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# THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON ENHANCING MUSEUM'S VISITOR EXPERIENCE: THE CASE OF THE SHARJAH MUSEUM OF ISLAMIC CIVILIZATION

**Said Nasser Mohammed**

Grand Egyptian Museum  
ORCID 0000-0001-6779-7809

**Monther Jamhawi**

University of Sharjah  
ORCID 0000-0003-0062-5038

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## Introduction

In the last two decades, ICT has become a cornerstone of modern life. It is difficult to imagine a world without digital devices, the Internet, or computers. Technology has permeated practically every aspect of our lives, from work and play to networking, altering our perception of the world.<sup>1</sup>

Recently, museums have been concentrating on the current and prospective visitors' requirements to build programs and exhibitions that appeal to them. Also, museums must adapt to changing social and cultural trends by finding new ways to educate and amuse visitors.<sup>2</sup>

Museums are raising utilizing ICT, not just to facilitate management operations, such as installation, display, and data, but

also directly by visitors, as an opportunity to boost their experience of the display.<sup>3</sup>

The glamor of ICT is its ability to creatively engage museum visitors and broaden their engagement beyond the museum walls.<sup>4</sup> Various modern technologies are bringing visitors into the experience heart, from publishing photographs in real-time beside displays to snapping shots of objects and bringing them home.<sup>5</sup> This paper discusses the effectiveness of ICTs in improving the VX and increasing links between museums and their audiences.

## 2. Theoretical background

### 2.1 History of ICT in museums

Museums have been utilizing portable devices such as guidebooks for many decades ago, the earliest of which can be found in the late 1950s when Acoustic guides used roll-to-roll tape players for guided tours in the home of Eleanor Roosevelt.<sup>6</sup> Whereas Tallon (2008) mentioned that the first handheld guides, in 1952, were used in the exhibitions of the Stedelijk Museum in Amsterdam.<sup>7</sup> This example was taken almost a decade later by the National Museum of American History, which adopted the audio guide 'Sound Trek' in 1961<sup>8</sup>



1. An audio-guide on 'Sound-Trek' in 1961 at the National Museum of American History (Othman & Petrie & Power, 2011)

In the early 1960s, many museums started to investigate the potential advantages of automating their collection management by using computerized systems to computerize museum collections. The early systems were developed on mainframes and were used to store museum objects'

descriptive details. The Museum Computer Network (MCN), for instance, established in 1967, evolved and distributed to its member organizations the GRIPHOS system (Generalized Retrieval and Information Processing for Humanities Oriented Studies). The first project of MCN was to assess information organization requirements and access at twelve art museums countrywide. In 1967, at the New York Metropolitan Museum of Art, MCN subsidized the first computer conference and its future apps in museums. In a similar vein, in the 1970s, multiple international documents on cultural asset preservation stressed the significance of using ICT at different levels of interpretation and presentation.<sup>9</sup> For example, the 1972 UNESCO Convention stipulates that the presentation work should keep up with advances in communications, multimedia, automated data management, other technical devices, and educational and entertainment trends. Moreover, during the historic and cultural display process, the information media should be used as mandated.<sup>10</sup>

By the 80s, with new technologies having been created supporting digital imagery, museums started to experiment with the development of digital image databases. From the 1990s on, with the beginning of the spread of the Internet, the use of ICT tools increased, as museum professionals sought methods to exchange data about their collections. Today museum curators are faced with a changing world of knowledge and digitization.<sup>11</sup> This is not a revolutionary shift. The substance value of a museum in the new world is to educate and inspire its visitors through collections. It is merely the continuation of the evolutionary process that has distinguished the museum community for the last 150 years.<sup>12</sup>

