# Development of Metadata Schema for Myanmar Pagodas' Information Management

Tin Tin Pipe[1] and Kulthida Tuamsuk[2]

**Abstract**

*Myanmar pagodas are a unique and diverse group of structures that have evolved over time, reflecting the country's rich history and cultural heritage, therefore information about pagodas in Myanmar is valuable social and economic development. According to official data, a total of 603,199 pagodas scattered across the country. This research aimed at creating a metadata schema for managing Myanmar pagodas' information. The study adopted the Metadata Development Lifecycle Model by MATT (2008), through a systematic research process involving three phases. This paper presents the study on phase three which involved the development and evaluation of the pagoda metadata schema, resulting in a metadata schema which comprised of 14 main data elements and 68 data elements in total. The schema will serve as a vital tool for preserving and documenting Myanmar's pagoda heritage, and foster collaboration among libraries, museums, and cultural institutions, both nationally and internationally.*

**Keywords:** *Pagoda Information, Metadata Schema, Metadata Lifecycle, Cultural Heritage, Digital Humanities.*

## INTRODUCTION

Cultural heritage encompasses historically significant cultural artifacts that were valued by previous generations and have managed to survive until today. Preserving cultural heritage not only offers educational and lifelong learning opportunities but also fosters a deeper understanding of history. It instills pride, identity, and a sense of belonging among residents, serving as a crucial component of society that tells stories from the past, celebrates and commemorates history, entertains, and envisions the future (Communications MDR, 2016; Kobylinski, 2013). The cultural heritage is also recognized as a vital component of a country's economy and society. For example, in some countries the heritage and tourism industries have merged, leading to significant economic benefits and a crucial source of income (Manzuch et al., 2005).

Myanmar's government, as noted by Harada (2013), has undertaken various efforts to conserve and restore the country's cultural heritage, while the people of Myanmar have shown enthusiasm and passion for restoration work. The Ministry of Religious and Culture oversees Myanmar's religious affairs, cultural affairs, and historical and archaeological research initiatives, including the preservation of intangible and tangible cultural heritage. The Department of Archaeology is tasked with conservation and repairing buildings and their contents, conducting research, and managing the Bagan area (Aung, 2017). Myanmar has established several laws to safeguard cultural heritage. The "Antiquities Act, 1957," and "The Protection and Preservation of Monuments, 2015" outline regulations for archaeological excavations, land use, antiquity restoration and management, and obligations for archaeological object discoveries. These laws ensure the preservation of movable and immovable cultural heritage with historical and archaeological significance (Harada, 2013). The 1998 Law on the Protection and Preservation of Cultural Heritage Regions, amended in 2009 and repealed in 2019, prioritized cultural heritage preservation (Zaw, 2020). Cultural heritage regions were defined as ancient monuments or sites with historical, cultural, artistic, or anthropological significance that must be preserved, with recognized objects and competent authorities for cultural heritage protection (Facchinetti, 2014). According to the Law Amending the Protection and Preservation of Cultural Heritage Regions Law, 2009,

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[1] Doctor of Philosophy in Information Studies, Faculty of Humanities and Social Sciences Khon Kaen University, Thailand, Email: tintinpipe@kkumail.com

[2] Department of Information Science, Faculty of Humanities and Social Sciences, Khon Kaen University, Thailand, Email: kultua@kku.ac.th, (Corresponding Author), https://orcid.org/0000-0003-0852-8945

each region designated as world heritage or national heritage must have a state or regional preservation officer. These officers are supervised by a committee led by the region's chief minister (Kyaw, 2019)

Myanmar's pagodas serve as a profound reflection of the nation's intricate history and cultural diversity, displaying a wide range of architectural styles that have developed over time. With deep roots in Buddhism, these structures hold immense spiritual importance for local communities. According to official data from the Myanmar General Administration Department, an astonishing total of 603,199 pagodas dot the landscape, including various forms such as pagodas, stupas, and temples. This diverse architectural tapestry is integral to Myanmar's cultural and religious heritage (Saw and Arnold, 2014). Each pagoda is regarded as a significant cultural heritage site, showcasing in its structure, form, architecture, art, religious teachings, rituals, and more, contributing to being a lucrative tourist destination that generates substantial revenue for the country. Among Myanmar's iconic pagodas is the Shwedagon Pagoda in Yangon, recognized as the tallest and oldest pagoda, standing over 99 meters tall. Believed to have been constructed between the 6th and 10th centuries CE, it is surrounded by numerous smaller pagodas and houses Buddha hair relics for worship (Ministry of Religious Affairs and Culture, 2018). The Shwedagon Pagoda alone is considered a world cultural heritage site. It holds a wealth of knowledge to study in terms of history, culture, religion, art, literature, and the way of life of Buddhists. Therefore, the stories of pagodas must be systematically collected, recorded, and preserved for the benefit of conservation efforts, learning, and cultural transmission to future generations.

