Assessing Research Data Management Services Maturity in Thai Higher Education: A Qualitative Exploratory Study in Comparison with Japan

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Abstract

Research data management (RDM) has evolved into a global prerequisite for scholarly communication, yet its implementation varies significantly, particularly across Asian regions where diverse institutional frameworks complicate standardization. This qualitative exploratory study investigates the current state of organizational RDM practices in Thai higher education by applying a six-dimensional RDM Service Maturity Model—encompassing awareness, governance, budget, services, user needs, and IT infrastructure. Through qualitative on-site interviews at three distinct institutions (Chiang Mai University, Chiang Mai Rajabhat University, and Chulalongkorn University), the research team analyzed their institutional RDM structures and compared the findings with extensive national survey data from Japan. The results reveal a stark contrast in developmental pathways: while Japan exhibits a steady, policy-driven trajectory bolstered by national initiatives, Thailand demonstrates a highly heterogeneous, bottom-up approach. In the absence of a unified national mandate, RDM adoption in Thai universities is primarily propelled by external publisher data-disclosure requirements, internal research integrity committees, and individual mission-driven research units rather than centralized library leadership. Despite these diverging pathways, both nations face critical shared challenges, including fragile project-based budget sustainability, ambiguity surrounding the definition of research data in national policies, and contested responsibilities among libraries, IT centers, and researchers. To transition from this qualitative baseline to a robust quantitative framework, future work aims to broaden and deepen the survey scope to a wider set of the Thai higher-education sector. Furthermore, the research team plans to expand the survey scope across the ASEAN region. To address the complexities of cross-cultural survey data harmonization, the research team proposes utilizing knowledge graphs to capture semantic relationships and document equivalencies between diverse survey items. This linked-data architecture will facilitate auditable, output-harmonized international comparisons, ultimately contributing to the establishment of a cohesive global RDM network.

Keywords

Research Data Management, Capacity Maturity Model, Thai Higher Education, Institutional Repository, Open Science, Academic Libraries

1. Introduction

Research data management (RDM) has moved from individual research ethics issues to a core institutional responsibility [1]. Funder mandates, publisher data-availability policies, and international open science policy trends have made RDM a prerequisite for participation in international scholarly communication [2]. Growing concern about research integrity has also given RDM an additional, non-publication-driven rationale: keeping verifiable records of how results were produced [3, 4]. Furthermore, as the use of generative AI grows exponentially, "managing and utilizing data correctly and securely" is becoming more important than ever.

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Despite growing societal demand for RDM, the implementation status varies by field [2, 5]. In research fields conducted primarily at the individual level, such as the humanities and social sciences, it is difficult to say there is sufficient understanding of, or practice with, research data [6]. This issue is particularly pronounced in Asian regions, where digitization lags behind Europe and the United States—regions where data digitization is advancing—and where the distinctiveness of local languages hinders knowledge integration. To address this issue, universities and research institutions must establish appropriate systems and frameworks to support the management, preservation, and reuse of research data. However, RDM service needs vary by the size and nature of the institution [7], making it challenging to reach consensus among stakeholders on which guidelines to follow and how to prioritize development.

To align stakeholder requirements with institutional policies and strategies, it is essential to establish a common framework to measure the degree of achievement in developing organizational RDM services comprehensively and consistently. In Japan, the trajectory of organizational RDM adoption has been tracked systematically since 2020 through a biennial national survey conducted among several associations [8]. This survey uses the RDM Service Maturity Model to assess the maturity of organizational RDM services [9]; applying this model may make it possible to measure the status of RDM services implementation outside Japan using common metrics.

This study extends that comparative analysis beyond Japan's borders. First, the research team, the "ASEAN Data Archives Research Group," conducted on-site interviews at three universities: Chiang Mai University, Chiang Mai Rajabhat University, and Chulalongkorn University. Next, they analyzed the findings from the three interviews using the RDM Service Maturity Model and sought to identify each university's characteristics and trends across six dimensions. Finally, they compared the three universities' initiatives with those in Japan and discussed their commonalities and differences. This study is a preliminary investigation to expand the survey methodology to Thai higher education institutions.