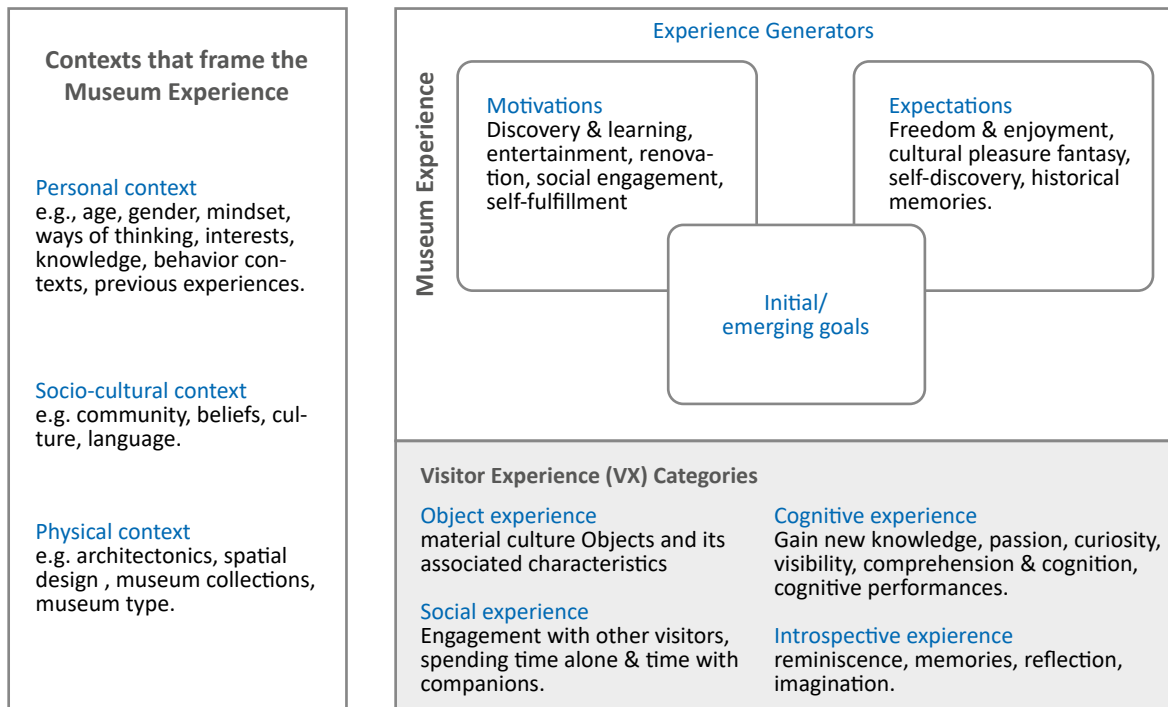
### 2.2 How ICT contributes to the museum exhibition

ICT apps will never replace actual museum visits. However today, successful exhibition shows almost always apply technology.<sup>13</sup> It is used to design work in the exhibition. Each museum has its exhibition plan which consists of a display, texts, videos, images, and other elements, and they all should sound harmonious. ICT can assist in organizing the visual and textual elements.<sup>14</sup> Furthermore, ICT supplies the museum's digital collection in cyberspace, it may enhance visitor interest, particularly among Internet generations who are unlikely to consider a visit to a museum. However, museums must adapt their approaches to a new audience generation with new research and processing habits and cultural preferences. Indeed, human mediation may be required more as ICT apps become more common in museum contexts.<sup>15</sup>

The use of ICT on cultural heritage sites and in museums, particularly in improving VX, is growing in recognition. The following paragraphs summarize how technology can make museum displays valuable:

1) Attractive exhibition: While the museum environment is evolving with new technology, the functions of display, study, and preservation remain unchanged. One of the advantages of the technology in museums is that it offers an excellent way to exhibit museum objects.

2) Entertainment: Technology provides different concepts of interpretation. Interactive apps are meant to be informative and entertaining. A mix of amusement and edutainment.<sup>16</sup>



2. Analytical framework that shows the source and components related to the visitor experience (Loboda et al., 2018, September)

3) Accessible and Interpretation: Digital devices are increasingly being employed in the historical interpretation and presentation process, providing for new interactive connections between audiences and heritage. Digital experience is progressively becoming an essential part of the VX.<sup>17</sup>

4) Educational: During their visit, the museum audience are interested in learning as layers of content allow interaction. Visitors select the information segment they wish to receive. Thus, the same application can be used by different audience categories. Accessible and comprehensible.<sup>18</sup>

5) Usability: If the apps are operated easily, the user can quickly find the required content.<sup>19</sup>

### 2.3 Visitor Experience

A valuable VX at a museum is one that chimes with interpersonal viewpoints, skills and critical thinking, previous experiences, and current contexts.<sup>20</sup> In other words, VX is explicated as an individual's instant or continuing, perceptual and personal reaction to an action, venue, or event that is outside their ordinary surroundings.<sup>21</sup> Giving visitors a better experience at museums or heritage attractions improves visitation, enhances the experience, and gains advocacy. Visitors who enjoy exhibitions with more energy are more motivated to return.<sup>22</sup>

Doering, Pekarik, and Karns in their 1999 study based on a long-term survey outlined four experience kinds: (pp. 157-159)

- The object experience focuses on things beyond the visitor, such as the object's authenticity, worth, and aesthetic; the desire to acquire the object; and the promotion of someone's professional growth.