Technology plays a vital role in preserving cultural heritage, especially in a digital society. Digitization projects store cultural collections online, making cultural heritage management in digital environments a critical research area. Metadata in particular is essential for managing digitized cultural heritage resources. It facilitates retrieval and accessibility, ensuring user-friendly access to cultural heritage on digital platforms. Metadata ensures the consistency, integrity, and trustworthiness of digitization processes, along with the quality, authenticity, and reliability of digital materials. Digital collections offer features like interoperability, reusability, persistence, and verification, ensuring long-term and evidence-based ICT for cultural heritage systems and services (Manzuch et al., 2005). Metadata can be generated through various processes, including item organization, cataloging, accessioning, and indexing. It simplifies monitoring, access, management, and collection while enhancing discovery and engagement. Metadata provides valuable information about individuals, locations, and events associated with each item, preserving the contextual information of the system. This makes it a crucial component of the digital collection preservation process (Fear, 2010; Gilliland, 2016).

Metadata standards are discipline-specific and developed for a particular user group, describing the resource of user needs. Adhering to metadata standards is vital for effective data searching and access. Metadata is not confined to a specific format and can encompass various media types, including text, audio, images, and video, making it a versatile tool for information management (Higgins, 2007). While there is a multitude of metadata standards available, no single or fixed set can adequately describe all types of collection data comprehensively. Therefore, the selection of suitable metadata standards is a critical decision that must be made to ensure the production of accurate and consistent metadata (Koch and Koch, 2017). By adopting and adapting metadata standards, this research seeks to enhance accessibility, interoperability, and the overall preservation of cultural heritage in the digital age, benefiting libraries and the broader community interested in preserving Myanmar pagodas.

Based on the previous research reviews, a significant research gap is evident in this study. Currently, there is no dedicated Metadata Schema specifically designed for Myanmar pagodas. This gap is especially noticeable in the field of cultural heritage preservation, particularly in terms of documenting and managing Myanmar's pagodas. The objective of this research is to address this critical gap by creating a customized metadata schema for Myanmar pagodas, thus filling a substantial void in the field of cultural heritage preservation.

The anticipated outcomes of the Myanmar pagodas metadata schema research project are extensive and influential. Firstly, the schema will serve as a vital tool for preserving and documenting Myanmar's pagoda heritage. Additionally, it will benefit the tourism industry and educational institutions. The standardization of

metadata through this schema will foster collaboration among libraries, museums, and cultural institutions, both nationally and internationally. Moreover, the digital platform for Myanmar pagoda data will be a valuable resource for professionals such as librarians, researchers, historians, archaeologists, and global visitors. One of the notable practical benefits is the efficient use and management of Myanmar pagoda data on a digital platform, providing valuable insights into the country's cultural heritage.

## LITERATURE REVIEWS

### Pagodas In Myanmar

Myanmar pagodas are a unique and diverse group of structures that have evolved over time, reflecting the country's rich history and cultural heritage. They have a strong foundation in Buddhism and are significant places of worship for the local people. According to official statistics provided by the Myanmar General Administration Department, Myanmar is home to a substantial number of pagodas, with a total count reaching an impressive 603,199. These pagodas encompass a variety of structures, including pagodas, stupas, and temples, collectively contributing to the rich tapestry of cultural and religious heritage in Myanmar (Saw and Arnold, 2014). However, according to the Ministry of Hotel and Tourism in Myanmar's website (https://tourism.gov.mm/), as of September 2023, a total of 157 pagodas have been officially recognized as the foremost tourist destinations in the country.

The religious architecture of Myanmar, specifically the pagodas or stupas, are heavily influenced by the cultural values, beliefs, and practices of the society that built them. As highlighted by Maw (2013), the architecture of a religious building serves as a reflection of the cultural background of the community. The Shwedagon Pagoda located in Yangon, Myanmar, is widely recognized as the most ancient and revered pagoda in the country. It symbolizes the centrality of Buddhism in Myanmar's culture and the significance of performing virtuous acts. The pagoda's various religious buildings, statuary, and bells add to the overall religious significance of the site. It has played a crucial role in the country's history, and its cultural, religious, and architectural significance continues to inspire people across the world (Ministry of Religious Affairs and Culture, 2018). According to Aung (2017), the conservation and restoration of Myanmar's ancient pagodas, temples, and stupas is an ongoing process that involves various techniques such as consolidation, strengthening, waterproofing, and masonry replacement. The efforts to preserve these structures have been successful in many cases, with some of the most famous sites, such as the Ananda Temple, Thatbyinnyu Temple, and Saytanagyi Stupa, being preserved for future generations.

There are four main types of pagodas found throughout the country of Myanmar: Payas, Stupas (Zedi), Temples (Patho), and Cave temples (Gu Paya) (Teslaru, 2020). Each type of pagoda has its unique features and serves a specific purpose in Buddhist. According to traditional architecture, the body of a pagoda comprises five main components. The circular bowl or Kyi-wun forms the base of the body, followed by the bell or hkaumg-laung. The girdle or yin-zi surrounds the bell and separates it from the next component, the inverted alms bowl or thabeit hnaung. Finally, the festoon or pan-zwe adorns the top of the pagoda's body (Christel, 2020). In addition, pagodas may also include other features, such as various types of decorations and ornaments. For example, many pagodas feature elaborate carvings and sculptures, as well as paintings and calligraphy. Some pagodas also include bells, which are used for religious purposes, and others may have small windows or openings that allow for the circulation of air and light. Additionally, pagodas may be adorned with various types of materials, such as gold leaf, colorful tiles, or precious stones, depending on the wealth and resources of the builder. Overall, the pagoda is a multifaceted structure that serves not only as a religious monument, but also as a cultural and artistic symbol of the region in which it is located.

