

THE PRACTICES, ISSUES AND CHALLENGES IN DIGITALISATION ACROSS MUSEUMS

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Abstract

Museum institutions play a vital role in safeguarding and preserving cultural heritage, history, and the arts, as well as curating and displaying valuable collections to provide meaningful experiences for visitors, both physically and online. In Malaysia, the Jabatan Muzium Malaysia (JMM) is tasked with implementing government strategies to advance the development of museum institutions through comprehensive strategic management and governance. In recent years, museums have evolved from being primarily custodial institutions into dynamic spaces that prioritise audience engagement. Previous studies have highlighted that achieving this shift requires a strong emphasis on digitalisation. This study adopts a qualitative approach, conducting interviews with museum employees under Jabatan Muzium Malaysia (JMM) to explore current practices, issues, and challenges related to digitalisation. Findings reveal that while museums under Jabatan Muzium Malaysia (JMM) recognize the importance of digitalisation, its implementation remains partial and inconsistent. The study further affirms that modern museums are now intrinsically linked to three key dimensions of digital engagement, fostering stronger connections with both local communities and tourists.

Keywords – Museum Institution, Digitalisation Museum in Malaysia

Introduction

Heritage and museums have long shared a close and interconnected relationship. Museums play a significant role in safeguarding, conserving, and presenting cultural, historical, and artistic heritage through curated collections that offer visitors meaningful experiences in physical spaces. In Malaysia, the Department of Museums Malaysia (Jabatan Muzium Malaysia, JMM) is the main body responsible for implementing national strategies to enhance the growth and development of museums through comprehensive strategic planning and effective governance. JMM oversees 23 museums located throughout the country, including in both Peninsular Malaysia and East Malaysia (Sabah and Sarawak). Each museum under JMM's administration contributes to the overall mission by managing daily operations

and aligning with JMM's strategic directives to maintain consistent standards and objectives. Malaysian museums are essential in delivering educational and cultural knowledge to the public while also acting as hubs for the preservation and promotion of the nation's historical identity (Jabatan Muzium Malaysia, 2022a). Furthermore, they play a key role in supporting local economic growth through cultural tourism (Brown, 2019).

The rise of digital technologies in the era of the Fourth Industrial Revolution (IR4.0) has significantly impacted numerous sectors, including culture and tourism, by introducing advanced tools that enhance communication and visitor engagement within virtual exhibition spaces. The rapid evolution of these technologies has blurred the line between the digital and physical worlds.

It is only in recent years that the relationship between museums and digital innovation has become more clearly recognized, marking a shift toward integrating digital solutions within traditional museum settings. This integration is reshaping the function of museums, compelling them to adapt from conventional physical exhibits to digital formats such as virtual exhibitions in order to engage both on-site and remote audiences (Gaylord-Opalewski & O'Leary, 2019; Trunfio et al., 2020). Historically, museums have depended on in-person visits as a means of fostering public understanding of the past and human culture. However, the digital revolution presents both challenges and opportunities, urging museum institutions and governmental bodies to incorporate digital technologies into their organisational frameworks and strategic planning (Vial, 2019). While digital technology's impact on organizational performance is widely discussed, there is limited understanding of the current practices and key challenges that hinder digitalisation in museums. Assessing these practices is essential to help museums select suitable technologies aligned with their resources, while also addressing fundamental obstacles in the process (Vial, 2019).

Stakeholders such as museum staff, government bodies, and the public play a crucial role in driving the digital transformation of museum institutions. Past research has emphasized the need for clear strategies to reduce dependence on physical visitors in the digital age. As the first study in Malaysia to examine the integration of current practices, issues, and challenges in museum digitalisation, a qualitative approach is appropriate to capture the real dynamics within this context.