The paper is organized as follows: Section 2 summarizes prior findings from the Japanese national survey and prior work on RDM practices in Southeast Asia. Section 3 describes the site-selection rationale, interview instrument and procedure, and analysis approach. Section 4 presents findings organized by the six maturity dimensions, together with the Thai national policy context. Section 5 discusses the commonalities and differences between the two countries, Section 6 describes the limitations of this study, and Section 7 concludes with directions for future work.

2. Related work

2.1. RDM services in Japanese Universities and Research Institutions

The "Survey on the Status of Research Data Management Initiatives at Japanese Universities and Research Institutions" is an online questionnaire survey jointly conducted by the Japan Consortium for Open Access Repository (JPCOAR), the Academic eXchange for Information Environment and Strategy (AXIES), and the National Institute of Science and Technology Policy (NISTEP) [8]. This survey uses a six-dimensional maturity model: awareness, policy, budget, services, user needs, and IT infrastructure. The model has been developed and implemented to evaluate the maturity of RDM services [9].

A large-scale survey of RDM initiatives in Japanese institutions was conducted in 2020, 2022, and 2024, drawing 352, 309, and 295 valid responses, respectively (an estimated 38–53% of JPCOAR-participating institutions) [10–12]. Across these three waves, the proportion of institutions with a formal data policy has increased from 23.6% to 70.9%, while the percentage of institutions that have implemented or are considering implementing an RDM system increased from 23.0% to 53.9%. Also, the percentage of institutions currently considering implementing the public release of research data through institutional repositories increased from 35.7% to 78.0%. Furthermore, the percentage of institutions that have implemented or are considering implementing research data storage services increased from 22.9% to 64.8%. However, only 24.4% of institutions have experience publishing research data through institutional repositories, and they have noted practical challenges. In particular, significant issues remain, such as a lack of manpower and difficulties in metadata description.

2.2. RDM practices in Southeast Asia

As with current practices in the EU and the United States, nationwide RDM surveys of organizational RDM practices in Southeast Asian higher education are scarce. The present fieldwork follows an earlier exploratory engagement with Vietnamese institutions in 2025 [13] and, to our knowledge, represents the first attempt to apply the RDM Service Maturity Model's dimensions, even informally, to Thai universities.

3. Approach

Section 3 explains the survey approach in detail. As shown in Section 2, this study is necessarily exploratory and qualitative, aiming to surface institutional variation that a future, more systematic regional survey could quantify. Drawing on experience from a previous survey conducted in Japan, the research team designed the survey with the following three perspectives in mind as future goals: (i) how do organizational structures and policies for academic information management differ across Thai universities of different types; (ii) what drives RDM services adoption in the absence of a Thai national mandate; and (iii) what commonalities and differences emerge relative to Japan's national survey findings, and what do they suggest for future bilateral collaboration. Based on these considerations, the research team determined the site-selection rationale, interview instrument and procedure, and analysis approach.

3.1. Site Selection

The research team conducted on-site interviews at Chiang Mai University, Chiang Mai Rajabhat University, and Chulalongkorn University in Thai and English to explore the model's applicability. The research team purposively selected these three universities to capture diversity in institutional type and research intensity within the Thai higher education sector.

Chiang Mai University (CMU) is a large national flagship university in northern Thailand, with approximately 34,800 undergraduate and 6,000 graduate students across 21 faculties and two research institutes. Its library system comprises one central library and 17 faculty libraries (92 staff at the central library), and operates an established institutional repository and a structured digital-preservation program.

Chiang Mai Rajabhat University (CMRU) traces its origins to an agricultural teacher-training institution established in 1924 and was granted university status in 2004. Rooted in teacher education, CMRU has expanded its mission to include research, innovation, and community development. At the university level, RDM is supported through central units, including the CMRU Library, the Institute of Research and Development (IRD), and the Digital Education Center. Individual institutes may also operate their own specialized RDM systems. For example, the Asian Development College for Community Economy and Technology (adiCET), an applied research institute within CMRU, independently manages its research data through a dedicated institutional system tailored to its externally funded research and operational needs.

