability, and monitoring.

This governance–management distinction provides the conceptual foundation for positioning metadata governance as an institutional function focused on decision rights and accountability rather than purely operational metadata management.

B. Metadata and Metadata Management

Metadata is commonly defined as structured information that describes, explains, locates, or otherwise facilitates the management, use, and understanding of data resources [1], [7]. It provides semantic context, provenance information, quality indicators, and structural descriptions that enable interoperability and meaningful reuse across heterogeneous systems [2], [3].

Within the data management discipline, DAMA-DMBOK defines metadata as information that describes data assets and provides context for their meaning, quality, structure, ownership, lineage, and usage across the organization [32]. DAMA emphasizes that metadata represents a critical organizational asset because it enables consistency, discoverability, governance enforcement, and integration across enterprise data ecosystems.

DAMA further defines metadata management as the discipline responsible for planning, implementing, and controlling the activities required to create, maintain, integrate, and govern metadata throughout its lifecycle [32]. Metadata management encompasses activities such as metadata modeling, standards definition, registry and catalog management, lineage tracking, quality profiling, and metadata integration with operational and analytical platforms.

International standards complement this perspective by formalizing metadata structures and interoperability mechanisms. ISO/IEC 11179 specifies the structure and management of metadata registries, while ISO/IEC 19763 addresses interoperability and model-driven metadata integration across heterogeneous systems [7], [10]. These standards primarily focus on syntactic consistency, semantic alignment, and technical interoperability rather than institutional governance mechanisms.

Although metadata management establishes the operational foundation for managing metadata assets, it does not explicitly address governance questions such as decision authority, accountability allocation, policy enforcement, compliance assurance, risk oversight, and long-term institutional sustainability. As a result, organizations may achieve technically mature metadata infrastructures while lacking coherent governance structures that ensure strategic alignment, accountability, and cross-organizational consistency.

C. Data Governance and its Relationship to Metadata

Building on the governance foundations discussed earlier, data governance is commonly conceptualized as the institutional arrangement of decision rights, accountabilities, policies, and control mechanisms that ensure data is managed as a strategic organizational asset. From a design perspective, Khatri and Brown conceptualize data governance through explicit allocation of decision rights across key decision domains, including data principles, data quality, access and security, regulatory compliance, and data architecture [28]. These decision domains are operationalized through decision-rights matrices to clarify authority and accountability within organizations.

Complementing decision-rights perspectives, governance has also been conceptualized as an organizational capability that aligns roles, responsibilities, and governance processes to sustain data quality and regulatory compliance [33]. Accountability structures are often operationalized through responsibility assignment mechanisms, such as RACI models, which clarify authority and auditability across governance domains [34]. Practitioner-oriented frameworks further consolidate governance design into integrated operating models encompassing organizational structures, policies, processes, and performance metrics [35].

Within enterprise data management bodies of knowledge, DAMA defines data governance as the function that establishes accountability, policies, and decision rights to ensure effective data management across the organization [32]. In DAMA's framework, metadata is explicitly governed under the scope of data governance but operationalized through the metadata management knowledge area, highlighting policy enforcement, stewardship roles, and governance structures as core mechanisms.

Although metadata is recognized as a critical enabling component supporting discoverability, traceability, and auditability, governance frameworks generally treat metadata as a supporting artifact rather than as a governance object in its own right. Decision structures and control mechanisms are primarily defined at the data asset level without formalizing governance structures specifically for metadata. This implicit positioning creates conceptual ambiguity: while data governance establishes general governance principles, it does not sufficiently articulate how metadata itself should be governed as an institutional asset with its own lifecycle, risks, and compliance implications.

Empirical and practitioner studies indicate that weaknesses in metadata management and governance directly affect decision quality, operational risk, and compliance exposure [4], [5]. Yet, these studies rarely articulate explicit governance structures for metadata, reinforcing the need for a dedicated conceptual consolidation of metadata governance.

D. Metadata Governance as an Emerging Domain

Building on the governance foundations discussed above, metadata governance can be understood as the system of policies, roles, decision rights, controls, and assurance mechanisms that regulate how metadata is defined, maintained, shared, protected, and evolved across organizational boundaries. This definition represents a synthesized conceptual interpretation derived from the literature, rather than an established or universally accepted definition. Unlike metadata management, which focuses on operational execution, metadata governance addresses institutional authority, accountability, compliance, and long-term sustainability. In this study, metadata governance is positioned not merely as an extension of data governance applied to metadata, but as a distinct governance object with its own decision scope, lifecycle considerations, and risk profile.