When considering the historical background, structural features, and cultural heritage values of Pagodas in Myanmar, as mentioned above, it can be said that Pagodas are information objects with three important components; Content, Context, and Structure that are conducive to data management and enabling systematic organization, description, and storage in metadata format (Baca, 2008; Gilliland, 2016). Content means the information existing in pagodas, or things that embodies the pagoda itself. These include architectural structures, construction materials, buddha images, inscription, ornaments, and other things in the pagodas compound. Context refers to the information not existing in the pagodas but rather indicates the

background or information of the pagodas. These include name, founding date, renovation date, historical background, location, etc. Structure refers to the information or set of information that indicates the relations between content and content, content and context, or context and context. The structure in this research was aimed at describing pagodas as valuable assets of cultural heritages and tourism. These include information that can be found in sources, such as media, government offices, tourist reviews, references sources, etc.

## Metadata for Cultural Heritage Data Management

Metadata is a crucial element in managing and sharing information resources for libraries and cultural institutions. It assists in the organization of collections, provides access to resources, and supports research. The various metadata schemas describe objects, resources, and items to help facilitate this process (Savanur and Nagaraj, 2004). In recent years, there has been a growing adoption of automated metadata retrieval to index cultural content, in addition to manual metadata generation. Digitization of cultural information has become a popular method for preserving, capturing, visualizing, and presenting tangible and intangible cultural resources. They have also designed a web-based platform to facilitate user engagement, visualization, and interface with existing resources (Giannoulakis et al., 2018). Metadata descriptions of cultural heritage objects typically include titles, authors, publications, creators, genres, and performances, and they play a crucial role in helping users comprehend historical information collections by describing the historical and social significance of objects and their relationships. Moreover, cultural heritage organizations collect metadata about artists and their lives, which can aid users in identifying or interpreting a resource (Ruthven and Chowdhury, 2017).

Metadata standards or schemas are important for organizing and sharing information in a standardized format to ensure efficient exchange and communication of metadata across different systems and platforms. Metadata standards like Dublin Core, MODS (Metadata Object Description Schema), VRA Core (Visual Resources Association Core Categories), and CDWA (Categories for the Description of Works of Art) have been developed to ensure the consistency, quality, and interoperability of metadata records across a wide array of systems and platforms They act as comprehensive frameworks, delineating the very structure, content, and contextual aspects of metadata. Consequently, they facilitate the effortless exchange and sharing of metadata within the digital information landscape, playing an indispensable role in the organization and retrieval of information across diverse domains. Notably, Dublin Core, VRA Core, and CDWA have gained widespread acceptance among cultural institutions, libraries, and specialized repositories (Higgins, 2007; Zeng and Qin, 2016).

Dublin Core is a versatile metadata standard that describes various digital resources, such as web pages, images, and audio recordings, using 15 key metadata elements like title, creator, date, and format. It's widely accepted in cultural, scientific, governmental, and corporate contexts, making it a foundational choice for diverse applications (Sugimoto et al., 2002). CDWA is a specialized metadata framework tailored for art-related materials. It encompasses descriptive, administrative, and structural metadata, serving as a collaborative platform for art historians, art repositories, and information providers. CDWA's primary purpose is to describe works of art and visual culture, including paintings, sculptures, photographs, and architecture. It provides a structured set of categories and elements to detail the physical attributes, subject matter, and historical context of these works, making it an invaluable resource for art description and documentation (Harpring, 2022). The VRA Core is ideal for describing visual resources like digital images, photos, and art reproductions. It offers a comprehensive set of 19 elements and attributes that cover various aspects, including the work, collection, agents, cultural context, dates, descriptions, inscriptions, and more (Library of Congress, 2007).

## Metadata Development Lifecycle

Metadata initiatives necessitate a systematic and effective development process, culminating in the creation of easily maintainable, shareable, and reusable metadata. Metadata must be tailored to meet the demands of its intended audience, persistently relevant and utilitarian. The emphasis on controlled vocabulary and standardization resounds in the pursuit of metadata quality. The MLM, as a holistic framework, elucidates the

panorama of crafting, administering, and preserving metadata, thereby establishing itself as an invaluable asset for digital libraries, archives, and museums.

The Metadata Architecture and Application Team (MAAT, 2008) has developed the Metadata Lifecycle Model (MLM) to systematize the metadata working procedure. The whole procedure can be divided into four groups: Requirement assessment and content analysis, System requirement specification, Metadata system and service and evaluation. The four groups can also be divided into 10 steps. These include essentials processes to ensure the quality of developed metadata, such as a comprehensive review of metadata standards, interviews with content experts, detailed metadata requirements, design and development of metadata elements and their descriptions, building metadata system, maintaining the metadata service, and continuously evaluating its performance.

Several scholars have suggested the approaches in each stage of MLM. For example, a planning stage proposed by Barton et al. (2003) entailing the delineation of the metadata project's objectives, ambit, magnitude, stakeholder identification, and contextual backdrop. In an analysis stage, Chen et al. (2001) revolves around ascertaining metadata prerequisites by discerning the data that necessitates description, the metadata's intended consumers, and its envisioned utility. This phase assumes the importance in ensuring that the metadata aligns with the physical and logical relationships it represents while being advantageous to its target audience. In the design phase, Bruce and Hillmann (2004), emphasize on formulating a conceptual model for metadata. This stage encompasses the selection of apt metadata schemas, the crafting of metadata components, and the definition of interconnections between these elements. The design phase assumes critical significance in guaranteeing that metadata attains consistency, sound structure, and user-friendliness. Many scholars recommend the importance of metadata testing and evaluation within the deployment phase of metadata inception and administration which would create an assurance of metadata completeness, precision, uniformity, and adherence to pertinent standards or guidelines (Busch et al., 2006; Luther, 2009).