Review of Literature and Conceptual Framework

Technology plays a significant role in enabling museums to adopt digital platforms that help them stay relevant to the public and evolve over time. A clear example is The Metropolitan Museum of Art (The Met), which has embraced digitalisation through initiatives such as its official website and mobile application. Among these is The Met's Timeline of Art History, a platform that allows users to access collections conveniently and without the limitations of physical space (LeVitus, 2010; The Metropolitan Museum of Art, n.d.). While the digitalisation of museums offers significant advantages, it also presents certain drawbacks. The growing reliance on online applications has, in some cases, led to reduced physical attendance, leaving museums vulnerable to isolation and diminished functionality. This trend contradicts the essential role of museums as hubs for knowledge exchange and community engagement. Fundamentally, digital museums are not intended to replace their physical counterparts; rather, they serve as complementary platforms that enhance the dissemination of information and support the continued relevance and vitality of traditional museums (Li & Liew, 2015).

Scott (2008) observed that the traditional values of museums have been unintentionally diminished through the process of digitalisation. Importantly, this shift is not intended to replace the physical museum experience but to serve as a supplementary tool that addresses gaps within on-site exhibitions. As digital transformation affects organisational structures, people, and technologies, assessing its impact is crucial for understanding current practices, identifying challenges, and addressing issues related to advancing digital transformation in museum

institutions (Agostino & Costantini, 2021).

The Practices of Digitalisation Across Museum Institutions

Current literature on digitalisation can be divided into three main streams. Museums have traditionally served as spaces for conveying historical and cultural knowledge about communities and their heritage, often illustrating past ways of life through exhibits that offer only limited physical interaction (Brown, 2019). The advancement of technology has transformed the operational practices of museums. In the present context, cultural heritage is defined not only by its historical significance but also by its artistic qualities, which reflect cultural values, shape identity, and contribute to the formation of collective memories (Vecco, 2010). Museum institutions in the current era use technology to display and manage heritage collections (Mohd Noor Shah et al., 2019). Digital technology undoubtedly drives significant progress through the introduction of new tools and innovations. Yet, digital transformation extends beyond technology itself, influencing the growth and adaptation of individuals, organisational processes, and institutions as a whole (Zollo et al., 2022). Bashirova et al. (2021) highlighted that ICT and digitisation technologies have been integrated into virtual museums. These technologies enable the enhancement of digital content based on visitors' requests through mobile devices. Additionally, technological databases can be utilised to gather insights into visitor behaviour, thereby supporting museums in fostering greater cultural engagement and improving the overall visitor experience (Bashirova et al., 2021).

Virtual Reality (VR) is a technology in which physical body representation is

irrelevant (Trunfio et al., 2022). Mixed Reality (MR), meanwhile, combines real and virtual environments through multimedia tools, enabling the re-creation of past or present events to provide visitors with a more immersive experience. Alongside Augmented Reality (AR), both VR and MR are applied across various domains such as tourism, hospitality, and cultural heritage (Trunfio et al., 2022). MR, in particular, offers an alternative form of engagement that enhances experiential value and stimulates interest in destinations through effective communication and marketing strategies. By merging augmented and virtual elements, MR serves as an advanced technological solution that reinterprets reality and historical events, reshaping spaces and exhibitions through digital storytelling (Trunfio et al., 2022). Within museums, MR plays a vital role in deepening connections between visitors and both tangible and intangible cultural heritage.

The Issues of Digitalisation Across Museum Institutions

Challenges in the digitalisation of museums often stem from limited resources, organisational capacity, and individuals' willingness to embrace digital transformation. Although the technology itself is readily available, its successful implementation depends on the ability of stakeholders to overcome key barriers that hinder progress. Since attracting visitors and generating revenue remain core objectives of museum institutions, these issues become particularly significant. Plaček et al. (2021) highlighted several post-COVID-19 challenges in museum management, ranging from visitor experiences and organisational decision-making to reliance on physical attendance for revenue generation and the level of employees' digital preparedness. The main issues relate to

the organisational adoption and acceptance of digital technologies such as Virtual Reality (VR) and Augmented Reality (AR), which consequently restrict visitors from fully engaging in interactive and immersive cultural and heritage experiences (Yang et al., 2020). Interestingly, museum visitors in China particularly the elderly show a preference for physical visits, valuing the authenticity, emotional connection, and tactile experience of engaging with real artefacts (Low et al., 2019).

