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**VENICE SCHOOL
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Working Papers Series

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cultural organizations. A
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**Working Paper n. 09/2024
December 2024**

ISSN: 2239-2734



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Working paper: The adoption of digital technologies in arts and cultural organizations. A review of the literature

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ABSTRACT

The concept of Digital Transformation has been the subject of extensive research, yet it remains difficult to define it with precision. What is universally acknowledged is that Digital Transformation represents a significant shift that can be revolutionary for an organization or even an entire industry. However, there has been relatively little investigation into how cultural institutions, particularly museums, engage with this phenomenon. Most studies tend to adopt a case study approach that focuses on the implementation of a single digital solution, often neglecting the broader context. Additionally, research in marketing typically emphasizes the visitor experience, largely underestimating the perspectives of museum management. The present study follows a literature review design by deepening the knowledge on different streams of previous research. Studies on digital transformation and technology adoption are taken into account in building the conclusion. Through this comprehensive investigation, a contribution is given to the digital evolution in cultural management providing valuable insights specifically oriented to museums.

Keywords: digital transformation, museums, Italy, innovation process

1. Introduction

In recent years, digital transformation has become a focal point of discussion in both academic research and practical application (Hanelt, Bohnsack et al. 2021). Organizations across a wide range of industries are actively initiating projects aimed at understanding how emerging digital technologies can revitalize and reshape their processes, products, services, and overall business models (Wiesböck and Hess 2020). This movement is not merely a trend; it represents a fundamental shift in how businesses approach their operations and strategic objectives (Kohli and Melville 2019).

As organizations embark on their digital transformation journeys, they often find themselves redefining their established value propositions and the underlying logic of value creation (Wessel, Baiyere et al. 2021). This process can lead to significant changes in how they engage with customers, deliver services, and differentiate themselves in the marketplace. Consequently, nearly every industry is compelled to rethink its operational frameworks and competitive strategies to foster growth and innovation (Nambisan, Lyytinen et al. 2017).

The aim of this paper is to thoroughly examine how the literature has addressed the topic of adopting new technologies, with a particular focus on exploring both the theoretical models and empirical research related to the integration of digital technologies within cultural organizations. The review allows to explore different stream of literature, like innovation management, information systems, digital transformation, organization, cultural marketing, management and economics. By adopting an interdisciplinary approach this paper offers a comprehensive and detailed analysis on three main areas: 1) the categories of the adopted (or to be adopted) existing technologies; 2) the different stages of technology adoption within the innovation process lifecycle; 3) the proxies used to explain technology adoption across different sectors, with a particular focus on cultural contexts. This approach enables a comprehensive understanding of how organizations have engaged with technological advancements, drawing on existing academic frameworks to shed light on the challenges, strategies, and outcomes associated with digital adoption in the cultural context.

The paper is organized as follows: in the first part digital transformation evolution and main definitions are presented, in the second one the strategic relevance of digital transformation when considered as a process is addressed. The third part focuses on the digital transformation in cultural contexts and specifically in museums while the fourth paragraph deals with digital transformation evaluating models. At the end of the

work, conclusions are drawn based on the findings from the literature regarding the adoption of new technologies.

2. Digital transformation

The concept of digital transformation is multidimensional and covers a wide range of subjects and activities. At its origin, digital transformation was mainly discussed in the information systems literature (Nadkarni and Prügl 2021, Vial 2021) with a prevalent focus on technological issues. From 2010 onward, it attracted interest from scholars working in other fields such as strategic management, organizational studies, and innovation management (Hanelt, Bohnsack et al. 2021, AlNuaimi, Singh et al. 2022). Today, Digital Transformation is an interdisciplinary research field with contributions from IT, entrepreneurship, strategic management, operations management, marketing, and organization science, among others (Plekhanov, Franke et al. 2023).

Scholars refer to digital transformation when firms use digital technologies to create new or modify existing business models and processes or to support the transformation of organizational structures, resources, or relationships with internal and external actors (Brynjolfsson and Hitt 2000, Loebbecke and Picot 2015, Frank, Dalenogare et al. 2019, Vial 2021).