Explicit use of the term metadata governance remains limited in both academic and practitioner sources. Among established bodies of knowledge and professional frameworks, explicit conceptualization of metadata governance as a distinct domain remains largely absent. DAMA-DMBOK is currently the only widely recognized reference that explicitly uses the term, yet even within this framework, metadata governance is not treated as an independent domain but is embedded within metadata management [32]. This reflects a limitation in the current body of knowledge, where metadata governance has not yet been formalized as an independent conceptual domain across multiple authoritative sources.

In contrast, broader governance frameworks such as ISO/IEC 38500 and COBIT 2019 provide general governance principles - such as decision rights, accountability, and oversight - but do not explicitly address metadata governance as a distinct conceptual domain. This indicates a structural gap in the literature rather than selective reliance on a single reference.

In academic literature, governance dimensions are typically addressed only implicitly and are not formalized as explicit governance constructs or models. Metadata-related studies typically focus on interoperability, quality, registries, or domain-specific standards rather than governance structures [1], [3]. Practitioner frameworks and industry sources provide operational guidance on stewardship and tooling, but seldom articulate governance mechanisms in a systematic or formalized manner [16], [17].

Regulatory and standardization documents [12], [13] introduce obligations related to security, privacy, and accountability that indirectly affect metadata governance. However, these instruments do not provide integrated governance architectures or conceptual models specific to metadata, reinforcing the absence of a formalized governance structure.

Taken together, existing sources predominantly frame metadata governance as fragmented operational practices and tool-oriented guidance rather than as a governance-level construct grounded in explicit decision rights, accountability structures, and institutional control mechanisms. This fragmentation indicates that metadata governance remains an emergent domain without a consolidated theoretical or conceptual foundation. As a result, metadata governance has not yet consolidated into a coherent research domain with shared terminology, validated models, or cumulative theoretical development.

III. Research Methodology

A. Design of the Study

This study adopts a Multivocal Literature Review (MLR) design with qualitative document analysis to examine the state of the art of metadata governance as an emerging scientific domain [36], [37], [38]. The MLR approach is appropriate because relevant knowledge is distributed across both academic publications and non-academic sources.

The analysis focuses on governance-level constructs, including decision rights, accountability mechanisms, institutional roles, policy instruments, and formal control structures, while excluding purely technical implementation aspects.

The review process consists of four stages. First, relevant sources are systematically identified and screened using explicit inclusion and exclusion criteria. Second, governance-related constructs are extracted from eligible documents using qualitative document analysis. Third, extracted constructs are synthesized to identify recurring patterns, conceptual convergence and divergence, and structural gaps across academic literature, grey literature, and authoritative non-academic sources such as standards, regulatory documents, and governance frameworks. Finally, the synthesis is interpreted to produce a state-of-the-art mapping and to derive implications and a future research agenda. These stages are further operationalized in the subsequent subsections (Sections C–F), while Section B describes the overall review protocol and its methodological rationale.

B. Review Protocol and Rationale

The review protocol follows established guidance for systematic literature reviews [25] and multivocal literature reviews to ensure transparency and rigor [36], [37].

In this study, MLR integrates academic literature identified through database search with non-academic sources. Grey literature refers to non-peer-reviewed practitioner-oriented materials, while standards, regulatory documents, and governance frameworks are treated as authoritative sources providing normative perspectives.

The protocol operationalizes the four review stages described in Section A (identification, screening, extraction, and synthesis), which are further detailed in the subsequent subsections (Sections C–F).

C. Search Strategy and Data Sources

A two-stage search strategy was applied. Academic sources were retrieved from Scopus, IEEE Xplore, ScienceDirect, SpringerLink, SAGE Journals, and Taylor & Francis, covering publications from 2000 to 2025.

Non-academic sources were identified through targeted search using general search engines, Google Scholar, and official repositories of standards bodies, professional organizations, and regulatory institutions. This approach ensures coverage of heterogeneous evidence beyond peer-reviewed publications and is consistent with multivocal literature review practices [36], [37].

D. Inclusion and Exclusion Criteria

Sources were selected based on governance-level relevance and conceptual structuring of metadata. Academic sources were included if they were peer-reviewed publications (journal or conference papers), published in English, and explicitly addressed metadata governance and/or conceptual modeling perspectives, including structural or metamodel-related representations. Studies focusing solely on data governance or operational metadata management without governance-level abstraction were excluded.

