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MİRAS TURİZMİNİ GELİŞTİRMEDE DİJİTAL TEKNOLOJİLERİN ROLÜ
THE ROLE OF DIGITAL TECHNOLOGIES IN ENHANCING HERITAGE TOURISM

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ÖZET

Miras turizmi, kültürel mirasın korunmasında ve yerel kalkınmanın desteklenmesinde önemli bir rol oynamaktadır. Dijital teknolojilerin evrimi ile birlikte, kültürel mirasın korunması ve turizmi açısından devrim yaratarak, miras alanlarının deneyimlenme ve küresel izleyicilerle paylaşılma biçimlerini yeniden şekillendirmiştir. Bu çalışma, miras turizmi sektörünü geliştirmede dijital teknolojilerin rolü üzerine bir literatür araştırması sunmaktadır. Literatür taraması, geleneksel belgeleme yöntemlerin zorluklarına ve eserlerin ayrıntıların kaydedilmesindeki kısıtlara dikkat çekmektedir. Buna yanıt olarak, üç boyutlu tarama ve fotogrametri gibi dijital teknikler, mimari yapıların ve eserlerin doğru ve ayrıntılı temsillerini oluşturmak için önemli ve pratik araçlar olarak kullanılmaya başlanmıştır. Bu teknolojiler, kültürel mirasın daha geniş bir kitleyle paylaşmanın güvenilir bir yolu olarak miras alanlarının uzaktan erişimine de olanak sağlamaktadır. Çalışmada ayrıca sanal gerçeklik (VR) ve artırılmış gerçeklik (AR) uygulamalarının miras turizmine olan etkisi vurgulanmaktadır. Bu tür dijital teknoloji uygulamaları, ziyaretçilerin tarihsel bağlamları ve geçmiş uygarlıkları sanal olarak keşfetmelerine olanak tanıyarak ilgi çekici bir deneyimi teşvik etmektedir. Ayrıca, dijital bilgilerin fiziksel ortamların üzerine eklemlenerek sunulması ziyaretçilerin miras alanlarını anlamlandırma deneyimlerini zenginleştirmektedir. Buna ek olarak, çalışma, mirasın yorumlanmasında etkileşimli multimedya sergilerinin ve hikâye anlatımlarının önemini göstermektedir. Bu sergiler, geleneksel müze teşhirlerini dijital teknolojilerle harmanlayarak kişiselleştirilmiş keşfe olanak tanır ve kültürel mirasla bağ kurulmasını destekler. Çevrimiçi platformlar, sanal turlar, çok dilli çeviriler ve dijital erişim girişimleri daha geniş kitlelere hitap ederek mirasın tanıtımının kapsamını genişletmektedir. Sonuç olarak, çalışma, dijital teknolojilerin miras turizmine entegrasyonunun, kültürel mirası koruma, sunma ve ilişki kurma konusunda aldığı önemli rolü vurgulamaktadır.

Anahtar kelimeler: Miras turizmi, sanal gerçeklik, artırılmış gerçeklik, dijital teknolojiler

ABSTRACT

Heritage tourism plays an important role in preserving cultural heritage and promoting local development. The advent of digital technologies has brought about a revolutionary transformation in the conservation and tourism of cultural heritage, redefining the way heritage sites are experienced and shared across global audiences. This study presents a literature survey on the role of digital technologies in developing the heritage tourism sector. The literature review highlights the difficulties of traditional documentation methods and the limitations in recording details of heritage artifacts. In response, digital techniques such as 3D scanning and photogrammetry emerged as essential and practical tools to create accurate and detailed representations of architectural structures and artifacts. These technologies enable remote access to heritage sites as a reliable way to share cultural heritage with a broader audience. In addition, the effect of virtual reality (VR) and augmented reality (AR) applications on heritage tourism is emphasized in the study. Such digital technology applications encourage an engaging experience by allowing visitors to explore historical contexts and past civilizations virtually. In addition, the

presentation of digital information on physical environments enriches the visitors' experience of making sense of heritage sites. Furthermore, the study demonstrates the importance of interactive multimedia exhibits and storytelling in interpreting heritage. These exhibitions blend traditional museum displays with digital technologies, enabling personalized exploration and enhancing bonding with cultural heritage. Online platforms, virtual tours, multilingual translations, and digital access initiatives play a significant role in appealing to diverse audiences, thus expanding the scope of heritage promotion. Overall, the study highlights the critical role that the integration of digital technologies into heritage tourism plays in preserving, presenting, and relating to cultural heritage.