Existing research suggests that organizations need to develop a digital transformation strategy to find innovative applications of technology, manage the changes triggered by technology and coordinate the implementation of the entire digital transformation (Hess, Matt et al. 2016). Therefore, some studies believe that digital transformation strategy and organizational change have become a new path of IT-driven digital transformation (Svahn, Mathiassen et al. 2017). Digital strategies present an opportunity for companies to explore new ways to create value from IT. IT infrastructure facilitates digital transformation by responding to and supporting selected business strategies. Moreover, top management is complementary to IT infrastructure and digital transformation strategy.

Although current literature shows a growing interest in Digital Transformation, it indicates a lack of a universal and comprehensive understanding of the concept (Gong and Ribiere 2021).

For example, if it was common to find conceptual miscellanea in the past between digitization, digitalization, and Digital Transformation, this issue now seems to be overcome (Reis and Melão 2023): they are interconnected, but they should be kept distinct at the conceptual level.

In fact, digitization essentially refers to *“taking analog information and encoding it into zeroes and ones so that computers can store, process, and transmit such information”* (Bloomberg 2018) or *“the technical process of converting analog signals into a digital form”* (Legner, Eymann et al. 2017). While, according to Gartner’s IT Glossary, is *“the process of changing from analog to digital form”*, whereas digitalization is *“the use of digital technologies to change a business model and provide new revenue and value-producing opportunities”*. In this regard, Kohli & Johnson (2011) stress that digitization is commonly associated with transforming traditional processes into digital ones. Loske & Klumpp (2022) also consider that digitization as a *“process of converting analog data into digital data sets”*. Digitalization in turn, refers to *“the pace of change in a society driven by digital technological development, involving multiple technologies at different stages of maturity that will converge and create new technologies”* (McAfee 2009) and *“a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural”* (Tilson, Lyytinen et al. 2010). Digitalization, is described as digital technologies that can be used to alter existing business processes. In that regard, companies are investing in products and process innovation through new digital solutions, allowing them to deal with more data and information (Castagna, Centobelli et al. 2020). Digital Transformation goes beyond digitalization as it involves changing organizational processes and tasks, which typically lead to developing new business models (Reis, Amorim et al. 2018).

Although the concept of Digital Transformation dates back to the 90’s it has gained significant notoriety only recently (de Souza, Szafir-Goldstein et al. 2020). The consensus today is that Digital Transformation is more than just a technological shift (Henriette, Feki et al. 2015), and that it requires not just technology but also the alignment of strategy and other factors, such as people, culture, mindset, talent development, and leadership (Goran, LaBerge et al. 2017).

Thus, Digital Transformation consists of integrating information technologies in companies’ operations, whether internal or external (Chaparro-Peláez, Acquila-Natale et al. 2020). It can also be considered as a change that occurs with the implementation of technologies in a system within a company (Loske and Klumpp 2022). This transformation is supported by the adoption of new technologies from which new

performance, new processes, and new business models emerge (Allen 2019, Nadkarni and Prügl 2021). In addition it is also linked to an improvement in collaboration, and culture (Bulović and Čović 2020, Krasnikolakis, Tsaropoulos et al. 2020).

Organizations compete and can gain an advantage by employing diverse methods. Digital transformation impacts the entire organization by reshaping processes to enhance business operations and value creation.

While traditional innovation diffusion models provide insight into the factors and conditions involved in technology adoption decisions, for the most part, these models and the empirical research that adopts them remain silent on the execution of implementation strategies that lead to employee sustained usage of the technology as discussed by Bonetti et al. (2023). In their paper the authors focused on how AI often disrupts employees' ways of working causing them to resist change, thus threatening the successful embedding and sustained usage of the technology. Additionally, digital transformation leverages digital technologies to facilitate connections with suppliers, customers, and competitors across borders (Ahmad, Alshurideh et al. 2021). In fact, the term "digital transformation" refers to the continuous networking of actors across all stages of the value chain (Andre, Michael et al. 2018).

It means that it can be considered as an organisational axis based on people and processes, driven by digital technologies (Warner and Wäger 2019).

