ENHANCING VISITOR EXPERIENCE: EXPLORING VIRTUAL PERSPECTIVES IN MUSEUMS

Marius SURUGIU
Institute of National Economy - Romanian Academy, Bucharest, Romania
marius.surugiu@ien.ro
Camelia SURUGIU
Faculty of Administration and Business, University of Bucharest, Bucharest, Romania
National Institute for Research and Development in Tourism, Bucharest, Romania
camelia.surugiu@faa.unibuc.ro
Raluca MAZILESCU
Institute of National Economy - Romanian Academy, Bucharest, Romania
ralucamazilescu@ien.ince.ro

Abstract
Museums play an essential role in valorising cultural heritage. As technology advances, museums have evolved from merely displaying collections online or offering virtual tours to providing immersive and interactive experiences. This paper focuses on the activities of museums with virtual capabilities, exploring how they integrate digital experiences to enrich their offerings. It also highlights the key features of virtual museum offerings, emphasising technological solutions and user engagement strategies.

Key words: *cultural heritage, museums, virtual reality*

JEL Classification: *L83, O33, Z11*

I. INTRODUCTION

Museums have an essential role in valorising cultural heritage. They help to carefully preserve rituals, art, and whatever aspects make a culture unique. Museums are spaces where visits can be organised for both entertainment and education.

Around the world, some museums have started to make their exhibits available in digital form. Technological evolution can influence the development of a virtual museum. Using available technologies, a virtual museum is more than just a presentation of collections on the Internet or a virtual tour of an exhibition; it is an immersive and interactive experience.

A virtual museum should enhance the visitor experience and provide access to additional materials to deepen knowledge. The information from the virtual museum can be used as teaching materials in schools and other educational institutions. Virtual reality (VR) and other technologies have opened up new possibilities, providing new avenues for visitor interaction. VR has been applied to a variety of projects, including the reconstruction of historical settings, interpretation, and experience improvement on and off-site, as well as the creation of immersive, interactive, and educational experiences for visitors and museum spaces (Shehade & Stylianou-Lambert, 2020).

Virtual museums are online platforms replicating the experience of visiting a physical museum. They contain collections of artworks, artefacts, historical objects, and other objects visitors can explore and interact with using a computer, smartphone, or VR headset. Virtual museums offer multimedia content, interactive features, educational resources, and other features that enhance the visitor experience.

Virtual museums house digitised versions of artworks, artefacts, etc., allowing visitors to examine high-resolution items. Visitors can zoom in on images, rotate objects, and access additional information. Virtual museums allow visitors to navigate museum galleries, exhibitions, rooms, corridors, etc. Educational resources are also provided, including audio guides, videos, and content about the historical background related to the exhibits.

The paper is structured as follows: The next section provides a comprehensive literature review, summarising relevant research and studies. The third section explores museums with virtual perspectives, discussing how these institutions incorporate digital experiences to enhance their offerings. The fourth section presents the key features of museums' virtual offerings, focusing on technological advancements and user engagement strategies. The fifth section develops a SWOT analysis of the virtual museum concept, evaluating its strengths, weaknesses, opportunities, and

threats. Finally, the concluding section summarises the paper's findings.

II. Literature Review

VR technology

Virtual reality (VR) is a developing field in the fourth industrial revolution, coinciding with the swift progress of digital technology (Kim et al., 2020). Although VR technology is still in its infancy, more individuals are showing interest in it and are hopeful about the potential improvements it may bring about in people's daily lives (Hamad & Jia, 2022). As Preece et al. (2022) underlined, VR has the potential to significantly alter social and individual affective, cognitive, and behavioural patterns.

As an innovative technology, VR has gained popularity in recent years and has made it possible for online platforms to interactively depict designs and intuitively illustrate concepts in the digital age (Maziriri et al., 2023; Tang et al., 2023). Visual displays, which present the user with the virtual environment; graphics systems, which produce images; tracking systems, which report the user's location and orientation; and information databases, are essential to VR (Vrechopoulos et al., 2009).

VR produces lifelike, immersive auditory, visual, and occasionally other senses experiences. One of the main components of the VR experience is a sensation of presence, which is enhanced by using the senses, especially sight and sound (Adachi et al., 2022). Flavián et al. (2021) stated that users of VR experiences are submerged in three-dimensional virtual worlds that they can explore and potentially interact with, stimulating their senses. Martí-Testón et al. (2023) also considered that VR apps can provide a more realistic and engaging experience. Users who engage in VR may become absorbed and captivated by its interactive aspects (Nguyen et al., 2023). However, unlike virtual worlds, VR does not require users to connect socially with one another (Chesney et al., 2018).

Users can access VR material through various media devices like computers or smartphones. They can move their computer mouse or smartphone around to view VR videos from different perspectives (Song et al., 2021). Hamad & Jia (2022) stated that, given how quickly smartphones and PCs have been adopted by society, VR has a chance to be the next major technology revolution that will eventually be used in most homes.

