

Received Date: 21 April 2026**Accepted Date: 12 May 2026****Published Date: 1 June 2026**

Museum Digitalization and Territorial Development: A Conceptual Framework for Structural Equation Modeling in the Moroccan Context

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Abstract

The digital transformation that most museums are currently undergoing has changed how cultural heritage is managed, how users are engaged, and how spaces are developed and integrated (engaged) in the world today. Whereas many studies have focused on the digital transformation of museums individually, on user engagement and behavior, on the capability of organizations, and on the attractiveness of the territories, not many studies have focused on the integration of these frameworks, especially in the developing countries like Morocco. To close this gap, we present the first digital transformation of a museum management framework, integrating the capability of a museum organization, perceived barriers, user experience, user satisfaction, engagement, intention, and the attractiveness of a territory and its development. The framework is constructed on recent digital heritage research and multiple theories, including the Technology Acceptance Model, Resource Based View, Dynamic Capabilities, the Experience Economy, the Theory of Planned Behavior, Territorial Attractiveness, and Smart Tourism. Based on the framework, twelve research hypotheses are proposed. The framework and the museum digital transformation framework will be further refined based on the users of the Mohammed VI Museum of Modern and

Contemporary Art in Rabat and the Mohammed VI Museum for the Civilization of Water in Marrakech. By integrating a cross-section of the technological, organizational, behavioral, and spatial dimensions, the study on museum management adds to the body of knowledge on the management of digital heritage in Morocco and offers recommendations for policy formulation, especially in sustainable spatial development.

Keywords: Museum Digitalization; Digital Heritage; Visitor Experience; Structural Equation Modeling; Territorial Development; Morocco.

1. Introduction

Digital transformation represents a major challenge and opportunity for twenty-first century museums. As cultural institutions develop and implement more sophisticated digital technologies, museums are re-evaluating their core functions: preserving cultural legacies, educating, and engaging the public. Digital technologies, including artificial intelligence (AI), virtual (VR) and augmented (AR) realities, immersive exhibitions, digital twins, and application software, are providing visitors the ability to enjoy personalized experiences and greater accessibility to cultural heritage, transforming museums into smart cultural environments (Bellio et al., 2022; Yang et al., 2025).

Recent trends in digital heritage have shown that the digitalization of museums goes far beyond the mere creation of digital collections. Rather, it represents a holistic transformation of the organization: its governance, digital and innovative mediation, visitor engagement, and institutional sustainability (Verhoef et al., 2021; Kraus et al., 2022). Modern museums employ more and more intelligent technologies to improve interpretation and accessibility, promote co-creation, and foster deeper emotional and educational engagement (Nespeca & Capodaglio, 2026). For this reason, digital transformation is now perceived as a vital strategic element for museums to preserve cultural heritage and compete on an international level.

In addition to enhancing services for museum patrons, digital transformation plays an important role in the advancement of a region. Innovative digital services in cultural institutions stimulate local heritage and contribute to the creative economy and cultural tourism. This, in turn, increases regional competitiveness and attractiveness (Richards, 2018; Yang et al., 2025). Recent data indicates that digital heritage drives the economy, as well as social and cultural spheres, by connecting museums and other institutions with visitors, local communities, and tourism actors. This promotes sustainable development for the region in question (Ez-zahrany et al., 2024; Fouinna & El Ouazzani, 2025).

Although there are numerous advances in the fields described above, the success of museum digital transformation hinges on more than technology. Institutional readiness and the potential for change are also important. Quite simply, good leadership and a strong, innovative culture combined with adequate funding and the willingness to learn are critical success factors. The primary, persistent barriers are insufficient funding, low IT skills, and resistance to change (Bellio et al., 2022; Nikolaou, 2024). The various organizational dimensions will ultimately define how digital technologies will impact the visitor experience and the level of cultural engagement.

Recent developments in the Moroccan museum sector have facilitated the rapid implementation of digital technologies. Funded by the National Foundation of Museums (Fondation Nationale des Musées), a number of museums have created virtual exhibits; developed multimedia systems; made online collections available; and created digital means of communication, with the goal of improving access to cultural heritage. Contemporary studies show that these technologies have increased the visibility of Moroccan museums, complemented the promotion of cultural tourism, and aided in the preservation of Moroccan heritage (Nabil & Moutaoukil, 2024). In addition, the use of digital technology as a tool has

advanced the cultural diplomacy of Morocco and provided an avenue to improve the international visibility of Moroccan heritage (Fouinna & El Ouazzani, 2025).

Existing literature on this topic remains disjointed. Studies exploring the digital transformation of museums, visitor experiences, and territorial development lack a holistic approach. In the Moroccan context, the rapid digital transformation of the museum sector remains largely undocumented and unsubstantiated (Nabil & Moutaoukil, 2024; Ez-zahrany et al., 2024).

This study will introduce the first of its kind integrated conceptual framework that describes the impact of museum digitalization on the visitor experience, satisfaction, and engagement, as well as a potential shift in behavioral intentions towards an improvement in territorial attractiveness and the commitment to promote ongoing development of the area. This framework acknowledges the influence of the available resources and the perceived constraints that exist within the organization. It addresses the integration of the technological, organizational, behavioral, and territorial dimensions of the digital transformation of museums.

The model under consideration relies on the Technology Acceptance Model (Davis, 1989), Resource-Based View (Barney, 1991), Dynamic Capabilities Theory (Teece et al., 1997), Experience Economy Theory (Pine & Gilmore, 1999), Theory of Planned Behavior (Ajzen, 1991), Territorial Attractiveness Theory, and the Smart Tourism Theory (Boes et al., 2016). Along these lines, a total of twelve research hypotheses are formulated and will be evaluated by means of Structural Equation Modeling (SEM).

The proposed model will be empirically validated through a quantitative, explanatory methodology that will analyze data collected via surveys administered to the guests of the Mohammed VI Museum of Modern and Contemporary Art in Rabat, as well as the Mohammed VI Museum of the Civilization of Water in Marrakech. By consolidating behavioral and territorial theories and incorporating the museum digitalization framework, this research expands the existing scholarship on digital legacy and offers contemporary, applicable strategies to museum directors and policymaking professionals focused on enhancing cultural innovation and sustainable territorial advances in the Moroccan context.

2. Literature Review

2.1. Museum Digital Transformation: From Digitization to Intelligent Museums

Digital transformation is a strategic consideration that restructures how museums sustain, interpret, and communicate their collections. In the last few decades, initiatives targeting the digitization of museum collections and the development of online collection access initiatives emerged. Museums today integrate technologies to extend beyond the digitization of museum collections and repositories to a systemic transformation of the organization opening new avenues for managing museum operations and enriching the services of museums to the communities they serve.

The integration of recent technologies, such as AI, cloud computing, VR, MR, AR, digital twins, and IoT, have enabled museums to provide even more diverse, interactive, personalized, and inclusive experiences. Digital technologies support richer collection interpretations that are more accessible to wider audiences and allow real time interaction. Behind the scenes, technology supports the collection of valuable behavioral data that facilitate the development of services tailored to the needs of museum visitors. As a result, digital transformation impacts the design and management of exhibitions, educational programs and services, collections, institutional communications, and governance.