Non-academic sources were included when originating from authoritative and traceable institutions, including grey literature,

standards bodies, professional organizations, and regulatory agencies. Sources lacking institutional authority or focusing purely on vendor-specific tooling or technical implementation were excluded to maintain a governance-level analytical focus.

E. Screening and Selection Process

Screening followed staged relevance filtering, including title and abstract screening followed by full-text assessment [25]. Duplicate records were removed during the screening process to ensure source uniqueness.

F. Data Extraction and Synthesis

Data extraction was conducted using qualitative document analysis to identify governance-related constructs, including decision rights, accountability structures, institutional roles, policy instruments, and control mechanisms [38]. Extracted constructs were iteratively compared and synthesized to identify recurring patterns, conceptual convergence and divergence, and structural gaps across academic literature, grey literature, and authoritative non-academic sources. Particular attention was given to distinguishing governance-level constructs from operational metadata management practices.

G. Quality Assessment and Source Evaluation

Quality assessment ensures source credibility, while analytical selection ensures conceptual relevance. Each selected source was evaluated based on three criteria: governance relevance, conceptual rigor, and evidence transparency. Governance relevance refers to the degree to which governance constructs are explicitly addressed. Conceptual rigor refers to the presence of structured models, frameworks, or formal definitions. Evidence transparency refers to the clarity of methodology, traceability of claims, and credibility of the source.

The quality assessment was conducted by the authors based on predefined criteria and was not intended as an objective measurement but as a structured analytical tool. The scoring supports consistent comparison across heterogeneous sources and reduces potential bias in interpreting multivocal evidence.

Each criterion was assessed using a three-level scale (low = 1, medium = 2, high = 3). To ensure consistency, each level was operationalized using indicative criteria. A high rating indicates that the source explicitly defines governance constructs, presents structured models or frameworks, and provides traceable and well-documented evidence. A medium rating indicates partial or implicit treatment of governance constructs, moderate conceptual structuring, or limited methodological transparency. A low rating indicates minimal or indirect reference to governance concepts, lack of formal structuring, or insufficient evidence transparency.

The final score reflects the overall contribution of the source to governance-level analysis. Lower-scoring sources were not excluded automatically, but were used cautiously to complement higher-quality sources, particularly when representing current industry practices. This approach ensures that the study's conclusions are not disproportionately influenced by weaker or purely descriptive sources.

Analytical roles were assigned independently from quality scores. Core sources were those that directly discuss metadata governance or metadata governance-related practices. Supporting sources were used to provide governance, compliance, security, or regulatory foundations for interpreting metadata governance. Contextual sources were used to explain metadata structures or technical foundations but were not used as primary governance evidence.

This quality assessment approach is adapted from established systematic literature review practices [25] and adjusted for multivocal literature review contexts [36], [37], where heterogeneous evidence sources must be evaluated consistently.

H. Analytical Selection Criteria

Following the quality assessment, a second-stage selection was applied to identify sources for core conceptual analysis. This stage focuses on governance-level relevance, particularly whether a source explicitly employs the term "metadata governance" or presents governance constructs such as decision rights, accountability structures, and control mechanisms.

Sources that primarily address operational, technical, or capability aspects without governance-level articulation were not included in the core analysis, even if they achieved high quality scores.

IV. Result

A. Results of the Systematic Literature Review (SLR)

The systematic literature review (SLR) was conducted across six academic databases using three query formulations targeting metadata governance and conceptual structuring. Table I reports the search outcomes by query and database, followed by title/abstract screening and full-text review. As shown in Table I, a total of 89 records were retrieved.

However, none of the retrieved studies were found to meet the inclusion criteria after title/abstract screening and full-text review. This result indicates that no peer-reviewed studies explicitly integrate metadata governance with formal conceptual structuring or metamodeling perspectives. This consistency across databases and query variations strengthens the validity of the result and reduces the likelihood of search bias or query formulation limitations.

This outcome should not be interpreted solely as a negative result, but rather as an indication of a conceptual and terminological gap in the literature. It reflects a conceptual gap in the literature, where 1) the term "metadata governance" is inconsistently used, 2) governance is often subsumed under broader data governance, and 3) governance perspectives are not integrated with formal modeling approaches. Therefore, this result provides a methodological justification for extending the evidence base beyond academic sources.

B. Multivocal Corpus and Evidence Landscape

Given the absence of eligible academic studies, the analysis was extended to non-academic and authoritative sources using a multivocal literature review approach.