VR design is multimedia that generates an image of the natural or imaginary environment, objects, space, or events (Stecuła, 2022). According to technical definitions, VR is a computer-generated environment in which users interact with an interface to excite one or more senses while acting in a real-time simulation of an environment (Innocenti, 2017). Conventionally, VR is described as a computer-generated environment where users may immerse themselves, look around, and control the experience (Godovykh et al., 2022). This visual realism results from several VR system components, such as head-based rendering, field of view, and field of regard. A VR system shows visuals that fluidly adjust to the head position and 360-degree orientation of the user (Chen & Wang, 2019).

Three essential components that define VR are interactivity, immersion, and visualisation (Nguyen et al., 2023). One of the most marketable features of VR technology is this immersive experience, which most people associate with VR (Hamad & Jia, 2022). A person engages in highly immersive VR interactions with a simulated surrounding environment. In other words, VR is provided through the interface between the technology and a programmer who can construct a virtual experience (Zeng et al., 2023).

VR and tourism

Dehghani et al. (2022) pointed out that VR devices have become more prevalent in the consumer market. Marketers can now use VR to promote their goods to accelerate economic growth (Subawa et al., 2021). When appropriate, marketers can use VR to recreate real-world environments. In addition, marketers can build new social and cultural spaces not determined by geographic proximity (Pennington, 2001). Zeng et al. (2023) added that VR technology offers unquestionable potential in terms of marketing effectiveness and experience, and it has introduced fresh IT innovation to the field. Yuce et al. (2020) emphasised that VR is a cutting-edge technology that presents many options for long-term, tangible advantages to most stakeholders.

VR is also a valuable marketing tool for destination marketing companies because it allows travellers to experience a place ahead of time. Moreover, VR impacts travellers' intentions to visit locations featured in VR travel (Kim et al., 2020). On the other hand, Kassaye (2007) considered VR to enable users to see and experience everything from the comfort of their computers, eliminating the need for travel. The focus is on image and image construction, and VR can accomplish this most effectively and globally without being constrained by linguistic barriers. Still, Oncioiu and Priescu (2022) argued that VR will never completely replace the experience of travelling in the real world, and it will undoubtedly help make decisions and provide information about potential vacation destinations.

The adoption and diffusion of digital technologies have tremendously impacted cultural heritage production, preservation, and use. Digitisation techniques and the Internet influence most of the activities carried out by such institutions: the use and valorisation of cultural heritage, as well as the costs related to conservation. VR and cultural heritage are

frequently integrated to optimise the benefits of both VR and narrative (Theodoropoulos and Antoniou, 2022). As a marketing tool, VR is revolutionising traveller experiences and how people perceive places (Nguyen et al., 2023).

VR is a viable way to boost travel, as the increased sense of presence facilitated by head-mounted displays (HMDs) contributes to a more favourable perception of the travel place (Adachi et al., 2022). Zeng et al. (2022) underlined that virtual tourism offers engaging and dynamic experiences to visitors, making it easier for them to understand and interpret the places they visit. The aesthetic experience realises the inherent values of amusement and pleasure. Visitors can enjoy a visual feast and momentary escape from reality with VR activities. VR tourism allows visitors to recognise and value the historical, cultural, athletic, and artistic accomplishments representing the nation's collective successes. Furthermore, depending on cultural expectations, VR enables the construction of hypothetical environments that do not exist (Pennington, 2001).

Kim et al. (2020) exposed that attachment to VR significantly influences prospective visitors' intentions to visit the location. VR tourism content creators should concentrate on producing authentic VR material, as it was discovered that authentic experiences with VR activities related to tourism substantially impacted potential visitors' cognitive and emotive responses.

Oncioiu and Priescu (2022) indicated that trust and optimising a great experience are the driving forces behind future intentions to utilise VR technology to select a travel destination. The traveller is greeted with virtual worlds where they can talk, interact, or explore to decide if it is worth buying the actual trip, rather than a screen showing the potential tourist destination or routes. The VR system responds to input from tourists by displaying a view of the virtual environment and concentrating on viewing the material (such as imaginary or actual landscapes), emphasising hearing in addition to sight. Therefore, one's sense of presence in a virtual environment refers to that sensation rather than the location of one's body at that moment.

Yung et al. (2021) indicated that VR improved destination image and decreased perceived destination choice risk. The immersive experiences were primarily responsible for the destination image's more robust cognitive and affective components.

VR and museums

Museums offer unique learning opportunities. Through the artefacts they hold, historical re-enactments and themed exhibitions, museums stimulate curiosity and learning, contributing to a deeper understanding of the world and facilitating access to lesser-known historical perspectives.

In addition to their educational role, museums are essential in preserving and celebrating traditions and uniting communities through shared heritage. Thus, cultural heritage is ensured to be maintained and transmitted to future generations.