- The cognitive experience is the inspirational motivation used to interpret and integrate the cognitive elements of the display or exhibition to obtain knowledge or expand one's understanding.
- The introspective experience is the emotion elicited by the object or display, which causes one to gaze inside, to have an intimate and confidential (introspective) experience: for example, by visualizing other times and locations; pondering on the substance; reliving personal recollections; experiencing a spiritual link or a sense of interconnectedness, etc.
- The social experience is the interaction with people that occurs during or immediately following a visit to an exhibition: for example, spending time with loved ones or witnessing the joy on the faces of young learners.<sup>23</sup>

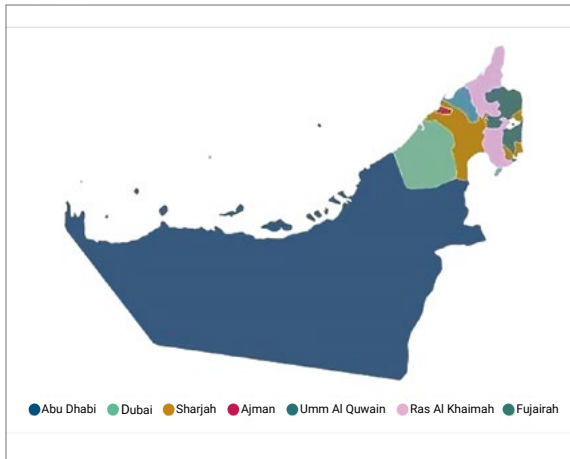
### 2.4 Case study: the Sharjah Museum of Islamic Civilization

#### 2.4.1 UAE museums overview

A brief overview: the UAE is a federation of seven emirates situated on the Arabian Peninsula's eastern coast in Western Asia. Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah are the seven emirates. The UAE was established on December 2, 1971.<sup>24</sup>

The UAE began to build museums around 50 years ago. They started with heritage and archaeological collections, intending to protect archaeological discoveries, culture, heritage, and society's identity.<sup>25</sup>

The UAE has become a regional innovation hub in the



3. U.A.E. country map showing the country's seven emirates, <https://www.moec.gov.ae/en/emirates-of-the-uae>

Middle East and Africa, investing in different creative and cultural sectors.<sup>26</sup> With its transition into a popular tourist destination, it has increased its efforts to enhance museums as cultural and tourist platforms that connect the past with its uniqueness to the UAE's present and future. According to recent statistics, the nation now boasts roughly 165 museums, 55 of which are government-owned and 110 are private.<sup>27</sup> The government help museums become tourist attractions, while museums have enhanced their position in national

cultural policies as cultural platforms that assist in delivering an integrated image of UAE's civilization.<sup>28</sup>

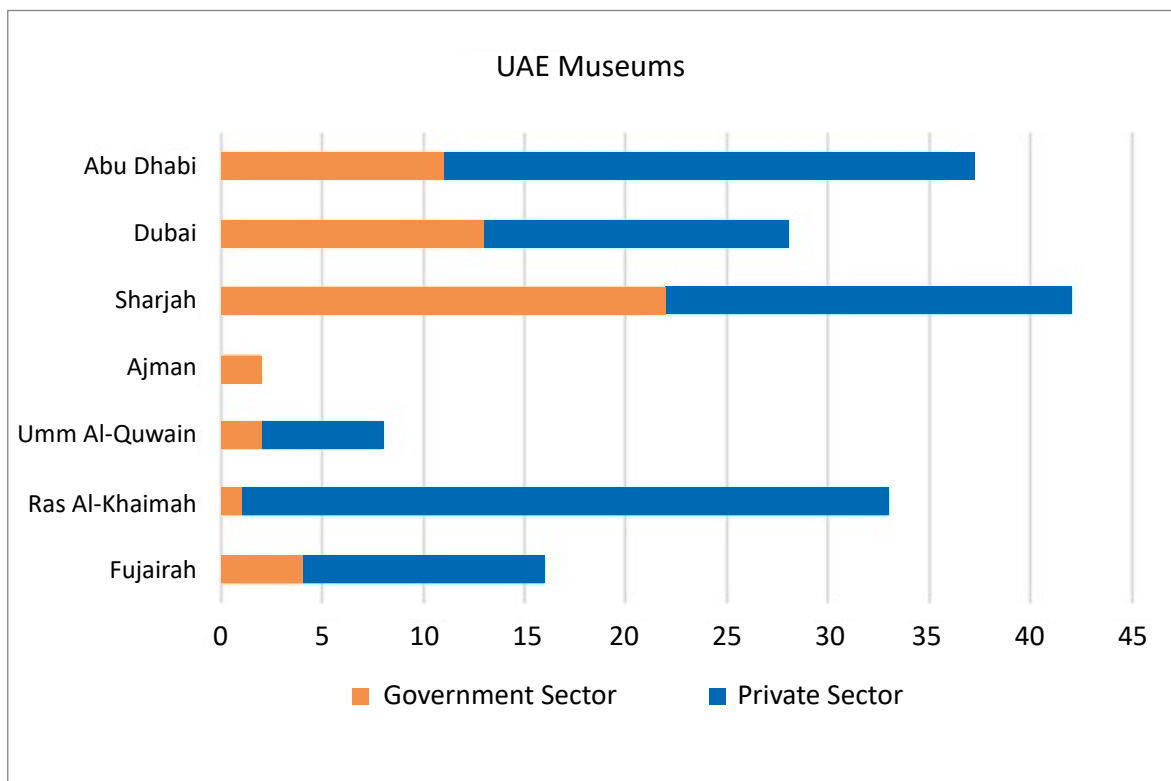
### 2.4.2 Sharjah museums overview

The Sharjah Museums Authority was established in 2006 as a government department. The Authority operates 17 museums in Sharjah, with three major hubs (discoveries and sciences; arts; heritage and history). In addition to Islamic arts and culture, it covers themes such as archaeology, history, and aquatic biology.