In contrast, younger Chinese tourists acknowledge the need for digital integration, as the younger generation is generally less inclined to visit conventional museums (Low et al., 2019).

Beyond the issue of technological acceptance, several scholars have highlighted concerns regarding visitor experience and the decline in physical attendance, both of which directly impact museum revenues. Visitor experience remains a critical focus for academic researchers and curators seeking to enhance museum functions and strengthen public engagement. Digitalisation, in this context, is viewed as a valuable tool for boosting attendance by enriching visitor experiences (Li & Liew, 2015). Given that visitors typically spend less than a minute on each exhibit (Beer, 1987), digital applications are regarded as effective means of sustaining interest, extending the duration of art appreciation, and deepening knowledge. The role of digital applications in this regard is not new, having been discussed in museum studies since as early as 1987. Wang et al. (2009) argued that visitor experiences can be enhanced through interactive applications and immersive environments. Shifting away from traditional exhibition methods allows

for richer sensory engagement and a more impactful experience. Such improvements encompass visual appeal, personal interaction, knowledge acquisition, and opportunities for revisiting and reflecting on exhibitions.

The COVID-19 pandemic severely disrupted the physical operations of museums and heritage sites, leading to their revival in virtual formats. In recent times, there has been a notable rise in the use of Virtual Reality (VR) by these institutions to facilitate virtual visits. Alongside VR, many museums and heritage sites have also relied on websites and social media platforms to share knowledge, promote exhibitions, and provide access to virtual tours. This demonstrates how digital applications, particularly VR, can revitalise the sustainability of museums and heritage sites while also functioning as effective long-term marketing tools. Furthermore, VR helps overcome spatial and architectural constraints by enabling artefacts and exhibitions to be displayed virtually rather than solely through physical installations (Carlsson, 2022, October 26). The Art Gallery of New South Wales in Australia animates historical artworks through the use of interactive technology. A notable example is the digital interpretation of Hiroharu Itaya's 19th-century *yōkai* piece, *Night Procession of the Hundred Demons* (*Hyakki Yagyō*), which allows visitors to easily grasp its meaning while simultaneously highlighting the beauty of the original artwork (Charr, 2020, June 17; S1T2, 2020, February 5).

Without the integration of digital technology, museum programs often become less effective and less appealing, as institutions tend to rely on traditional promotional approaches that mainly target specific groups, such as schools. However, Evans and Achim (2021) noted that out-of-school

activities like museum visits offer valuable opportunities for community engagement, fostering healthier mindsets and social well-being through physical interaction. While such physical programs provide numerous benefits, the COVID-19 pandemic reshaped public attitudes toward in-person activities, prompting a shift in museum experiences and accelerating the adoption of digital platforms as communication tools, thereby encouraging greater openness to online learning (Choi & Kim, 2021). Moreover, conventional museums often impose limitations on visitor experiences through institutional or social rules within exhibition spaces, with certain art collections even being obstructed by external barriers (Coulter-Smith, 2007). Exhibitions and collections ideally serve as learning platforms for visitors and form a core aspect of museum culture (Falk & Dierking, 2012). To maximise their effectiveness and visitor value, museums should emphasise physical displays of authentic objects, enrich visitor experiences, and enhance two-way communication by incorporating interactive elements (Li & Liew, 2015). The table below outlines the key issues surrounding digitalisation in Malaysian museum institutions.