Bachiller et al. (2023) find that young visitors highly appreciate using augmented and virtual reality in a museum, emphasising the importance of improving the learning experience while preserving the museum artefacts. Cheong et al. (2023) show that an immersive VR museum is well-received by young individuals, with positive feedback on usability and learnability. Vishwanath (2023) found that senior citizens are more interested in listening to stories about cultural heritage artefacts, whereas playful interactions increase engagement among younger generations. YiFei and Othman (2024) discuss a generational variation in museum VR engagement, with most museum visitors holding a positive attitude towards VR. According to Li and Lv (2024), while online VR exhibitions are based on digital technology, it is essential to consider users' varied needs.

III. MUSEUMS WITH VIRTUAL PERSPECTIVES

Various museums worldwide have implemented a virtual system for presenting their exhibits:

- The Louvre Museum is one of the most famous museums in the world, offering virtual tours through which visitors can discover valuable historical information.[1] Thus, the built-in technology allows one to admire the exhibits at an excellent resolution.
- The Oxford University Museum of Natural History has implemented a virtual tour.[2] This museum in Parks Road, Oxford, England, displays many of the University of Oxford's natural history specimens. It is home to many of Oxford University's world-class collections of zoology, entomology, geology, and mineralogy, including discoveries of a dinosaur, a 40-metre Tyrannosaurus rex, a beehive, and Alice's Dodo (see Alice in Wonderland by Lewis Carroll, 1865).
- The British Museum in London, England, is a public institution dedicated to history, art, and culture. Its permanent collection of approximately eight million works is one of the largest and most comprehensive. The institution also owns a virtual museum titled ”The Museum of the World”, which offers an interactive experience across time, continents,

[1] The Louvre Museum, https://www.louvre.fr/visites-en-ligne#visites-virtuelles.

[2] The Oxford University Museum of Natural History, https://www.oum.ox.ac.uk/tour/tour.html.

and cultures, presenting some of the most fascinating objects in human history.[3]

- The Smithsonian National Museum of Natural History, Washington, USA, holds an archive of the Earth's physical, cultural, and biological diversity, with more than 145 million objects. The museum has a long history of research, exhibitions, and public programs. Virtual tours allow visitors to take self-guided, room-by-room visits to exhibits and areas in the museum.[4]
- The Metropolitan Museum of Art is in New York, USA, on Central Park's east side. The museum holds objects from the Stone Age and has special exhibitions of contemporary artists. It also has The Met 360° Project, which invites visitors to explore the virtual museum.[5]

In Romania, many museums offer virtual tours. There are several museums in Bucharest:

- The National Museum of Romanian History holds objects of historical value discovered from prehistoric times to the contemporary period. The museum offers virtual tours, such as the "Romania in WWII. 1941-1945" virtual tour.[6]
- The National Museum of Art of Romania, established in 1948, is housed in the Royal Palace in Bucharest. This museum offers virtual tours of European, Romanian, modern, and medieval art galleries.[7]
- The "Grigore Antipa" National Museum of Natural History is in Bucharest. Its heritage comprises over 2 million pieces in different zoological, paleontological, mineral, rock, and ethnographic collections. The museum offers virtual tours of its exhibits.[8]
- The National Museum of Romanian Literature is a museum in Bucharest dedicated to Romanian literature. Its collections comprise over 300,000 manuscripts and old books, including old and rare books, historical-literary documents, works of art (graphics, painting, and sculpture), periodicals, furniture, photographs, and audio-video recordings. The museum offers various virtual tours.[9]
- The "Dimitrie Leonida" Technical National Museum, located in Carol I Park, Bucharest, benefits from an exhibition area of 4,500 square meters, of which 1,000 square meters is outdoors, and the presentation of its exhibits is grouped as follows: the history of mechanics, electricity, magnetism, the mining and oil industry, heat, telecommunications, hydraulics, electrical engineering, industrial machinery, land and air transport, and atomic physics. The museum also offers a virtual tour.[10]
- The National Museum of the Romanian Peasant is known for its 100,000-object collection, which includes ceramics, folk wear, interior fabrics, furniture, and more. The museum offers a virtual tour.[11]
- The "Dimitrie Gusti" National Museum of the Village is one of the biggest tourist attractions in Bucharest. The owned houses were disassembled and transported to Bucharest, where they were assembled on the museum's surface on the shore of Herăstrău Lake. The oldest house was built in the 17th century, and the most recent is from the 20th century. The museum offers a virtual tour.[12]
- The Cotroceni National Museum is a museum in Bucharest located in the Cotroceni Palace, where King Ferdinand and Queen Marie lived. It holds collections of old European decorative art and offers virtual tours.[13]
- The Romanian Railway Museum in Bucharest was inaugurated in 1939. The museum offers a virtual tour.[14]
- The National Museum of Romanian Aviation is located in Bucharest on the site of the former Pipera Airport. It offers exhibitions highlighting Romanian aviation history's most important moments and a virtual tour.[15]