TABLE I. SLR RESULTS BY QUERY AND DATABASE

No.	Query Description	Database	Initial Hits	After Title/Abstract Screening	After Full-Text Review
1	Metadata governance + metamodel terms	Scopus	0	0	0
		Taylor & Francis	0	0	0
		SAGE	0	0	0
		IEEE Xplore	0	0	0
		SpringerLink	0	0	0
		ScienceDIrect	0	0	0
2	Metadata governance + modeling frameworks	Scopus	16	0	0
		Taylor & Francis	9	0	0
		SAGE	6	0	0
		IEEE Xplore	0	0	0
		SpringerLink	27	0	0
		ScienceDirect	18	0	0
3	Metadata governance + conceptual structure	Scopus	7	0	0
		Taylor & Francis	1	0	0
		SAGE	0	0	0
		IEEE Xplore	0	0	0
		SpringerLink	1	0	0
		ScienceDirect	4	0	0
	TOTAL		89	0	0

These sources collectively represent heterogeneous evidence spanning structural, institutional, and practice-oriented perspectives. Standards (e.g., ISO/IEC 11179, ISO/IEC 19763) provide structural foundations for metadata representation, while governance frameworks (e.g., DAMA-DMBOK2, COBIT, ISO/IEC 38500, DCAM [39]) offer conceptual grounding for governance roles, controls, and accountability. Regulatory sources (e.g., GDPR, national data regulations) contribute compliance perspectives, and industry/practitioner sources reflect current implementation practices.

Table II presents the consolidated corpus of sources included in the multivocal literature review. The corpus reflects a heterogeneous evidence base, including academic literature, grey literature, international standards, governance frameworks, and regulatory sources.

TABLE II. CONSOLIDATED CORPUS OF SOURCES IN THE MULTIVOCAL LITERATURE REVIEW

No	Source	Type	Source Category	Rationale for Inclusion
1	DAMA-DMBOK2 Revised (2024) [32]	Industry Framework	Governance Framework	Primary reference for metadata management and governance practices
2	ISO/IEC 38500: Governance of IT for the Organization [29]	International Standard	Governance Standard	Provides governance principles (EDM, accountability)
3	COBIT 2019 [30], [31]	Industry Framework	Governance Framework	Defines governance domains and control structures
4	ISO/IEC 11179: Metadata Registries [7], [8], [9], [11]	International Standard	Metadata Standard	Defines metadata registry structures
5	ISO/IEC 19763: Metamodel Framework for Interoperability [10]	International Standard	Metadata Standard	Defines metamodel for interoperability
6	ISO 19115: Metadata for Geographic Information [6]	International Standard	Metadata Standard	Provides domain-specific metadata structure
7	ISO/IEC 27001: Information Security Management [13]	International Standard	Security Standard	Provides security governance context
8	General Data Protection Regulation (GDPR (EU 2016)) [12]	Regulation	Regulatory Source	Defines compliance and accountability obligations
9	Presidential Regulation of Indonesia No. 39/2019 on One Data Indonesia (Perpres 39/2019) [14]	Regulation	Regulatory Source	National data governance regulation
10	Law No. 27/2022 on Personal Data Protection (PDP Law) [15]	Regulation	Regulatory Source	Personal data protection framework
11	Metadata Governance in Media Industry [16]	Industry Study	Practice-Based Evidence	Demonstrates governance practices in industry
12	Atlan [40]	Industry Source	Grey Literature	Vendor-based governance practices
13	data.world [41]	Industry Source	Grey Literature	Metadata governance tooling and practices
14	Decube [42]	Industry Source	Grey Literature	Governance implementation practices
15	Dataversity [43]	Industry Source	Grey Literature	Educational and practitioner materials

16	DCAM v2.2 [39]	Industry Framework	Governance Framework	Data governance capability model
17	MetaStore [17]	Industry Framework	Academic	Metadata architecture model
18	COBIT-based IT Governance Metamodel [44]	Academic Model	Academic	Formal governance metamodel (reference)

In addition, practitioner-oriented sources such as Atlan [40], data.world [41], Decube [42], and Dataversity [43] illustrate how the term "metadata governance" is used in practice, often referring to operational and tool-oriented activities rather than formal governance structures.

C. Quality Assessment and Analytical Selection

Following corpus construction, all sources were evaluated using a structured quality assessment framework (Table III). The assessment considers governance relevance, conceptual rigor, and evidence transparency. Table III evaluates the entire corpus presented in Table II.