Table 1. An Overview of Digitalisation Issues in Museum Institutions

Name of Researchers	Year	Issues	Indicator of Issues		
			DE	PY	DR
Carlsson	2022	Space and building limitations can also be addressed through virtual reality (VR) as the artefacts and exhibitions can be displayed in virtual tours.	/	/	
Plaček et al.	2021	Lack of Visitor's experience when COVID-19 pandemic.	/	/	
Exans & Achim	2021	The absence of digital technology leads to ineffective and unattractive program designation since museum institutions highly rely on conventional ways.		/	/
Choi & Kim	2021	The pandemic of COVID-19 has changed the way we react to open physical activities, which witnessed a major revamp towards the museum experience, leading to the emergence of the utilisation of digital networks as a medium of communication, triggers the openness for online learning.	/	/	
Yang et al.	2020	Visitor's opportunity to experience interactive and imaginative experiences in heritage and culture.	/	/	
Charl	2020	Bring historical works of art to life through interactive technology. It provides a positive impression.	/	/	
ST2					
Low et al.	2019	Elder prefer ability to sense and touch physical artefacts.	/		
		Young generation admits that integration of digital technologies is required.	/	/	
Li & Liew	2015	Digitalisation of museum institution is considered to have a positive significance in increasing visitors' attendance through the appreciation of the visitor experience.		/	
		In achieving functionality and effectiveness for the value of visitors, museum institutions need to be implemented physically by displaying natural objects, improving the visitor experience, and upgrading two-way communication by considering the interactive factors.	/	/	
Falk & Dierking	2012	Exhibitions and collections function as a learning environment for visitors and become the culture of a museum institution.	/	/	
Wang et al.	2009	Museum visitors' experience could improve with interactive applications and an immersive environment.	/	/	
Coulter-Smith	2007	Today's traditional museums restrict the visitors' needs through the constitution or social rules implemented in the exhibition hall, while some art collections are blocked by external objects.	/	/	
Beer	1987	Museum visitors spend less than one minute on each exhibition.	/		
		TOTAL	11	3	13

Indicators:

DE : Digital Experience
 PY : Preferring Physical Visit
 DR : Digital Required

The Challenges of Digitalisation Across Museum Institutions

The adoption of digital technology within museums demands substantial investment in both financial resources and human capital (Yang et al., 2020). Museum decision-makers and professionals often express concerns about the risks involved, largely due to limited understanding of how such technologies can truly benefit the institution (Plaček et al., 2021; Santagati et al., 2020; Wang et al., 2021). From the literature review, this research identifies three major challenges associated with museum

digitalisation: financial limitations, leadership issues, and resistance to change. Financial constraints are often the most critical barrier preventing museums from adopting digital technologies. Approval processes within financial systems, which depend heavily on top management, frequently result in insufficient support for technology implementation (Wang et al., 2021). Djukic et al. (2019) further emphasise that uneven financial allocation makes it even more difficult for museums to integrate new technologies. Additionally, the development of digital tools remains uncertain, with many professionals viewing technological investment as a financial risk (Yang et al., 2020).

Beyond financial limitations, challenges in human capital also hinder digital transformation, particularly staffing issues caused by insufficient funding to recruit qualified personnel capable of managing digital technologies (Ntieche, 2021). Since digital innovation requires substantial human investment, many museums are unable to bear the costs of developing or hiring such expertise (Trunfio et al., 2022). Interestingly, Šešić and Stefanović (2021) found that organisational barriers can be reduced when museum leaders adopt inclusive and participatory decision-making practices. In contrast, Rex (2020) highlighted that within the UK government context, budget allocations for human capital must be supported by concrete evidence to persuade decision-makers to invest in staff capable of handling new technologies. The Table 2 below presents a summary of digitalisation challenges faced by museum institutions.