#### 2.4.2.1 The Sharjah Museum of Islamic Civilization (SMIC) overview

It is one of the world's most significant Islamic museums. It was once known as the Islamic Museum before being renamed. Established in 1996 in the Heritage Area, it transferred to another building that was a market known as Souq Al Majara (opened in 1987 as a Souq). It was renewed and reopened in 2008 after moving the re-interpreted and re-displayed artifacts from the old museum to this renovated state-of-the-art museum. More than 5.000 items from all around the Islamic world are on subject-based display in seven large exhibition halls.<sup>29</sup>

The Museum has 3 levels. On the ground floor, the Abu Bakr Gallery of Islamic Faith displays Muslim rites and faith. The Ibn al Haitham Gallery of Islamic Science and Technology shows the contributions of Muslim intellectuals and scientists

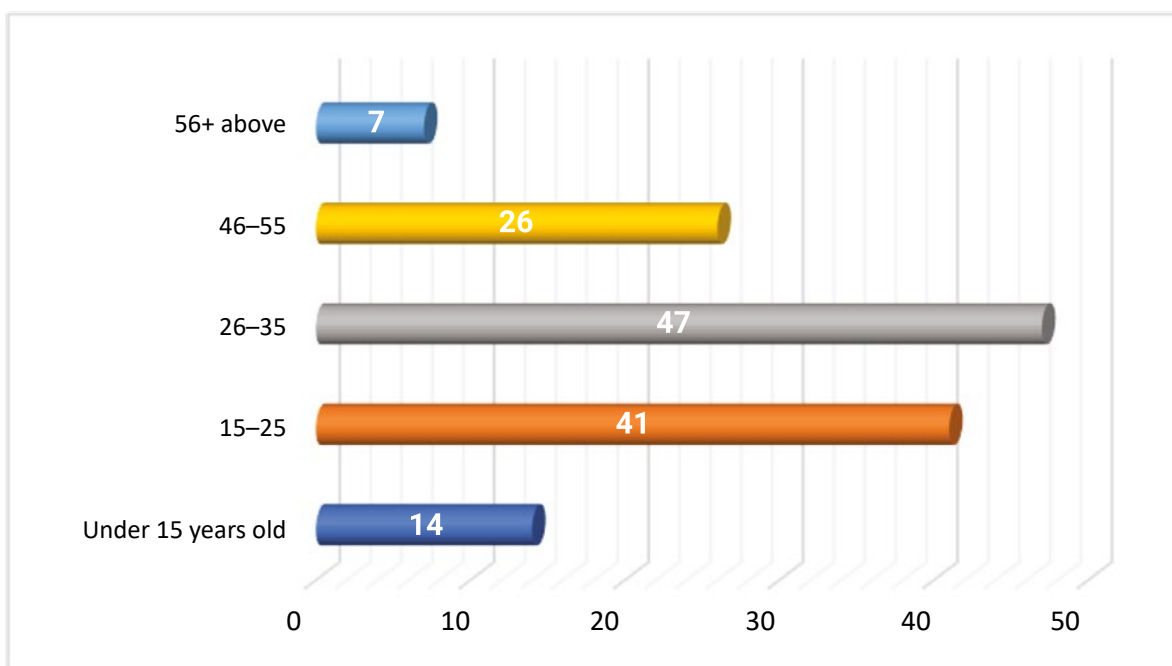


4. The percentage of the number of museums belonging to the government and private sector (Bukhash, 2021)

Table 1. The government museums under the supervision of SMA

KEY THEME	MUSEUM	OPENING DATE
Archaeology	Sharjah Archaeology Museum	1993
	Sharjah Museum of Islamic Civilization	1996
Art	Sharjah Art Museum	1997
	Sharjah Calligraphy Museum	2002
Discovery and Science	Sharjah Science Museum	1996
	Sharjah Discovery Centre	1999
	Sharjah Aquarium	2008
Heritage and History	Bait Al Naboodah	1995
	Sharjah Fort (Al Hisn)	1997
	Bait Sheikh Saeed Bin Hamad Al Qasimi	1999
	Al Mahatta Museum	2000
	Al Eslah School Museum	2003
	Sharjah Maritime Museum	2003
	Sharjah Heritage Museum	2005
	Sharjah Classic Cars Museum	2008
	Hisn Khor Fakkan	2019
	Resistance Monument	2020