Digital transformation goes beyond just technology. It refers to a strategic orientation of the organization that relies on leadership, digital skills, and an innovative and flexible organizational culture. The seamless integration of technology and organizational transformation positions museums to satisfy, engage, and extend their reach and impact to sustain their operations.

Lastly, digital transformation embeds an integration of the physical and digital spaces of a museum making them smart cultural ecosystems. Digital technology creates hybrid and omnichannel experiences where visitors can interact with (and experience) a museum in many different ways and at many different places, including (but not limited to) onsite and online exhibitions, mobile apps, social media, and various forms of digital storytelling. With this kind of technology, museums can keep in touch with visitors before, during and after their on-site visits and continues their educational mission and cultural outreach beyond the confines of geography.

Digital technology in museums, while continuing to offer unique opportunities, has been fragmented. Current systematic reviews indicate that the study of Digital Technology in museums is highly fragmented, focusing on one or several Digital Technologies without integrating models that would offer holistic and comprehensive views on how Digital Technology impacts different domains, including Organizational Technology, Visitor Experience, Territorial Development, and so on. This clearly shows that more integrated models are needed that include a multitude of domains and can be analyzed from different perspectives such as Technology, Organization, Behavior, and Territorial.

2.2. Museum Digitalization in the Moroccan Context

In the last decade, the Digital Technology in Moroccan museums has rapidly expanded, modernizing and showcasing Morocco's significant and diverse history. With leadership of the National Foundation of Museums (Fondation Nationale des Musées), many museums have adopted new Digital Technologies to create and offer onsite interactivity, online exhibitions, multimedia devices, online collections, and new digital outreach efforts to engage and enhance the visitor experience. These efforts signal that Morocco places significant focus on Digital Technology to preserve its heritage while maximizing the potential of cultural institutions in the fields of cultural tourism and sustainable development to enhance the visitor experience.

The COVID-19 pandemic was the first major reason for the rapid cultural and technological advancement in Morocco's cultural institutions and museums. For example, to keep the public interested during lockdowns, Moroccan museums started to use (and in many cases, started for the first time) virtual exhibitions, online educational activities, and digital communication and cultural mediation channels. Recent Moroccan studies show the undertaking of these activities by the museums increased the museums' visibility and access and highlighted the importance of the use of digital technologies to offer cultural services. The adoption of digital technologies reveals the varying degrees of digital maturity of museums, which can be attributed to differences in technological infrastructure, financial resources, institutional preparedness and digital skills.

Modernization of Moroccan museums through the use of digital technologies, according to recent Moroccan studies, offers an opportunity to promote Moroccan cultural heritage on both local and global levels. The use of digital technologies to create virtual and numerous Moroccan museums and interactive cultural interpretation systems increases the accessibility and the scope of Moroccan cultural heritage and

helps preserve Morocco's cultural heritage, both tangible and intangible. The use of digital technologies promotes innovative management techniques in museums and cultural mediation.

The digitalization of museums, in the opinion of many researchers, has the potential to promote a region's cultural heritage and contribute to cultural diplomacy. The use of digital technologies in museums increases Morocco's regional and international visibility and promotes its cultural heritage, therefore creating opportunities for the regional creative industry and other economic activities. Recent studies indicate that in order to achieve these goals, more control, increased digital infrastructure, improved digital skills and technical training, and more collaboration between cultural institutions is essential.

Although Moroccan literature notes some significant steps towards the digitalization of museums, most studies remain largely descriptive and focus on particular projects or technological solutions. Rarely, if ever, do studies include integrated theoretical frameworks that can encompass the digital transformation of museums, the internal and external organizational capabilities, and the behavior of museum visitors as well as the spatial development of the museum. This clearly demonstrates the need for the development of an appropriate comprehensive conceptual framework for museums in the Moroccan context.

2.3. Organizational Capabilities for Museum Digital Transformation

Organizational capabilities are vital to the success of any digital transformation in museums. Although technology offers the tools for digital advancement, the impact of technology on a museum is dependent on the mobilization of the museum's staff, management, and financial, intellectual, and creative resources. As a result, many view contemporary digital transformation as more an organizational issue rather than a technological one.

The role of digital leadership is crucial in directing and managing change. Museum directors have to balance multiple roles including the championing of innovation, enabling organizational learning, fostering collaboration, and dealing with opposition to change in the workforce. Organizations that are endowed with strong digital leadership and a flexible organizational culture have a better chance of successfully applying digital strategies and using emerging technologies in their everyday work.

Organizational learning and the skills of the workforce are also critical determinants of success. The application of artificial intelligence, immersive technologies, digital collections, and smart visitor services brings with it the need for ongoing staff development and the collaboration of different disciplines within the museum, IT, education, and the heritage field. The absence of suitable capabilities can render even the most advanced digital technologies ineffective in enhancing the visitor experience or improving institutional performance.

Ultimately, organizational capabilities are key strategic resources for museums to successfully navigate the challenges of digital transformation within a competitive environment, and to foster, resilient, and sustainable public value.

2.4. Perceived Constraints to Museum Digitalization

The opportunities presented by digital transformation draw attention to aspects of current museum operations that, if addressed, may lead to a more successful implementation of transformation. Barriers to museum digitalization identified in recent literature include financial constraints, an insufficient level of digital competence, technological complexity, resistance to change, cyber security threats, and poor interoperability of digital systems.

Among the many constraints faced by museums on a small budget, the need to innovate and modernize museum digital offerings and services places an even greater economic burden. Investment in new technologies such as virtual reality, artificial intelligence, and interactive displays, as well as digital infrastructure, requires significant financial resources over an extended period. Furthermore, rapid changes in technology create the potential for obsolescence that introduces an even greater economic risk. The latest technologies require frequent financial investments to remain current.

Organizational barriers present additional challenges. Changes in the workplace can create uncertainty. Many museum professionals possess limited knowledge in new technologies and are challenged to preserve cultural artifacts. Additionally, there are competing priorities and complexities of management that must be resolved, including the integration of existing innovative technologies and the telerebotics of future technologies.

In less economically developed countries there is even more limited access to digital technologies, fewer highly skilled workers, and even greater financial constraints to the digital economy. Given the circumstances, barriers are best

understood by viewing the broader picture of transformation and the challenges of digital innovation as they apply to varying conditions characterized by different types of institutions.

2.5. Visitor Experience in Digital Museums

The visitor experience is now a key theme in modern museum studies. Beyond assessing museums based on the quality of their collections, newer studies focus on the need to understand visitors' interactions with digital settings to construct knowledge, process feelings, and form relationships with cultural heritage. Digital technologies have changed the role of the museum visitor from a passive spectator to an active participant with interactive, engaging, and tailored exhibits.

Virtual and augmented realities, interactive screens, apps, digital narrative tools, and AI impact the cognitive, emotional, educational, and social aspects of a museum visit. These tools and technologies transform cultural heritage interpretation by advanced accessibility and by providing a greater degree of tailoring and involvement for visitors. There is a growing body of studies that suggest that immersive digital experiences enhance visitor satisfaction, and drastically improve the perceived educational and emotional aspects of the visit and the intent to return.