Table 2. An Overview of Digitalisation Challenges in Museum Institutions

Name of Researchers	Year	Challenges	Indicator of Challenges			
			FC	HC	TG	MG/DC
Trunfio et al.	2022	Digital innovation requires significant human investment, and some museum institutions cannot incur the cost of investing in human capital.	✓	✓		
Šešić & Stefanović	2021	The issues of organisational structure can be mitigated if the museum leaders practice active participation and inclusivity in the decision-making process.			✓	
Wang et al.	2021	Financial constraints can be seen as the most challenging components restricting the museum institution from deploying digital technology to run museum institutions. This is because the financial systems that require approvals from the top management lead to lacking support systems in technology deployment.	✓		✓	✓
Ntieche	2021	Facing financial issues as the significant challenges delaying the digital transformation, human capital-related staffing issues can be explained due to the lack of financial allocations in hiring qualified staff with the ability to operate digital technologies.	✓	✓	✓	
Pláček et al.	2021	The decision-makers and the professionals in the museum institution often raise their concerns about the risk of implementing new technologies.	✓	✓		
Wang et al.	2020	Santagati et al. (2020) highlighted that within the UK government context, budget allocations for human capital must be supported by concrete evidence to persuade decision-makers to invest in staff capable of handling new technologies.	✓	✓		
Rex	2020	The UK government in managing budget allocations related to human capital must be proven by evidence to convince decision-makers to invest in hiring workers to operate the new technologies.	✓	✓	✓	✓
Yang et al.	2020	Implementing digital technology in the museum landscape requires massive investment in financial and human capital.	✓	✓	✓	
Djukic et al.	2019	Technology development remains in a grey area, where professionals consider financial investment in technology risky.	✓		✓	
		The imbalance distribution of finances makes it harder for museum institutions to adopt the technology.	✓		✓	
		TOTAL	7	4	9	7

Indicators:

FC : Finance

HC : Human Capital

TG : Technology

MG/DC : Management/Decision Makers

The initial draft of the framework was developed through earlier observations, as shown in Figure 1.

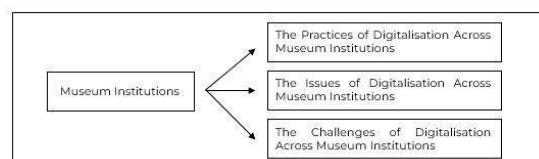


Figure 1. The Conceptual Framework of the Research

Research Methodology

Awang (2001) defines data collection as a process involving the design and gathering of information relevant to specific issues. In this study, a

qualitative research design was employed, with data obtained through interviews and a review of existing literature. The selection for interview of museum institutions under the Jabatan Muzium Malaysia (JMM) was done through the distribution of visitor attendance statistics from 22 museum institutions, excluding temporary exhibitions. The interview method was used as the instrument to collect the data and written consents were obtained to create an audio or video recorded interview. To determine the number of informants, Creswell (2011) states that the interpretation of data can be done involving between four to ten informants. It was proposed that the recruitment of informants can stop once data saturation is reached. Saturation occurs when conducting the interview with additional informants does not lead to the discovery of new data and the views given by the informants are repeated in the interview session (Polit & Beck, 2017; Richards & Morse, 2013). In addition, Hennink and Kaiser (2021) believe that interviewing nine to seventeen informants is sufficient to reach the level of saturation in a qualitative study. Therefore, the statements by Creswell (1998), Richards and Morse (2013), and Hennink and Kaiser (2021) were used as the basis for conducting the interview sessions and it was stopped once reaching data saturation.

According to Creswell et al. (2007), the research group should comprise three to fifteen people with experience linked to the examined topic. These instructions assist this research in estimating the required number of informants when saturation is reached. Data saturation is accumulating qualitative data to the point where there is a sense of closure, as additional data generate redundant knowledge (Polit & Beck, 2017). As with the seven informants, data

gathering was halted due to data saturation. Generally, the seven informants have led the study to a new construction of a research framework related to the practices, issues, and challenges faced by the Jabatan Muzium Malaysia (JMM) towards digitalisation, cultural tourism and online learning of museums which will be discussed in Chapter 4. This research has also suggested a formula for the sustainability of museums institutions in Malaysia. The formula is the novelty of this research. The list of museums to be part of informants of study, as shown in Table 3 below:

Table 3. The list of museums to be part of informants of study

Informant	Museum	High Visitor Arrival					
		2015	2016	2017	2018	2019	
1	Muzium Seni Kraf Orang Asli	112,684	198,393	74,160	98,987	105,608	
Medium Visitor Arrival							
2	Muzium Arkeologi Lembah Bujang	176,367	180,509	162,475	204,997	152,424	
3	Muzium Marin Labuan	144,439	131,761	141,557	133,334	126,443	
Low Visitor Arrival							
4	Muzium Sungai Lembing	70,965	80,574	71,745	64,964	63,254	
6	Galeria Perdana	109,081	82,323	78,756	89,503	108,892	
7	Muzium Adat	70,614	80,923	86,116	88,242	77,685	

Source: Jabatan Muzium Malaysia (2015, 2016, 2017, 2018, 2019)

The findings of the interview and the collection of literature reviews were presented in the results section below.