Among other museums in Romania that have adopted a virtual tour are the following:

- The "Ion Creangă" Memorial Museum in Humulesti, Târgu-Neamţ, Neamț County, has a valuable exhibition that includes archive documents, letters, photocopies of

[3] The British Museum, https://artsandculture.google.com/partner/the-british-museum.
[4] The Smithsonian National Museum of Natural History, https://naturalhistory.si.edu/about/virtual-tour.
[5] The Metropolitan Museum of Art, https://www.metmuseum.org/art/online-features/met-360-project.
[6] The National Museum of Romanian History, https://muzeulvirtual.ro/tur-virtual/.
[7] The National Museum of Art of Romania, https://mnar.ro/en/explore/397-virtual-tours.
[8] The "Grigore Antipa" National Museum of Natural History, http://www.imagofactory.ro/muzee/antipa/antipa.html.
[9] The National Museum of Romanian Literature, https://mnlr.ro/mnlr3.html.
[10] The "Dimitrie Leonida" Technical National Museum, http://www.imagofactory.ro/muzee/mntdl/mntdl.html.
[11] The National Museum of the Romanian Peasant, http://www.tur.muzeultaranuluiroman.ro.
[12] The "Dimitrie Gusti" National Museum of the Village, https://muzeul-satului.ro/descopera/tur-virtual/.
[13] The Cotroceni National Museum, https://www.muzeulcotroceni.ro/viziteaza/tur_virtual_expozitii.html.
[14] The Romanian Railway Museum, https://www.zona3d.ro/work/2017/Muzeul_Cailor_Ferate_Tur_Virtual_Stereo3D/zona3d_vr3dmcf/zona3d_mcf_turvrstereo3d.html.
[15] The National Museum of Romanian Aviation, https://my.matterport.com/show/?m=zag4CJyJfvr&brand.

manuscripts, photographs, etc. The museum offers a virtual tour.[16]

- The "Lucia Condrea" Museum of Painted Eggs in Moldovița, Suceava County, has 106 display cases. The museum's structure includes three sections: the unique works of Lucia Condrea, very old painted eggs, and an international collection. The museum has a virtual tour.[17]
- The County Art Museum "Baia Mare Artistic Center" from Baia Mare, Maramureș County, has a permanent exhibition entitled "Baia Mare Artistic Center. European Landmarks Between Traditions and Innovations" with almost 400 works. From 195 pieces registered in 1960, when the Modern and Contemporary Romanian Art Collection was established within the Maramureș Regional Museum, the museum's heritage now includes over 3,900 works of art. The museum offers a virtual tour.[18]
- The Bicaz History Museum, Neamț County, holds archaeological materials resulting from the investigations carried out by the Romanian Academy's research group in the 1950s, as well as Paleolithic pieces resulting from the excavations on the Ciungi-Bicaz terrace (1964, 1967, 1969) and Izvorul Alb (1979, 1980). Currently, the museum has over 8,000 exhibits and offers a virtual tour.[19]
- The "Calistrat Hogaș" Memorial Museum is a museum in Piatra-Neamț, Neamț County, dedicated to the writer's work. The museum has authentic furniture, art objects, clothing, tapestries, carpets, personal and office pieces, manuscripts, documents, books, etc. It offers a virtual tour.[20]
- The Ialomița County Museum from Slobozia, Ialomița County, has a valuable archaeological heritage, consisting of objects from different historical periods, from the Neolithic to medieval times. The museum has a virtual tour.[21]
- The "Victor Gorduza" Mineralogy County Museum in Baia Mare, Maramureș County, is the largest regional museum in Europe. It hosts an exhibition covering 900 square meters and over 1,000 mineral, rock, and fossil samples. The museum also offers a virtual tour.[22]
- The Museum of Natural Sciences in Piatra-Neamț, Neamț County, was established in 1960 and has a collection of fossil fish unique worldwide and rare exhibits from the geology, flora and fauna of the Neamț mountains. The museum was opened to the public in 1965. The museum's collections (mineralogy-petrography, palaeontology, botany, and zoology) include over 50,000 objects. The museum has a virtual tour.[23]
- The History Museum from Roman, Neamț County exhibits archaeological objects, of which the following stand out: Cucuteni Neolithic treasure, the inventory of the Dacian necropolis at Văleni, a Dacian collection from the classical period (Brad fortress), a collection of free Dacian objects, medieval objects from the Roman citadel and surrounding villages (14th-16th centuries), etc. The museum holds over 170,000 objects and has a virtual tour.[24]
- The Art Museum in Roman, Neamț County, houses paintings, graphics, and sculptures and offers a virtual tour.[25]
- The Museum of Natural Sciences in Roman, Neamț County, has temporary exhibitions such as: “Flora and Fauna from the Confluence of Moldova with Siret”, “Trees and Shrubs from Deciduous Forests”, “Earth and Environmental Protection”, “The Story of Softwood”, “The Wonderful World of Crystals”, “The Story of Tobacco”, “Natural Therapy between Tradition and Actuality”, “Living Reptiles”, “The Story of Sugar and Chocolate”, “Dinosaurs, Curiosities of Extinct Life on Earth”, “Entomofauna of Deciduous Forests”, “The World of Mushrooms”, and “The Bread Road to Roman”. The museum has a virtual tour.[26]
- The "Ștefan cel Mare" County Museum in Vaslui, Vaslui County, was established in 1974. The opening of the museum took place in 1975. The main sections of the museum are Ancient History and Archaeology, Modern History, Medieval History, Ethnography and Folk Art, Thesaurus-Numismatic-Medals,