5. Doorway of the museum from the city's side, <https://www.sharjahmuseums.ae/en-US/Museums/Sharjah-Museum-of-Islamic-Civilization>



6. Respondents' age groups of the survey

to human civilization. A hallway is for Islamic Coins. The Al Majarrah Gallery hosts international exhibits. The museum has a VIP room, offices, instructional spaces, and a café. The first level has four Islamic galleries created to exhibit Islamic civilization's elegance and excellence. The second level has a mosaic dome representing a night sky and astrological signs.<sup>30</sup>

### 3. Data collection and analysis

Data were gathered using a mixed-method approach, including surveys and interviews, to concentrate emphasis on the VX. E-mail was used in interviews to communicate with the staff. It was a series of seven open-ended questions on two main themes. The data were collected from the second quarter of 2021 up to the third quarter of 2021. The research surveyed the understanding of the impact of ICTs on VX in the museum exhibition. Besides, it was all pertinent to the situation of technology in Sharjah museums. To realize the impact of ICT apps (on-site and online) on VX at a museum exhibition. The research question must be considered.

How can technology in museums affect the VX?

#### 3.1 Museum audience survey

The audience survey about SMIC includes 12 questions. The survey consists of three portions. The first and second parts demonstrate the audience's personal information and audience's interests. This part consists of 3 items from Q 6 to Q 8. The third part reflects the information on participants' experience with ICT apps in the SMIC exhibitions.

- Museum visitors' categories  
According to the survey, the participants diversified in age. The majority of the responses were from people

between the ages of 26 and 35, accounting for 35%, along with the ages 15-25, accounting for 30% of the total, with only 11% of those under 15 as well as 5% over 55.

- Digital technology used in the museum  
These questions present the VX with digital technology in the museum exhibitions (*in situ* & web).

Considering multiple replies were permitted, the total number of responses beat the full-scale number of respondents. Table 2 illustrates the technology used in the museum.

The touch screen was used by 42% of participants, followed by the web at 30% and digital audio guide devices at 18%. 8% of participants used social media in the museum. 2% of participants used their phones to scan barcodes.

- Participants' Experience with ICT applications  
Table 3 indicate the below responses from audiences for four components (from 2. A to 2. D).

(2. A) According to the findings, the majority of participants (95 % out of 138) believe that using ICT enhances the museum VX. (2. B) The survey's second statement was most intriguing: not engaging with ICT in museum exhibitions. The findings show that more than half of the participants (58% out of 138) would engage with ICT in museum exhibitions. (2. C) Thereupon, 92% out of 138 respondents appreciate ICT used as an assistance material in museum exhibitions. Concerning clause 2. D, the ICT will help the visitor to engage with the exhibition. Upon the findings, the majority of participants (88% out of 138) approved that the ICT will help the visitor to engage with the exhibition.

- Participants' experience with the Museum's website  
Table 4 findings indicated the below responses from audiences for four components (from 3. A to 3. D). Participants' responses to statements (3. A, 3. B, 3. C and 3. D) were based on their preferences for browsing the SMA website.

Table 2. The ICT applications used in the museum

QUESTIONS	ANSWERS	FREQUENCY	PERCENTAGE %
1 Which of the ICTs following have you seen/used in the Sharjah Museum of Islamic Civilization? (Select all that apply)	Digital/touch screen kiosk	110	42%
	Web	77	30%
	Audio (digital) Guide devices	48	18%
	Social Media	20	8%
	Others	5	2%

(3. A) The findings indicated that the majority of participants (85% out of 138 respondents) agreed that the museum exhibits are attractive and explicit on the website. As regards clause 3. B, the website gives the visitor intellectual stimulation around the exhibits. 77% out of 138 respondents admitted that the website gives the visitor intellectual stimulation around the exhibits. (3. C) According to the data, the majority of participants (76% out of 138 respondents) agreed that the virtual tour on the museum’s website makes the visitor feel engaging with it. (3. D) As per the findings, the majority of respondents (85% out of 138 participants) agreed that the virtual exhibitions on the website motivate the visitor to discover the exhibits in the museum.

In the museum galleries, visitors can choose their preferred language and play the video that gives general information about the galleries.