For research related to the development of metadata schema for cultural heritage, there are several efforts, all aimed at documenting cultural heritage data for the benefits of preservation, accessibility, and utilization in educational and developmental contexts. Examples of such research include Hoaihongthong and Kwiecien (2022), who established metadata requirements for managing data on wall murals found in monasteries in northeastern Thailand. Additionally, other studies have devised metadata schemas for various aspects of cultural heritage, such as folklores (Kwiecien et al., 2021), folk dances (Giannoulakis et al, 2018), historical buildings and archaeological heritage (Agathos and Kapidakis, 2019), traditional clothing (Ye, 2023), and more.

Despite the availability of numerous metadata standards, it is recognized that no single or fixed set can comprehensively describe all types of collection data (Koch and Koch, 2017). Therefore, the development of metadata standards or schemas remains for research studies, particularly in the context of cultural heritage information management.

## RESEARCH METHODOLOGY

This study adopted a research and development approach for metadata life cycle guided by MAAT (2008). In this research, metadata development was composed into three phases to effectively meet the research objectives, including: Phase 1, Analysis of metadata requirements; Phase 2, Review of relevant metadata standards; and Phase 3, Metadata schema development and evaluation. This paper presents the third phase of the study. The research conceptual framework is presented in Figure 1.
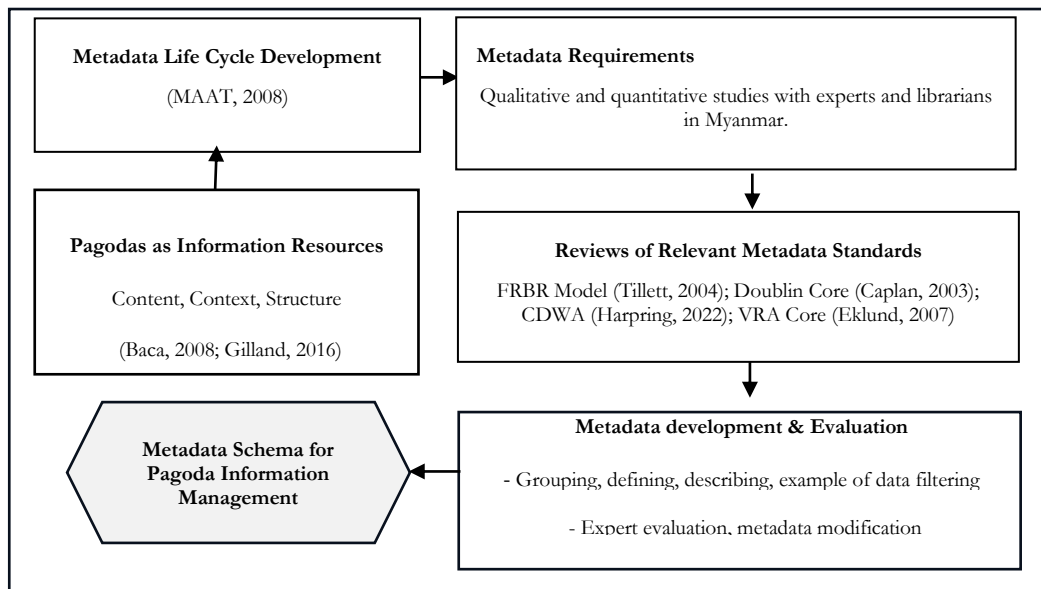
**Figure 1.** Research conceptual framework.

Analysis of metadata requirements in phase 1, the mixed methods of qualitative and quantitative studies were utilized to gain a comprehensive understanding of the demand for pagoda information, and metadata concerns in Myanmar libraries. For the qualitative study, eight participants were selected based on their knowledge about pagoda data and expertise in library services, which included library staff, librarians, and retired experts who were interviewed using a semi-structured approach. For the quantitative study, questionnaires were sent to 57 librarians in 23 university libraries and two national libraries to investigate pagoda data management and necessary metadata elements in libraries of Myanmar. The findings revealed that besides the standards elements such as names, location, sizes, etc., pagoda metadata should include valuable information such as history, architecture, structure, and design. In addition, respondents agreed that metadata should not include oral histories, pagoda income, donation money, materials, and expenditures (Anonymous, 2023b).

Reviews of relevant metadata standards in phase 2, the methodology involved an examination of pagoda data elements, guided by the principles of Functional Requirements for Bibliographic Records (FRBR) as articulated by Coyle (2010) and Tillett (2004). The study analyzed existing metadata standards like Dublin Core (Caplan, 2003; Kakali et al., 2007; Sugimoto et al., 2002), MODS (Gartner, 2003; Guenther, 2003; Library of Congress, 2022), CDWA (Harpring, 2022), and VRA Core (Library of Congress, 2007) to determine their applicability for the organizational framework of pagoda data. A comparative analysis of user needs from phase 1 and data elements in the existing metadata standards applicable to pagoda data management was conducted. As a result in this phase, appropriated data elements were selected (Anonymous, 2023a).