Findings

Results The Practices, Issues and Challenges of Digitalisation Across Museum Institutions in Malaysia

The interview conducted among experienced informants provides insights into the museum's trajectory in nurturing digitalisation by improving practices and rectifying major issues and challenges the museum institutions face. Figure 2 is a thematic mapping of the principal practices, issues, and challenges often faced by museum institutions related to digitalisation from the informants' perspectives. The components mentioned are relevant and consistent with the findings in Ocón

(2021) which highlighted the need to explore digitalisation practices related to preserving heritage and culture in Southeast Asia, including Malaysia. Therefore, this research managed to fill the knowledge gap by recognising digital technologies being used by the museum institution to preserve the value of heritage and culture in the urban space. This study found that 13 sub-themes contributed to the practices, issues, and challenges in digitalising museum institutions in Malaysia.

THE PRACTICES, ISSUES AND CHALLENGES OF DIGITALISATION ACROSS MUSEUM INSTITUTIONS IN MALAYSIA		
PRACTICES	ISSUES	CHALLENGES
Mutual benefits	Handling Artefacts collection	Nature of artefacts
Promotional activities	Limited digital storage space	Financial constraints
Artefacts collection	High reliance on physical visitors	Unskilled workforce
Program designation	Limited access to internet	Limited technological facilities & infrastructure
	Digital reluctance	

Figure 2. Finding Framework for The Practices, Issues and Challenges of Digitalisation Across Museum Institutions in Malaysia

The four themes are (i) mutual benefits, (ii) promotional activities, (iii) artefact collection, and (iv) program designation. Table 4 shows the themes for the practices of digitalisation across museum institutions in Malaysia.

Table 4. The Themes for The Practices of Digitalisation Across Museum Institutions in Malaysia

The Practices of Digitalisation Across Museum Institutions in Malaysia	Informant	Practices	Indicator of Themes			
			MB	PA	AC	PD
	Informant 3	Sam ada kita suka atau tidak, kita perlu menerima hakikat bahawa kita perlu mempelajari asas teknologi dalam mempromosikan muzium kita kepada generasi muda				/
	Informant 2	Tidak salah mencuba teknologi baharu yang akan membawa kepada kemampuan bagi mempromosikan budaya kita				/

Informant 6	Kampung kilang adalah kawasan yang kurang membangun, jadi kami menggunakan kewujudan untuk membangun muzium ini di Kampung kilang untuk menarik minat orang ramai untuk berkunjung, sedangkan usaha untuk meningkatkan ekonomi tempatan.	/			
Informant 3	Pendigitalan ialah digunakan sebagai platform atau alat untuk kerja-kerja promosi, organisasi dan pelakar pengurusan atau dalam organisasi pameran.	/			
Informant 3	Kami menggunakan maklum balas positif daripada orang ramai menerusi media sosial dan dalam pelatihan yang kepada peningkatan jumlah pelawat.	/			
Informant 7	Media sosial ialah salah satu cara untuk berinteraksi dengan masyarakat luar serta menampilkkan muzium.	/			
Informant 3	Pendigitalan ialah alat yang kita gunakan untuk menempah artefak kami.	/			
Informant 3	Kami menggunakan Muzium sebagai alat menguruskan inventori koleksi kami. Muzium ini merupakan makam yang tersebut hanya terhad kepada penggunaan kabinet dan rak.	/			
Informant 7	Pengurusan data inventori digital setiap muzium mestil dimana nantinya data inventori digital untuk Jabatan Muzium Malaysia (JMM) dan mengintegrasikan data muzium nyata, merentas institusi muzium.	/			
Informant 1	Pendigitalan program muzium akan menarik pelawat yang baharu dan memberikan pengalaman menarik kepada pengunjung.	/			
Informant 3	Kami mengadakan "Hari Antarabangsa Muzium" (DAM) peringkat Muzium Marin secara dalam talian kerana wabak COVID-19.	/			
	TOTAL	3	3	3	2