Keywords: Heritage tourism, virtual reality, augmented reality, digital technologies

INTRODUCTION

Heritage tourism is a dynamic concept for preserving cultural heritage and driving local development (Yang & Wall, 2022). Heritage tourism nurtures cultural understanding from a historical perspective, arouses curiosity, and connects present generations with their past. However, the preservation and promotion of cultural heritage have long been confronted by challenges regarding traditional documentation methods, the limitations of recording intricate heritage artifacts, and the complexities of preserving and accessing physical records (Georgopoulos & Stathopoulou, 2017). In this context, the emergence of digital technologies has led to significant developments in how heritage sites are experienced and shared with a global audience for the conservation and tourism of cultural heritage.

This study focuses on the role of digital technologies in advancing heritage tourism. It delves into the transformative potential of cutting-edge technologies, such as 3D scanning, photogrammetry, virtual reality (VR), augmented reality (AR), interactive multimedia exhibits, and digital accessibility initiatives, in overcoming the longstanding challenges faced in the preservation and presentation of cultural heritage (Di Angelo et al., 2022). The study's purpose is to present examples of digital technologies as indispensable tools in the heritage tourism sector. The highly-used applications and their importance in the presentation of cultural heritage to different audiences around the world were investigated by emphasizing the impact of digital technologies. The study draws conclusions on the implications of digital technologies in advancing heritage tourism practices by a combination of literature review and presentation of examples.

The study's scope covers the benefits and applications of digital technologies in heritage tourism. The study demonstrated the contributions of 3D scanning and photogrammetry to the digitization of heritage sites with accurate and detailed representations of architectural structures and artifacts. Emphasis was placed on the immersive experiences offered by virtual reality, which allows visitors to explore distant heritage sites virtually. The importance of interactive multimedia exhibitions in establishing meaningful connections between visitors and cultural heritage is examined. Digital storytelling platforms were showcased for their ability to present historical narratives to enhance the overall visitor experience. Along with that, an emphasis on the role of digital accessibility initiatives in promoting inclusivity and cultural exchange is given in this study. Heritage promotion reaches diverse audiences, transcending geographical and language barriers by using online platforms, multilingual translations, and virtual tours. In conclusion, this research highlights the transformative role of digital technologies in enhancing heritage tourism.

RESEARCH AND FINDINGS

1. Digitalization of Cultural Heritage: 3D Scanning and Photogrammetry

1.A. 3D scanning technology and its applications:

3D scanning has emerged as a non-invasive robust method for capturing detailed representations of heritage artifacts and architectural structures. 3D scanners create digital replications by employing lasers or structured light by capturing the intricacies and dimensions of historical items with high precision and accuracy (Haleem et al., 2022). This technology has revolutionized heritage preservation, offering researchers and curators a means to study and document artifacts without subjecting them to physical handling, reducing potential risks of damage. 3D scanning also creates media for virtual exploration,

thus enabling global audiences to access and interact with cultural heritage remotely, which transcends geographical barriers for the dissemination of knowledge (Little et al., 2020).

The digital preservation of artifacts in the Herzegovina Trebinje Museum:

The Herzegovina Trebinje Museum implemented 3D scanning technology to preserve a collection of artifacts digitally. As the project was initiated in 2019, it utilized a 3D scanner for digitizing three-dimensional artifacts and specialized equipment for two-dimensional objects. According to Mijic et al., challenges arose in configuring the mobile 3D scanner (Zscan 700) due to its sensitivity to environmental conditions. After post-processing using Geomagic 12 software, the digitized collection was made accessible through the Museum's website, offering a virtual 360° view of the artifacts with detailed information. This initiative not only increased access to the Museum's collection but also protected valuable specimens and simplified the use of frequently requested materials. By embracing digital technologies, the Herzegovina Trebinje Museum exemplified how digitization can contribute to preserving cultural heritage and facilitating global access to its treasures (Mijić et al., 2021)

1.B. Photogrammetry in heritage preservation:

Photogrammetry, a technique based on image capturing and processing, plays a significant role in reconstructing 3D models from a series of overlapping photographs (Kingsland, 2020). Photogrammetry enables heritage sites and archaeological remains to be digitally documented with high-resolution 3D models that accurately represent the original structures. This method offers a cost-effective solution for capturing large-scale environments and intricate details with photographic accuracy (Themistocleous et al., 2015).

Use of photogrammetry Temple of Apollo in Gortyn:

The Temple of Apollo in Gortyn, Crete, is an important archaeological site holding historical significance as a religious structure (Bonetto et al., 2020). The site houses numerous ancient Greek inscriptions from the 7th century B.C., which constitute the oldest code of laws in the ancient world (Condorelli & Bonetto, 2022). Due to its significance, scholars used advanced digital technologies like photogrammetry to preserve and analyze the complex ruins, allowing for a comprehensive three-dimensional survey and providing detailed representations of the temple's structural and stratigraphic sections. By using a camera with a 35 mm lens for high-quality image acquisition, researchers could zoom in on every detail and obtain precise, high-resolution models of the elements, such as columns, capitals, and entablatures, both in situ and collapsed (Salvalaggio et al., 2021). The 3D model facilitated the study of the site's evolution over time and also offered virtual interactions into its functions and historical significance for the visitors.