[16] The “Ion Creangă” Memorial Museum, http://mmich.muzeu-neamt.ro/tur-virtual.html.
[17] The "Lucia Condrea" Museum of Painted Eggs, https://captur3d.io/view/artalucia/muzeuloualorluciacondrea.
[18] The County Art Museum "Baia Mare Artistic Center", https://www.muzartbm.ro/tur-virtual/.
[19] The Bicaz History Museum, http://mib.muzeu-neamt.ro/tur-virtual.html.
[20] The "Calistrat Hogaș" Memorial Museum, http://mmchpn.muzeu-neamt.ro/tur-virtual.html.
[21] The Ialomița County Museum, http://mjialomita.ro/panos/tvmji/tour.html.
[22] The "Victor Gorduza" Mineralogy County Museum, https://www.muzeuminbm.ro/tur.html.
[23] The Museum of Natural Sciences, http://msnpn.muzeu-neamt.ro/tur-virtual.html.
[24] The History Museum in Roman, http://mir.muzeu-neamt.ro/tur-virtual.html.
[25] The Art Museum in Roman, http://mar.muzeu-neamt.ro/tur-virtual.html.
[26] The Museum of Natural Sciences in Roman, http://msnr.muzeu-neamt.ro/tur-virtual.html.

Culture and Civilisation, and Contemporary Romanian Art. The museum has a virtual tour.[27]

IV.Key Features of Museums' Virtual Offerings

In virtual museums, artefacts can be presented through high-quality images and video clips. Artefact descriptions, either in text or audio form, may be available via connection to the museum's central computer. Virtual museums are thus characterised by aspects such as:

- using multimedia platforms allows communication through images, text, and sounds.
- interactivity offers the ability to act, select and actively structure information.
- accessibility in real-time.

A virtual museum's target audience is predominantly adults. However, it can dedicate a section that allows young audiences to get to know the museum in a fun and interactive way, giving them the chance to play games, watch videos, and so on. The museum can dedicate a specific digital section to scientific research, and visitors can receive information about the museum's mission, the professionals working there, research activities, and training.

Virtual museums can create exhibitions or thematic trails to support educational activities in kindergartens, schools, and other institutions, complementing classroom learning and using interactive content for awareness-raising. Thus, there are some advantages offered by virtual museums:

- provide enough space for exhibitions because most museums display part of the exhibits they own. Some items may be too fragile for display but can be effectively displayed with the help of virtual reality.
- provide an interactive experience with an impact on the level of knowledge acquisition.
- allow visitors to observe a simulation of a heritage object significantly damaged or needing reconstruction.
- provide the possibility for the visitors to observe only the exhibits in which they are interested.
- allow the visualisation of parts and details of works that otherwise could not be identified, even by direct observation of the original.

V.SWOT Analysis of the Virtual Museum

Developing a SWOT analysis for the virtual museum concept is a valuable exercise to understand its position in the digital and cultural landscape. This analysis examines some of the virtual museums' strengths, weaknesses, opportunities, and threats.

Among the strengths of a virtual museum, the most critical elements could be:

- high-quality representation of original works can be developed.
- augmented reality and virtual reality can create engaging, immersive experiences.
- virtual space allows for more extensive and diverse exhibitions.
- labour and other costs can be reduced.

Among the weaknesses of virtual museums, the most important could be:

- high setup and maintenance costs are associated with creating and maintaining a high-quality virtual museum.
- digitising a large number of exhibits can be a lengthy process.
- the impact of viewing artefacts in physical museums cannot be fully replicated in the digital world.

Opportunities might include:

- virtual museums can collaborate with online education platforms to enhance learning experiences.
- prospects for attracting government grants and investments from stakeholders should be considered.
- advances in artificial intelligence can enable the creation of personalised and interactive experiences.