In addition, digital technologies now allow museums to engage visitors outside of the physical visit. Social media and other digital platforms provide opportunities for museums to interact with visitors before they arrive, while they are physically present, and after they have left, creating what some recent authors refer to as omni-visit experiences. This has a positive impact on visitor engagement and cultural participation as well as on the operational power of museums.

Visitor experience is now seen as the main driver of behavior change in response to the territorial impact of museums' digital offerings. An improved digital experience augments visitor satisfaction and stimulates cultural involvement and positive behavioral intentions while increasing the attractiveness of a destination and contributing to sustainable territorial development. Because of these rationale and indicators, Digital Experience is placed at the core of the conceptual framework formulated for this research.

2.6. Visitor Satisfaction

Visitor satisfaction is a key outcome of a museum's digital transformation. It indicates how well the museum exceeded visitor expectations in the quality, accessibility, and interpretive elements of the exhibition and digital services,

and the enjoyment of their overall experience. In the context of modern-day museum management, satisfaction is more than a measure of service quality; it is also an indicator of satisfaction-driven loyalty, word-of-mouth referrals, intentions to revisit, and the overall success of the museum.

From the visitor's perspective, enhancement of interactivity, personalization, accessibility, and didactic value through digital technologies significantly boosts satisfaction. Mobile technologies, immersive systems, augmented and virtual reality, and digital installations empower visitors to interact with collections and personalize their museum experience in a meaningful way. Such technologies have the potential to strengthen cognitive engagement and emotional participation, and increase the value visitors ascribe to the experience (Ceccarelli et al, 2024; Li et al, 2024; Xu et al, 2024).

Simply incorporating digital technology does not guarantee visitor satisfaction. Visitor satisfaction is contingent upon the digital technology's usability, authenticity, content quality, relevance, and how well it integrates into the broader context of the museum. Interactive technologies that invite visitor participation, but create barriers to experiencing the museum, or diminish the perceived authenticity of the museum, may also diminish the overall experience. It is therefore essential for museum practitioners to balance the use of technology with the educational and cultural mission of the museum, and the emotional experience of the visitor (Berta et al, 2025; Lu et al, 2023).

Visitor satisfaction mediates the relationship between the quality of experience and behavior after the visit. The more immersive, meaningful and enjoyable a museum experience is, the more likely it is for visitors to hold a positive view of the museum, recommend it, post about it, and return in the future. Satisfaction has the potential to carry the impact of museum digitalization on a range of behavioral and spatial impacts (Gao et al., 2024; Lu et al, 2023).

In the model presented, the influence of digitalization and visitor experience on behavioral intention is through visitor satisfaction as a key mediating variable.

2.7. Cultural Engagement

Cultural engagement can be described as the interaction between visitors and cultural heritage through the development of cognitive, emotional, social and behavioral involvement. It is more than just the passive viewing of a museum's collections. It is the desire to comprehend, value, verbalize, and take part in cultural expressions.

Research indicates that the use of new technologies has the potential to increase cultural engagement through the development of heritage interpretations that are interactive, easy to access, and relevant to the individual. The use of AR, VR, and other multimedia and digital tools allow visitors to shape their own definitions of museum content and to engage with cultural heritage in novel, diverse, and personal ways (Kheiri et al, 2023; Li et al, 2024).

The digital outreach of a museum need not stop when a visitor leaves the museum grounds. The ability to use social media, access virtual exhibits, and view online collections and engage with digital communities means that museums can keep their visitors involved with them and their cultural materials and discussions before and after the onsite visit. With digital outreach, museums can transform onsite participation into an ongoing relationship with their patrons (Palumbo et al., 2023).

Cultural engagement can promote the long-term support of preservation efforts and stimulate positive word-of-mouth promotion. As a result, it can increase the appreciation of cultural heritage and future involvement in cultural activities. This engagement serves as a description of the connection between the short-term visitor engagement and the long-term effects.

Digital cultural mediation in Morocco may increase access to the national heritage and preserve the cultural identity of the visitors. It can enhance the participation of the Moroccans in culture, improve the representation of the heritage, and increase the visibility of the Moroccan cultural heritage internationally (Ez-zahrany et al., 2024; Fouinna & El Ouazzani, 2025; Nabil & Moutaoukil, 2024).

The model that has been developed indicates that cultural engagement is the primary influencer of the visitor experience and the subsequent behavioral intention.

2.8. Behavioral Intention

Behavioral intention encompasses the desire to return to a museum, recommend a museum to others, share the experience on social media, and participate in other cultural activities and museum visits. It is a strong indicator of future actions, and is used to analyze the potential impact of the satisfaction and experience a visitor has.

Recent museum studies indicate the value of immersive and digitally enhanced experiences in affecting behavioral intention through an increase in perceived value, pleasure, engagement, and satisfaction. Visitors are more likely to have a favorable attitude toward the museum and a greater intention to recommend and revisit the museum if they view digital

systems as valuable, aesthetically pleasing, interactive, and real (Li Yifei et al., 2024; Lu et al., 2023).

Digital media enhance the intention to recommend and revisit by creating a post-visit relationship between the museum and the visitor. Online reviews, social media, virtual communities, and user-created content motivate visitors to share a museum experience with their social networks. Electronic word-of-mouth can improve an institution's visibility and motivate potential visitors to experience the museum.

Interactivity, perceived value, visual appeal, and authenticity have a significant impact on the intention to recommend in the context of digital museums. This suggests that the impact of technology on users' behavioral intention is more about the digital experience that is offered to users (Chen et al., 2026).

Behavioral intention is the link that connects individual visitor perceptions and collective outcomes. Increased museum attendance, improved destination image, and the promotion of cultural tourism are the results of the intention to recommend, revisit, and share digitally. In the current conceptual model, the intention to engage and the satisfaction of cultural engagement are expected to impact the cultural, social, and economic development of the region.

2.9. Territorial Attractiveness

Territorial attractiveness encompasses how a city or region draws visitors, cultural events, investment, talent, and opportunities across its resources, identity, infrastructure, and institutional environment. Museums enhance attractiveness through the destination's image, cultural heritage, tourism market, and identity of the place.

The digital age advances this attractiveness as museums expand the content of their resources. Virtual tours, online documents, interactive interfaces, digital narratives, and participatory exhibits, help cultural institutions access audiences that are not immediately accessible. These can shape the perceptions of potential visitors about a destination prior to an actual visit and can assist in their decision to include museums in their itinerary (Clini et al., 2024; Li et al., 2024).

Digitally enhanced museums are potential players in smart tourism ecosystems where cultural institutions, tourism services, and digital resources co-create and share value to visitors. This is an extension of their contribution towards territorial attractiveness beyond museum attendance, to include destination identity, cultural balance, global reach, and new tourism experiences.

Contemporary studies have shown that the extension of online and digital services has the potential to strengthen the attractiveness of an organization, in this case, a museum, by enabling them to stay in contact and enhance their visibility (Palumbo et al., 2023). In the same vein, immersive and AI-based technologies have the potential to redefine heritage tourism and enhance destination competition (Sánchez-Martín et al., 2025).