Due to its wide meaning, the term "digital transformation" is used in different ways by different sectors. Europeana proposes a definition, the summary of which is: *"[Digital transformation is] both the process and the result of using digital technology to transform how an organization operates and delivers value. It helps an organization to thrive, fulfil its mission and meet the needs of its stakeholders. It enables cultural heritage institutions to contribute to the transformation of a sector powered by digital and a Europe powered by culture."*

Vial (2021) defines Digital Transformation as *"a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies"*. Additionally, he describes "entity" as mainly being an organization but adding that both society and industry can be a part of the definition, i.e., Digital Transformation can occur on one or multiple levels at once and bring value to any or all the entities.

Of course, the role of IT in Digital Transformation varies, as an organization's digital maturity and digital culture evolve (Dremel, Wulf et al. 2017). Higher level of digital maturity, culture and technology-focused skillsets within the organization allows innovation and acceptance of Digital Transformation efforts (Fehér, Szabó et al. 2017).

Verhoef et al. (2021) through the following definition of digital transformation *"a change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm"*, also note that there are several dimensions of digital transformation that must also change in order to reach the level of digital maturity and thus achieve competitive advantage (Marei, Abou-Moghli et al. 2023). First: customers. Following a digital transformation strategy means moving to a customer-first or customer-centric approach (Abu-AlSondos, Alkhwalidi et al. 2023). Second: the services and products provided by companies must evolve through the transformation to modern digital business models concerned with innovation and creativity. Third: the strategy. As previous studies and international reports emphasize the importance of a strategy for digital transformation that leads companies and institutions towards leadership and creativity. Fourth: organizational culture and customer culture. This is an important element for success in the digital transformation journey, as senior management and employees must be supporters of digital transformation. In addition, the need to change the culture of customers who are still afraid of dealing with companies that provide digital services due to fear of the risks of cyberattacks (Shehadeh, Almohtaseb et al. 2023).

Digital transformation according to the above presented definitions, is a complex journey that needs to be guided by a clear digital transformation strategy (Li, Su et al. 2018). To sum up, Digital transformation marks a radical rethinking of how organizations combine technology, people, and processes to achieve better business performance (Bonnet and Westerman 2020) with the primary goals of enhancing sales, promoting sustainability, improving customer satisfaction, and fostering network co-creation and value sharing (Sultan, Alqallaf et al. 2021).

3. Digital transformation as a process of strategic relevance

According to previous study, the implementation of digital transformation if well planned, plays a significant

role in promoting economic benefits (Zhang, Shi et al. 2022). In fact, digital technology has a transformative impact on almost all aspects of enterprises' internal operations and external environment and this digital disruption requires the coordination and adjustment of many corporate strategies (Vial 2021). In this regard, Bharadwaj et al. (2013) had argued that digital technologies need to integrate organizational and information system strategies and propose the concept of digital business strategy. Matt et al. (2015) focused on the transformation of processes, products and organizations brought by new technologies and proposed the concept of the digital transformation strategy, arguing that in a dynamic environment, digital transformation strategy can guide the integration and application of digital technologies, to achieve digital transformation. Therefore, the formulating and implementing of a clear and scientific digital transformation strategy becomes a critical path for the digital transformation practice of enterprises. They also proposed that digital transformation strategy refers to supporting the strategic transformation of enterprises brought about by the application of digital technology and the strategic positioning of the operation and development of enterprises during or after transformation and divided it into four dimensions: technology use, value creation, structural change and financial gain. Hess et al. (2016) refined these four dimensions into eleven items and verified and adjusted them through case interviews. Tekic and Koroteev (2019) proposed four general digital transformation strategies from the dimensions of digital technology application and digital operation business model, namely disruptive strategy, business model-led strategy, technology-led strategy and customized simulation strategy. As Hanelt et al., (2021) demonstrated, Digital Transformation is a multidisciplinary process that orchestrates value-creation functions, structural changes, technology usage, and financial issues. It can be characterized by three key elements: (1) the wide scope of its applications and its pervasiveness across industries; (2) the exceptional scale of benefits potentially deriving from its implementation; and (3) the rapidity of the change process it provides the organization.