In Phase 3 of the research presented in this paper, it involves metadata schema development and evaluation. The details are as follows:

In the development stage, the researchers created a draft metadata schema by grouping 77 data elements obtained from the analysis in Phase 2 into 16 groups of main data elements. Subsequently, the details of each data element according to the guidelines for creating data descriptions of the Dublin Core Data Element Set (Caplan, 2003), which includes Name, Definition, Format, and Example of data were constructed. In the

Example of data section, the researchers used real data from 50 pagodas out of 157 pagodas officially recognized as the foremost tourist destinations in the country by the Ministry of Hotel and Tourism (https://tourism.gov.mm/) as of September 2023. The data was derived and collected from several sources, such as library collections, books, government documents, media, and internet resources. The example data from these 50 pagodas is beneficial for experimenting with the developed data elements to ensure the most comprehensive and complete data compilation possible.

In the evaluation stage, a quantitative research method was employed, involving the creation of a draft assessment form for the Pagoda Metadata Schema developed. This form was distributed to 12 experts from Thailand and Myanmar who met the selection criteria, including university librarians, educators, and researchers with expertise in metadata, library science, pagoda data, cataloging, library automation systems, information retrieval, Buddhist philosophy, and cultural studies. The evaluation utilized the Index of Congruence (IOC) analysis technique. The experts were tasked with assessing the data elements in the Pagoda Metadata Schema using a three-point scale: 1 indicating agreement, 0 indicating uncertainty, and -1 indicating disagreement. The IOC score for each data element was subsequently computed. An item with an IOC score exceeding 0.5 signified substantial alignment with the acceptance criteria (Turner and Carlson, 2003) were incorporated into the metadata schema. To rectify IOC misalignment, the elements with IOC score lower than 0.5 were excluded, including: 'Top dimension', 'Body dimension', 'Base dimension', 'Historical measurement', 'Guest house', 'Disaster and accidental name ID', and 'Physical description'. Moreover, following expert advice, the 'Current decoration' element has been replaced with two distinct elements: 'Exterior decoration,' and 'Interior decoration'. In addition, modification of data elements according to the experts' suggestions relating to decreasing redundancy, duplication, and unclear data, has resulted in a total of 14 main data elements, which comprised 68 data elements. The other improvements have been made to the data elements, definitions, and format, with the aim of enhancing both logic and comprehensiveness in the metadata schema.

## RESULTS

The development of Metadata Schema for Managing Myanmar Pagoda Information based on the metadata development lifecycle in this study has resulted in metadata schema which comprised of 14 main data elements: Pagoda name, General information, Founding information, Location, Decoration, Physical description, Religion and beliefs, Ritual information, Damage and conservation, Inscription details, Management and authority, Replicated pagoda information, Tourist information, and Media and online links; and 68 data elements in total. Each data element has its own description which includes name, definition, format, and example of data, as shown in Table 1.

**Table 1. The developed Metadata Schema for Managing Myanmar Pagoda Information**

| No. | Data element name | Definition | Format | Example |
|---|---|---|---|---|
| **Main data element 1: Pagoda name** | | | | |
| 1 | Official name | The official name of the pagoda. | Text | Shwedagon Pagoda |
| 2 | Former name | The previous name of the pagoda, if any. | Text | Tigonpa SantawShin Ceti Daw |
| 3 | Alternative name | Another name by which the pagoda is known. | Text | Great Dragon Pagoda or Golden Pagoda |
| 4 | Common name | The commonly used name for the pagoda. | Text | Shwedagon Zedi Daw |
| 5 | Significant name | The meaning or significance behind the pagoda's name. | Text | "Alaungdaw Kassapa" refers to veneration of the deceased body of the venerable person. |

| No. | Data element name | Definition | Format | Example |
|---|---|---|---|---|
| 6 | Similar name | Pagodas with the same name but in different locations or different pagodas. | Text | Kyauktawgyi Pagoda (Mandalay) and Kyauktawgyi Pagoda (Amarapura) |
| **Main data element 2: General information** | | | | |
| 7 | Pagoda type | Identification of the pagoda's type (Paya, Stupa (Zedi), Temple (Patho), Cave temple (Gu Paya) | Text | Temple (Patho) |
| 8 | Historical type | Categorization of the pagoda's history: Clear history, Complex histories, Diverse histories, Various oral histories. | Text | Various oral histories |
| 9 | Pagoda style | Type of architectural style: Bagan, Burmese, Indian, Innwa, Konbaung, Mon, Pyu, Rakhine (Arakan), Shan, Sri Lanka, Thai, Greek, and others. | Text | Burmese |
| 10 | Design | Description of the pagoda's design. | Text | Stone-adorned terraces exhibit a multi-tiered, tapering design. |
| 11 | Construction material | Construction materials used in the pagoda's structure. | Text | Sandstone |
| 12 | Enshrined material | Materials enshrined within the structure of the pagoda. | Text | Buddha hairs |
| 13 | Pagoda number | Official government or association numeric pagoda code. | Numeric or Text | 478/364 - Ka |
| 14 | Descriptive note | Concise overview of the pagoda's notable attributes. | Text | The massive Mingun Pathodawgyi pagoda was intended to be the largest in the country. |
| **Main data element 3: Founding information** | | | | |
| 15 | Founder name | Name of the person who founded the pagoda. | Text | Tapussa, Bhallika |
| 16 | Founder role | Identification of the founder's role or position: Businessman, Government, King, Monk, People, Queen, Royal family, and others. | Text | Businessman |
| 17 | Founding date | The date when the pagoda was established. | Date or Text | B.C. 588, 6th century BCE |
| 18 | Hti (finial) mounting date | The specific date when the finial was placed at the top of the pagoda. | Date or Text | 6th of the Nyon Burmese month |
| **Main data element 4: Location** | | | | |
| 19 | Location and contact address | Address and contact information of the pagoda. | Text | Shwedagon Pagoda Road, dagon Township, Yagon, Myanmar |
| 20 | Coordinates | Geographical coordinates of the pagoda' location. | Numeric or Text | 16.7984° N, 96.1491° E |
| 21 | Old location | Previous location of the pagoda. | Text | Nyaung Shwe City, Shan State, Myanmar |

