

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2022

Volume 25, Pages 152-165

**IconSoS 2022: International Conference on Social Science Studies**

## **Balancing Sustainability Factors Affecting the Implementation of Digital Libraries of Malay Manuscript: A Proposed Framework**

**Nor Hasni CHE HASSAN**  
MARA University of Technology

**Wan Satirah WAN MOHD SAMAN**  
MARA University of Technology

**Abstract:** The aim of this study is to explore and understand the factors that will affect the implementation of Digital Libraries of Malay manuscripts in libraries. The paper discusses the issues related to the risk management of digital resources in Malaysian documentary heritage institutions. The study will have employed a descriptive-qualitative approach to explore how the DLMM is operated in five selected information institutions in Malaysia. Three types of data collection techniques were used: interviews, observation, and document analysis. The semi-structured interview was used as the main data collection technique. The paper's findings and discovery are significant in highlighting the crucial elements which need to be addressed to ensure the sustainability and successful implementation of digitization projects. The paper's findings and discovery are significant in highlighting the crucial elements which need to be addressed to ensure the sustainability and successful implementation of any digitization project. The findings of this paper contribute toward the dissemination of new knowledge specifically in the management of digital preservation of documentary heritage available in Malaysia.

**Keywords:** Digital library; Digital preservation; Risk management; Documentary heritage; Malay manuscript

### **Introduction**

One of the most significant current discussions in the information management context is digital library especially with the advent of pandemic COVID-19 and the closing of libraries around the world. A considerable amount of literature has been published on Digital Library (DL). However, far too little attention has been paid to the Digital Library of Malay manuscript (Zahidah, 2011; Ding, 2014; Awang, 2020). Malay manuscript is defined as hand-written document in Jawi script from early 14th century till early 20th century. Study on the development of the DLMM in many senses is vital for digitization professionals, digitization managers, and librarians who would like to pursue digitization and digital preservation projects, especially those agencies that have the collection of Malay manuscript namely the National Library of Malaysia, National Archive of Malaysia, UM library, UKM library, USIM library, IIUM Library, UNISZA library, DBP, Terengganu Museum and Islamic museum particularly to get themselves acquainted with the challenges.

While research on the digital library has been greatly reported in the literature, gaps still exist in a number of areas. However, there has been little discussion about the challenges for the implementation of DL focused on Malay manuscript collection in developing countries from the perspective of practitioners. The research to date has tended to focus on digital library of book, journal and thesis collection (Ghamouh, 2015; Agosti, 2018; Singeh, 2020).

Studying the factors that affect the implementation of DLMM has become an important issue in determining the value of digitization. There have been a limited number of studies that have been conducted to analyse the

---

- This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

- Selection and peer-review under responsibility of the Organizing Committee of the Conference

© 2022 Published by ISRES Publishing: [www.isres.org](http://www.isres.org)

economic, social, cultural, technological and organizational factors that affected the implementation of DLMM in libraries or digitization of documentary heritage (Voutssas, 2011; Masenya, 2020). The digitization professionals, digitization managers and librarians should have proper knowledge about the factors that affect the implementation of DLMM before they decide to implement DLMM in their institution to reduce unnecessary cost.

Based on the previous research on DL, it was seen that there have been conceptualized and proposed several frameworks for the design, development, evaluation and interaction of digital libraries (Levy and Marshal, 1995; Moen, and McClure, 1997; Marchionini and Fox, 1999; Saracevic, and Covi, 2000; Fuhr, 2001, Blandford et al, 2004). However, it is not comprehensively including the economic, social, cultural, technological and organizational aspects in their framework. As stated by Manaf (2010) although there is a Department Digitisation Policy developed by the National Library of Malaysia in the year 2000, this policy is not comprehensive enough to serve as a guideline by cultural institutions. It does not include the selection criteria, the principles guidelines and the most important elements, the standard and protocol to be used by the institutions in their digitisation projects.

## **Literature Review**

Documentary heritage represents a large proportion of the world's cultural heritage. Many of these resources have lasting value and significance, and therefore constitute a heritage that should be protected and preserved for current and future generations. UNESCO (2010) defines documentary heritage as items that are moveable; made up of signs, codes, sounds and images; capable of preservation; reproducible; and they are products of deliberate documentation process. A further definition is given by Edmondson (2015) who describes documentary heritage as comprises those single documents – or groups of documents – of significant and enduring value to a community, a culture, a country or to humanity generally, and whose deterioration or loss would be a harmful impoverishment. The significance of a document may become clear only with the passage of time. For each state, its documentary heritage reflects its memory and identity, and thus contributes to determining its place in the global community. This definition is close to that of Robert (2016) who defines heritage as “our legacy from the past, what we live with today and what we pass on to future generations”.

Manuscript can be categorised as one of valuable asset and historical documentary heritage. Malay manuscript is defined as a handwritten document in the Jawi script which surfaced in the beginning of the sixteenth century and ended in early twentieth century with the coming of the west and the introduction of printing machines. Siti Munirah (2018) has defined MM as “all kinds of hand written materials in any of the Malay languages using the jawi script concerning the Malays and their civilization that are at least a hundred years old”. According Chambert-Loir (2011), Malay manuscript tradition comes from the tradition of Arab and Indo-Persian. Manuscripts generally refer to unpublished original sources and have the characteristic of being unique. Unlike books, journals and other resources typically collected by libraries, manuscripts typically do not exist in multiple copies (Hilmi, 2007). Most of the Malay manuscripts were written in Jawi scripts. Historically, Jawi scripts are taken from Arabic language and Persian and it had been added five new letters that made it suitable for Malay to use. In earlier times, Malay manuscripts were usually written by royal and religious people (Zahidah, 2013; Samsu, 2021). According to the historians, when British came to Malaysia, the Malay manuscripts had been spread all over the world. The number of collections that had been found had developed from time to time. Prof Dato’ Ismail Hussin, an expertise in Malay manuscript stated that it was about 2000 of manuscripts that had been taken by Raffles, Farquhar, Maxwell, Klinkert and Voorhoeve on the 19th century.

For writing material, the Malays used pen or kalam derived stem of plants of which the most commonly used were kalam resam and kalam kabong (Mariani, 2001). Kalam resam was made from the stem of fern resam (*gleichenia linearis*) and the kalam kabong was made of a black hard bristle from various palmae plants namely enau or kabong (*arenga pinnata*) and gomuti palm (*borassus gomuti*). As for the ink, it was locally manufactured from the ingenuity of the Malays. It was largely made from oily or torch lamp black or burnt charcoal mixed with gum and honey. Another source of ink was from a local fruit called majakani. Coloured ink was extracted from certain plants such as water hyacinth for purple ink, the fruit rind of mangosteen for brown ink and safflower for red. The luxuriant colours from the fauna enhanced the beauty of illuminated manuscript.

The writing activity is believed to start from a string of writing on a stone. Like the stone inscriptions in Terengganu. Its influence has had an impact on the writing of this manuscript. In addition, foreign traders also influenced the writing of this manuscript. The paper used was brought from Arab countries, China, India and Europe while the ink was brought from China (National Library, 1997). As for the Arab traders, in addition to

trading, they were also active in spreading religious knowledge so that the space was open for the locals to record by composing whatever they learned.