Threats might include:

- economic instability may lead to decreased funding and investment in virtual museums.
- developing various digital entertainment and learning platforms can divert users' attention from virtual museums.
- there may be increased demand for more sophisticated and engaging information presentation methods.
- hacking poses significant digital content and user data risks.
- access requires internet connectivity and devices, which may exclude individuals without these resources.

Considering these aspects, virtual museums can potentially transform visitors' experiences. Virtual museums can continue to grow and innovate in the digital age by leveraging their strengths and opportunities while addressing weaknesses and threats.

[27] The "Ștefan cel Mare" County Museum, https://muzeu-vaslui.ro/index.php/sectii/tur-virtual.

VI. Conclusions

Today, museums are transforming, changing their purpose from holding heritage assets to spaces dedicated to education and entertainment. Technology facilitates this change by allowing museums to create attractive presentations to communicate their message effectively. Digitisation and online accessibility attract new consumer segments, especially young people, and new ways of engaging the audience.

Digital technologies have the potential to create bridges between cultural heritage institutions and different categories of the public and to offer captivating and memorable experiences. Communication is achieved by supplementing the exhibition's presentation with multisensory information (images, video, sound, feedback, etc.) designed and integrated into an exhibition context. The idea of a virtual museum has developed in recent years also due to the dissemination of information in the online environment and the integration of technology within the activities carried out by museums.

This research discusses various museums worldwide that have implemented virtual systems to present their exhibits, covering aspects of human and natural history with cultural and technical information. The paper highlights virtual museums' advantages, including ample exhibition space and an interactive experience. Additionally, the SWOT analysis of virtual museums reveals that they must leverage their strengths and opportunities while addressing weaknesses and threats to develop and compete successfully with other online entertainment platforms.

Museums need to be aware of the impact of their online presence. Access to new and innovative products in a virtual museum is crucial for creating a unique experience. Examples include virtual exhibitions that combine heritage assets from different regions, offer tours with expert commentaries, showcase rare collections, or incorporate interactive elements for user engagement.

VII. References

1. Adachi, R., Cramer, E., Song, H. (2022) Using virtual reality for tourism marketing: A mediating role of self-presence, The Social Science Journal, 59:4, 657-670, https://doi.org/10.1080/03623319.2020.1727245.
2. Bachiller, C., Monzo, J.M., Rey, B. (2023) Augmented and Virtual Reality to Enhance the Didactical Experience of Technological Heritage Museums. Appl. Sci. 13, 3539, https://doi.org/10.3390/app13063539.
3. Chen, H., Wang, Y. (2019) Product Placement in Virtual Reality Videos from the Perspective of Dialogic Engagement, Journal of Interactive Advertising, 19:2, 133-147, https://doi.org/10.1080/15252019.2019.1596850.
4. Cheong, S.N., Lim, E., Mah, S.T., Hew, J., Tan, Y.L., Permadi, D., Mahadzir, M.B., Jabbar, E.A. (2023) Designing the Future of Museum Exhibition: A User Acceptance Study of Immersive VR Museum, in Mustaffa, F. (ed.) Proceedings of the 3rd International Conference on Creative Multimedia 2023 (ICCM 2023), Advances in Social Science, Education and Humanities Research, 786, https://doi.org/10.2991/978-2-38476-138-8_10.
5. Chesney, T., Chuah, S.H., Hoffmann, R., Hui, W., Larner, J. (2018) Virtual Economic Experiments, in Lakkaraju, K., Sukthankar, G., Wigand, R. T. (Eds.) Social interactions in virtual worlds: An interdisciplinary perspective, 218–249, Cambridge University Press, https://doi.org/10.1017/9781316422823.010.
6. Dehghani, M., Acikgoz, F., Mashatan, A., Lee, S.H. (2022) A holistic analysis towards understanding consumer perceptions of virtual reality devices in the post-adoption phase, Behaviour & Information Technology, 41:7, 1453-1471, https://doi.org/10.1080/0144929X.2021.1876767.
7. Flavián, C., Ibáñez-Sánchez, S., Orús, C. (2021) Impacts of technological embodiment through virtual reality on potential guests' emotions and engagement, Journal of Hospitality Marketing & Management, 30:1, 1-20, https://doi.org/10.1080/19368623.2020.1770146.
8. Godovykh, M., Baker, C., Fyall, A. (2022) VR in Tourism: A New Call for Virtual Tourism Experience amid and after the COVID-19 Pandemic, Tourism and Hospitality, 3, 265–275, https://doi.org/10.3390/tourhosp3010018.
9. Hamad, A., Jia, B. (2022) How Virtual Reality Technology Has Changed Our Lives: An Overview of the Current and Potential Applications and Limitations, International Journal of Environmental Research and Public Health, 19, 11278. https://doi.org/10.3390/ijerph191811278.
10. Innocenti, A. (2017) Virtual reality experiments in economics, Journal of Behavioral and Experimental Economics, 69, 71-77, https://doi.org/10.1016/j.socec.2017.06.001.
11. Kassaye, W. (2007) Virtual Reality as Source of Advertising, Journal of Website Promotion, 2:3-4, 103-124, https://doi.org/10.1080/15533610802174979.
12. Kim, M.J., Lee, C.K., Jung, T. (2020) Exploring Consumer Behavior in Virtual Reality Tourism Using an Extended Stimulus-Organism-Response Model, Journal of Travel Research, 59(1), 69–89, https://doi.org/10.1177/0047287518818915.
13. Li, J., Lv, C. (2024) Exploring user acceptance of online virtual reality exhibition technologies: A case study of Liangzhu Museum, PLoS ONE, 19(8): e0308267. https://doi.org/10.1371/journal.pone.0308267.
14. Martí-Testón, A.; Muñoz, A.; Gracia, L.; Solanes, J.E. (2023) Using WebXR Metaverse Platforms to Create Touristic Services and Cultural Promotion, Applied Sciences, 13, 8544, https://doi.org/10.3390/app13148544.
15. Maziriri, E., Mashapa, M., Nyagadza, B., Mabuyana, B. (2023) As far as my eyes can see: Generation Y consumers' use of virtual reality glasses to determine tourist destinations, Cogent Business & Management, 10:3, 2246745, https://doi.org/10.1080/23311975.2023.2246745.
16. Nguyen, T.B.T., Le, T.B.N., Chau, N.T. (2023) How VR Technological Features Prompt Tourists' Visiting Intention: An Integrated Approach, Sustainability, 15, 4765, https://doi.org/10.3390/su15064765.
17. Oncioiu, I., Priescu, I. (2022) The Use of Virtual Reality in Tourism Destinations as a Tool to Develop Tourist Behavior Perspective,