| No. | Data element name | Definition | Format | Example |
|---|---|---|---|---|
| **Main data element 5: Decoration** | | | | |
| 22 | Interior decoration | Artistic elements such as murals and sculptures within the pagoda. | Text | 33,600 gold plates and 3.5 tons of pure gold. |
| 23 | Exterior decoration | Ornamental elements, architectural embellishments, and visual features grace the outside of the pagoda. | Text | N/A |
| 24 | Pagoda top decoration | Design adorning the top section of the pagoda. | Text | Top stupa features gold plates, 4531 diamonds (72 carat diamond), rubies, sapphires, emeralds. |
| 25 | Pagoda body decoration | Decorative motifs and embellishments on the body of the pagoda. | Text | Eight-pointed corners, arches on all four sides. |
| 26 | Pagoda base decoration | Decorative features and designs located at the base of the pagoda. | Text | Glazed terracotta plaques on its base and terraces, depicting Jakata tales. |
| **Main data element 6: Physical description** | | | | |
| 27 | Pagoda shape | The architectural form or shape of the pagoda. | Text | Cone with 5 terraces and bell-shaped stupa. |
| 28 | Pagoda color | Identification of the pagoda color: Golden, Original, White, and others. | Text | Golden. |
| 29 | Pagoda dimension | Total measurements encompassing the height and width of the pagoda. | Text | 120 feet in length, 66 feet in width. |
| **Main data element 7: Religion and beliefs** | | | | |
| 30 | Buddha statue | A distinct Buddha or deity statues within the pagoda compound. | Text | Inside the temple, there are four towering standing Buddha statues, each measuring 10 meters in height. |
| 31 | Miracles | Supernatural events or incidents linked to the pagoda. | Text | Nine miracles |
| 32 | Spirituals | The specific deity or spiritual figure. | Text | Su Le Bobogyi (prayerful and famous deities and gods. |
| 33 | Religious items | Religion-related items or structures found within the pagoda compound. | Text | Small buddhas, small enshrine, bronze bells, gods. |
| 34 | Noteworthiness | Noteworthiness of the pagoda within religious and belief context. | Text | Myanmar's most sacred Buddhist site. |
| **Main data element 8: Ritual information** | | | | |
| 35 | Ritual date | Dates when rituals are conducted at the pagoda. | Date or Text | From the 10th day of Tazaungmone to the 10th day of waning of Tazaungmone. |
| 36 | Ritual duration | Duration of rituals performed at the pagoda. | Text | 14 days or 30 days. |
| 37 | Ritual activities | Ritual activities conducted during ceremonies at the pagoda. | Text | Evening entertainment options include Zat (drama) performances, stage shows, |

| No. | Data element name | Definition | Format | Example |
|-----|-------------------|------------|--------|---------|
| | | | | and movie shows. |
| **Main data element 9: Damage and conservation** | | | | |
| 38 | Pagoda damage date | Date of occurrence of damage to the pagoda. | Text | A.D. 1838 |
| 39 | Damage part | The part or component of the pagoda impacted by the damage. | Text | Collapsed either at the top or Buddha image. |
| 40 | Conservation history | Previous initiatives taken to restore the pagoda. | Text | Renovated and refurbished several times. |
| 41 | Conservation type | Methodology or approach used for conserving, restoring, or maintaining the pagoda: Pagoda, Pagoda compound, Buddha statue, Pavilion (Tansong), Rest house, and others. | Text | Pavilion (Tansong) |
| 42 | Conservation person or body | Entity responsible for performing treatment on the pagoda. | Text | Chatthin Wealthy Man U Ba Tin and people. |
| 43 | Earliest conservation date | The earliest treatment of conservation date. | Date or Text | 23/03/1959 |
| 44 | Next conservation date | Next treatment or maintenance date. | Date or Text | 05/051974 |
| 45 | Latest conservation date | The most recent date of treatment, restoration, or conservation. | Date or Text | A.D. 2000 |
| **Main data element 10: Inscription details** | | | | |
| 46 | Inscription type | Categorization of inscriptions: Bell inscription, Stone inscription, Wall painted letters, and others. | Text | Bell inscription |
| 47 | Inscription author | Individual or entity responsible for creating the pagoda's inscription. | Text | Owner |
| 48 | Inscription location | The specific placement of inscriptions. | Text | In the pagoda compound. |
| 49 | Inscription information | Identifier or inscription-related data: Prayers, Curse, History, and others. | Text | Curse |
| 50 | Inscription language | Identification of the language used in the pagoda's inscriptions: Burmese, Pali, Mon, Pyu, and others. | Text | Pali |
| 51 | Inscription date | Date of the inscription. | Date or Text | Waso 5th day of 1353 M.E. |
| **Main data element 11: Management and authority** | | | | |
| 52 | Authority | Governing entity responsible for pagoda supervision and upkeep: Buddhist religious association, Government, Monk, Monk and people, Owner, Pagoda's board of trustees, Pagoda slaves, People, and others | Text | Pagoda's Board of Trustees. |