Due to its complex nature, there are different motivations and expectations to be found in relation to the Digital Transformation. The management has the goal of conserving the existing business model under the influence of Digital Transformation or opening up new business models and thus business areas while employees have a tendency to secure the job or to get work facilitation regarding the accomplishment of routine tasks or complex tasks (Olešnaníková and Púchyová 2014).

Digitalization should enable firms to: (1) optimize physical and digital resources; (2) obtain greater competitive advantage; (3) obtain greater creation of value for the customer (Marques and Ferreira 2020); and (4) obtain cost reduction (Cahyadi 2020, Wolpert, Roth et al. 2020). However, digital transformation may also bring some risks at the organizational and individual level. For organizations, the pervasive adoption of digital technologies may compromise the security of corporate data and could be linked to the lack of specific digital skills that are often absent in the company (Lanzolla, Lorenz et al. 2020). For individuals, the adoption of digital technologies may generate psychological pressure on employees who are pushed to continuously up-grade their digital competencies (Harish, Mansurali et al. 2023). To reap the benefits and reduce the risks of digital transformation, organizations face a set of challenges: the coherence of the digital transformation with the organization's wider business strategy, the development of digital skills, the change of internal processes and roles, alignment with international standards and regulations, fulfillment of customer or user expectations, and the availability of funds for investment.

Following the main impacts of Digital Transformation are briefly explored (Plekhanov, Franke et al. 2023).

Business models

Several authors, as already explained, claim that Digital Transformation is a driver of business models changes. Loebbecke & Picot (2015) even specify that Digital Transformation requires fundamental changes in business models, rather than incremental improvements in processes and operations.

Organizational culture

Has been shown to serve as both an accelerator and inhibitor of Digital Transformation. The transition toward an organizational culture that favors change and supports a firm's Digital Transformation requires constant adjustments, recalibrations, and a pioneering spirit, while avoiding a follower culture that struggles to achieve overarching strategic objectives (Westerman and Bonnet 2015, Eden, Burton-Jones et al. 2019). However, making cultural change is difficult because business models, organizational structures, and organizational culture are linked (Eller, Alford et al. 2020).

Interaction with customers

In a digital economy, relationships between customers and firms are undergoing major changes. The scope of changes includes new power dynamics between firms and customers, close engagement, and new lifestyles that directly impact consumption patterns. In addition to their role as consumers, customers become co-creators of digital solutions (Ziaie, ShamiZanjani et al. 2021). Customers are involved either through a

passive offer of feedback on improvement suggestions or through active participation in designing and improving digital solutions (Srai, Graham et al. 2020).

Competition

Researchers have paid considerable attention to Digital Transformation's effects on market competition, and vice versa. Specifically, Digital Transformation can dismantle incumbents' competitive advantages, potentially leading to hyper competition, with uncertain consequences for existing firms (Plekhanov, Franke et al. 2023). Enterprises view investments in IT as a way to gain a competitive advantage in the fierce and dynamic market competition environment. Currently, the new generation of information technology represented by artificial intelligence, block-chain, cloud computing, big data and the internet of things is driving the rise of the digital economy and bringing disruptive changes to the organizational structure, business process and business model of enterprises (Vial 2021) with the specific scope of winning the war with competitors.

Sustainability

Many companies need to align sustainability goals with their business objectives and the technological opportunities at hand. Various studies have shown that digital transformation can significantly enhance the sustainability of business operations. These improvements lead to more efficient resource use, optimized energy consumption and distribution, longer product lifespans, and reduced waste (Plekhanov, Franke et al. 2023). For instance, studies have illustrated that preemptive maintenance scheduled via artificial intelligence can identify problems before they actually emerge (Sjödin, Parida et al. 2020), and smart grids and smart metering can optimize the use of renewable energy (Duch-Brown and Rossetti 2020). Advancements in digital technologies also give rise to sustainable product designs and manufacturing processes, thereby reducing negative environmental impacts and ultimately supporting a faster transition to a circular economy (Kusiak 2022).