Sustainability, 14, 4191, https://doi.org/10.3390/su14074191.
18. Pennington, R. (2001) Signs of Marketing in Virtual Reality, Journal of Interactive Advertising, 2:1, 33-43, 10.1080/15252019.2001.10722056.
19. Preece, C., Whittaker, L., Janes, S. (2022) Choose your own future: the sociotechnical imaginaries of virtual reality, Journal of Marketing Management, 38:15-16, 1777-1795, https://doi.org/10.1080/0267257X.2022.2112610.
20. Shehade, M., Stylianou-Lambert, T. (2020) Virtual Reality in Museums: Exploring the Experiences of Museum Professionals, Applied Sciences, 10(11):4031, https://doi.org/10.3390/app10114031.
21. Slater, M, Gonzalez-Liencres, C., Haggard, P., Vinkers, C., Gregory-Clarke, R., Jelley, S., Watson, Z., Breen, G., Schwarz, R., Steptoe, W., Szostak, D., Halan, S., Fox, D., Silver, J. (2020) The Ethics of Realism in Virtual and Augmented Reality, Frontier in Virtual Reality. 1:1, https://doi.org/10.3389/frvir.2020.00001.
22. Song, H., Kim, J., Nguyen, T., Lee, K.M., Park, N. (2021) Virtual reality advertising with brand experiences: the effects of media devices, virtual representation of the self, and self-presence, International Journal of Advertising, 40 (7): 1096–1114, https://doi.org/10.1080/02650487.2020.1834210.
23. Stecuła, K. (2022) Virtual Reality Applications Market Analysis-On the Example of Steam Digital Platform. Informatics, 9, 100, https://doi.org/10.3390/informatics9040100.
24. Subawa, N.S., Widhiasthini, N.W., Astawa, P., Dwiatmadja, C., Permatasari, N.P.I. (2021) The practices of virtual reality marketing in the tourism sector, a case study of Bali, Indonesia, Current Issues in Tourism, 24:23, 3284-3295, https://doi.org/10.1080/13683500.2020.1870940.
25. Tang, Y.M., Lau, Y.y., Ho, U.L. (2023) Empowering Digital Marketing with Interactive Virtual Reality (IVR) in Interior Design: Effects on Customer Satisfaction and Behaviour Intention, Journal of Theoretical and Applied Electronic Commerce Research, 18, 889–907, https://doi.org/10.3390/jtaer18020046.
26. Theodoropoulos, A., Antoniou, A. (2022) VR Games in Cultural Heritage: A Systematic Review of the Emerging Fields of Virtual Reality and Culture Games, Applied Sciences, 12(17):8476, https://doi.org/10.3390/app12178476.
27. Vrechopoulos, A., Apostolou, K., Koutsiouris, V. (2009) Virtual reality retailing on the web: emerging consumer behavioural patterns, The International Review of Retail, Distribution and Consumer Research, 19:5, 469-482, https://doi.org/10.1080/09593960903445194.
28. Vishwanath, G. (2023) Enhancing Engagement through Digital Cultural Heritage: A Case Study about Senior Citizens using a Virtual Reality Museum, in ACM International Conference on Interactive Media Experiences (IMX'23), June 12–15, 2023, Nantes, France. ACM, New York, NY, USA, https://doi.org/10.1145/3573381.3596154.
29. YiFei, L., Othman, M.K. (2024) Investigating the behavioural intentions of museum visitors towards VR: A systematic literature review, Computers in Human Behavior, Volume 155, 108167, https://doi.org/10.1016/j.chb.2024.108167.
30. Yuce, A., Arasli, H., Ozturen, A., Daskin, M. (2020) Feeling the Service Product Closer: Triggering Visit Intention via Virtual Reality, Sustainability, 12, 6632, https://doi.org/10.3390/su12166632.