Chulalongkorn University (Chula), Thailand's oldest university, is among the country's most research-intensive institutions. Its library recently absorbed data management responsibilities previously held by a since-dissolved graduate school and operates the "Chula DigiVerse." As Thailand's first digital repository, it offers free access to preserved e-theses and rare books. Furthermore, this platform safeguards Thailand's cultural heritage and institutional memory to support global learning and research.

3.2. Interview Instrument and Procedure

In this survey, the research team used a topic guide to share the specific phase of the RDM services as defined by the model. A semi-structured interview protocol of six open-ended questions was used at each site, adapted into Thai and English versions and shared with interviewees in advance:

(Q1) an overview of the institution and its distinguishing characteristics;
(Q2) the organizational structure of research- and education-support units;
(Q3) an overview of academic-information-related policies (e.g., open access, RDM policy);
(Q4) the academic-information-related services actually provided by each department (library, IT infrastructure, etc.);
(Q5) the degree of researcher awareness and use of these policies and services;
(Q6) other relevant information, such as national trends or policy context.

Site visits took about an hour and a half to two hours each and took place in 2026 on 13 July at the CMU library, 14 July at the CMRU, and 16 July at the Chula Library.

3.3. Analysis

This section explains the procedure for analyzing the interview results. The analysis used thematic analysis, a method widely used to explore and interpret patterned meaning [14]. Firstly, the research team created transcripts that identified speakers based on information from the interviews with the three institutions. Secondly, the research team extracted discourses corresponding to the six RDM Service Maturity Model dimensions from the transcripts. Under the research team's supervision, the extracted discourses were converted into short sentences that were taken out of the context of the conversations. Thirdly, the research team compared them with the short sentences on the respective institutions' websites to verify the accuracy of the sentences. The research team also asked the interview participants to review the sentences; All verified results and returned review comments were incorporated into the set of short sentences. Given the exploratory, single-visit nature of the fieldwork, the research team report qualitative, descriptive comparisons across institutions rather than assigning formal maturity-level scores; where relevant, the research team relate findings to the aggregate trends reported for Japan [10–12].

4. Findings

Section 4 presents findings organized by the six maturity dimensions: Awareness, Governance, Budget, Services, User needs, and IT infrastructure. Table 1 summarizes the three institutions' relative positioning across the six RDM Service Maturity Model dimensions, based on the qualitative evidence above. Since this is a qualitative exploratory study, the research team notes that the adjectives listed in Table 1, such as "Emerging," "Low," and "Rising fastest," are all relative judgments among the three institutions.

Of the six dimensions, "Awareness and Governance" and "Services and IT Infrastructure" were represented as a single unit within the organizational context, so the research team prioritizes the model dimension and addresses them in the same section. Also, the National Policy Context, which directly affects Thailand's higher education sector, will be presented in a separate section.

4.1. Awareness and Governance

At CMU, the library maintains an "Information Resource Policy," but this coexists with several separate, uncoordinated policies (e.g., an upload policy, a user policy, a cataloging policy) rather than a single organizational RDM or open-access policy; awareness among library staff of the distinction between managing publications and managing underlying research data is emerging but still developing.

At CMRU, no organizational policy governs the archiving or capturing of research data; an open-data policy exists mainly for community-service project reports. Governance follows a mixed top-down/bottom-up pattern: the university president sets overall direction, a vice-president oversees IT systems, and departments implement locally, while individual research units (such as the energy-systems group) have historically managed their own infrastructure and, at times, sought policy guidance only informally.

Table 1
Qualitative comparison of the three visited organizations across the six RDM Service Maturity Model dimensions. All adjectives are relative judgments among the three institutions, not maturity-level scores.