Cultural heritage is an important asset for regional appeal in Morocco. The case of Fez illustrates the interdependence of heritage preservation, tourism, urban renewal, and the competitiveness of a travel destination. This also demonstrates that economic value, social equity, and cultural preservation are not in conflict (Boussaa, 2024). The Moroccan studies indicate that preserving cultural heritage with digital tools allows for greater visibility of cultural destinations both within and outside of Morocco (Ez-zahrany et al., 2024; Fouinna & El Ouazzani, 2025).

In this context, regional appeal is understood as a potential consequence of the digitization of museums and as a potential precursor of regional development.

2.10. Territorial Development

Regional development encompasses transformations of the economy, society, and environment at the level of an administrative or geographic region. In this context, it encompasses the contribution of digitally enhanced museums to the development of cultural and economic activities, as well as the employment of creative talent, the sustainable appreciation of culture, and the enhancement of accessibility and identity at the local level.

Museums foster regional development by attracting visitors and business spending, supporting cultural enterprises, enhancing community identity, and creating partnerships among regional government and public service agencies, cultural and tourism enterprises, and the community. The value of museums extends beyond the direct economic benefit. Museums create social value in the form of educational and cultural opportunities.

Digital transformation has a potential positive impact on audience reach, access to heritage, promotion of destinations, and even integration of museums in the heritage and culture tourism ecosystems. Digital heritage and virtual museums offer an even greater opportunity, if adequately funded and supported, to preserve heritage that is located in multiple places, support its dissemination, and contribute to advanced

networks of cultural development. (Clini et al. 2024, Sandriester et al. 2025)

The digitalization of culture offers uneven and unpredictable benefits to territories. To benefit from digital technologies, a balance of several factors is necessary, such as social and digital infrastructures and community participation. This is especially true in the context of culture. Without positive alignment and balance, museums and other cultural institutions may carry out digital projects that are, at best, irrelevant to the social context and of unequal social and territorial benefit.

Morocco is particularly focused on this balance. Since the heightened interest in the conservation of heritage and cultural tourism, the case in Fez exemplifies the tensions that heritage-based tourism may incur within urban and regional development (Boussaa 2024). The Moroccan Economic, Social, and Environmental Council reflects the need to integrate the multiple goals of heritage conservation, accessibility, and territorial valuation and sustainable development (Economic, Social and Environmental Council 2023).

Studies recently conducted in Morocco demonstrate that, while there exists potential for digital heritage to improve tourism competitiveness, strengthen cultural diplomacy, offer better public access, and promote national heritage internationally, there are several gaps that still need addressing, including, better coordination, the establishment of effective governance, and funding as well as better digital skills (Ez-zahrany et al., 2024; Fouinna & El Ouazzani, 2025; Nabil & Moutaoukil, 2024).

In the case of the proposed conceptual model, the primary focus will be on the ultimate goal of Territorial Development. This will be the direct or indirect result of the digitalization of museums, and will be measured through the Visitor Experience, Visitor Satisfaction, the Engagement of the Visitor with Culture, the Intention to Act and the Attractiveness of the Territory.

3. Conceptual Research Model

The development of a conceptual model is one of the essential first steps in any research project, as it enables the theoretical foundations to be translated into a form that can be empirically tested. Its purpose is to codify the relationships between the various elements that make up the answer to the research question, and to summarise the findings of existing research on the subject. With regard to this research, the conceptual model is based on an analysis of the main theories cited,

namely the Technology Acceptance Model (TAM), the Diffusion of Innovations Theory, the Resource-Based View (RBV), the Experience Economy Theory, the Theory of Planned Behaviour, the Territorial Attractiveness Theory and the Smart Tourism Theory. The combination of these approaches enables the construction of an explanatory model which, in the context of Moroccan museums, encompasses the dimensions of the research from the perspectives of both behaviour and actions, as well as technology, organisation and the scope of the research regarding its impact.

The proposed model assumes that the digitalisation of museums is the main factor which, directly or indirectly, could alter visitors' perceptions and/or behaviours. However, the impact of museum digitalisation on visitors' perceptions and behaviours is flexible and depends on the limitations affecting the potential of digital systems. The impacts of the explanatory factors are then transmitted via several mediating factors – namely visitor experience and satisfaction, as well as cultural engagement – and result in behavioural and territorial impacts that manifest themselves through visitor behaviour, the attractiveness of the area and its development. This framework enables us to understand the process of museum digitalisation as a participatory innovation which, within a given region, gradually spreads to users and partners.

The conceptual model proposed here forms the scientific basis of this study. It will be used to formulate hypotheses, design the survey questionnaire, and carry out empirical validation using Structural Equation Modelling (SEM).

3.1. Theoretical justification of the model

This conceptual model is the result of a review of the literature on digital cultures and the academic field devoted to the digitisation of cultural institutions, the visitor experience, museum management and marketing, regional marketing and smart tourism. The evolution of concepts and practices relating to the digitalisation of museums has revealed that what they offer goes beyond the provision of digital services and tools. It contributes to the transformation and diversification of visitors' practices and behaviours, cultural practices, and strategies for cultural and heritage outreach, as well as to regional solidarity and the development of cultural regions and cultural destinations.

This model is based on a temporal approach and a causal logic. Within this model, digital technologies constitute the first stage of a process whose ultimate goal is the quality of the visitor experience. Consequently, information and communication technologies play a vital role in the transformation of museums, but they are dependent on

museums' internal resources and on constraints that may slow down their adoption. These factors determine the value proposition and the visitor experience, upon which visitors' satisfaction and cultural engagement—as well as their behaviour—are based. These behaviours, viewed through a systemic and temporal lens, have an impact on the attractiveness and vitality of local areas.

This model serves a dual purpose. On the one hand, it enables a deeper understanding of the processes involved in the digital transformation of museums, from the perspective of the relationships and interactions between various organisational and behavioural variables. On the other hand, it broadens the scope to analyse the impacts and relationships of digital transformations in museums within the framework of the dichotomy of space and time, an aspect that remains largely unexplored in the literature on digital museology. This comprehensive and systematic approach to modelling via structural equations is justified by the analysis of the proposed relationships.

3.2. Identification of explanatory variables

Explanatory variables are factors likely to influence other constructs within the model. In this study, three variables are considered independent: the digitalisation of museums, organisational capabilities and perceived constraints. Their selection was guided by the key findings and the relevance of the scientific literature within the context of museum discourse in Morocco. These variables form the initial determinants of the study and enable an understanding of the mechanisms linked to the observed impacts on visitors and the museum space.

3.2.1. Museum digitisation

Museum digitisation is the main focus of this study. This refers to the digital tools integrated into museums to meet users' needs and diversify the way in which artworks are presented, to modernise cultural mediation tools and to enrich the visitor experience. In this regard, there are audio guides and mediation devices, digital kiosks and tablets, mobile applications, and digital and virtual mediation tools. In the model developed, digitalisation is the main determinant that can explain variations in visitor behaviour and performance disparities across regions.