31. Yung, R., Khoo-Lattimore, C., Prayag, G., Surovaya, E. (2021) Around the world in less than a day: virtual reality, destination image and perceived destination choice risk in family tourism, Tourism Recreation Research, 46(1), 3–18, https://doi.org/10.1080/02508281.2020.1788351.
32. Zeng, Y., Liu, L., Xu, R. (2022) The Effects of a Virtual Reality Tourism Experience on Tourist's Cultural Dissemination Behavior, Tourism and Hospitality, 3, 314–329, https://doi.org/10.3390/tourhosp3010021.
33. Zeng, J.Y., Xing, Y., Jin, C.H. (2023) The Impact of VR/AR-Based Consumers' Brand Experience on Consumer-Brand Relationships, Sustainability, 15, 7278, https://doi.org/10.3390/su15097278.
34. ***, The Louvre Museum, https://www.louvre.fr/visites-en-ligne#visites-virtuelles.
35. ***, The Oxford University Museum of Natural History, https://www.oum.ox.ac.uk/tour/tour.html.
36. ***, The British Museum, https://artsandculture.google.com/partner/the-british-museum.
37. ***, The Smithsonian National Museum of Natural History, https://naturalhistory.si.edu/about/virtual-tour.
38. ***, The Metropolitan Museum of Art, https://www.metmuseum.org/art/online-features/met-360-project.
39. ***, The National Museum of Romanian History, https://muzeulvirtual.ro/tur-virtual/.
40. ***, The National Museum of Art of Romania, https://mnar.ro/en/explore/397-virtual-tours.
41. ***, The "Grigore Antipa" National Museum of Natural History, http://www.imagofactory.ro/muzee/antipa/antipa.html.
42. ***, The National Museum of Romanian Literature, https://mnlr.ro/mnlr3.html.
43. ***, The "Dimitrie Leonida" Technical National Museum, http://www.imagofactory.ro/muzee/mntdl/mntdl.html.
44. ***, The National Museum of the Romanian Peasant, http://www.tur.muzeultaranuluiroman.ro.
45. ***, The "Dimitrie Gusti" National Museum of the Village, https://muzeul-satului.ro/descopera/tur-virtual/.
46. ***, The Cotroceni National Museum, https://www.muzeulcotroceni.ro/viziteaza/tur_virtual_expozitii.html.
47. ***, The Romanian Railway Museum, https://www.zona3d.ro/work/2017/Muzeul_Cailor_Ferate_Tur_Virtual_Stereo3D/zona3d_vr3dmcf/zona3d_mcf_turvrstereo3d.html.
48. ***, The National Museum of Romanian Aviation, https://my.matterport.com/show/?m=zag4CJyJfvr&brand.
49. ***, The "Ion Creangă" Memorial Museum, http://mmich.muzeu-neamt.ro/tur-virtual.html.
50. ***, The "Lucia Condrea" Museum of Painted Eggs, https://captur3d.io/view/artalucia/muzeuloualorluciacondrea.
51. ***, The County Art Museum "Baia Mare Artistic Center", https://www.muzartbm.ro/tur-virtual/.
52. ***, The Bicaz History Museum, http://mib.muzeu-neamt.ro/tur-virtual.html.
53. ***, The "Calistrat Hogaș" Memorial Museum, http://mmchpn.muzeu-neamt.ro/tur-virtual.html.
54. ***, The Ialomița County Museum, http://mjialomita.ro/panos/tvmji/tour.html.
55. ***, The "Victor Gorduza" Mineralogy County Museum, https://www.muzeuminbm.ro/tur.html.
56. ***, The Museum of Natural Sciences, http://msnpn.muzeu-neamt.ro/tur-virtual.html.
57. ***, The History Museum in Roman, http://mir.muzeu-neamt.ro/tur-virtual.html.
58. ***, The Art Museum in Roman, http://mar.muzeu-neamt.ro/tur-virtual.html.
59. ***, The Museum of Natural Sciences in Roman, http://msnr.muzeu-neamt.ro/tur-virtual.html.
60. ***, The "Ștefan cel Mare" County Museum, https://muzeu-vaslui.ro/index.php/sectii/tur-virtual.