Reflected by the ability of the traditional society at that time, highly skilled and capable of producing so many manuscripts. It should be noted that the manuscript is not just a diary, but the knowledge contained in it is very broad (Awang, 2020). It covers all aspects of daily life. Its content is comprehensive and extensive covering all fields such as law, administration, constitution, religion, prophecy, medicine, beliefs, storytelling as well as the history of the origin of the state, religion and descent. The authors of this script could be said as knowledgeable and educated person. They are considered as the expert in their subject.

Malay manuscripts are scattered and kept by the respective institutions and individuals in Malaysia, Brunei, Indonesia, Britain, Germany, France and South Africa. Several institutions that have Malay manuscripts in Malaysia such as the National Library of Malaysia, National Archive and Malaysian Institute for Language and Literature (Dewan Bahasa dan Pustaka) have published series of catalogs of Malay manuscripts as reference documents for users. The distribution of Malay manuscripts is shown in Figure 1.

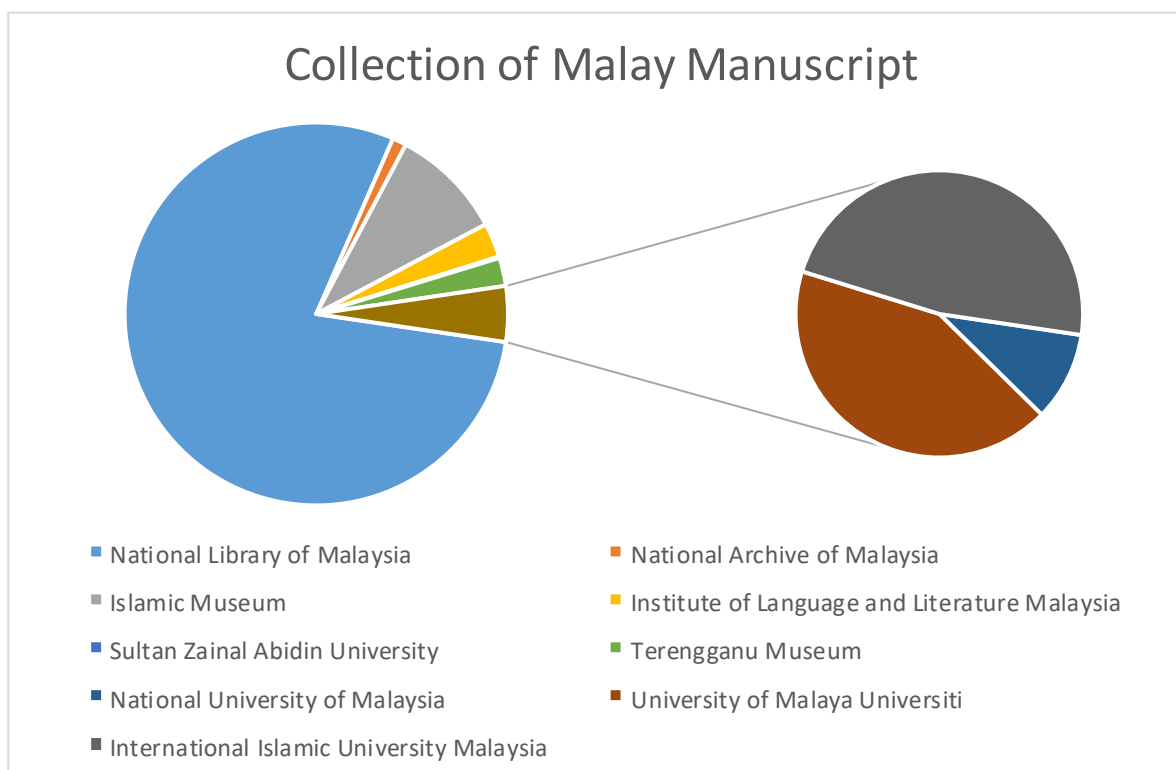


Figure 1. Collection of Malay manuscript in institution in Malaysia.

It is of great importance to make cultural heritage available to people, particularly those who participate in disseminating the cultural heritage, notably the written cultural heritage, such as scholars, researchers, students, and so forth. For many years, libraries, museums and archive centers have played a significant role in preserving, organizing, and disseminating mankind's cultural heritage. Malay civilization, particularly in its golden age, which lasted for around fourteen centuries, has contributed much to subsequent civilizations, and some of its rich cultural heritage remains. Malay manuscripts are one of the remaining legacies of Malay civilization. This heritage has lasted until the present day because it is part of mankind's heritage, and many scientific fields still rely on this heritage as a fundamental source of knowledge.

In respect of the preservation of manuscripts, the Memory of the World Programme launched by UNESCO in 1992 is formed aimed at focusing world attention on the need to safeguard endangered and unique library and archives collection, to make it available for future generations and to improve its accessibility globally. It also aims to stimulate a responsible approach to the sources from which our historical consciousness grows and to contribute to the general availability of information about our history and culture. The Programme also seeks to develop products based on this documentary heritage and make them available for wide distribution, while ensuring that the originals are maintained in the best possible conditions of conservation and security. It

establishes and maintains a World Register identifying documentary heritage of international, regional and national standards. As of December 2018, 381 documentary heritages had been inscribed in the Register, with 274 of these from Europe and North America and 116 from Asia and the Pacific as displayed in Figure 2.

## MEMORY OF THE WORLD

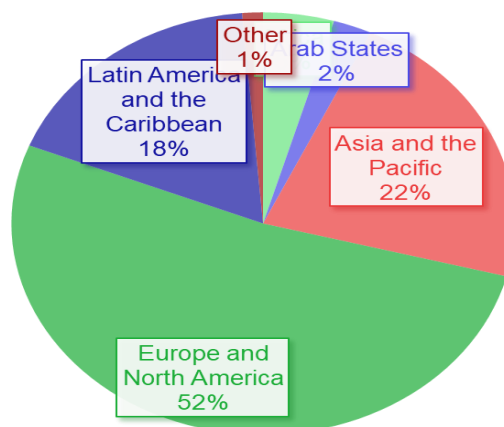


Figure 2. Documentary heritage in MOW

Malay civilisation, particularly in its golden age, which lasted for around fourteen centuries, has contributed much to subsequent civilisations, and some of its rich cultural heritage remains. Malay manuscripts are one of the remaining legacies of Malay civilisation. This heritage has lasted until the present day because it is part of mankind's heritage, and many scientific fields still rely on this heritage as a fundamental source of knowledge.

Malay civilization such as the Malacca, Pattani and Aceh which is scattered in the south eastern part of the Asian continent has its own unique heritage treasures (Amer, 2017). Although these treasures were once not so valuable because they are not envisaged commercial value, but its aesthetic value that stores a variety of tips and 'story' ancient ancestors of the Malays should guarantee the security of these treasures in the hands of the Malays. But the delay in understanding this fact can cause a large amount of money to be spent later to collect it back after the passage of time. It is not merely a theoretical predictable-bit or dire predictions are exaggerated, but a fact that has happened and bitter lesson that already had swallowed up by the Malays as a precious treasure, including manuscripts and historical documents, was taken home by Dutch after their arrival in the archipelago in 1596.