Indicators of Themes:

MB : Mutual Benefits
 PA : Promotional Activities
 AC : Artefacts Collection
 PD : Program Designation

This research found five themes that lead to the disincentive of digitalisation: (i) handling the artefacts collection, (ii) limited digital storage space, (iii) high reliance on physical visitors, (iv) limited access to Internet, and (v) issues with digital reluctance. Table 5 shows the themes for the issues of digitalisation across museum institutions in Malaysia.

Table 5. The Themes for The Issues of Digitalisation Across Museum Institutions in Malaysia

The Issues of Digitalisation Across Museum Institutions In Malaysia	Informant	Issues	Indicator of Themes				
			HC	LD	HP	LI	DR
	Informant 1	Kami mempunyai lebih daripada 6,000 koleksi, tetapi kami hanya mempunyai bangunan yang berada memaparkan 2,000 koleksi kerana kami mempunyai ruang terhad.					/
	Informant 7	Bangunan kami kecil dan tidak perlu makelarakan ungel yang berbeza seperti galeri pameran, ruang penyimpanan, pejabat, perpustakaan, dan lain-lain.					/

	Informant	Challenges	Indicator of Themes			
			NA	FC	UW	LT
The Challenges of Digitalisation Across Museum Institutions in Malaysia	Informant 1	Oleh kerana koleksi pameran institusi kadangkala disebabkan susun surut yang baik. Disebabkan ruang ini, pihak institusi suka melepasikan pelbagai bentuk medium peruncitan di ruang pameran.	/			
	Informant 3	Kami menggunakan aplikasi komputer menyimpan koleksi arifak sebagai rancangan, sehingga berlaku sebarang berneka alam.	/			
	Informant 7	Muzium ini memerlukan sistem repositori untuk menyimpan koleksi dalam format digital. Satu-satunya ada iaitu Musescore. Walau bagaimanapun, platform ini mempunyai storan terhad.	/			
	Informant 3	Lewatkan fizikal adalah lebih baik kerana pelawat boleh melihat objek sebenar secara langsung dan dekat. Pendekatannya mengurangkan kos, tetapi lewatkan fizikal memerlukan teknologi penglibatan yang lebih baik dengan pelawat.	/			
	Informant 5	Pelawat tempatan dan antarabangsa boleh lebih mudah memahami dan memahami di muzium kedua pameran yang dipamerkan. Kami menggunakan tayangan video di ruang pameran untuk menyebarkan maklumat mengenai koleksi.	/			
	Informant 4	Muzium kami terletak di kawasan terpencil, jauh dari bandar. Kami tidak berada dalam program berasaskan digital di muzium.	/			
	Informant 7	Pendigitalan barang-barang alat, di mana perkenaananya bukan fokus utama, jadi ia tidak menyeluruh. Kami menghargai barang-barang fizikal di galeri pameran.	/			
	Informant 6	Tidak ada keperluan menarik bagi institusi muzium untuk berlalu kepada pendigitalan.	/			
	TOTAL			3	2	2
	TOTAL			1	2	

Indicators of Themes:

HC : Handling Artefacts Collection
LD : Limited Digital Storage Space
HP : High Reliance on Physical Visitors
LI : Limited Access to Internet
DR : Digital Reluctant

This research found four themes impacting the slow pace of digitalisation in the museum institution, which are (i) the nature of the artefact collections, (ii) financial constraints, (iii) unskilled workforce, and (iv) limited technological facilities & infrastructure. Table 6 shows the themes for the challenges of digitalisation across museum institutions in Malaysia.