3.2.2. Organisational capacities

Organisational capacities refer to the totality of resources (human, technical, financial, managerial, etc.) that a museum can mobilise to implement its digital transformation strategy. These are reflected in a museum's ability to integrate digital

tools into its day-to-day activities over the long term, to train its staff and ensure the sustainability of its digital infrastructure, as well as to develop an innovative organisational culture. Derived from the Resource-Based View, this variable is crucial to the success of digitisation projects.

3.2.3. Perceived constraints

Perceived constraints are the set of factors limiting the digitalisation of museums. These include disparities in both digital and cultural tools, malfunctions in digital tools, and constraints relating to technology, human resources and financial resources. This variable helps to identify the main factors likely to undermine the quality of digital services offered to the public.

3.3. Mediating variables

Mediating variables are central to the conceptual model, as they enable us to describe the processes through which explanatory variables influence dependent variables. They represent users' behaviour in relation to the digital tools developed by museums and constitute the intermediate stages of the causal process under investigation in this study.

3.3.1. Visitor experience

The visitor experience encapsulates the totality of perceptions generated by a museum visit, at the intersection of visitors, collections, digital tools and the cultural environment. This experience encompasses immersive aspects, interactivity, educational value and the emotional response during the visit.

3.3.2. Satisfaction

Satisfaction refers to the degree of pleasure the visitor feels at the end of their visit. This variable reflects the quality of the services offered by the museum in terms of digital mediation, in particular the degree of satisfaction in relation to visitors' needs and expectations.

3.3.3. Cultural engagement

Cultural engagement refers to the level of enthusiasm the visitor demonstrates for discovering, understanding and appreciating cultural heritage. These variable measures the potential of digital tools to spark an interest in culture, to facilitate the acquisition of new knowledge and to encourage visitors to take part in other cultural events.

3.4. Dependent variables

The dependent variables are the outcomes expected from the digitisation process under investigation in this research. They relate to the behavioural and regional effects that digital innovations in museology are likely to produce.

3.4.1. Behavioural intention

Behavioural intention indicates the likelihood that a visitor will return to the museum, recommend the museum, share information about the museum, or promote the museum on social media.

3.4.2. Regional attractiveness

Regional attractiveness concerns the potential of digital museums to enhance cities' identities, increase their appeal in both tourism and cultural terms, and optimise their place within national and international heritage.

3.4.3. Regional development

Regional development is the ultimate goal of the model. It reflects the contribution of digital museums to the cultural, economic and social dynamics of regions, to the improvement of cultural services and to the sustainable promotion of Moroccan heritage.

3.5. Graphical representation of the conceptual model

A conceptual model has been proposed to diagram the research hypotheses. This model presents the causal relationships between the proposed variables and the types of relationships defined in the literature.

The graphical representation adheres to the principles of structural equation modelling. This model presents the conceptual framework of this research and will be used in the construction of the measurement model, in the formulation of hypotheses and in the validation of the research using AMOS software.

The selected conceptual model and its illustration are presented below. This model will undergo a process of statistical validation in the chapters on data analysis and hypothesis testing.

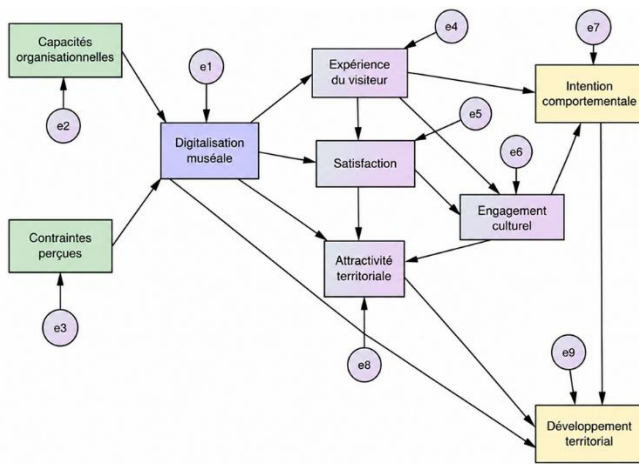


Figure 1: Conceptual model of the research

4. Research hypotheses

The research hypotheses in this study reflect the operational form of the conceptual model. They describe the presumed links between the variables, as identified in the literature and in the main theoretical frameworks underpinning it. Within the framework of the hypothetical-deductive method, the hypotheses set out theoretical propositions in the form of relationships that can be measured using empirical techniques, which will be applied here through structural equation modelling (SEM).

This approach assumes that the digitalisation of museums, by influencing visitors' perceptions, gradually alters their experience, satisfaction and intentions, as well as the attractiveness and development of local areas. These relationships will, to a certain extent, be modified by the organisational limitations of museums and by the constraints that arise when implementing digital systems. The following hypotheses reflect this causality and form the starting point for the statistical analyses to be presented in subsequent chapters.

H1: Museum digitalisation and the visitor experience

H1: Museum digitalisation has a positive and significant influence on the experience of visitors to Moroccan museums.

This hypothesis is based primarily on the Technology Acceptance Model (TAM) and the Experience Economy Theory, according to which digital technologies improve the quality of interactions between visitors and the museum, thereby fostering a more immersive, interactive and enriching experience.

H2: Museum digitalisation and visitor satisfaction

H2: Museum digitalisation has a positive influence on visitor satisfaction.

This hypothesis assumes that digital tools improve the perceived quality of museum services and enhance overall visitor satisfaction.

H3: Museum digitalisation and regional attractiveness

H3: Museum digitalisation contributes positively to the regional attractiveness of cultural destinations.

This relationship is based on research relating to regional marketing and smart destinations.

H4: Organisational capabilities and museum digitalisation

H4: Organisational capabilities have a positive influence on the quality of museum digitalisation.

This hypothesis stems directly from the Resource-Based View (RBV), according to which human, technological and organisational resources determine the success of digital transformation.

H5: Perceived constraints and museum digitalisation

H5: Perceived constraints have a negative influence on the effectiveness of museum digitalisation.

This hypothesis posits that technical, organisational or financial limitations may reduce the effectiveness of digital systems.

H6: Visitor experience and satisfaction

H6: A positive visitor experience significantly influences visitor satisfaction.

This relationship forms one of the cornerstones of Experience Economy Theory.

H7: Satisfaction and behavioural intention

H7: Visitor satisfaction positively influences their behavioural intentions.

Satisfied visitors are more likely to revisit the museum, recommend it and share their experience.

H8: Visitor experience and cultural engagement

H8: The visitor experience positively influences their cultural engagement.

This hypothesis assumes that an immersive experience fosters a deeper appreciation of cultural heritage.

H9: Cultural engagement and behavioural intention

H9: Cultural engagement has a positive influence on visitors' behavioural intentions.

Visitors who are highly culturally engaged are more likely to intend to revisit the museum and recommend it to others.

H10: Regional attractiveness and regional development

H10: Regional attractiveness has a positive influence on regional development.

This hypothesis reflects the strategic role of cultural facilities in enhancing the value of regions.

H11: Behavioural intention and regional development

H11: Visitors' behavioural intentions contribute positively to regional development.