This incident is the most obvious example, and transfer the treasures of the Malay heritage to some other European countries such as Germany, France, Britain has led it to today 'buried' in them and be their property. As a result, these valuable treasures cannot be taken or collected back except by paying a very high price. Hassan Omar said in a report in *The Straits Times* (11 July 2006) has proved this when he quoted the words of the Minister of Culture, Arts and Heritage Minister Datuk Seri Dr Rais Yatim when delivering his opening speech at the International Seminar on Malay Manuscript in 2006 in Kuala Lumpur said, "We try to bring it (the Malay Manuscript) return but the price offered direct mediator does not make sense. So we don't buy it" (Amer, 2017).

Malay manuscripts serve as an important source of understanding the intellectual and literary heritage of the Malays. Some of these works were later re-published in printed format when printing was introduced first in Java then Penang, Malacca and Singapore in the 19th century, before the existence of a writing system, using only traditional Malay oral tradition to develop a story for them. However, this oral tradition is seen as not trying to be a legacy that is present in tangible form, instead it appears to be a 'little tradition'.

Since libraries have been close temporarily (some are partially open) since the outbreak of pandemic COVID 19 as could be seen in Figure 3, most libraries offer their services via digital as it is advised for society to practice social distancing and to avoid libraries from being too crowded (Rahimi & Rosman,2020; Bhati,2020). Other than sharing the information and awareness via the social media and official websites, most of the libraries in the world are focusing on their campaign to encourage their users to use the digital services. For example, the National Library of Spain is promoting its digital content that can be used to support education. On the other hand, the New York Public Library gives the initiative for users to use a mobile application to borrow research databases and access a multitude of online resources. The library provides a wide collection of digital offerings,

including e-books for borrowing on their Simply E application, research databases, and access to a multitude of online resources.

	Cases	Deaths
Malaysia	362,173	1,333
Brunei	219	3
Indonesia	1,571,824	42,656
Singapore	60,692	30
Thailand	34,575	97
Philippines	884,783	15,286
Myanmar	142,596	3,206
Cambodia	4,696	33
Timor-Leste	1,046	1
Laos	52	0
Vietnam	2,707	35

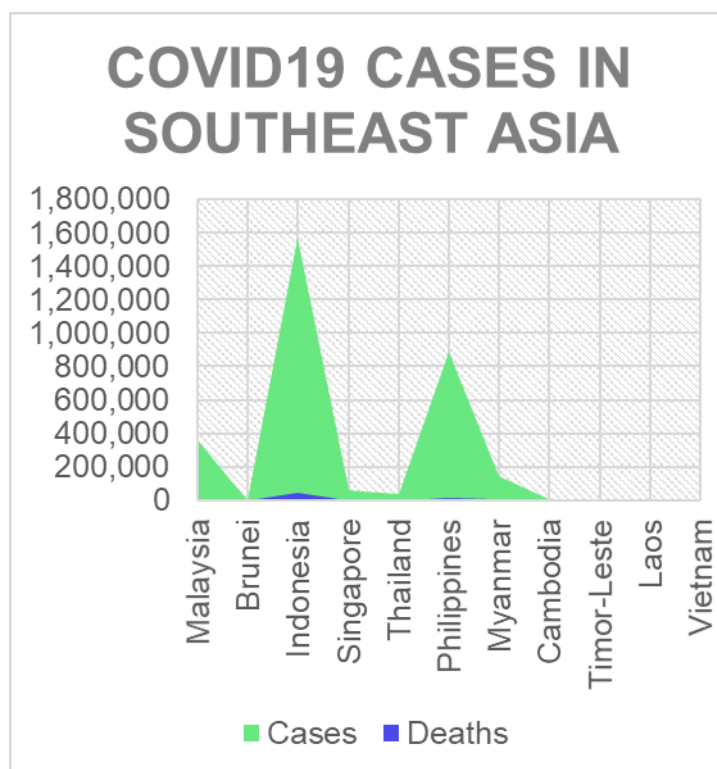


Figure 3. COVID19 cases and deaths in Southeast Asia updated 13 April 2021

Over the last decade, the social facilities integrated to traditional digital libraries have been seen. Users not only can access information by basic features but also they would need more advanced services from digital libraries (Gaona-García et al. 2017). As Pérez (2017) pointed out digital libraries will extend various services in order to support for knowledge sharing between users. An extended definition of a digital library from a workshop based on the social aspects is given by (Islam, 2014) “1. Digital libraries are a set of electronic resources and associated technical capabilities for creating, searching and using information 2. Digital libraries are constructed, collected and organized by (and for) a community of users, and their functional capabilities support the information needs and uses of that community.”

With rapid development of information communication and technology, manuscripts can now be preserved electronically through digitization for future keep, simultaneously making it accessible globally (Suleiman, 2013). Many libraries are venturing into digitization project which is new and costly. Rapid changes in computer technology offers a multitude of application devices for digitization. It is crucial to study and select the appropriate technology suitable for the needs of manuscript as the manuscripts are fragile and may endanger its physical condition. The most important thing is to define the formal rules which would be worldwide acceptable. Furthermore, this format must fit with the necessary standards for dissemination of data via Internet (Zahidah, 2013; Tatjana, 2017).

Manaf (2010) emphasizes that the use of hardware and software to capture an item and convert them into bits and bytes, matches by a quickly developing set of practices for describing and retrieving digital objects, is giving form to the talk of a “library without walls”. The main reasons to digitise are to enhance access and improve preservation (Isa, 2018). By digitising their collections, cultural institutions can make information accessible. It also allows users to search collections rapidly and comprehensively from anywhere at any time. Digitisation can also help preserve precious materials. Making high-quality digital images available electronically can reduce wear and tear of fragile items (Anau, 2019). Hence, the main objective of digitisation initiatives is to enhance and improve access to information. Indirectly, it can also ensure preservation of the information using the most appropriate technology. Both the preservation and increase in accessibility complement one another as access incites protection and preservation ensures access (Baomah, 2017).

Ding (2014) pointed out that, an increasing number of Malay manuscripts in libraries especially those in private collections, are disintegrating. This problem has been with the Malay World since the very beginning. Deterioration may be due to acid embrittlement of the paper, unsuitable storage environment, biological attacks or human negligence and mishandling (Hilmi, 2007). A number of these manuscripts are already brittle to a point of being unusable. As mentioned by Van Lit (2019), flooding, terrorism, bomb threats, explosions, transportation accidents, earthquakes, fire and war also prove dangerous threats to the written cultural heritage. It has been well publicized how much effort has been expended in order to restore the losses experienced by Bosnian and Kosovan libraries. The artefacts in Baghdad National Museum and Baghdad National Library are no longer available for the benefit of future generations and humanity as a whole. The world cultural heritage is continually at risk because of natural and unnatural disasters.