Dimension	CMU	CMRU	Chula
Awareness	Emerging among library staff; publication vs. underlying-data management still conflated	Low outside the applied-research institute; "research data" not yet a distinct concept for most researchers	Rising fastest of the three; driven by publisher data-disclosure requirements and a research-integrity committee
Governance	No unified RDM/OA policy; separate, uncoordinated upload, user, and cataloging policies	No policy for archiving/capturing research data; open-data policy limited to community-service project reports; mixed top-down (president→VP-IT) / bottom-up decision-making	No institutional or national RDM mandate; practice led by an ad hoc research-integrity committee rather than formal policy; national "publication" scope re: data remains undefined (cf. TSRI open-science guidance)
Budget	Project-based development budget (university-approved); 2 years externally contracted maintenance, then brought in-house	Separate development vs. recurring operations budget; annual expenses for cloud storage, network, and cybersecurity; policy shift away from on-premises server farms; one research group migrated its server onto university-supported server budget after its own funding lapsed	RDM budget not separately tracked; discussed via Thailand's national APC spend, only partially offset by capped university publication-incentive funding
Services	Mature Intellectual Repository (CMU IR: theses, dissertations, papers, books), access-restricted; 4-step digital-preservation cycle (storage relocation, repository hosting, obsolete-media management, format control)	No library-led RDM service; IRD lead the research publication repository; applied-research institute built its own bespoke project-tracking system for funded-project data, run independently of the library	DigiVerse platform (incorporating the former DigiRepos IR, ≈ 80% OA theses/dissertations after a copyright-default policy change); national NRIIS links funded projects/reports; new library fellowship exchange with a U.S. partner to build RDM services
User needs	Compliance-driven engagement; researchers report repository deposit/consultation as time-consuming	Small core research staff (faculty + graduate students) relative to teaching-oriented faculties; no department has yet asked the library to take on data management	2024 internal survey (engineering, science, education, dentistry staff) ranked priorities as: data repository > DMP consultation > RDM training (storage/backup, file naming, metadata); frequent problems: lost files, reliance on personal PCs/cloud drives/external HDDs
IT infrastructure	Established, library-managed infrastructure underpinning the repository and preservation program	Centralizing: IT staff consolidated from faculty-level units into one central unit; shifting from on-premises servers to cloud computing	Library–IT collaboration still evolving; graduate-school dissolution shifted some data-infrastructure responsibility toward the library

At Chula, interviewees explicitly described RDM as "not coming from our culture" and noted the absence of any national or organizational RDM mandate. Two forces nonetheless drive local adoption: increasingly rigorous publisher requirements to disclose where research data are placed at the time of manuscript submission, and a university research-integrity committee (established roughly two years prior to the visit) that surfaced cases in which researchers under investigation had no retained records of their underlying data; reframing RDM as a means of protecting researchers themselves.

Across all three sites, and echoing a gap also reported in Japan, no clear consensus exists on whether

"publication" already encompasses the associated research data, or on which department (library, IT center, or a new unit) should bear ultimate responsibility for RDM.

4.2. Budget

CMU's institutional repository required an initial system-development budget approved on a project basis by the university; ongoing maintenance relied on externally contracted support for the first two years before the library's own IT staff took over operation.

CMRU explicitly distinguishes development budget from maintenance/operations budget, requesting the latter annually for network equipment, cloud storage, and cybersecurity (client-side antivirus and server-side firewalls tied to internet service provisioning). The university has adopted a policy of reducing on-premises server farms in favor of cloud computing, reflecting a shift from capital to recurring operating expenditure. A research group without dedicated infrastructure funding described migrating its own server onto a university-supported server once its initial funding lapsed, illustrating the fragility of project-based infrastructure funding at the sub-departmental level.

At Chula, budget pressure was discussed primarily in relation to open access rather than RDM directly. Thai universities collectively spend a large amount of money per year on Article Processing Charges (APCs), against which university publication-incentive funding only partially compensates; one interviewee described this dynamic as increasingly shaped by publisher business models rather than organizational RDM strategy.

4.3. Services and IT Infrastructure

CMU operates a mature Intellectual Repository (CMU IR) covering theses, dissertations, research papers, and academic books, and a digital-preservation program built on four recurring checkpoints: storage relocation, repository hosting, obsolete-media management, and file-format control. Notably, CMU IR itself is access-restricted rather than fully open, even as the library positions open access as a strategic goal for other digital collections.