Visitors' positive behaviours contribute to the regions' tourist and cultural appeal.

H12: Museum digitalisation and territorial development

H12: The digitalisation of museums has a positive influence, either direct or indirect, on territorial development.

This hypothesis forms the culmination of the conceptual model and assumes that digital technologies contribute to cultural, economic and territorial development through the mechanisms previously examined.

5. Research Methodology

5.1. Research Design

This study utilizes a quantitative, explanatory, and hypothetico-deductive approach to understand museum digitalization and its interactions with organizational capabilities, perceived constraints, visitor experiences, visitor satisfaction, cultural engagement, behavioral intentions, and the attractiveness and development of a given territory. Given

these attributes, this approach will help with the planned empirical analysis of the twelve hypotheses within the proposed conceptual framework.

The quantitative dimension stems from the study's aim to assess constructs that are not directly measurable, and most importantly, to analyze cause and effect, as well as the direct and indirect impacts of museum digitalization on the visitors' and the territory's outcomes. Being explanatory allows the research to extend beyond the mere description of digital practices to the analysis of the potential mechanisms to generate value through a museum's digital transformation, not only to the museum and its visitors, but also to the territory.

The research will be cross-sectional, as data will be collected from respondents at a single given time. Although changes over time will be captured indirectly, it is the most suitable means of assessing visitors' perceptions and of measuring the proposed relational framework at one particular instance of the Moroccan museums' digital transformation.

5.2. Study Context

The empirical study is conducted on the two of the largest museums in Morocco - the Mohammed VI Museum of Modern and Contemporary Art in Rabat and the Mohammed VI Museum of the Civilization of Water in Marrakech. It focuses on these two museums, as they illustrate two different cultural and spatial contexts, as well as two important examples of the effects of museum digitalization.

The Mohammed VI Museum of Modern and Contemporary Art is located in Rabat, Morocco's administrative and cultural capital. The Museum of Modern and Contemporary Art in Rabat helps encourage more current artistic endeavors that enrich the cultural fabric of the city. The Mohammed VI Museum for the Civilization of Water in Marrakech follows a different theme and focuses on the heritage of water, the environment, and the history of water management in Morocco.

These two Museum choices allow the study to focus on the digitalization of museums in relation to different types of cultural institutions, visitor profiles, and local settings. The focus also provides an analysis of how digital services of museums may enhance and develop the cities of Rabat and Marrakech.

5.3. Target Population and Sampling

The population of interest includes the visitors of the Mohammed VI Museum of Modern and Contemporary Art in Rabat and the Mohammed VI Museum for the Civilization of

Water in Marrakech. The criteria for participation included the museum visitors' adults' capacity to assess the digital services and mediation tools provided by the museum in relation to the museum's territorial presence and the services offered.

Visitors who did not complete the museum visit, did not have sufficient exposure to the museum services, and could not provide an informed assessment of the services were excluded from participation. Participation was voluntary, and the visitors were made aware that the information collected would be for academic purposes only. Non-probability convenience sampling was applied, as no complete sampling frame of the museum visitors was available.

Specific Visitor Studies methods rely on the context of the study and limit the statistical generalization of the study's findings. However, they are appropriate for acquiring respondents present on-site at the cultural locations.

In general, the sample size must be sufficient for Structural Equation Modeling (SEM). The sample size must be large enough to accurately measure and evaluate the structural and measurement models, validate the proposed theories, and evaluate the direct, indirect, and mediation effects. The proposed sample is then measured based on the number of latent constructs, the observed indicators, the number of structural paths, and the overall complexity of the model.

5.4. Data Collection Instrument

Data in this study was collected via a structured questionnaire guided by the conceptual framework and measurement dimensions gleaned from the literature. The design of the questionnaire allows for the operationalization of the nine constructs of the model under study:

- Museum digitalization
- Organizational capabilities
- Perceived constraints
- Visitor experience
- Visitor satisfaction
- Cultural engagement
- Behavioral intention
- Territorial attractiveness
- Territorial development

These constructs represent the explanatory, mediating, and dependent constructs of the conceptual model.

The first section of the questionnaire describes the study and states that participation is voluntary. The second section collects demographic and visit-related data (e.g. age, sex, education, residence, the museum visited, visit frequency, and visitation experience with digital museum services).

The remaining sections contain statements designed to measure the theoretical constructs of the study. Responses are captured using a Likert-type scale. The digitalization of museums was evaluated based on visitors' perceptions of the availability, accessibility, ease of use, level of interactivity, and the perceived usefulness of the digital resources.

At this level, the organizational capability indicators ask for the museum's assessment for the human, technical, managerial, and institutional capacity for implementing digital transformation. Factors related to perceived constraints ask for the museum's assessment for financial, technical, organizational, accessibility, and competency factors that may constrain the digitalization of the museum.

Visitor experience indicators ask for the assessment of the extent to which the visit was immersive, educational, emotional, interactive, and personalized. Satisfaction indicators ask for the assessment of the museum services and the extent to which the visit fulfilled the evaluator's expectations. The Cultural Appraisal Engagement indicators ask for the assessment of interest in heritage, knowledge, emotional appraisal, and the willingness to engage in future cultural practices.

Behavioral intention indicators ask for the assessment of intention to revisit, recommendation, sharing digitally, and future engagement. Territorial attractiveness indicators ask for the assessment of the contribution of the museums to the destination's image, cultural visibility, and tourism attractiveness. Territorial development indicators ask for the assessment of the contribution of the museums to cultural vitality and local economy, in addition to the enhancement of heritage and social development with the introduction of a new dynamic to the territory.

5.5. Pre-Test and Instrument Validation

During the first stage of the main data collection activity, the target population is screened, and a smaller sample that is a similar approximation is drawn to represent the population for the purpose of a pre-test. The pre-test evaluates the item prompts for clarity and relevance and assesses the

appropriateness of the item sequence and overall comprehension.

In the first stage of the data collection activity, some of the more significant prompts are assessed for overly repetitive phrasing, inclusion of jargon, and items that the respondents will likely perceive as problematic. The data collection instrument is revised for the issues that were raised in the pre-test prior to its final administration.

The content validity of the instrument is assured by the alignment of the item prompts to the constructs represented in the conceptual framework and to the formal theories that offer support to the twelve propositions. If needed, expert judgment may be applied to determine the relationship between the respective items and the dimensions they are intended to measure.

5.6. Data Collection Procedure

The survey will be administered to museum visitors using Google Forms and, where applicable, distributed directly on-site. A digital survey will streamline the data collection process, minimize the manual coding errors, and provide the means for the electronic survey responses to be directly exported to the data analysis software.

Data will be collected after museum visitors have experienced the exhibitions and museum services. This will enable the visitors to provide evaluative feedback on the digital devices, the visitor experiences, visitor satisfaction and engagement, and the perceived visitor territorial effects.

Respondents will be informed that their participation will be voluntary, their responses will be anonymous, and the collected data will be kept confidential. There will be no need to provide personally identifiable information for the data analysis.