Many digital library initiatives focus on preserving various cultural heritages. Often, the initiatives comprise of various materials such as pictures, maps and paintings, and manuscripts are one of the materials included. Shafi (2004) listed some Western and Indian digital library of manuscripts initiatives; among others MASTER (Manuscript Access Standards for Electronic Records), The Digital Scriptorium (<http://sunsite.berkeley.edu/SCRIPTORIUM/>), Oxford University Manuscripts, (<http://image.ox.ac.uk>), Medieval Manuscripts of Syracuse University (<http://libwww.syr.edu/digital/collections/m/Medieval>), The Bibliotheque National De France (<http://www.bnf.fr/en/luminures/>), “Medical Manuscripts in NLM”, “European Manuscript Server Initiative” (EMSI), and “Unesco Memory of World”. Those projects have used photographic and digital methods to develop a full or partial archival copy of the manuscripts available on-line using different software with JPEG format for image processing in association with different metadata initiatives. Shafi (2004) argues that these attempts could be very useful in evolving a common strategy for digitization of vast manuscripts resources.

The proliferation of electronic information; the dwindling budget for acquisition of library stocks; the desire to access materials in remote locations; the quest for collaboration, partnerships and resource sharing; and the ever increasing cost of preserving analogue materials, and so on, are some of the forces that prompted digitization of archives and records (Anundhra, 2017; Pandey, 2014). The aim of digitizing library materials is for preservation and easy access by any user or researcher. Digitization improves access to library resources. By digitizing library collections, information will be accessible to all instead of a group of researchers. Digital projects allow users to search for collections rapidly and comprehensively from anywhere at any time. Digitization makes the invisible to be visible. Several users can access the same material the same time without hindrance. It also removes the problem of distance, as users do not have to travel to libraries that possess the hard copies of library materials before they can access and use such materials (Ukwoma, 2019).

## **Issues and Challenges in Implementing Digital Library of Malay Manuscript**

A considerable amount of literature has been published on the challenges and barriers in implementing DL in libraries. These studies including the management of digital assets presents new challenges to the library community in terms of administering complex hardware and software, but mass digitization has not changed the fundamentals of library services (Pandey & Kumar, 2020). The ephemeral nature of digital items will require more expense and staff attention in meeting preservation commitments, but the relationship of user needs to item selection and organization remains essential. The complexities involved in supervising intricate information systems optimized to meet specialized user needs requires a strategic approach to management that takes into account the role of digitized collections within the larger context of the library and parent organization (Joselt, 2019). Guiding users to the items most suited to their information needs becomes a very different task as service points become more remote, but the digital environment brings with it increased possibilities to meet the traditional goal of providing personalized services to every user (Anuradha, 2017).

Furthermore, digitization of library resources poses a great deal of challenge to the major stakeholders, that is, the library management, employees and library users. Despite everything that digitization can accomplish, there are some good reasons librarians and archivists in developing countries may regret embarking on such project. Not everything in the collection is worthy of digitizing because the idea of an entire archives or library being digitized is a long way process. Successful digital project are the result of careful planning and evaluation of collections and the digitization of only those items that will provide the greatest benefits to the users.



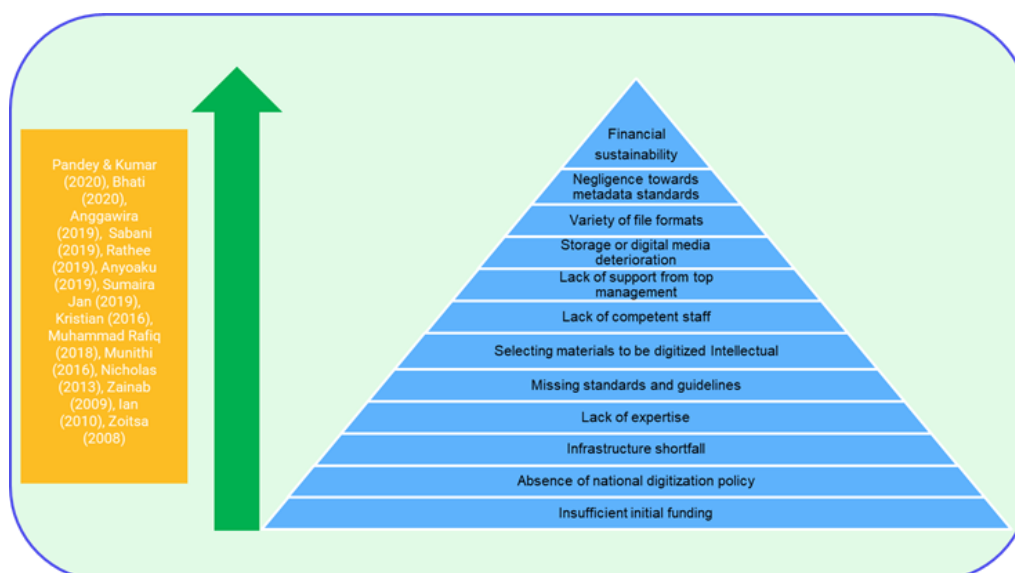


Figure 4. The mapping of barriers to digitization or digital library

### 1. Insufficient initial funding

A primary reason why libraries and archives fail in digitization projects is a lack of funding or working capital (Pandey, 2020; Khan, Shafi and Ahangar; Rafiq, Ammen, and Jabeen, 2018). Pandey (2020) states that initial funding was including the cost of digitization in-house that is, with its own employees, equipment and within its facilities or to hire a provider specialized in these services. Similarly, a study by Khan et al (2018) found that inadequate funding for the library is one constraint against practical digitization of library materials.

### 2. Absence of national digitization policy

There is a significant need for standard policy or national-level policy, rules, and methods to bring uniformity. In the absence of policy, professionals feel confused, eventually leading to a loss of consistency in their work. Mesui, Andrade, and Waizenegger (2019) emphasised that despite awareness of Information Communication Technologies, there is a lack of ICT policy in heritage institutions in Tonga. Similarly, Rafiq, Ammen and Jabeen (2018) explored that lack of established digitization plan, policies and procedures in Pakistan as one of the most important barriers in implementing DL.

### 3. Infrastructure shortfall

As infrastructure is the backbone of any countries progress, in the same way, the success of any project in the libraries cannot be imagined without proper infrastructure. Asogwa, Ali and Ezeani (2021) showed that only 12.5% of libraries in Nigeria have enough infrastructure for digitization and rest 82.5% do have not enough infrastructure. In the same context, Rafiq, Ammen and Jabeen (2018) in their study found that insufficient technological infrastructure as third major barriers to digitization initiative in Pakistan.

### 4. Lack of expertise

Lack of expertise is a crucial reason for the failure of any project or organization. Especially in the field of digitization and digital library, the lack of IT experts will lead to the unsatisfactory output of the project. Rachman (2018) found lack of expertise or limited technical knowledge was one of the key challenges in digitization especially in Indonesian's libraries. Likewise, lack of technical expertise was the fourth in the list of the obstacles in digital heritage preservation in the study done by Pandey (2020). According Anuradha (2017), inadequate technical expertise is prevalent in many developing countries. There is shortage of personnel/human capital. Few librarians with computer science qualifications (computer engineers) work in libraries, hence the consequent frequent break down of ICT facilities and disruption of services in digitized libraries.