| No. | Data element name | Definition | Format | Example |
|---|---|---|---|---|
| 53 | Former pagoda caretaker | Individuals or groups previously responsible for the pagoda maintenance. | Text | Pagoda slaves. |
| **Main data element 12: Replicated pagoda information** | | | | |
| 54 | Replica pagoda name | Name of replica pagoda. | Text | Uppatasanti Pagoda |
| 55 | Replica pagoda date | Replica pagoda's creation date. | Date or Text | 2009 |
| 56 | Replica pagoda location | Location where a replica or duplicate pagoda is situated. | Text | Naypitaw, Myanmar |
| 57 | Buddha image replica description | Description of replicated Buddha images within the pagoda complex. | Text | Rakhine Muni Bhudda image. |
| **Main data element 13: Tourist information** | | | | |
| 58 | Tourist attraction fact | Information about the pagoda as a tourist destination. | Text | Foot rowing, lotus threads, cultural performances, and music. |
| 59 | Recreational facilities | Activities and amenities available to visitors for leisure and enjoyment at the pagoda. | Text | Therapeutic hot water springs at the base. |
| 60 | Do-Don't | Permitted and restricted activities within the pagoda. | Text | Do not apply gold plating to the Buddha images. |
| **Main data element 14: Media and online links** | | | | |
| 61 | Pagoda image | Photograph of the pagoda used in the metadata. | Image | JPG, JPEG |
| 62 | Buddha image | The Buddha image within the references in the metadata. | Image | JPG, JPEG |
| 63 | Arts and architecture images | Links to images displaying the pagoda's appearance, features, murals, sculptures, bells, inscriptions, and events, both indoor and outdoor. | URL | https://www.uclmyanm.ar.org/rangoon-north-entrance-the-shwe-dagon-pagoda/? |
| 64 | Document sources | Physical book bibliography. | Text or URL | SHWEDAGON: The Sacred Shrine – Burma Superintendent, Government Printing and Stationery, 1964.or https://elib.uclmyanmar.org/elib/cgi-bin/opacexe.exe? |
| 65 | Video link | Web link directing to videos showcasing the pagoda and its surroundings. | URL | https://www.youtube.com/watch?v=dfiYK73yEa4 |
| 66 | Audio link | Resources containing audio content about the pagoda's history, rituals, or significance. | URL | https://podcasts.google.com/feed/aHR0cHM6Ly93ZXRyYXZlbHRoZXJlLmxxpYnN5bi5jb20vcnNz/episode/MzBjODhhNzktMjEzZi00NzljLTk0NjUtNTQ2ZjQ5 |
| 67 | Pagoda authority's Facebook page | Official Facebook page or profile of the authority overseeing the pagoda. | URL | https://www.facebook.com/shwedagonpagoda |
| 68 | App store | Links to web or mobile applications | URL | https://play.google.com/store/apps/det |

| No. | Data element name | Definition | Format | Example |
|---|---|---|---|---|
| | | available on app stores providing information or guides about the pagoda. | | ails?id |

## DISCUSSION AND CONCLUSION

The Myanma's pagoda metadata schema developed according to the Metadata Development Lifecycle, modified from MATT (2008), through a systematic research process involving three phases. Phase 1 involves studying metadata requirements from expert users and librarians of the National Library and University Libraries in Myanmar (Anonymous, 2003b). Phase 2 entails analyzing to determine the data element set for pagoda metadata, aligning concepts with the FRBR Model, and comparing data elements obtained from user requirement studies with existing metadata standards such as Dublin Core, CDWA, and VRA Core (Anonymous, 2023a). Phase 3 involves the development and evaluation of the pagoda metadata schema, resulting in a standard metadata with a suitable data element set for managing and describing pagoda data comprehensively and effectively in Myanmar.