2. Virtual Reality and Augmented Reality Applications in Heritage Tourism

2.A. Impact of virtual reality on the heritage tourism experience:

The widespread use of virtual reality has changed the way people interact with historical sites, providing them with interactive experiences that go beyond the limitations of time and space. Tourists can experience virtual tours with VR technology, which allow them to explore remote heritage sites as if they were physically present (Dawson et al., 2018). VR experiences are enriched by contextual information, audio guides, and visual storytelling, which provide visitors with a relation to each site's history (Shehade & Stylianou-Lambert, 2020).

Virtual tour of Pompeii's Porta Nocera necropolis using VR technology:

The Porta Nocera necropolis is an important heritage site with its funerary monuments and burials located in the extraordinary archaeological site of Pompeii. The Laboratory of Immersive and Multimedia Archaeology (LAIM) at IBAM-CNR Catania developed a digital model of the necropolis to facilitate the preservation and restoration efforts (Malfitana et al., 2018). LAIM created a virtual tour that faithfully reproduces the current state of the necropolis with unparalleled detail and scale by using advanced instruments like laser scanning and drone-captured ortho-photogrammetry. Unlike traditional virtual tours, this immersive experience allows users to explore the site in 360°, which provides a realistic representation of the site's present state. LAIM's creation serves as an invaluable tool for study, documentation, and research within the Pompeii Sustainable Preservation Project (Malfitana et al.,

2018). Available as a web resource, the immersive gallery revolutionizes the traditional concept of virtual tours and offers a new dimension to the exploration of historical-archaeological contexts by enabling users to access valuable scientific content and navigate the digital model in real-time.

2.B. Enhancing visitor engagement through augmented reality:

Augmented reality enriches the physical world with digital overlays, which provide a richer experience for heritage interpretation and encourage the visitors' participation. Augmented reality enhances the physical world with digital overlays, providing a richer experience for interpreting heritage and actively encouraging visitors to participate (Damala & Stojanovic, 2012). AR applications allow visitors to access digital information such as historical images, videos, or interactive guides by simply scanning a QR code with mobile devices on locations. This interactive and dynamic approach creates a deeper connection with heritage sites and contributes to improving the visitor experience (Jevremovic & Petrovski, 2012).

AR-guided tours and interactive exhibits for Hwaseong Fortress:

As examples of AR-guided tours and interactive exhibits for enriched heritage interpretation, Koo et al. conducted a study focused on developing and evaluating an AR-powered phone application to guide the visitors at Hwaseong Castle in Suwon, - an inscribed World Heritage Site (Koo et al., 2019). he mobile app offers a comprehensive set of features that contain navigation to specific points, visual information, and interactive learning activities through AR-based games. These AR-powered elements significantly improve user experiences by providing an engaging understanding of the heritage site's historical and cultural aspects. The application's evaluation received positive responses from users, emphasizing the impact of AR in making heritage interpretation more enjoyable, interactive, and accessible (Koo et al., 2019). Combining user requirements, usability, and innovative AR visualization methods in their research highlights the place of AR in the technology-driven heritage interpretation field, where the potential of AR to enrich user experiences and develop deeper connections with cultural heritage sites is unrivaled.

3. Interactive Multimedia Exhibits and Storytelling

3.A. Importance of interactive exhibits in heritage interpretation:

Interactive multimedia exhibits are crucial for visitors to construct meaningful connections with cultural heritages (Dubois et al., 2011). Integrating conventional museum exhibits with digital technologies aims to empower visitors to engage with historical artifacts and stories for better understanding actively. The exhibits integrate conventional museum exhibits with digital technologies to enable visitors to discover and understand historical artifacts and stories actively. The interactive nature of these exhibits enhances the visitor's overall experience that fosters a sense of discovery and connection with the past (Karayılanoğlu & Arabacıoğlu, 2020).

Examples of interactive multimedia installations enhancing visitor experiences:

The Chicago Museum of Science and Industry exemplifies the effective use of interactive multimedia installations to enhance visitor experiences. Notably, the Science Storms exhibition immerses visitors in educational experiences exploring natural phenomena like tornados and tsunamis(Lord & Piacente, 2014). An exceptional interactive interface allows real-time manipulation of a genuine flame, empowering the public to control variables and understand scientific principles (MSI, 2023a).

The museum currently features two captivating live exhibitions. The Blue Paradox exhibition offers an immersive journey into the impact of plastic pollution on the planet's largest ecosystem, promoting awareness and action (MSI, 2023c). In addition, the Pompeii: The Exhibition utilizes immersive multimedia to transport visitors back in time to the Roman city of Pompeii, offering holographic gladiator displays and a 4D eruption simulation of Mount Vesuvius (MSI, 2023b).