### 5. Missing standards and guidelines

In any organization, standards and guidelines are the protocols for professionals. Like business organizations, libraries also require standards and guidelines for keeping up uniformity in their administrations and practices. In this context, previous studies reported severe negligence in the implementation of standards and guidelines and termed it as one of the hindrances in the success of digitization projects. The survey conducted by Masenya (2019) in Africa analysed the responses of libraries with respect to the availability of standards on preservation

and revealed that only 14.3% of libraries follow de facto standards while 85.7% do not support any standard. A few of them were even not aware of any standards.

#### **6. Selecting materials to be digitized**

One of the significant tasks in the process of digitization and digital preservation is selection of materials to be digitized and is usually finalized at the managerial level. However, managers often face difficulty in selecting material to be digitized or preserved. Rafiq and Ameen (2019) describe the top three selection criteria for digitization, namely, academic importance, increasing access to the documents, and reducing damage to the original. In another study by Liljeström (2018) in Sweden emphasized that selection of the analogue material to be digitized by the respondent libraries is steered first and foremost by high-level values of the primary criteria of significance, e.g. historic, scientific or research potential.

#### **7. Lack of competent staff**

A competent workforce is one of the crucial forces for the completion of a project. Without sufficient and skilled staff, no project can be imagined. According to Jan (2019), lack of staff was another problem that contributed to challenges in the implementation of digitization policy in mostly university libraries in India. Likewise, Anyouka (2020) reported that 52.2% of the university libraries in Africa have lack of competent staff. This is a problem for many digitization projects in Africa, as studies in libraries in general and university libraries in particular have consistently reported inadequate level of information and communication technology skills as one of the major problems facing libraries in Africa.

#### **8. Lack of support from top management**

The administration is the backbone of an organization. The primary role of the administrator is to make connections among different sections and employees of the institution. Management is responsible for policymaking, decision making, and taking positions on current issues the organization is facing. A study conducted by Ogenga (2015) in Kenya analyzed lack of awareness and support from top management as a challenge in digital preservation. His study used structured questionnaires and interview schedule to collect data from 150 graduate students, 25 academic staff and 25 library staff. Findings from his study revealed that the management has not put up policies with regards to access and use of the repository resources. It shows that lack of support from top management has huge impact to the failure of DL project.

#### **9. Storage or digital media deterioration**

Deterioration of digital media is responsible for the disappearance of, or inaccessibility of digital information in the long run. This is because media deteriorates or decays within few years after digitization. Another challenge is that digital media get lost during disaster or virus attacks. Anuradha (2017) analysed the reason why re-digitization is inevitable is the likelihood that electronic resources created in previous years using older technologies may not be accessible or compatible with the new technologies. Furthermore, Toyo (2017) found that deterioration of content is a big concern in the conservation of manuscripts. In his study he sample size was forty-seven (47) library staff (professional and para-professional) from John Harris Library. The finding was that 97.9% of the respondents agree that deterioration of digital media as the major challenges in DL project.

Undoubtedly, digital archives should be transcribed every ten to twenty years to ensure that they will not become technologically obsolete (Joselt, 2019). The continuous changes in computer hardware and software cause technological obsolescence which is a threat to digitization and digital preservation. It causes the loss of the means to access to information in digital form. Technological obsolescence is caused by continuous upgrade of operating system, programming language application and storage media.

#### **10. Variety of file formats**

Computer files are used to store digitised data on storage devices, and the format of a file dictates its future readability. It is strongly advised that the digitization project manager should adopt open file formats or at least those file formats whose backward compatibility can be assured. Studies have reported a high level of variation in the storage file formats in different heritage organizations for the same type of documents. Liu and Yang (2007) delineated that for storage of pictures in Chinese libraries out of 21 libraries only 9.3% employ a single picture storage format, while 23.8% libraries use two picture storage formats, 28.6% libraries use three picture storage formats, and 38.1% libraries support more than three picture storage file formats.

#### **11. Negligence towards metadata standards**

The discoverability of digital resources is greatly aided by metadata. In the current situation, digitization and preservation of data are insufficient; it is critical to organise and interoperate that data. Gkoumas (2018) analysed that one of the challenges in digitization in Greece is negligence towards metadata standard. In his study, he found that the lack of systematic documentation of scientific material and metadata in digital libraries



has reduced the distribution and stewardship of research output. Similarly, Mannheimer (2017) stated that de-contextualization due to insufficient description or metadata is one of the factors that threaten digital materials in USA.

## 12. Financial sustainability

Digitization and digital preservation activity require a high level of investment from a financial point of view as the processes involve hiring outsourced human resources and procurement of equipment such as scanners and servers. In the reviewed literature, insufficient funds was reported as a significant constraint globally (Masenya, 2020; Anuradha, 2017; Peter, 2019; Rahman & Islam, 2020). Anyoku (2019) found that funding of projects like building IRs and sustaining the project is a major challenge universities face in Nigeria. Out of the 23 respondents, 56.5% indicated that there is no long-term funding in their digitization project. In the same context, a study done by Rafiq and Ameen (2018) identified major barriers as financial sustainability. In his study, two-thirds of the interviewees mentioned finances as the most important barrier in digitization activities.

Matrix for research objectives/research question					
RQ2: What are the challenges that libraries face as they relate to the implementation and development of DLMM?					
	Masenya T. (2020)	Akoiki-Owoyele (2020)	Rahman (2020)	Gkoumas (2018)	Khan (2017)
Purpose	To investigate the factors that can inform the implementation of sustainable digital preservation	To examine protection of Africa's cultural heritage through digital preservation	To build a model for Digital Content Management (DCM) in agricultural university libraries in Bangladesh	To analyze the challenges and obstacles of developing a digital archive of scientific publications	To explore the essential digital competencies for developing and managing digital libraries
Country	South Africa	Africa	Bangladesh	Greece	Pakistan
Theory (Principle)	Open Archival Information System (OAIS) reference model	N	N	N	N
Research design	A quantitative	A mixed method	A mixed method	A quantitative approach	A quantitative research
Strategy / research method	Online survey questionnaires	Survey and interview	Online survey questionnaires	Survey	Questionnaires
Sample	Twenty-seven academic libraries	66 staff and seven heads of various institutions who were either Directors, Deputy Directors or Heads of Departments	70 teachers and 175 students filled	636	132 university librarians
Finding	The findings show that academic libraries in South Africa are significantly affected by the changes in the digital environment	Cultural institutions in Nigeria are yet to make serious effort towards digital preservation of cultural heritage	The findings reveal some hindrances to the establishment of DCM, such as lack of constant power supply, limited bandwidth speed, some users have lacking fundamental IT knowledge and shortage of digital resources, in addition to some suggestions for improving DCM in these libraries.	The findings of this inquiry indicate that financial and human resources insufficiency, inadequate time frame and lack of promotion, have hindered the success of the project.	The findings of the study showed that digital competencies for developing and managing digital libraries fall into three main categories: digital competencies for developing digital libraries; digital competencies for managing digital libraries; and digital competencies to protect digital contents. The
Suggestion	Proposes a conceptual model for preservation of digital resources in academic libraries	The need for cultural institutions in Nigeria to be more focused on digital preservation of cultural heritage.	DCM model for agricultural university libraries of Bangladesh has been proposed and	A possible solution to cover the operational and management expenses, while offering quality digital services, is to charge subscribers with a small fee for using digital content	Joint efforts are required by library schools, library associations and different training groups to develop digital skills of university librarians.