While most sources demonstrate high conceptual rigor, particularly standards and governance frameworks, quality assessment alone does not determine inclusion in the analytical synthesis.

A second-stage analytical selection was applied to identify sources relevant to governance-level conceptualization. Specifically, only sources that explicitly employ the term "metadata governance" or reflect governance constructs such as decision rights, accountability, and control mechanisms were included in the core analysis.

TABLE III. QUALITY ASSESSMENT AND ANALYTICAL CLASSIFICATION OF SOURCES

No	Source	Type	Gov. Relevance	Conceptual Rigor	Evidence Transparency	Score	Analytical Role
1	DAMA-DMBOK2 Revised (2024)	Industry Framework	High	High	High	3	Core
2	ISO/IEC 38500	International Standard	High	High	High	3	Supporting
3	COBIT 2019	Industry Framework	High	High	High	3	Supporting
4	ISO/IEC 11179	International Standard	Low	High	High	2	Contextual
5	ISO/IEC 19763	International Standard	Low	High	High	2	Contextual
6	ISO 19115	International Standard	Low	Medium	High	2	Contextual
7	ISO/IEC 27001	International Standard	High	High	High	3	Supporting
8	GDPR (EU 2016)	Regulation	High	Medium	High	3	Supporting
9	Perpres 39/2019	Regulation	High	Medium	High	3	Supporting
10	PDP Law (Indonesia)	Regulation	High	Medium	High	3	Supporting
11	Metadata Governance in Media Industry	Industry Study	Medium	Medium	High	2	Core
12	Atlan	Industry Source	Medium	Low	Low	1	Supporting
13	data.world	Industry Source	Medium	Low	Low	1	Supporting
14	Decube	Industry Source	Medium	Low	Low	1	Supporting
15	Dataversity	Industry Source	Medium	Low	Low	1	Supporting
16	DCAM v2.2	Industry Framework	Medium	High	High	3	Supporting
17	MetaStore	Industry Framework	Low	High	High	2	Contextual
18	COBIT-based IT Governance Metamodel	Academic Model	High	High	High	3	Supporting

This distinction ensures that quality assessment supports source credibility, while analytical selection determines conceptual relevance.

D. Governance-Level Conceptual Analysis

Based on the analytical selection, a subset of sources was examined in detail (Table IV). While Table III evaluates source quality and analytical roles, Table IV presents a governance-level interpretation of the same corpus to ensure traceability across the analysis. Table IV follows the same ordering as Table III to ensure traceability across the analysis. Selection is based on analytical relevance rather than quality score alone. These sources include governance frameworks, metadata standards, regulatory sources, practitioner-oriented materials, and conceptual references.

To distinguish governance from operational management, the analysis was grounded in governance theory, particularly ISO/IEC 38500 and COBIT, which conceptualize governance through decision rights, accountability, and the Evaluate–Direct–Monitor (EDM) cycle.

The analysis shows that while several sources employ the term "metadata governance," none fully satisfy formal governance criteria. Governance is generally embedded within metadata management practices rather than conceptualized as an independent governance system.

These findings indicate that metadata governance remains conceptually underdeveloped as a formal governance domain. The persistent conflation of governance with operational management reveals a structural gap in both literature and practice, reinforcing the need for clearer conceptual structuring and further research in metadata governance.

E. Conceptual Positioning of Metadata Governance

To synthesize the evidence landscape, Fig. 1 positions the reviewed sources along two analytical dimensions: 1) the degree of structural formalization, ranging from conceptual guidance to structured frameworks and further toward formal metamodel representations; and 2) the explicitness of metadata governance focus, ranging from implicit governance treatment to explicit conceptualization.

Within this positioning, DAMA-DMBOK2 Revised is situated in the region of conceptual guidance with a dominant management orientation. Industry and vendor-oriented sources exhibit more concrete and technically oriented structures, but generally lack explicit governance abstraction. In contrast, governance-oriented models, such as COBIT-based metamodels [44], demonstrate higher structural formalization but remain non-specific to metadata governance.