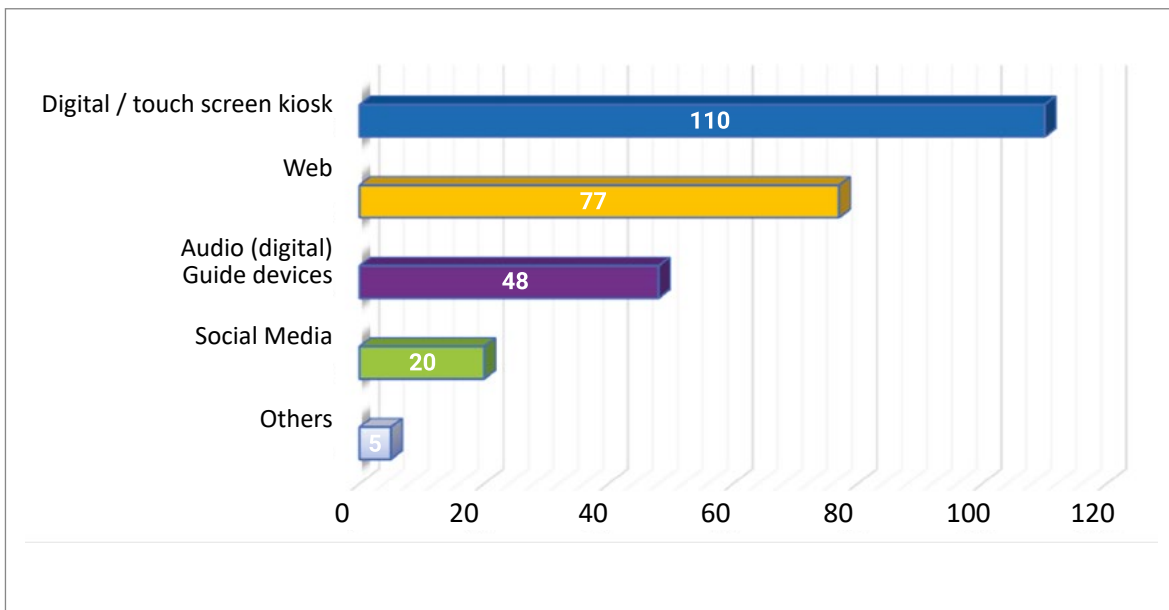
Interviewing a SMIC employee revealed that the Museum gives QR codes to visitors as an alternative to the audio tour, allowing them to scan the code to learn more about the Museum’s exhibits. It is also used to evaluate the services in the Museum.

- Future technology projects at SMA and SMIC.

During the interview, one of the SMA experts indicated that ‘we are working on developing and updating the permanent and temporary exhibitions to add some elements of modern technology’. The infrastructure for ICT is widely available, so SMA can deliver the promised service quality of new ICT to its visitors, and expand their knowledge and information about museums. Although financial support is the biggest challenge for museums in the world, with His Highness Sheikh Sultan Al Qasimi’s continued support, SMA invests in ICT to enhance VX. Moreover, another museum professional indicated that the most common technology

#### 4. Results and recommendation

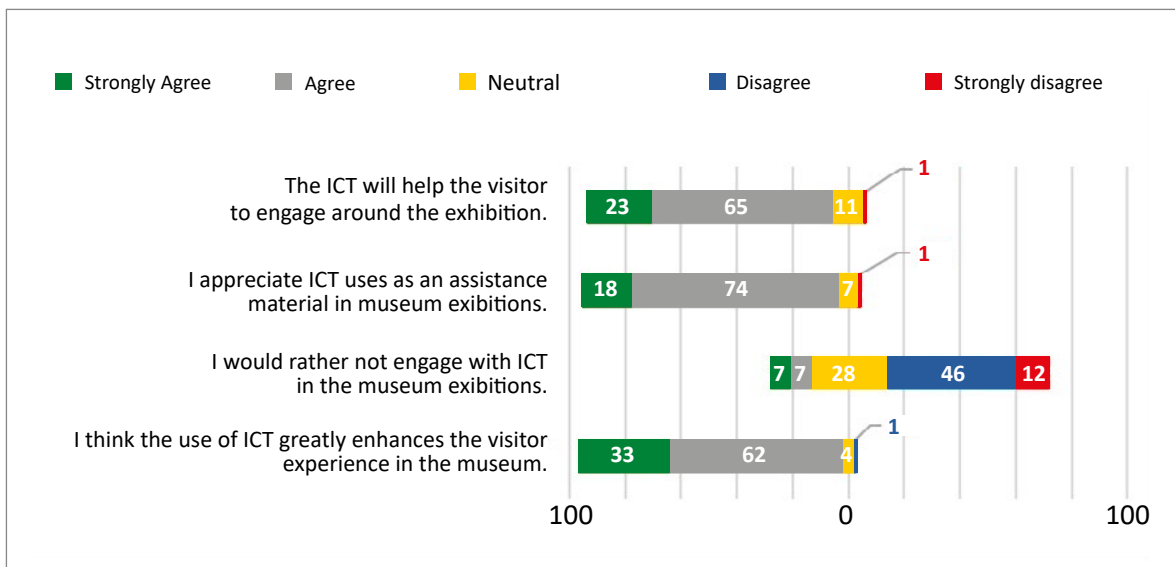
- Digital technology in SMIC  
Digital screen kiosks, web, voice guide devices, shower sound devices, and mobile are the ICT technologies used in SMIC. They were specified by the most of audience.