## Factors Affecting the Implementation of Digital Library Malay Manuscript

We need to know about the factors that affected the implementation of DL of documentary heritage. According to Voutssas (2011), the factors that affect the preservation of long-term digital documentary can be categorized as economic, social, cultural, technological and organizational factors. The first type of factor that affects the preservation of digital documents is made up of the cultural factor. The main elements in this factor are the lack of sensitivity and understanding of the problem. Many of us tend to think that the dark ages are long gone, and that in particular our contemporary age, called by many the "information society" or "knowledge society" is far from that situation, and that today more than ever we are aware of the value of information. A lot of information is produced, distributed and consumed every day. Today many companies and millions of people live from the information. But, like many other resources, it is one thing to consume and another to preserve. In this society, we consume our natural resources disproportionately, but we preserve little of them.

The second type of factor that affects the implementation of DLMM is economic. The first cost to establish during these processes is the cost of digitizing. This is the cost of converting a document that is in a traditional medium to a document in digital form. In some libraries, the cost of producing a digital material is also considered within these costs, which does not necessarily come from a "traditional" original. When digitizing documents, the library always has two paths: one, to digitize intramural that is, with its personnel, equipment

and within its facilities. The second option is to hire a provider specialized in these services. The decision must always be made under the best economic criteria that satisfies a pre-established quality criterion for that digitization. This is very important: a digitization project should not be decided simply based on the greater economy; a quality criterion must also be included. Ignoring this principle is the best way to get the institution a collection of poor quality digital material, which most likely will not serve as planned or which will have to be digitized again in a certain period of time.

Once the librarian has determined the cost of digitizing, he must move on to the second cost involved: the cost of editing. This cost is established based on leaving the documents as a useful digital object, according to his specifications. Once the librarian or digitization manager has determined the cost of editing, it is necessary to go on to establish the cost of registering; that is, the cost of preparing a formal record, catalogued graphically speaking, for each document. Obviously, there would be no point in creating our digital collection - large and important as it may be - if it cannot be located when required or if it should invest a lot of time in decanting information not relevant for our purpose. The next cost to be determined for the collection to be digitized is to store. It is about establishing how much it will cost the institution to have the collection stored on technological media, once it is digitized. To do this, it is necessary to first reflect on the fact that there are two main storage mechanisms, and that they directly affect the price: online storage and offline storage.

The last of the costs to consider is the upgrade. Although this cost is never present when creating a new digital collection, it is inevitable that it will appear from time to time in our preservation costs, and will affect our annual budget from time to time, therefore we must keep it in mind to include it in future years when relevant. The third type of factor that affects the preservation of digital documents is made up of the cultural factor. The main elements in this factor are the lack of sensitivity and understanding of the problem. Many of the librarians tend to think that the dark ages are long gone, and that in particular our contemporary age, called by many the "information society" or "knowledge society" is far from that situation, and that today more than ever they are aware of the value of information (Mingers, 2018). But are they really? Many might be tempted to say yes, since according to current statistics – a lot of information is produced, distributed and consumed, every day more. Today many companies and millions of people live from information. But, like many other resources, it is one thing to consume and another to preserve. In this society, we consume our natural resources disproportionately, but we preserve little of them. Does the same happen with documentary resources?

In reality, globally, as a global society we have neglected the preservation of our information (Rahaman, 2018), especially, regarding the digital information that we have been producing in the past decades. In general, there is a lot of ignorance about digital preservation. At the corporate level, the librarians or digitization managers are only just beginning to generate projects and initiatives to organize the preservation of these documents, long after the problem has been created and when many documents disappear every day (Warren & Matthews, 2019). Furthermore, notable preservation projects are being developed only in the most prosperous and developed societies, which are therefore from a few countries and regions. In the rest of the world they practically do not see this type of project at the level of decision-makers and covering large sectors of society. They generally exist at the level of some academic or cultural organizations and that in an incipient and little coordinated way. This phenomenon between countries and regions further deepens the previously mentioned "digital divide" between these more developed countries and those that are not so developed, and between people with greater educational and economic capacities than those who do not have them (Mingers, 2018).

Even at the level of those responsible for collections, very few are actually aware of the problem and who have the knowledge and resources to deal with it (Rahman, 2020; Warren & Matthews, 2019). To compound the situation, most people think that it is an exclusively technology problem, which is seriously misleading, it is not actually the main problem. To illustrate this, in the case of the "US National Endowment for the Humanities" - US National Endowment for the Humanities or NEH-, in 2003, this fund provided the Cornell University Library with resources to develop a management training program for preservation. Prior to the training workshops, the attendees, people from 110 institutions, participated in a study for this purpose. In a question related to the degree of preparedness that they observed in their institutions regarding digital preservation projects, the majority pointed out as the main threat to digital materials the lack of policies and plans to preserve them. As a second cause, the lack of resources for that purpose, as a third threat, insufficient support from the intermediate command levels; only up to the fourth place was technological obsolescence mentioned as a threat and in the fifth place the lack of knowledge and experience in this regard appeared as a threat (Anyoaku, 2018).

Technological factors have to do with the rapid and constant change of devices and technological aspects related to electronic information. These are the factors related to the environment of that digital information, such as the equipment and programs that are required to reproduce them. Special mention should be made of the operating

systems and multiple formats that have been created for the representation of various digital documents in all their types: text, audio, static and moving images, etc., and that appear and disappear with increasing rapidity. Whereas, social factor affected the implementation of DL as Colin Webb has stated that digital documents must be understood on four levels: as a physical phenomenon, as logical codes, as conceptual objects with meaning for human beings, and as a set of essential elements that must be preserved to offer future access to the essence of each of those objects. It can be clearly seen that the last two levels that he mentions have eminently social components.

Organizational factors have to do with the top management support, IT expert and staffing. At a more local or meso level, the size of the organization, infra-structure, organizational readiness and culture, capabilities and beliefs of the workforce were also identified as important when considering the application of the identified factors (Fennelly et al., 2020).

### **The Research Objectives**

The research objectives are as follows:

- To explore the development of digital library of documentary heritage in libraries.
- To explore the factors affecting the implementation of DLMM in libraries.
- To develop a framework of Digital Library of Malay manuscript for libraries in Malaysia.

### **Proposed Research Framework**

This research seeks to explore the development of digital library of documentary heritage. This research is significant to the library management discipline, addressing the gap between Malay manuscript management and its challenges in the implementation aspect. It will specifically tackle the economic, social, cultural, technological and organizational factors that will affect the implementation of digital library of Malay manuscript.

The main purpose of the study is to analyse the factors that affect the implementation of digital library of Malay manuscript. To accomplish this, it is important to explore the issue of the implementation of digital library of Malay manuscript from various angles to gain a holistic picture. Accordingly, the research aims to explore the current development of DLMM in local, South East Asia and international countries.

It sets the foundation for the research framework illustrated in figure 5, which demonstrates the factors that affecting the implementation of Digital library of Malay manuscript in libraries.