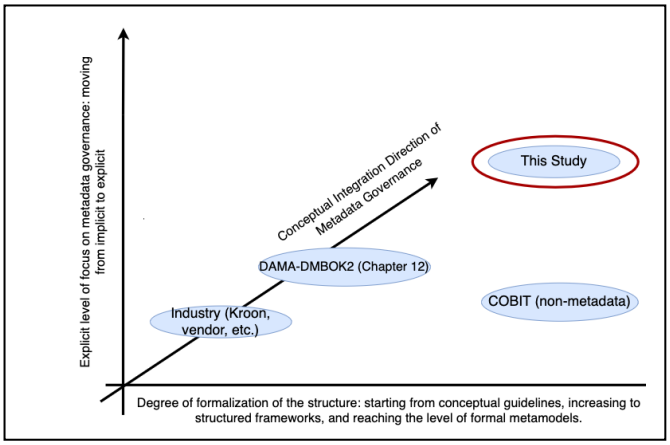

Fig. 1. Conceptual landscape of metadata governance research.

TABLE IV. GOVERNANCE-LEVEL CONCEPTUAL INTERPRETATION OF SOURCES

No	Source	Source Type	Explicit and Formal Governance?	Summary of Content	Governance Limitations
1	DAMA-DMBOK2 Revised 2024	Industry Framework	No (Embedded)	Mentions metadata governance within metadata management, covering standards, catalogs, lifecycle, and controls	No explicit EDM cycle; governance embedded in management
2	ISO/IEC 38500	International Standard	No	Defines governance principles (accountability, responsibility, EDM)	Not metadata-specific
3	COBIT 2019	Industry Framework	No	Defines governance domains and EDM cycle	Not metadata-specific
4	ISO/IEC 11179	International Standard	No	Defines metadata registry structures	No governance constructs
5	ISO/IEC 19763	International Standard	No	Defines metamodel for interoperability	No governance constructs
6	ISO 19115	International Standard	No	Provides domain-specific metadata structure	No governance constructs
7	ISO/IEC 27001	International Standard	No	Defines security governance controls	Not metadata-specific
8	GDPR (EU 2016)	Regulation	No	Defines compliance and accountability obligations	No governance structure model
9	Perpres 39/2019	Regulation	No	Defines national data governance obligations	No formal governance modeling
10	PDP Law (Indonesia)	Regulation	No	Defines personal data protection obligations	No governance modeling
11	Metadata Governance in Media Industry	Industry Study	No (Implicit)	Discusses governance in media workflows	No formal governance structure
12	Atlan	Industry Source	No (Practical)	Provides governance practices and tooling	Operational focus
13	data.world	Industry Source	No (Practical)	Focus on cataloging and governance tools	No formal governance abstraction
14	Decube	Industry Source	No (Practical)	Defines governance workflows	No institutional governance model
15	Dataversity	Industry Source	No (Educational)	Conceptual materials on metadata governance	No formal model
16	DCAM v2.2	Industry Framework	No	Defines data governance capability model	Not metadata-specific
17	MetaStore	Academic Framework	No	Defines metadata architecture	Technical focus only
18	COBIT-based IT Governance Metamodel	Academic Model	No (Non-metadata)	Formal governance metamodel	Not metadata-specific

Beyond these two axes, a third analytical dimension is introduced to represent the degree of conceptual integration. This dimension reflects how governance-related constructs are integrated into a coherent conceptual structure. These constructs include policies, roles, controls, accountability mechanisms, decision authority, lifecycle coordination, and assurance functions.

The analysis shows that most sources cluster in regions characterized by partial formalization and fragmented integration. Industry sources tend to provide localized operational integration without formal governance abstraction. DAMA-DMBOK provides partial integration by embedding metadata governance within broader data governance practices but does not establish it as an independent conceptual system. Formal governance metamodels exhibit strong abstraction but lack metadata specificity.

This study contributes by providing an integrated interpretation of governance-related constructs across heterogeneous sources, highlighting structural gaps and conceptual inconsistencies in metadata governance. Rather than proposing a design artifact, the study contributes by consolidating dispersed governance knowledge and clarifying the conceptual landscape of metadata governance.

V. Discussion

A. Answers to the Research Questions

This section synthesizes answers to the research questions based on the evidence presented in the Results.

1) RQ1 – Thematic coverage and research focal points: Research related to metadata governance is predominantly concentrated in technical and operational areas. Academic studies mainly address repositories, interoperability engineering, schema harmonization, metadata quality, and domain-specific applications, while explicit investigation of metadata governance as a standalone topic remains largely absent, as reflected by the zero eligible studies in the SLR. Metamodeling perspectives are rare and typically appear in interoperability standards rather than governance modeling. Grey literature broadens coverage by addressing stewardship, policies, security, and lifecycle concerns, yet these themes remain dispersed and lack consolidation into an integrated governance research stream.