Innovation

Existing literature has used digital transformation as an intermediate variable to explore the impact of the digital economy on innovation (Li, Rao et al. 2022). The cited authors used the number of patent applications to measure innovation performance and found that the digital economy could stimulate firm innovation by driving the digital transformation. Few studies have also directly explored the relationship between digital transformation and innovation (Nambisan, Wright et al. 2019, Appio, Frattini et al. 2021). In addition, many scholars mentioned that digital transformation is disrupting traditional innovation models (Loonam, Eaves et al. 2018), but few scholars explored how digital transformation directly affects this disruption.

Numerous studies indicate that the more companies use digital technology, the more potentially innovative they are. However, some authors insist that digital technology has very little impact on innovation performance, and that R&D expenses are the most reliable predictor of innovation (Usai, Fiano et al. 2021). In many cases, digital technologies have a cross-sectional character with a wide range of potential effects. However, the isolated application of digital technologies often induces only poor benefits. The lack of transparency concerning the benefits of digital technologies makes the process of technology assessment particularly difficult even if technology assessment is seen as an essential necessity for effective and efficient technology management (Andre, Michael et al. 2018).

4. Digital transformation in museums

The latest digital revolution of this century has transformed every industry, with the adoption of technological innovations proving essential for companies to stay competitive. This holds true in the cultural heritage sector as well, where the real challenge lies in understanding and meeting the evolving needs of visitors (Leoni and Cristofaro 2021). In fact, the profound transformations generated by the introduction of new technologies, such as social media, mobile apps and virtual, augmented or mixed reality (Lu, Moyle et al. 2023), are now at the basis of the paradigm shift occurring in the cultural industry. These are able to enrich visitors' experiences and create new business models (such as pure digital museums). Thanks to the adoption of these technologies, museums have progressed from being considered a place in which objects of cultural interest are collected, preserved, stored, and exhibited to a place in which visitors are emotionally stimulated and can live memorable experiences.

In fact, according to the recent definition provided by Extraordinary General Assembly of ICOM in 2022 a museum is: *"A not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums*

foster diversity and sustainability. They operate and communicate ethically, professionally and with the participation of communities, offering varied experiences for education, enjoyment, reflection and knowledge sharing". This new definition reflects the shift from a collection-centric to a user-centric attitude that has been taking place in the past decades. This definition specifically illustrates how museum work now, striving to follow an inclusive and democratic human-centered approach to sustain a range of movable and immovable assets, as well as being open to different voices of interpretation and providing visitors with meaningful experiences through active engagement with the collections (Simon 2010, Martins, Martins et al. 2021, Leoni and Cristofaro 2022). Digital technologies are used in museums to enhance its new role by making them more accessible, engaging, fun, and attractive, and by creating a unique and memorable experience. Technologies entered the world of museums in the second half of the twentieth century, with the first conference on museums and computers taking place in 1968 at the Metropolitan Museum of Art in New York. In this early stage, technologies were used for recording, cataloguing, and researching collections; by the end of the century, their use was expanded to the digitization of museum collections (Zuanni 2022).

Curatorship literature has already demonstrated how the implementation of technologies in museums is beneficial for increasing their accessibility, engagement and attraction (Lazzeretti, Sartori et al. 2015, Lazzeretti and Sartori 2016). However, few studies have provided a comprehensive overview of the relevant research. The fragmented body of knowledge gives the impression that museums are lagging behind other sectors.

There exists a range of barriers to digital innovation. Ramilo and Embi (2014) merge the barriers into three categories, i.e. organisational, technical and financial barriers. Most challenges in museum settings are organisational barriers, e.g. lack of digital integration efforts in business models or strategies, workforce not fully equipped with necessary knowledge or skills, and shortage of professional development training. Such organisational barriers can derail any desired innovation outcomes (Goulaptsi, Manolika et al. 2020). Technical and financial barriers have also been frequently reported in the literature. For example, infrastructural constraints can be attributed to the existence of museums for decades or centuries, whose hardware and software are unlikely to have been developed with digital innovation in their designs.