Table 6. The Themes for The Challenges of Digitalisation Across Museum Institutions in Malaysia

Informant	Challenges	Indicator of Themes			
		NA	FC	UW	LT
The Challenges of Digitalisation Across Museum Institutions in Malaysia	Informant 1	Koleksi kami kebanyakannya dari pada sumber semula jadi, dan jangka hayat item adalah pendek. Kami akan menggantikannya dengan koleksi baru, tetapi untuk arifak, kami hanya mengambil gambar dan dokumentasi biasa seperti mengambil video.	/		
	Informant 3	Kami tidak menyimpan sebarang model dalam format digital. Beberapa koleksi seperti seni halus harus dibuat semula.	/		

	Informant	Challenges	Indicator of Themes			
			NA	FC	UW	LT
	Informant 3	Kami bertanggungjawab di bawah Akta Kuasa Menteri dan Akta Warisan Kebangsaan 2005. Sebarang keputusan, termasuk akses peruncitan dan pameran arifak, mesti dibuat dan bertanggungjawab di bawah undang-undang. Malah penyelidik yang ingin mengambil video mengenai arifak itu bergantung kepada kerajaan untuk kelulusan perlembagaan negara.	/			
	Informant 6	Kami berharap kami dapat menggunakan teknologi Augmented Reality (AR). Bagaimanapun, Jabatan Pelancongan Malaysia akan memberi maklum balas buat kami. Kewangan tidak bersedia dengan kos penyelenggaran dalam menyelenggara teknologi digital.	/			
	Informant 7	Kami mungkin menghadapi masalah dengan belanjawan kerana kos pelaksanaannya agak mahal.	/			
	Informant 6	Kami memerlukan profesional dalaman dari Jabatan Muzium Malaysia (JMM) untuk membangunkan sistem teknologi digital.	/			
	Informant 7	Kita perlu belanja untuk memperbaiki pakar untuk memberi nasihat tentang aspek pendigitalan. Kami kekurangan sumber manusia untuk melatih kakitangan kami menjadi pakar. Kami memerlukan pasukan khas khusus untuk kemahiran teknologi. Orang muzium tidak tahu banyak tentang teknologi, dan kami tidak mempunyai banyak kemahiran literasi digital.	/			
	Informant 7	Pelawat asing datang ke Malaysia untuk melihat koleksi fizikal secara terus.	/			
	Informant 7	Kami meraka perbezaan budaya kami melalui jalan cerita. Kami turus mencipta kandungan yang hebat dengan jalan cerita yang bagus, yang mana kami turut mengubah susur arut koleksi mengikut cerita yang ingin kami sampaikan pada masa itu.	/			
	Informant 2	Kami mengalaukan pelawat untuk datang ke muzium kerana kami sendiri tentang arifak arkeologi yang biasanya kami temui dalam proses mencari mineral.	/			
	TOTAL			2	3	2
	TOTAL			1	2	3

Indicators of Themes:

NA : Nature artefacts
FC : Financial constraints
UW : Unskilled workforce
LT : Limited technological facilities & infrastructure

Conclusions

In conclusion, this study affirms that museums are increasingly linked to digital elements in engaging both communities and tourists. The use of digital narratives is viewed as a form of edutainment and a modern method for disseminating knowledge. However, despite the continuous growth of digital technologies, their adoption within museums remains limited. Embracing digital tools is crucial not only for fostering interactive, museum-based economic activities but also for serving as a medium for knowledge

enhancement and development. The advancement of digital technology in museum exhibitions should be further expanded to attract visitors and redefine exhibition approaches in line with contemporary community needs. Implementing digital tools in museums not only enhances interactivity but also contributes to shaping socio-economic perspectives by supporting cultural tourism.

Museums serve as key drivers of a nation's cultural tourism, largely because cultural assets, such as crafts, traditions, and heritage contribute to the community's income through the tourism sector. This study further highlights that museums are not merely repositories of artefacts but also play vital roles in education, capacity-building, and communication. Ultimately, the importance of a museum can be measured through the engagement and presence of its visitors.

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