5.7. Data Analysis Strategy

The collected data will be analyzed using IBM SPSS Statistics and IBM SPSS Amos. ArcGIS will be used to represent and analyze the spatial attributes of the study areas, and Google Forms will facilitate the survey administration and the initial data organization.

The analysis will be performed in a number of stages.

5.7.1. Data Screening and Preparation

The first stage will be to review the data for missing data, incomplete surveys, coding errors, duplicate surveys, and

outlier values. The distribution of the variables will also be analyzed to determine if the data meet the required assumptions for the application of multivariate statistical analysis.

Descriptive statistics will be computed for means, standard deviations, frequency distributions, percentages, and values for skewness and kurtosis. These analyses will provide a preliminary understanding of the respondent group and how responses to survey items are distributed.

5.7.2. Description of the Sample

Sociodemographic and visit-related respondent characteristics will be studied and presented using frequency distributions and percentages. Potential characteristics include: gender, age, education level, place of residence, specific museum, visit frequency, and past engagement with digital museum services.

The analysis of survey item responses will help assess the respondent sample's heterogeneity and will aid in the interpretation of the findings to follow.

5.7.3. Exploratory Assessment of Measurement Scales

Prior to factor analysis, the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity will be computed. If applicable, Exploratory Factor Analysis will be performed to understand the measurement scales and to assess if the survey items are clustered into the expected themes.

Survey items that are weakly associated with a factor, highly load onto multiple factors, or have low relevance may be retained, as long as the proposed change is consistent with theory.

5.7.4. Reliability Analysis

The internal consistency measurement of each survey item will be evaluated using Cronbach's alpha. During the confirmatory stage, Composite Reliability will be evaluated. Reliability values will be assessed based on the conventional standards, given the item count and scales' theory.

5.7.5. Confirmatory Factor Analysis

Using IBM SPSS AMOS, Confirmatory Factor Analysis will be performed to assess the measurement model. This process will evaluate if the observed survey items sufficiently represent the latent constructs in the theory.

Standardized factor loadings, Composite Reliability, and Average Variance Extracted will be used to assess Convergent Validity. To assess discriminant validity, the extent of covariance amongst constructs will be analyzed, along with the ability of each construct to remain empirically distinct from the others.

5.7.6. Structural Equation Modeling

Once the measurement model has been validated, Structural Equation Modeling will allow analysis of the relationships among latent variables, and will provide an evaluation of the twelve hypotheses.

The structural model will estimate the effects of:

- Museum digitalization on visitor experience, satisfaction, territorial attractiveness, and territorial development;
- Museum digitalization and territorial development;
- Organizational capabilities on museum digitalization;
- Perceived constraints on museum digitalization;
- Visitor experience on satisfaction;
- Satisfaction and cultural engagement on behavioral intention;
- Territorial development; and
- Behavioral intention on territorial attractiveness.

The regression estimates, standard errors, and critical ratios will be assessed to evaluate the strength and significance of the relationships.

5.7.7. Direct, Indirect, and Mediating Effects

Beyond the direct effects, the study will analyze the presence of indirect effects and mediation. More specifically, the effects of museum digitalization on territorial development may be mediated by visitor experience, satisfaction, behavioral intention, and territorial attractiveness.

Statistical significance of indirect effects will be assessed using the bootstrapping approach, which is appropriate for mediation analysis as it doesn't require the indirect effects to be normally distributed.

5.7.8. Model Fit Assessment

The adequacy of the measurement and structural models will be evaluated using several goodness-of-fit indices. These may include the chi-square statistic, chi-square divided by degrees of freedom, Root Mean Square Error of Approximation, Standardized Root Mean Square Residual, Comparative Fit Index, Tucker–Lewis Index, Incremental Fit Index, Goodness-of-Fit Index, and Adjusted Goodness-of-Fit Index.

The interpretation of model fit will not depend on a single indicator. Instead, several complementary indices will be considered to determine whether the proposed model adequately represents the observed data.

5.8. Cartographic Analysis

Alongside the statistical analysis, this study employs a cartographic analysis using ArcGIS. This analysis aims to provide the geospatial and territorial context of the selected museums and analyze their positioning relative to the cultural infrastructure and urban functions, as well as the flow of tourism and accessibility.

The primary focus of the cartographic analysis will be on the access and placement of the Mohammed VI Museum of Modern and Contemporary Art in Rabat, and the Mohammed VI Museum for the Civilization of Water in Marrakech, after showing the national and regional distribution of museums and cultural institutions.

The maps will illustrate the museums' Urban Cultural Synthesis, which will enhance the explanation of the urban services, cultural, transport, and tourism synthesis. The complementarity of the visitor survey and Structural Equation Modeling with the cartographic analysis aims to provide the conceptual model with the territorial and spatial dimensions.

5.9. Ethical Considerations

The research respects the principles of voluntary participation, anonymity, confidentiality, and informed consent. Respondents are informed about the academic purpose of the study and their right to decline or discontinue participation.

The collected data will be used only for scientific analysis. Results will be presented in aggregate form, and no individual respondent will be identifiable in the published article.

Conclusion

As digital technologies become integrated in museums, changes in the ways cultural heritage is preserved and expressed become apparent. Digital technologies allow museums to go beyond collection and exhibition; digital technologies encourage museums to become active cultural institutions. The digital services provided by museums have the potential to positively impact visitor experience, satisfaction, cultural engagement, and the attraction and development of territories.

This paper presents a dynamic and integrated framework of the technology, organization, behavior, and territory related to the digitalization of museums. The framework comprises nine elements: digitalization of museums, organizational capabilities, perceived constraints, visitor experience, visitor satisfaction, cultural engagement, behavioral intention, territory attractiveness, and territory development. These elements are placed within a causal framework consisting of twelve research questions.

The framework posits that the digitalization of museums positively influences visitor experience and satisfaction, and territory attractiveness. Moreover, the digitalization of museums positively influences the (local) territorial development of museums. Within the organization, the digital transformation of museums is contingent on the availability of human, technical, managerial, and financial resources. The absence of such resources is perceived as a constraint that negatively impacts the quality and the value of the digital services offered by a museum.

For visitors, the framework views experience as value. The interactive services offered by the museums are perceived to be value creating. The digital services offered by the museum are expected to create a meaningful and satisfying experience and promote cultural engagement. These services are expected to influence visitor behavioral intentions to engage in future cultural activities, to participate in activities, to share activities, and to recommend activities.

The framework posits that positive visitor behaviors and increased attraction of a territory are perceived to positively impact the visibility of culture, the valuation of heritage, the valuation and sustainability of the territory, and the development of the territory. This model thus extends beyond a technology-oriented perspective of museum transformation and considers digitization as capable of producing outcomes that are institutional, behavioral, cultural, and spatial.

The Moroccan context adds special value to this model. The recent emergence of digital mediation, virtual exhibitions, online collections, and interactive services offered by museums create significant opportunities for outreach, exhibition of cultural heritage, and enhancement of the museums' role within tourism and spatial/territorial planning. Still, for the most part, the available literature is of a descriptive nature and empirical studies about the interaction of the various dimensions within Moroccan museums are almost nonexistent.