These exhibitions showcase how AR and immersive technologies captivate visitors, foster enriched learning, and evoke wonder and connection with historical and environmental themes (Vaz et al., 2018). The Chicago Museum of Science and Industry continues to inspire and engage its audience through memorable and educational encounters, encouraging awareness and action on critical global issues.

3.B. Leveraging digital technologies for immersive storytelling:

Digital storytelling platforms provide unique opportunities to present historical narratives and cultural significance in captivating and accessible ways. These platforms create emotionally engaging experiences, fostering a deeper connection between visitors and the stories of the past by combining audio, visuals, and interactive elements (Rizvic et al., 2019).

The interactive storytelling for visitor's experience: 1001 Stories of the Ancient Agora:

Engaging visitors through emotive storytelling experiences can significantly impact their understanding and connection with cultural heritage. Roussou et al.'s (2017) pilot study, "1001 Stories of the Ancient Agora," exemplifies this approach at the archaeological site in Athens (Roussou et al., 2017). The prototype featured two emotionally resonant stories: one about a discovered grave and the other showcasing a post-Herulian wall. It revealed the power of storytelling to evoke strong connections with historical content and the potential of augmented reality to create immersive experiences. This example application shows how cultural institutions can enrich visitor engagement through interactive and emotive narratives. Embracing these technologies fosters curiosity, empathy, and a deeper appreciation of historical contexts.

4. Digital Accessibility and Inclusivity Initiatives

Utilizing digital platforms is essential for promoting heritage sites and reaching a global audience. Online platforms, including websites, social media, and virtual exhibitions, offer comprehensive and easily accessible information, encouraging visitors to explore cultural treasures from the comfort of their homes (Liang et al., 2021).

Online heritage promotion initiative of UNESCO and Google Arts & Culture:

As a prominent example of online heritage promotion initiatives, the collaboration between UNESCO and Google Arts & Culture stands out for its efforts to make world heritage sites accessible to a global audience (Google Arts & Culture, 2023; UNESCO, 2023). Since 2012, Google has been working closely with UNESCO's World Heritage Centre to promote the Outstanding Universal Value of World Heritage sites through the Google World Wonders Project. This project allows people to explore the cultural and natural treasures virtually with a 360° immersive experience as they indulge in the comfort of their homes. By utilizing 3D collections, virtual tours, and storytelling, the platform offers an interactive and convenient way for users to engage with more than 39 collections of world heritage sites. The platform offers users the opportunity to explore various corners of these sites with interactive 360° panoramic views. Google not only promotes awareness about the need for safeguarding and conserving world heritage but also offers a means for individuals across the globe to connect with these remarkable places through this project (Jin & Liu, 2022).

CONCLUSION

This study focuses on the transformative impact of digital technologies on heritage tourism and reveals their essential role in overcoming traditional challenges related to cultural preservation and presentation. The integration of digital technologies, including 3D scanning, photogrammetry, virtual reality (VR), augmented reality (AR), interactive multimedia exhibits, and digital accessibility initiatives, has revolutionized the way we experience and engage with cultural heritage. The digitalization of heritage sites through 3D scanning and photogrammetry has opened up new avenues for accurate documentation and preservation of delicate artifacts and architectural structures. These technologies ensure the physical integrity of the artifacts and enable global audiences to explore heritage sites remotely by increasing accessibility.

The use of virtual reality positively contributed to how people experience heritage tourism. VR experiences offer visitors interactive virtual tours of historically significant locations and provide contextual information transfer that deepens their understanding of cultural heritage. This results in a stronger connection with the past. Similarly, augmented reality has also transformed heritage interpretation. Added digital overlays to the reality bring historical sites to life, thereby increasing visitor engagement. AR guided tours and interactive exhibits enrich the overall visitor experience, providing dynamic encounters with cultural heritage.

Interactive multimedia exhibits have proven to be valuable tools in bridging the gap between visitors and cultural artifacts. These exhibits foster active exploration and meaningful connections with the past, encouraging a deeper appreciation of cultural heritage by combining traditional museum displays with digital technologies. Digital storytelling platforms have emerged as powerful mediums for presenting historical narratives and cultural significance. Through emotionally engaging experiences, visitors develop a deeper connection with the stories of the past, creating lasting impressions. Digital accessibility initiatives such as online platforms and multilingual translations have broadened the scope of promoting cultural heritage by making it more inclusive and accessible.

In conclusion, responsible integration and collaboration between experts are crucial to benefit the great potential of digital technologies in heritage tourism. The impact of digital technology on cultural heritage should be recognized and mitigated while using them innovatively and sustainably. In doing so, the visitor experience of cultural heritage tourism can be enhanced and transferred to future generations. This harmonious synergy between the past and future is essential to ensure that these treasures continue to benefit humanity.

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