In facing the several challenges associated to its complex dynamics and institutional goals, museums have been for sure impacted by the process of digital transformation that has interested the society and that has required the assumption of plans for digitalization of their cultural offering (Bello-Orgaz, Jung et al. 2016, Giannini and Bowen 2019).

Not only do museums compete with each other, but they also jostle for market share against a variety of other visitor attractions or tourism destinations.

Museums should facilitate interactive involvement of stakeholders to co-create value through enhancing visitor experience with digital technologies (Serravalle, Ferraris et al. 2019).

The COVID-19 pandemic displayed that organizations had the willingness to change on short notice, and that those issues which appeared as barriers to technology adoption and digital transformation, were self-imposed. The pandemic also forced the acceleration of the pace of Digital Transformation, whether organizations had planned so or were ready (Almeida, Santos et al. 2020, Barnes 2020, Kudyba 2020, Nagel 2020).

Shortly after the pandemic-forced closures, museums started increasing their online and digital activities with a strong institutional presence on social media to implement further digital experiences and changed staff roles to focus on digital tasks. Usage of similar digital tools throughout associated sectors such as education allowed museums to adopt remote work, and in cases where dedicated digitally focused staff were not initially present, roles were redefined to match the new needs. The pandemic highlighted that museums needed to update their approaches, both on the offerings regarding their art collections and the overall workplace as well as the management of both the museum operations and digital offerings. Previously the use of digital technologies in art museums had focused heavily in websites through sales and marketing activities, social media, and museum apps for visitors (Simone, Cerquetti et al. 2021). Additionally, museums had already moved majority of their back-office functions to digital and implemented information systems such as content management systems, point of sale systems and online sales and reservation capabilities which are prevalent in most commercial sectors. This meant that while the museum sector may have lagged in overall technology adoption, the biggest hurdle of digitization had been cleared already (Ch'ng, Cai et al. 2019).

The difference is that now, many museums are able to take a more integrative model of physical and digital realities and become more flexible in incorporating virtual, augmented, or mixed reality both onsite and online to accommodate the changes in digital culture and visitors' demand (Giannini and Bowen 2022).

Museums during the Pandemic, in particular, were the key players in the tourism ecosystem, investing in digital transformation to sustain tourist interest and establishing competitive advantages in regions which rely on tourism. The adoption of these digital technologies allowed to adapt to new social demands, which were intensified by the pandemic (Morse, Landau et al. 2022).

As the various researches conducted both nationally and internationally confirm, the pandemic emergency has pushed museums to be more digital. The Pandemic has shed even more light on the limits and potential of the relationship between museums and digital, particularly with regard to the public-museum relationship, highlighting how this needs to be revised both in terms of the adoption of chosen tools and in policies of greater involvement based on mutual empathy. The proliferation of digital content and experiences also highlighted that a good portion of the proposals were the result of improvisation and lack of a real strategy. While it is important to keep in mind that a well built process plays a crucial role in fostering connections with audiences, enabling organizations to fulfill their missions and ultimately creating a more favorable environment in the post-pandemic era.

5. Evaluating digital transformation

It is important to recognize that the use and types of technology differ significantly among institutions, influenced by their unique organizational structures, infrastructure, and policy environments that shape their digital capabilities (Nikolaou 2024). This points to Francesca Taormina and Sara Bonini Baraldi's (2023) proposal that digital transformation, or the digitalisation, of museums requires a multidimensional analytical approach that looks at museums from an operational, organisational, and strategic perspectives.

Museums are facing major challenges in the identification, assessment and selection of digital technologies. The reason for this lies in the unmanageable variety and diversity of digital technologies which can be used within the value creation as well as in the market performance. Moreover, it is unclear to many managerial teams how digital technologies are characterized and how they differ from other types of technology. Further confusion is caused by the inflationary and often inconsistent use of the term "digital technologies" in public and scientific literature (Andre, Michael et al. 2018).