To fill this gap, the model will be applied in an explanatory quantitative manner. This will be based on data collected through a questionnaire directed at the visitors of the Mohammed VI Museum of Modern and Contemporary Art in Rabat and the Mohammed VI Museum of the Civilization of Water in Marrakech. Measurement scales will be validated through a reliability analysis and Confirmatory Factor Analysis and the Structural Equation Modeling will be used to provide an answer to the twelve hypotheses and evaluate the direct, indirect, and mediating effects among the constructs.

This study aims to provide several theoretical advancements. First, a unified model that integrates museum management, digitalization, visitor behavior, cultural engagement, tourism, and territorial development will be offered. Second, it will broaden the analysis of museum digitalization beyond the scope of visitor satisfaction and engage in the analysis of potential territorial impacts. Third, it offers a value framework for a context of an emerging country that has not yet been represented in international discourse.

The practical value of this research is evident. Museum managers could utilize the research results to help them pinpoint the digital services that enhance their visitors' experiences and boost engagement. Results may also help them assess the resources their organizations may require to carry out digital transformations and the obstacles that may hinder their efficiency. Results may also assist local and regional government policy makers to incorporate museums into their cultural tourism and urban integration frameworks that balance the preservation of tangible and intangible heritage with sustainable development.

There may, however, be some limitations to the study. Because of the cross-sectional design, researchers will capture visitors' opinions at one specific point in time, as opposed to measuring changes that may occur over time. Using convenience sampling may also limit the study. There is also a concentration on two Moroccan museums, and as such, the study may not capture all the museums and cultural institutions in the Moroccan context.

Future studies may employ longitudinal designs, broaden the sampling to include other cities in Morocco and other types of museums, and include public, private, archaeological, ethnographic, and contemporary art museums as subjects of research. Within the context of other North African, African, or Mediterranean countries, perhaps even more, may research of this kind explore the museum sector further to identify other cultural and institutional contexts and determine whether the suggested relationships remain.

The proposed framework may also further articulate museum digitalization beyond the boundaries of the institution. The study links technological advancement with the understanding of visitor behavior and spatial dynamics to locate museums as key players in cultural growth. It offers an evidence-based approach for crafting more inclusive, cutting-edge, and sustainable museum policies in Morocco.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Bellio, E., Rossi, A., & Baccigalupi, C. (2022). Digital transformation in museums: Technologies, visitor engagement, and organizational challenges. *Museum Management and Curatorship*, 37(6), 635–654.
- Berta, M., Rossi, L., & Marino, F. (2025). The effect of interactive technology on enriching visitor engagement and museum experience. *Journal of Open Innovation: Technology, Market, and Complexity*, 11(2), 100284.
- Boes, K., Buhalis, D., & Inversini, A. (2016). Smart tourism destinations: Ecosystems for tourism destination competitiveness. *International Journal of Tourism Cities*, 2(2), 108–124.
- Boussaa, D. (2024). Cultural heritage tourism and urban regeneration: The case of Fez, Morocco. *City, Culture and Society*, 39, 100597.
- Ceccarelli, S., Rossi, M., & Marchetti, E. (2024). Evaluating visitors' experience in museums: Comparing methodological approaches. *Journal of Cultural Heritage*, 67, 195–206.
- Chen, Z., Wang, H., & Liu, X. (2026). How design features influence users' recommendation intention in digital museums. *Journal of Open Innovation: Technology, Market, and Complexity*.
- Clini, P., Quattrini, R., & Bonvini, P. (2024). Adrijo: A digital platform for Adriatic port heritage—Good practices for a widespread virtual museum. *Heritage*, 7(3), 1202–1226.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Economic, Social and Environmental Council. (2023). *Towards a new vision for cultural heritage management and valorisation*. Economic, Social and Environmental Council of Morocco.
- Ez-zahrany, C., Elmadhi, A., & Mokharjij, K. (2024). L'impact des technologies numériques sur le tourisme culturel et la valorisation du patrimoine au Maroc. *Revue du LaRSLAM*, 12(10).
- Fouinna, L., & El Ouazzani, H. (2025). La digitalisation du patrimoine culturel au service de la diplomatie culturelle marocaine: Acquis, défis et leviers de développement. *Revue électronique suisse de science de l'information*.
- Gao, B., Zhang, Y., & Li, X. (2024). Upgrading museum experience: Insights into offline visitor reviews and service perceptions. *Journal of Hospitality and Tourism Technology*.
- Kheiri, J., Rahmani, M., & Ahmadi, A. (2023). Tourists' engagement in cultural attractions: An exploratory investigation of psychological and behavioral investment. *Journal of Innovation and Entrepreneurship*, 12, 87.
- Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2022). Digital transformation in business and management research: An overview of the current status quo. *International Journal of Information Management*, 63, 102466.
- Li, J., Wang, H., & Zhang, Y. (2024). A systematic review of digital transformation technologies in

- museum exhibitions. *Computers in Human Behavior*, 161, 108407.
- Li, Y., Chen, X., & Wang, Z. (2024). Investigating the behavioural intentions of museum visitors towards virtual reality technology: A systematic review. *Computers in Human Behavior*, 156, 108213.
 - Lu, S. E., Huang, C., & Lin, Y. (2023). Technology and museum visitor experiences: A four-stage model of visitor interaction. *Information Technology & Tourism*, 25, 203–232.
 - Nabil, N., & Moutaoukil, A. (2024). La digitalisation des musées au Maroc sous l'ère de la pandémie de COVID-19: État des lieux. *Espace Géographique et Société Marocaine*.
 - Nespeca, R., & Capodaglio, G. (2026). Intelligent museums: Artificial intelligence, immersive technologies, and visitor engagement. *Museum International*.
 - Nikolaou, I. (2024). Organizational readiness for digital transformation in museums. *Museum Management and Curatorship*.
 - Palumbo, R., Adinolfi, P., & Manna, R. (2023). Surviving COVID-19: What museums and cultural institutions can do to attract audiences through digital services. *International Review on Public and Nonprofit Marketing*, 20, 809–835.
 - Pine, B. J., II, & Gilmore, J. H. (1999). *The experience economy*. Harvard Business School Press.
 - Richards, G. (2018). Cultural tourism: A review of recent research and trends. *Journal of Hospitality and Tourism Management*, 36, 12–21.
 - Sánchez-Martín, J. M., García, J. A., & Pérez, L. (2025). Artificial intelligence in heritage tourism: Innovation, visitor experience, and cultural sustainability. *Heritage*, 8(10), 428.
 - Sandriester, J., Müller, T., & Hoffmann, P. (2025). Digital transformation in the cultural heritage sector and its role in sustainable development. *Sustainability*, 17(15), 6661.
 - Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
 - Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901.
 - Xu, D., Liu, H., & Zhang, P. (2024). Digitally enriched exhibitions: Perspectives from museum visitors and professionals. *Tourism Management*, 104, 104922.
 - Yang, Y., Li, X., & Zhang, H. (2025). Smart museums and sustainable cultural heritage: Digital innovation for visitor engagement and territorial development. *Journal of Cultural Heritage*