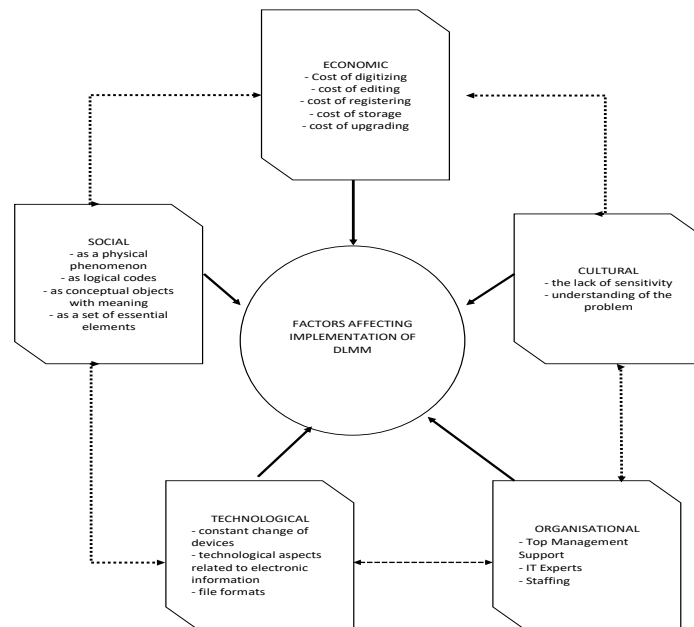


Figure 5. Proposed framework for DLMM implementation

## **Conclusion**

Through this study, it is obvious that the digital library field is a heterogeneous domain. The paper's findings and discovery are significant in highlighting the crucial elements which need to be addressed to ensure the sustainability and successful implementation of any digitisation project. The findings of this paper contribute towards the dissemination of the new knowledge specifically in the management of digital preservation of documentary heritage available in Malaysia. Moreover, this study is very significant to professionals who are involved in archiving the digital documentary heritage as it can be a guide for managing risks in preserving the valuable digital resources. The result of this study can be a practical tool of managing risks not only for digital documentary heritage but also to all documents in digital format. In the context of community, this study will also attempt to foreshadow the needs of community who are now conducting digital-based research that requires full-text analysis or large aggregations of "big data" (IFLA Rare Book and Special Collections Section, 2014).

## **Scientific Ethics Declaration**

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

## **Acknowledgements or Notes**

\* This article was presented as an oral presentation at the International Conference on Social Science Studies ([www.iconsos.net](http://www.iconsos.net)) held in Istanbul/Turkey on August 25-28, 2022

## **References**

- Agosti, M., Orio, N., & Ponchia, C. (2018). Promoting user engagement with digital cultural heritage collections. *International Journal on Digital Libraries*, 19(4), 353–366. <https://doi.org/10.1007/s00799-018-0245-y>
- Amer, H.H. (2017). Manuskrip melayu: isu kontemporari dan lontaran idea. *International Journal of West Asian Studies* 9(1), 25-38
- Anau, M., Antonio, D.A. & Lena, W. (2019). *Digital technology for preserving cultural heritage in tonga. information and communication technologies for development. Strengthening Southern-Driven Cooperation as a Catalyst for ICT4D* (pp. 215-226).
- Andrade, A. D., & Waizenegger, L. (2019, May). Digital Technology For Preserving Cultural Heritage in Tonga. In *International Conference on Social Implications of Computers in Developing Countries* (pp. 215-226). Springer, Cham.
- Anuradha, P. (2017). The impact of digital technologies on academic libraries : challenges and opportunities. *IP Indian Journal of Library Science and Information Technology*, 2(2), 46–50.
- Anyaoku, E., Echedom, A. U. N., Baro, E. E., & State, B. (2018). Digital preservation practices in university libraries : An investigation of institutional repositories in Africa. *Digital Library Perspectives*, 35(January 2020). <https://doi.org/10.1108/DLP-10-2017-0041>
- Asogwa, B., Ali, A., Onoh, C., Asogwa, M., Ngwuchukwu, M., Igbokwe, J., & Ezeani, C. (2021). *Preparedness of Nigerian university libraries for the acquisition and management of digital records*. Libri.
- Awang, S.& Abdul, R.J. (2020). Sumbangan manuskrip melayu lama kepada peradaban bangsa. *PENDETA Journal of Malay Language, Education and Literature Jilid 1*(2).
- Baomah, E & Liew, C. (2017). *Conceptualising the digitisation and preservation of indigenous knowledge: The importance of attitudes*. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics). July. 65-80
- Bhati, P., & Kumar, I. (2020). Role of library professionals in a pandemic situation like COVID-19. *International Journal of Library and Information Studies*, 10(2), 33–48.
- Ding, C.M. (2014). The application of Malay indigenous scientific and technical knowledge in the production of Malay manuscripts. *Persidangan Antarabangsa Manuskrip Melayu*, 3(1), 1-12
- Edmondson, R. (2015). Memory of the world: the cinema challenge. *Journal of Film Preservation*, 93, 17.
- Fennelly, O., Cunningham, C., Grogan, L., Cronin, H., O'Shea, C., Roche, M., Lawlor, F., & O'Hare, N. (2020). Successfully implementing a national electronic health record: a rapid umbrella review. *International Journal of Medical Informatics*, 144. <https://doi.org/10.1016/j.ijmedinf.2020.104281>