7. Museum visitors’ use of ICT applications

Table 3. Participants' experience with ICT applications

QUESTION		Frequency Percentage	ANSWERS				
			Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
2	In each of the following situations, how agree are you that using ICTs at museums can improve the experience of visitors? (This includes the use of museum apps, audio tours, videos, etc.)						
2A	I think the use of ICTs greatly enhances the visitor experience in the museum.	Frequency	46	85	6	1	0
		Percentage %	33%	62%	4%	1%	0
2B	I would rather not engage with ICTs in museum exhibitions.	Frequency	9	10	39	64	16
		Percentage %	7%	7%	28%	46%	12%
2C	I appreciate ICTs uses as an assistance material in museum exhibitions.	Frequency	25	102	10	0	1
		Percentage %	18%	74%	7%	0	1%
2D	The ICTs will help the visitor to engage with the exhibition.	Frequency	32	90	15	0	1
		Percentage %	23%	65%	11%	0	1%



8. Experiences of participants with ICT applications at the museum

tools crucial for museum exhibitions are as follows: virtual reality, audio guide (QR code), touchscreen kiosk, TV, projector, hologram, and the augmented reality.

• Visitors Experience

Through the surveys, the statistics of Q 2 results revealed that 83% of the participants agree that using ICT at museums can improve the experience of visitors. In addition, the findings for Q 3 demonstrated that, while 81% of participants agreed the museum's website will enhance the VX before/after visiting the museum, the majority of the remaining 18 % were uncertain about it.

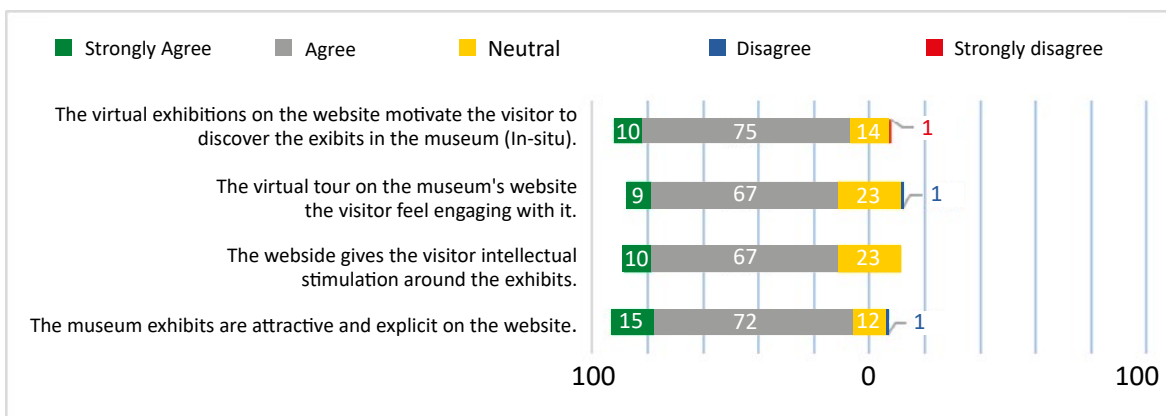
Despite the epidemic spread, the digital transformation of museums in Sharjah helped to attract more audiences.

SMA turned to unconventional strategies. This was also a unique opportunity to expand the museums' digital presentations. The authority always interacts with their audience using multimedia, the website, and social media. It seized the time to accelerate its digital transition. Thus, the authority designed a selection of digital programs and workshops to enable the audience to visit and interact with museums from home and various countries of the world submitting 158 digital programs to audiences worldwide. Thus, the number of visitors reached 370.055 in only 8 months: with 25.457 virtual visitors (through the updated virtual programs) and 344.598 actual visitors. The number of website visitors increased exponentially in 2021, reaching



Table 4. Participants' experience with the museum's website

QUESTION		Frequency Percentage	ANSWERS				
			Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
3	In each of the following situations, how agree are you that the museum's website will enhance the visitor experience before/ after visiting the museum?						
3A	The museum exhibits are attractive and explicit on the website.	Frequency	20	100	17	1	0
		Percentage %	15%	72%	12%	1%	0
3B	The website gives the visitor intellectual stimulation around the exhibits.	Frequency	13	93	32	0	0
		Percentage %	10%	67%	23%	0	0
3C	The virtual tour on the museum's website makes the visitor feel engaging with it.	Frequency	12	93	32	1	0
		Percentage %	9%	67%	23%	1%	0
3D	The virtual exhibitions on the website motivate the visitor to discover the exhibits in the museum.	Frequency	14	103	20	0	1
		Percentage %	10%	75%	14%	0	1%



9. Participants' experience with the museum's website

67.909 (56.538 new visitors and 11.371 returning visitors).<sup>31</sup>

Demas, Director of Executive Affairs, noted during the interview about the benefit of ICT in enhancing VX: 'Making it more fun, more dynamic, and more engaging. One great added point here is that it can be used to allow inclusion, to allow the visitor to share their personal views as well via social media for example. It is no longer only the voice of the museum, the educator, or the curator that is being heard, but also the visitor and the student can voice their opinions and share their ideas. This gives the visitor a sense of ownership and boosts their experience'.