It is demonstrated that digital technologies stimulate change and are present in several digital transformation studies but it is difficult to find an exhaustive list since several studies have considered them from different perspectives (Menezes, Fernandes et al. 2023). The digital transformation is not only characterized by new technologies, but also in particular by the combination of new and old: evolution and revolution. For example, Wolf et al. (2018) have focused their investigation on the following areas: Augmented Reality, Artificial Intelligence, Big Data, Blockchain, IoT and 3D printer. Matt Gess et al. and Singh and Hess (2015, 2020) include the cloud, mobile services and social media. While others (Hanelt, Bohnsack et al. 2021, Wang, Chen et al. 2021, Morse, Landau et al. 2022, Van Veldhoven and Vanthienen 2022) have grouped these technologies into Social, Mobile, Analytics, Cloud, and Internet of Things (SMACIT) and blockchain, robotics, artificial intelligence, and quantum cognitive computing (BRAICQ).

Technologies can be used in museums in many ways: apart from standard utilization for administrative purposes (such as word processing, computerized accounting methods and so on), applications range from diagnostics, conservation and restoration to Information and Communication Technology (Guccio, Martorana et al. 2023). The influence of ICT on museum management has been explored from different disciplinary perspectives, both theoretically and empirically. A common tenet is that ICT and digitization affect the scope and the mission of museums and impact transversally on their activities, modifying conservation and exhibition practices, widening cultural participation and appreciation (Fernández-Blanco and Prieto-Rodríguez 2020), and reshaping their role as producers and distributors of cultural content.

Different explanations can be put forward for the partial Digital Transformation process of museums. A political economy explanation might apply when considering that the government has a prominent role in the cultural heritage field and most of the major heritage organizations are somehow publicly funded (Holler and Mazza 2013). In such a context, the conventional wisdom about the behaviour of heritage experts, such as museum directors, highlights a potential bias in favour of an "elitist" curatorial approach, due to their educational background and peers' scrutiny. Consistently with this view, communication methods such as ICT and virtual reality may not be adequately appreciated as a tool for the promotion of museum's collections and considered to downgrade the "high" character of heritage (Peacock and Rizzo 2008). Paolini et al. (2013) outline that when

museums rely on public funding, the relationship with the audience may not be considered a priority and, therefore, the investment in ICT may be limited: one major effect would be the occurrence of a digital divide across countries and institutions, with the consequence that culturally important institutions that are not visible on Internet may be dominated by less relevant ones. Another possible explanation for the apparently scarce interest of museums toward the online publication of collections may be due to ‘the fear of cannibalization’ and the related risk of losing onsite visitors because of their availability online (Navarrete 2013). However, this does not seem to be the case. The adoption of technological innovation in museums and its effects are likely to depend on their specific features, such as size, governance and degree of autonomy. For example, Camarero et al. (2011) found that larger museums are more likely to engage in technological innovation than small ones. Bertacchini et al. (2013) show that, in Italy, private museums as well as public ones – autonomous, or outsourced – perform better than public museums directly managed by government bodies, as far as web visibility is concerned; similarly, Leva et al. (2019) show that among state museums, the autonomous ones are more active in implementing policies aimed at enhancing accessibility (including ticket on line and facilities through websites), attractiveness (including on-site audio visual equipment for visitors) and relations with the local context (including web advertising).

Several previous researches have considered the available technologies dividing them in terms of use onsite or online (Clini, Angeloni et al. 2023). Today, authors believe it is hard to keep this clear distinction since (a) the same technology can be applied in several solutions both online and onsite, (b) one technology could be used at the same time to provide a phygital experience. Due to this, the authors’ perspective is of looking into museums dividing the considered digital technologies in macro groups starting from the existing literature without using a real world or digital world separation as shown in table 1.

Table 1: Considered Digital Technologies

Grouped digital technologies	Main references
Official website	<i>(Guarino, Di Palma et al. 2020, Guccio, Martorana et al. 2022, ICOM 2023)</i>
Social media	
Collection digitalization (documents, catalogues, databases, archives, etc.)	
Online services (booking, ticketing, etc.)	<i>(Guarino, Di Palma et al. 2020, Guccio, Martorana et al. 2022, Colamatteo, Sansone et al. 2024)</i>
Augmented reality/Virtual reality	
Artificial intelligence	
Mobile Apps	<i>(Guarino, Di Palma et al. 2020, Guccio, Martorana et al. 2022, ICOM 2023)</i>
Technologies into the museum’s journey	