The data element set of the Pagoda metadata schema developed includes common data elements for creating descriptions of information objects such as name, founder, location, and physical description. However, due to the nature of pagodas as information objects with a significant amount of diverse data, two clear differences from other metadata standards like Dublin Core (Caplan, 2003; Kakali et al., 2007; Sugimoto et al., 2002), MODS (Gartner, 2003; Guenther, 2003; Library of Congress, 2022), CDWA (Harpring, 2022), and VRA Core (Library of Congress, 2007) are evident. Firstly, since the data elements for describing similar information vary due to background, language, popularity, and familiarity, it becomes necessary to either consolidate them or establish relationships among them under main data elements. For example, under the main data element 'Name' of a pagoda, there could be up to 6 different names such as 'Official name,' 'Former name,' 'Alternative name,' 'Common name,' 'Significant name,' and 'Similar name.' Secondly, many data elements specific to pagodas need to be newly defined as they are unique characteristics not presented in other metadata standards. For instance, main data elements like 'Religion and beliefs,' 'Ritual information,' 'Damage and conservation,' 'Inscription details,' and 'Replicated pagoda information', are needed to be established. These main data elements are not included in other metadata schema for murals (Hoaihongthong and Kwiecien, 2022), folklores (Kwiecien et al., 2021), folk dances (Giannoulakis et al, 2018), historical buildings and archaeological heritage (Agathos and Kapidakis, 2019), and traditional clothing (Ye, 2023) in the previous studies. Furthermore, it's noted that information about pagodas in Myanmar found in sources other than libraries is extensive and includes details that may not be recorded in library documents. Therefore, researchers have designated main metadata related to 'Media and online links' which allow data recorders to add link details to other data sources in various formats such as images, videos, audio, websites, Facebook, and Mobile App stores.

The use of a structured metadata schema will offer benefits that extend beyond the immediate. It not only enhances data retrieval efficiency, standardizes updates, and preserves dataset integrity but also improves accessibility for contributors and users. This standardization is vital for the sustainability and longevity of the information repository. The caution for data entry professionals lies in the scarcity of information, necessitating cross reference with multiple sources. For example, when entering data for a pagoda, consulting information from at least three books is advisable to address potential discrepancies. In cases where certain pagodas present conflicting or perplexing data, it's essential to explore by listening to audio files and watching video files from trustworthy sources. Augmenting this with photos from inscriptions or pagoda images, along with official Facebook pages, can enhance the reliability of the information. Extracting audio data elements from podcast recordings and accessing video content on platforms like YouTube, including historical narratives, artistic displays, and architectural showcases, is crucial. The recommendation is to avoid incorporating unverified or entertaining content and to rely solely on historical facts.

### Recommendation

The crafted metadata schema designed for Myanmar pagodas, incorporating established standards like CDWA and VRA Core, lays a foundational framework for the systematic organization and effective utilization of digital collections within libraries. Comprising 68 validated metadata elements, the schema not only captures the physical attributes of pagodas but investigates into the profound traditions and spiritual significance associated with these sacred sites. It plays a pivotal role as a bridge between the digital library and its content, enhancing the discoverability and accessibility of digital assets related to Myanmar pagodas. To fully unleash the capabilities of this metadata schema, it is strongly recommended to seamlessly integrate it into library systems. This involves collaborating closely with librarians and information specialists to align the metadata schema with the library's existing information and organizational needs. Essential to this process is the imperative to conduct user training sessions, acquainting library staff with the schema, and promoting its effective use in the management and retrieval of digital collections related to Myanmar pagodas.

The pagoda's metadata schema can also have the potential to serve as a valuable resource for fostering both local and international collaboration on pagoda data. The metadata can be effectively combined and integrated with data from pagodas in other countries, creating opportunities for a comprehensive understanding of these cultural structures. Encouraging partnerships with local communities, cultural organizations, and international researchers is pivotal. Such collaborations will contribute to and enrich the metadata, ensuring a more holistic representation of Myanmar's pagodas that incorporates diverse perspectives and expertise. This collaborative approach not only enhances the schema's depth but also strengthens its capacity to encapsulate the intricate cultural tapestry surrounding these sacred sites.The creation and integration of the metadata schema for Myanmar pagodas provide notable contributions by improving the online cataloging system and structuring the organization of pagoda information, ensuring it is easily accessible and searchable. This schema serves a practical purpose, bringing benefits to libraries and library professionals, streamlining the retrieval and data entry processes effortlessly. It plays a pivotal role as a bridge, connecting library operations with on-the-ground conservation efforts.

The research makes a dual contribution, spanning both academic and practical domains. It enhances our understanding of metadata schemas, particularly in the context of cultural heritage data like pagodas. Moreover, it offers insights into future studies, ensuring a continuous and evolving impact in both theoretical and practical contexts. In the academic realm, the schema acts as a facilitator for research and exploration, catering to the needs of researchers, historians, and scholars. This results in the provision of high-quality digital information, facilitating global outreach and contributing to valuable academic research, cultural preservation, and practical conservation efforts. The Myanmar pagoda metadata schema provides a structured framework for the scholarly documentation of Myanmar's pagodas, enabling researchers to explore intricate details and foster a deeper understanding of the country's rich landscape.

On a practical level, the metadata schema serves as a foundational resource, providing a comprehensive repository of pagoda information and establishing the groundwork for sustainable management and conservation practices. In the contemporary era, it introduces innovative technology to Myanmar libraries, creating a systematic digital collection on a unified platform. This not only streamlines data management for libraries but also enables users to access information related to Myanmar pagodas efficiently. It empowers conservationists, architects, and policymakers, promoting sustainable tourism practices and public education about pagodas' historical significance, transcending theoretical frameworks in real-world contexts. By centralizing and standardizing pagoda information, the schema becomes a cornerstone for collaboration, ensuring a harmonious integration of academic pursuits and tangible conservation outcomes. This integrated approach emphasizes the schema's role as a dynamic tool that not only documents the past but also contributes to the sustainable future of Myanmar's pagodas.

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