CMRU is midway through centralizing IT operations: The IT personnel, formerly distributed across faculties, now report to a central unit. Distinct from the library, the applied-research institute has developed its own bespoke research-project management system to track funding, progress, and outputs of externally funded projects—illustrating how, without library-led RDM services, mission-driven research units may build parallel, non-library tooling.

Chula's central library operates DigiVerse, which provides online access to selected scholarly outputs, institutional memory, and cultural heritage collections for learning, teaching, research, and public knowledge. The National Research and Innovation Information System (NRIIS) links funded projects, proposals, and final reports across funding agencies, though it does not itself require submission of underlying research data. The library has also begun a fellowship exchange with a partner U.S. university library specifically to build RDM services, and the recent re-organization of the university's graduate school, which previously handled dissertation-related data management, has created both a service gap and an opportunity for the library to expand its RDM role.

4.4. User Needs

At CMU, researcher engagement with RDM-related services is described as compliance-driven (depositing required materials) rather than proactive, and researchers report repository consultation as time-consuming when preparing submissions.

At CMRU, the applied-research institute's core research staff (four faculty members, supplemented by graduate students) is small relative to the university's teaching-oriented faculties, and the concept of "research data" as distinct from publications has low salience; the library reported that no department had yet asked it to take on data management responsibility.

Chula's central library conducted its own internal survey of RDM awareness and needs among faculty researchers and administrators in 2024. Survey respondents included staff from engineering,

science, education, and dentistry. Reported priorities were, in order, a research data repository, DMP consultation, and RDM training, particularly on storage and backup, file naming, and folder/metadata organization. Commonly cited problems included lost or misplaced files and heavy reliance on personal PCs, cloud drives, or external hard drives for storing research data.

4.5. National Policy Context

No binding national RDM mandate exists in Thailand in July 2026. Open science policy operates mainly at the funding-agency level: Thailand Science Research and Innovation (TSRI) was cited as encouraging open science and channeling funding through Program Management Units, but implementation is voluntary and uneven across institutions. Interviewees at both CMRU and Chula noted ambiguity at the national level about how "publication" is defined and whether it includes research data. The Chula team offered to connect the researchers with TSRI policy staff for further discussion, indicating a potential channel for future engagement with Thai national policy actors.

5. Discussions

Section 5 discusses the survey results from three universities in Thailand and the situation in Japan. First, this comparison highlights two contrasting pathways. Japan's national survey shows a relatively steady, policy-driven trajectory, reinforced by a national open-access acceleration project that has visibly increased budget allocation and service provision across many institutions at the same time [12]. By contrast, Thailand's landscape is markedly heterogeneous across institution type and appears to be advancing from the bottom up. RDM services at the three universities are propelled by individual libraries' and researchers' responses to publisher requirements and research-integrity concerns rather than by coordinated national policy.

Despite these different pathways, both countries face several common challenges. Responsibility for RDM remains contested between libraries, IT centers, and individual researchers. Budget sustainability is another shared vulnerability: CMU's and CMRU's experiences of time-limited external support and ad hoc, department-level infrastructure funding echo a pattern Japan itself experienced before introducing dedicated national funding streams for RDM.

The library's position as the natural institutional home for RDM services, which applies only partially, holds in Japan as well as in Thailand: it is clearly the case at Chula and, to a lesser extent, at CMU, but at CMRU an applied-research institute has instead built its own, library-independent project management tooling. This suggests that where an institution's research activity is concentrated in a small number of mission-driven units rather than distributed broadly, RDM capability may develop outside the library rather than through it. The scope of "publication" in relation to the paper's underlying data remains ambiguous in national policy and is also related to this issue. It could be argued that the entities leading RDM services are determined not by their nature as institutions, but by their motivations for promoting RDM.