Scholars have investigated the antecedents of Digital Transformation (Weritz, Braojos et al. 2020), the barriers (Vial 2021), described initiatives at the firm (Sia, Soh et al. 2016) and industry (Datta 2020) levels and posited Digital Transformation strategies (Gurbaxani and Dunkle 2019). The diverse use of different types of digital technologies has been examined in relation to several different issues. Rogers (1962) has focused on evaluating the stage of technology adoption. Bakhshi and Throsby (2009) have distinguished technologies according to their main function: to build a relationship with visitors, to support collection management, to support museum operations, and to support the visit. This study was done by assessing the orientation towards various stakeholder groups such as museums’ management, visitors, and content producers. With a similar conceptualization Nuccio and Bertacchini (2021) identify in the use of data the major driver of digitalization in arts and cultural organizations and show how data can make the difference in building different relationships with the whole set of stakeholders and can facilitate the development of data-driven business models in museums, theaters and festivals. The advantages and disadvantages of using digital technologies in mediating museum collections to visitors have long been a subject of discussion as well; examples include the risk of Disneyfication (Cerquetti and . 2016); whether technological tools can potentially distract visitors or isolate them from their social surroundings during their visit in the museum and limit their interaction with other visitors (Kirova 2021); and how the “generational divide” materialises into different expectations on the value of technology in museums (Carvajal-Trujillo, Molinillo et al. 2021).

These elements present in literature, have been grouped by Elia et al. (2024) into four categories that constitute the building blocks of the Digital Transformation Canvas: (1) Digital Transformation Strategy, which includes

the purpose of the initiative and the strategic direction of the digital transformation; (2) Digital Transformation Operational Pillars, which assembles the core issues of the digital transformation and systematizes them into a project; (3) Digital Transformation Value, which articulates the expected value that the initiative should create; and (4) Digital Transformation Pitfalls, which accounts for issues related to the privacy and protection of data and information in organizations.

What can be noticed is that focusing on museums, mostly a case study approach is used to explain factors linked to the introduction of a single solution. Moreover, the perceptions and experiences of museum professionals in adopting digital technologies are understudied. The challenges in the digital transformation of museums, are known but not explored in depth (Nikolaou 2024) since marketing studies mostly consider visitors' experience avoiding the museum management perspective.

6. Conclusion

Today, numerous companies, managers, and researchers are actively engaged in digital transformation, recognizing it as an essential trend for development. The drive for digital transformation in businesses stems from factors such as competition, emerging technologies, customer demands, and regulatory requirements, with economic benefits being a key motivator for companies.

In a rapidly changing digital landscape, continuous innovation is vital for maintaining a competitive edge. Organizations must explore new technologies and business models consistently. In museum contexts, the process is often iterative, with core innovation activities—such as initiation, development, implementation, and exploitation—interconnected in practice. This process not only involves cyclical actions to develop new artifacts but also requires a comprehensive view of both tangible and intangible factors that impact internal and external stakeholders, including visitors, staff, and the community.

While there is considerable literature on digital transformation, its application and importance in the cultural context remain underexplored. Understanding the challenges and opportunities at each stage of the digital transformation process can help museums leverage digital tools for success. Given the increasing significance of digitalization in art and cultural organizations, it is crucial for museums to grasp digital transformation concepts to navigate their path to success effectively.

This research aims to provide scholars interested in the cultural sphere with insights on the level of technology adoption by museums, contributing significantly to the literature on digital transformation in this field. The methodology developed for investigating Digital Transformation in museums can be replicated to yield broader insights. The findings can inform a model that offers guidelines for addressing fundamental challenges related to digital transformation.

Furthermore, scholars can enhance these insights by examining the enablers and barriers to technology adoption, which is crucial for identifying areas for improvement. Museum directors and curators can benefit from this work by understanding which technologies are most and least implemented, thus gaining clarity on their organization's strengths and weaknesses.

Overall, this research aims to shed new light on the digital transformation processes currently faced by museums, helping them better align their technology adoption decisions with market needs.

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