- Fuhr, N., Hansen, P., Mabe, M., Micsik, A., & Sølvsberg, I. (2001, September). Digital libraries: A generic classification and evaluation scheme. In *International Conference on Theory and Practice of Digital Libraries* (pp. 187-199). Springer, Berlin, Heidelberg.
- Gaona-García, P.A., Martin-Moncunill, D. & Montenegro-Marin, C.E. (2017). Trends and challenges of visual search interfaces in digital libraries and repositories. *The Electronic Library*, 35(1), 69-98. <https://doi.org/10.1108/EL-03-2015-0046>.
- Ghamouh, N. & Boulahlib, M. (2015). Cultural heritage digitization projects in Algeria: Case study of the National Library. *IFLA Journal* 41(3), 272-278. <https://doi.org/10.1177/0340035215603994>
- Hilmi, M.R. & Zainab, A.N. (2007). Creating a digital library to handle Malay manuscripts using greenstone. *ICOLIS 2007, Kuala Lumpur*: LISU, FCSIT, 2007: (pp 223-231)
- IFLA Rare Book and Special Collections Section (2014). *Guidelines for planning the digitization of rare book and manuscript collections*. Netherlands: International Federation of Library Associations and Institutions.
- Isa, W.M.W., Zin, N.A.M. & Rosdi, F. (2018). Digital preservation of intangible cultural heritage. *Indonesian Journal of Electrical Engineer*, 12(3), 1373-1379.
- Islam, M. A., & Ikeda, M. (2014). Convergence issues of knowledge management in digital libraries: steps towards state-of-the-art digital libraries. *VINE*, 44(1), 140-159.
- Jan, S., & Ganaie, S. A. (2019). Trends in collection & collection development practices in university libraries with a particular reference to India and other developing countries: A review of literature. *Library Philosophy and Practice*, 0\_1-17.
- Jiazhen, L., & Daoling, Y. (2007). Status of the preservation of digital resources in China: results of a survey. *Program*, 41(1), 35-46.
- Jolselt, J. (2019). The role of technology in the preservation of records in the digital age. *Journal of Library, Science Education and Learning Technology*, 1(2), 49-61.
- Khan, Nadim Akhtar, S.M. Shafi, & Humma Ahangar. (2018) Digitization of cultural heritage: Global initiatives, opportunities, and challenges. *Journal of Cases on Information Technology* , 20(4), 1–16.
- Levy, D. M., & Marshall, C. C. (1995). Going digital: A look at assumptions underlying digital libraries. *Communications of the ACM*, 38(4), 77-84.
- Mannheimer, S., & Cote, C. (2017). Cultivate, assess, advocate, implement, and sustain: A five-point plan for successful digital preservation collaborations. *Digital Library Perspectives*, 33(2), 100–116. <https://doi.org/10.1108/DLP-07-2016-0023>
- Manaf, Z. A & Ismail, A. (2010). Malaysian cultural heritage at risk?: A case study of digitisation projects. *Library Review*, 59(2), 107-116.
- Mariani, S. (2001). Preservation of Malay manuscripts as a national documentary heritage : Issues and recommendations for regional cooperation. *Sekitar Perpustakaan*, 23, 5-11.
- Masanya, T. M., & Ngulube, P. (2020). Factors that influence digital preservation sustainability in academic libraries in South Africa. *South African Journal of Libraries and Information Science*, 86(2007), 52–63. <https://doi.org/10.7553/86-1-1860>
- Mingers, J., Standing, C. (2018). What is information? Toward a theory of information as objective and veridical. *J Inf Technol* 33, 85–104. <https://doi.org/10.1057/s41265-017-0038-6>
- Ogenga, D. O. (2015). *Adoption of institutional repositories in dissemination of scholarly information in Universities in Kenya with reference to United States*, International University Africa (Doctoral dissertation, University of Nairobi).
- Pandey, R. & Kumar, V. (2020). Exploring the impediments to digitization and digital preservation of cultural heritage resources: A selective review. *Preservation, Digital Technology & Culture*. 49(1), 26–37
- Pérez-Soler, S. (2017). Journalism and social networks: keys to managing digital content. *Journalism and Social Networks* , 1-143
- Rachman, M. A., & Rachman, Y. B. (2019). Peran Perpustakaan Umum Kota Depok pada era teknologi digital. *Berkala Ilmu Perpustakaan dan Informasi*, 15(2), 137-148.
- Rafiq, M., Ameen, K., & Jabeen, M. (2018). Barriers to digitization in university libraries of Pakistan: a developing country's perspective. *The Electronic Library*, 36(3), 457-473.
- Rahaman, H. (2018). Digital heritage interpretation: a conceptual framework. *Digital Creativity*, 29(2), 208-234
- Rahimi, M., Rosman, M., Ismail, M. N., & Masrek, M. N. (2019). Investigating the determinant and impact of digital library engagement: A conceptual framework. *Journal of Digital Information Management*, 17(4), 214. <https://doi.org/10.6025/jdim/2019/17/4/214-226>
- Rahman, M. H., & Islam, M. S. (2020). Building a model for digital content management in agricultural university libraries in Bangladesh. *Knowledge Management & E-Learning*, 12(3), 359–379. <https://doi.org/10.34105/j.kmel.2020.12.019>.
- Razak, S. M. A., Seman, M. S. A., Mamat, W. A. W. Y. W., & Noor, N. H. N. M. (2018, July). Transliteration Engine for Union Catalogue of Malay Manuscripts in Malaysia: E-Jawi Version 3. In 2018

- International Conference on Information and Communication Technology for the Muslim World (ICT4M)* (pp. 58-63). IEEE.
- Robert, M.M. (2016). Preservation of documentary heritage in Malawi. *Journal of The South African Society of Archivists*, 48, 2015. 55-60.
- Samsu, L. M., Saiful, M., Fathurrahman, I., & Bahtiar, H. (2021, April). Digitization of Takepan Sasak manuscript based on the OPF flipbook. In *Journal of Physics: Conference Series 1869(1)*, 012073. IOP Publishing.
- Shafi, S.M. (2004). Digitization perspective of medieval manuscripts. Paper presented at the *2nd Convention PLANNER* – November 4-5, 2004, Manipur University, Imphal.
- Singeh, F. W., Abdullah, A., & Kaur, K. (2020). Critical success factors for digital library implementation in Africa: Solution focused rather than problem focused. *Information Development*, 0266666920918002.
- Suleiman, S.A. (2013). *Best practice in a digital library of Arabic manuscript*. PhD diss. Department of Computer and Information Sciences University of Strathclyde. Glasgow, United Kingdom
- Tatjana, A.J. (2017). *Digital libraries for cultural heritage: Development, outcomes, and challenges from European perspectives. Synthesis lectures on information concepts, Retrieval, and Services*, 9(4) , Pages i-175 <https://doi.org/10.2200/S00775ED1V01Y201704ICR058>
- Toyo, O. D. (2017). Library resources' digitization and its impact on the services of academic libraries: the case of John Harris library, university of Benin. *International Journal of Education and Evaluation*, 3(7), 33-48.
- Ukwoma, S. C., & Ngulube, P. (2019). Obstacles to the utilization of institutional repositories by academics in higher education in Nigeria. *Webology*, 16(1).
- Van Lit, L. W. C. (2019). *Among digitized manuscripts. philology, codicology, paleography in a digital world* (p. 348). Brill.
- Voutsas, M. (2011). Cultural, economic and social factors of documentary digital preservation. *Library Research*, 25(55), 107-150.
- Warren, E. & Matthews, G. (2019). Public libraries, museums and physical convergence: Context, issues, opportunities: A literature review Part 1. *Journal of Librarianship and Information Science*, 51(4), 1120-1133.
- Zahidah, Z. (2013). *Eliciting paleographers' needs and modeling a collaborative workspace for digital library Malay manuscripts*, PhD diss. Faculty of Computer Science and Information Technology, University of Malaya, Malaysia.
- Zirra, P. B., Ibrahim, A. J., & Abdulganiyyi, N. (2019). A review of digital libraries and their impact in Africa. *American Journal of Computer Science and Technology*, 2(4), 60-67.

---

### Author Information

---

**Nor Hasni Che Hassan**

MARA University of Technology  
Jalan Pulau Indah Au10/A, Puncak Perdana,  
40150 Shah Alam, Selangor, Malaysia  
Contact e-mail: [hassanhasni887@gmail.com](mailto:hassanhasni887@gmail.com)

**Wan Satirah Wan Mohd Saman**

MARA University of Technology  
Jalan Pulau Indah Au10/A, Puncak Perdana,  
40150 Shah Alam, Selangor, Malaysia

---

**To cite this article:**

Che Hassan, N. H. & Wan Mohd Saman, W.S. (2022). Balancing sustainability factors affecting the implementation of digital libraries of Malay manuscript: A proposed framework. *The Eurasia Proceedings of Educational & Social Sciences (EPESS)*, 25, 152-165.