To conclude, ICT in the museum improves visitor satisfaction and meets their demands, notably web-based virtual tours, touch screens, and QR codes. Collections are also explained digitally in museum galleries. This increases the quantity of information in a catchy way to the audience. So, the technology is useful both as an interpretive tool and as a component of an exhibition.

## 5. Conclusion

This paper discussed the effect of ICT tools on the experience of visitors in museums based on the questionnaire, the survey of relevant literature, with the main aspects and factors affecting the digital experience of visitors during the visit. The findings indicated that digital display technologies were well received by museum visitors and encouraged them to explore the galleries. In addition, they revealed that the presence of the ICT in SMIC was a motivation for the visit and contributed to enhancing the VX.

Using these technologies, visitors were able to see galleries' richness, which increased their desire to learn more about the exhibits. It also enhanced the museum experience (on-site and online). Moreover, it had a tremendous influence on visitors' enjoyment. More significantly, it generated new experiences for visitors to live in the history and stories of the collections. An innovative use of ICT is

Table 5. The ICT Technologies used *in situ* & online

<i>In Situ</i>	Online
Multimedia kiosks	Website
Audio and smart guides	Social Media
Mobile (QR)	



10. Digital/touch displays were used by the family while visiting the Ibn Al-Haytham Gallery of Science and Technology, taken by the researcher (SMA)



11. QR-codes used in the exhibition (in-situ and online), taken by the researcher (SMA)

required to fulfil the museum’s educational and entertaining purposes from its exhibits. Although financial support is the biggest challenge for museums in the world, with His Highness Sheikh Sultan Al Qasimi’s continued support, SMA

invests in ICT to enhance the VX. Based on visitor feedback, this study suggests boosting the usage of current ICT apps including mobile apps and holograms, in addition to enhancing a customized display of online digital display.

**Abstract:** Museums are progressively using ICT to reinforce cultural and heritage tourism. Museums are vital in transmitting cultural values, propagating traditions, and linking current generations to their heritage. ICT has recently

gained prominence for its ability to stimulate creative approaches. The use of ICT in museum operations is widespread, particularly in the areas of presentation and preservation. Museums, according to previous research, use

a range of ICT tools to enhance the visitor experience (VX) through modernizing their exhibits and object interpretation. The purpose of this paper is to gain a better understanding of the VX as well as to evaluate the visitors' standpoint on ICT in museums.

The research was applied to the Sharjah Museum of

Islamic Civilization. Two primary approaches were used, which include qualitative data such as literature reviews and interviews, as well as quantitative data as the main ways that employ questionnaires. Findings indicate that integrating technological tools can enrich the VX in museums by allowing for the usage of a variety of digital media types.

**Keywords:** ICT, Sharjah Museum of Islamic Civilization, Visitor Experience, Exhibition, Digital.

## Endnotes

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### **Said Nasser Mohammed**

An archaeologist and museum professional, working at the Grand Egyptian Museum. Said has experience in developing narratives and managing exhibitions, in areas ranging from temporary exhibition design and writing curatorial research briefs, to working with interpretation and design teams. Post Graduate student in the 'Conservation Management of Cultural Heritage'; Master's programme focusing on Museum management at the University of Sharjah; saidradwan10@gmail.com.

### **Monther Jamhawi, PhD**

An associate professor at the Univ. of Sharjah working as the coordinator of the MSc programme in Heritage Conservation and Management that he runs jointly with ICCROM Sharjah. Dr Jamhawi is the former Director General of the Department of Antiquities of Jordan for the period August, 2013- Aug. 2018. He is basically an associate professor of Conservation and Management of Cultural Heritage at the Department of City Planning and Design in the College of Architecture and Design at Jordan University of Science and Technology. Dr. Jamhawi has been working as consultant expert for many national, regional, and EU Heritage Conservation and Tourism Development projects. He has also published many articles in the field of Management and Protection of Cultural Properties, Planning for Cultural Tourism, Sustainable Tourism, Heritage Restoration and Revitalization, and New IT Applications in Heritage Management; mjamhawi@sharjah.ac.ae.

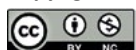
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