2) RQ2 – Coverage of governance domains, processes, and conceptual components: Governance coverage across the literature is uneven and fragmented. Structural aspects of metadata are well documented in standards, while organizational constructs such as roles and policies are primarily addressed in frameworks and regulatory guidance. However, explicit articulation of governance domains, process structures, and conceptual relationships is largely absent. Most sources describe isolated elements without integrating them into a coherent governance architecture, reinforcing the lack of consolidated conceptual structures for metadata governance.

3) RQ3 – Evidence of validation practices: Reported validation practices remain limited. Academic studies occasionally employ technical validation (e.g., prototypes or performance evaluation), but validation of governance-oriented conceptual structures is rarely documented. Grey literature primarily relies on expert consensus and institutional review rather than systematic validation. Overall, the lack of explicit validation practices reflects the early and fragmented state of metadata governance as a research domain.

This limitation further reinforces the absence of formally defined and validated conceptual representations of metadata governance.

4) RQ4 – Conceptual and methodological deficiencies: The evidence reveals persistent deficiencies hindering the maturation of metadata governance as a research domain. These include limited integration between governance and formal modeling, inconsistent definition of governance constructs such as decision authority and accountability, and weak methodological rigor in validation. These deficiencies contribute to the absence of shared terminology and cumulative theoretical development.

While these findings provide a structured overview of the current state of metadata governance research, they also indicate a deeper conceptual limitation. The absence of governance-oriented abstraction across studies suggests that metadata governance is not yet recognized as a distinct analytical domain, but rather remains embedded within technical or operational perspectives.

B. Fragmentation of Metadata Governance as a Research Domain

The findings indicate that metadata governance has not yet evolved into a consolidated research domain. Academic studies largely approach metadata from technical perspectives, while governance aspects remain implicit or embedded within broader data governance discussions. Grey literature provides normative guidance through standards and frameworks, yet these sources remain heterogeneous and rarely integrated into coherent conceptual structures. This fragmentation reflects an imbalance between technical maturity and governance conceptualization in the metadata domain.

This fragmentation is not merely descriptive, but reflects a structural misalignment between the increasing strategic importance of metadata and the lack of corresponding governance formalization. As a result, the domain lacks conceptual coherence and cumulative theoretical development.

C. Governance Versus Management in Metadata Practices

A recurring pattern across the evidence is the conflation between governance and management. Many sources employ the term “governance” to describe operational controls, workflows, or tooling practices.

However, governance theory consistently distinguishes governance from execution. Institutional perspectives such as the G20/OECD governance principles frame governance as an arrangement of decision authority, accountability, and oversight structures. In the data domain, Khatri and Brown emphasize governance as the allocation of decision rights and responsibilities across critical decision areas, while DAMA positions governance as the function establishing accountability and policy direction for data assets.

This theoretical grounding is further operationalized in IT governance standards such as ISO/IEC 38500 and COBIT, which define governance through decision authority and oversight cycles (e.g., Evaluate–Direct–Monitor), clearly separating governance from operational management. However, analysis of the reviewed sources indicates that most references do not explicitly define governing bodies, decision domains, or governance cycles specific to metadata. Instead, governance is often implicitly reduced to management practices.

Clarifying this distinction is essential for advancing metadata governance as a formal governance domain grounded in decision authority and institutional accountability rather than operational best practices. This distinction is further supported by governance frameworks such as ISO/IEC 38500 and COBIT, which define governance in terms of decision authority, accountability, and oversight, rather than operational execution.

This inconsistency reveals a fundamental contradiction in the literature. While governance theory clearly distinguishes governance from management through decision authority and accountability, most metadata-related sources operationalize governance as execution-level practices. This contradiction contributes to conceptual ambiguity and limits the development of governance as an independent analytical construct.

D. Absence of Formal Conceptual Models and Metamodels

This observation is visually reflected in the conceptual positioning presented in Fig. 1. The review highlights a systematic absence of formal conceptual models and metamodels dedicated to metadata governance. While standards such as ISO/IEC 11179 and ISO/IEC 19763 provide structural rigor for metadata interoperability and registry architectures, they do not address governance abstraction. Conversely, governance metamodels developed in non-metadata domains demonstrate the feasibility of formalizing governance constructs but remain disconnected from metadata-specific contexts.