6. Limitations

The study has several limitations. First, it is based on a single visit to each organization, with interviewee availability and role determining which parts of each organization were represented. Interview depth and duration varied across sites. Second, the findings describe three purposively selected institutional cases and are not statistically representative of the Thai higher-education sector as a whole; they are intended to surface variation for further, more systematic investigation. Third, the researchers' positionality may have shaped both the data and their interpretation. The research team consists of Japanese researchers engaged in promoting RDM, and the first author co-developed the maturity model used as the analytical framework. This may have predisposed the team to view Thai practices through categories derived from the Japanese context. To mitigate these risks, the interview questions were

shared in advance, and interpretations were discussed with Thai collaborators. In a full-scale future study, it would be desirable for Thai researchers to participate from the coding stage.

7. Conclusion and Future Work

This paper presented a qualitative, maturity-model-based comparison of RDM practices at three Thai universities. The research team found substantial organizational heterogeneity that a single country-level maturity score would obscure: research intensity, organizational mission, and the presence or absence of external pressure such as publisher requirements appear to matter more than any uniform national policy, which remains absent in Thailand.

Future work will pursue two directions: First, broadening and deepening the sample to a wider set of the Thai higher-education sector to test whether the patterns observed here generalize. By conducting a more detailed investigation into the actual state of RDM at each organization, it can be clarified the potential for using knowledge graphs to organize, connect, and query heterogeneous research data, enabling richer metadata representations, provenance tracking, and cross-disciplinary integration in organizational RDM practices. Second, adapting the quantitative scoring procedure used in the Japanese national survey to enable direct, numeric maturity comparison across countries. The research team believes knowledge graphs could also support the team's survey data management. In the following paragraphs, the research team will briefly touch on this concept.

Realizing this cross-country comparison in practice first requires a fully quantitative Thai instrument suitable for comparison with the Japanese survey, rather than the case-study interviews reported here. Before fielding such an instrument, the team should settle several questions from the comparative-survey-methodology literature in advance, following the University of Michigan's Cross-Cultural Survey Guidelines (CCSG) [15]. These guidelines consist of 18 chapters, ranging from survey design to ethical considerations; however, the data harmonization strategy is particularly important. The research team should decide at the design stage which of CCSG's two harmonization strategies to pursue: input harmonization, imposing an identical, centrally coordinated questionnaire on all sites from the outset, or output harmonization, allowing the Thai instrument to diverge somewhat from the Japanese one but mapping responses to comparable target variables afterward. Since this survey considers differences in the cultures, customs, and national policies of each country, it will inevitably adopt the latter approach. However, this approach creates a challenge: ensuring comparability of the survey data between the two countries.

To address this challenge, the research team is exploring the creation of a knowledge graph from survey data. The GESIS panel data could serve as a precedent, where architecture has been proposed to semantically enrich survey data within a shared RDF model and establish relationships between them [16]. This architecture divides survey data into item-level and survey-level layers and assigns semantic relationships to each.

At the item level, it uses a structure that represents the relationships between the questions and response options in the survey data. Figure 1 shows an example of how 2024 Japanese survey data [17] has been structured.

Based on the structure shown in Figure 1, the research team records a post hoc determination that two items with different expressions are logically comparable by setting `skos:closeMatch` between the Thai item and its corresponding Japanese item and attaching a short rationale as an RDF annotation. These items are not automatically merged; instead, they are treated as independent items within each study, and analysts interpret them as needed. For example, item Q20 (RDMServiceImplementationStatus) in the 2024 Japanese survey asks, for each of seven RDM services (DMP support, training/literacy, IP support, storage, publication platform, curation, and use and citation), whether the service is "Implemented," "UnderReview," "NotImplemented," or "NotSure." Here is an example of how the description of Chulalongkorn University shown in Table 1 was mapped.