This disconnect explains the empty upper-right region in the state-of-the-art map, representing the intersection of explicit metadata governance focus, high structural formalization, and strong conceptual integration. Without formal conceptual representations, governance knowledge remains difficult to validate, reuse, or evolve cumulatively across studies.

This limitation has significant implications. Without formal conceptual models or metamodels, governance knowledge cannot be systematically validated, compared, or reused across different organizational contexts. This absence constrains both theoretical advancement and practical implementation.

It is important to clarify that this study does not propose a formal governance framework or metamodel. Instead, it synthesizes and consolidates existing knowledge to provide a structured conceptual understanding of metadata governance and to identify research gaps.

The objective of this study is not to design or validate a governance model, but to identify conceptual patterns, gaps, and inconsistencies in the current body of knowledge. This positioning aligns with the nature of multivocal literature review, which emphasizes synthesis rather than artifact development.

E. Implications for Research and Practice

From a research perspective, the lack of unified conceptual frameworks limits comparative analysis, validation, and theory development. For practice, organizations struggle to align technical metadata initiatives with institutional governance objectives, regulatory accountability, and cross-organizational coordination. Tool-centric approaches risk reinforcing operational silos without establishing robust governance structures. These findings indicate the need for structured conceptual foundations as a prerequisite for meaningful operational standardization and governance maturation.

These findings indicate that current approaches are insufficient to support governance maturity. Without a structured conceptual foundation, organizations risk implementing fragmented governance mechanisms that lack consistency, accountability, and strategic alignment.

F. Critical Synthesis and Limitations

The analysis reveals a clear problem–concept gap in metadata governance. While the need to govern metadata is increasingly evident in practice, the conceptualization of metadata governance remains underdeveloped and insufficiently formalized in the literature.

This gap is reinforced by three structural issues: 1) the dominance of technical and operational perspectives, 2) the fragmentation of governance constructs across heterogeneous sources, and 3) the absence of formal conceptual models supporting governance abstraction.

Furthermore, contradictions between standards-oriented and industry-oriented sources highlight a tension between formal governance design and practical implementation. Standards emphasize consistency and formalization, whereas industry practices prioritize flexibility and operational efficiency. The lack of integrative conceptual models prevents these perspectives from being systematically reconciled. This tension remains unresolved.

Nevertheless, the findings should be interpreted in light of the limitations of multivocal literature reviews. The inclusion of grey literature introduces variability in methodological transparency, and the absence of peer-reviewed studies limits comparative academic validation. Despite these limitations, the synthesis provides a structured conceptual foundation for future research.

VI. Conclusion

This study advances the understanding of metadata governance by consolidating the state of the art through a

multivocal literature review that integrates academic and authoritative grey sources.

The findings indicate that metadata governance remains conceptually fragmented, weakly formalized, and insufficiently validated as a scientific domain. Existing standards and professional frameworks do not yet provide a coherent governance architecture or a formal conceptual model.

The analysis identifies several critical gaps, including the absence of explicit governance abstractions, limited integration across governance domains, and weak validation practices.

These findings contribute to the development of a conceptual foundation for future theoretical, empirical, and methodological research on metadata governance.

A. Limitations of the Study

This multivocal review faces several limitations. First, the scarcity of peer-reviewed studies explicitly addressing metadata governance limits comparative academic evidence, reflecting the early maturity of the domain and motivating the inclusion of grey literature. Second, grey literature exhibits heterogeneous methodological transparency, which may affect replicability across review contexts. Third, the study emphasizes conceptual consolidation rather than empirical evaluation; therefore, findings primarily inform theoretical positioning rather than operational effectiveness.

B. Future Work

Despite the growing importance of metadata for interoperability and digital governance, the field remains conceptually fragmented and methodologically immature. The absence of consolidated theoretical foundations and formal models limits cumulative knowledge development and cross-context applicability.

Future research should elevate metadata governance beyond operational metadata management by framing it as an institutional governance problem involving decision authority, accountability, and sustainability. Future research may examine the development of governance frameworks, reference architectures, and conceptual metamodels for metadata governance constructs and relationships. Further research should also strengthen validation methodologies, explore governance–technology alignment, and conduct cross-domain and cross-sector comparative studies to understand how regulatory and institutional contexts shape metadata governance design.

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VII. DECLARATION ON GENERATIVE AI

The authors acknowledge the use of generative AI to assist in improving the clarity, grammar, and structure of the manuscript. The content, analysis, and conclusions remain the sole responsibility of the authors.

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