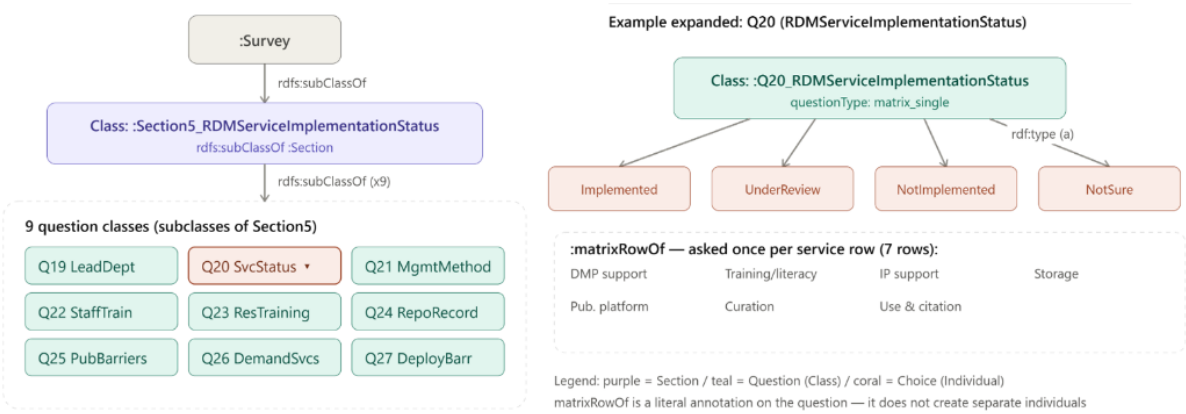


Figure 1: An example of how the data from the "Survey on the Status of Research Data Management Initiatives at Japanese Universities and Research Institutions 2024" was structured. In this example, the nine subclasses included in Section 5 and the possible options for each subclass are represented in RDF format.

```
@prefix rdf:      <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs:     <http://www.w3.org/2000/01/rdf-schema#> .
@prefix skos:     <http://www.w3.org/2004/02/skos/core#> .
@prefix dct:      <http://purl.org/dc/terms/> .
@prefix xsd:      <http://www.w3.org/2001/XMLSchema#> .
@prefix :         <https://example.org/rdm-survey/schema#> .
@prefix rdms-jp:  <https://example.org/rdm-survey/jp/2024/> .
@prefix rdms-th:  <https://example.org/rdm-survey/th/2027/> .

rdms-th:Q20_RDMServiceImplementationStatus
  skos:closeMatch
    rdms-jp:Q20_RDMServiceImplementationStatus
  {| rdfs:comment """ DigiVerse platform
       (incorporating the former DigiRepos IR,
       ≈80% OA theses/dissertations after a
       copyright-default policy change)."""@en ;
     dct:creator :ASEANDataArchivesRG ;
     dct:date "2026-07-16"^^xsd:date |} .
```

In the case of Chulalongkorn University, the option "Implemented" was selected, and there is no semantic discrepancy among the Japanese items. However, in the case of CMRU, it is reported that the research unit is leading the implementation of the service; therefore, the semantic relationship must be described at the option level. An example of the CMRU description is shown below.

```
rdms-th:ImplementedByUnitsOnly
    skos:broadMatch rdms-jp:Implemented
    {| rdfs:comment "applied-research institute
         built its own bespoke project-tracking system
         for funded-project data, run independently
         of the library"@en |} .
```

Because the level of detail in the description of "option level" depends on the direction of the comparative analysis, this is an issue to address in the future. At the survey level, the design metadata CCSG asks harmonizers to preserve — sampling frame, field period, mode of data collection — remains linked to each Observation by treating each country's survey wave as an independent entity within a shared StudyGroup. This enables secondary users to assess comparability rather than simply assume it. Finally, because every mapping decision, translation annotation, and equivalence judgment can itself be expressed as an RDF statement with its own provenance (who asserted it, and on what basis), the knowledge graph produces much of the auditable harmonization documentation such as crosswalks, transformation rules, and reversibility as a by-product of the data model itself.

The research team believes that converting survey data into a knowledge graph could become even

more effective as the team expands the survey scope to ASEAN countries in the future. Through discussions with expert groups, including those in Thailand, the research team hopes to contribute to establishing RDM's international network.

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Declaration on Generative AI

During the preparation of this work, the author(s) used Claude (Anthropic) in order to: Drafting content, Formatting assistance. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

Disclosure of Interests

The authors have no competing interests to declare that are relevant to the content of this paper.

Data Availability Statement

The interview data supporting the findings of this study are available from the corresponding author upon reasonable request.

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