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To cite this article: Deborah Agostino (23 Dec 2023): COVID-19 and the economic sustainability of Italian museums: can digital technologies enhance new revenue models?, Museum Management and Curatorship, DOI: [10.1080/09647775.2023.2297352](https://doi.org/10.1080/09647775.2023.2297352)

To link to this article: <https://doi.org/10.1080/09647775.2023.2297352>



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Published online: 23 Dec 2023.



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COVID-19 and the economic sustainability of Italian museums: can digital technologies enhance new revenue models?

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ABSTRACT

This study analyses the impact of COVID-19 on the economic sustainability of Italian museums and questions whether the wide diffusion of digital technologies can enhance new revenue models. Museums have largely used digital technologies during the pandemic to offer an alternative to the onsite experience. Yet it is less clear whether and how digital technologies can also enhance new revenue models, finally contributing to the overall sustainability of museums. The survey conducted revealed that Italian museums were deeply financially affected by the pandemic, as highlighted by the reduction of onsite visitors and revenues. At the same time, Italian museums adopted different typologies of digital technologies to offer new online experiences, sometimes associated with new revenue models. This new online offer also requires an internal change of competencies and roles of the staff, supporting reflections on the future trends for the economic sustainability of museums.

ARTICLE HISTORY

Received 6 March 2023

Accepted 17 December 2023

KEYWORDS

Museum; digital transformation; innovation; technology; COVID-19; performance

Introduction

At the beginning of 2020, the infection caused by the SARS-CoV-2 virus was initially detected and on March 11, 2020, the World Health Organization declared COVID-19 as a pandemic. The pandemic posed several challenges to all the spheres of daily lives, from health care to education, working environment, and social life. The cultural sphere, and museums more specifically, have not been immune to the disease. Museums have been deeply affected by forced closure rendered heritage assets physically inaccessible. A survey conducted by UNESCO on museums worldwide evidenced that nearly 90% of the institutions had been forced to close their doors for a time (UNESCO 2021, 11). The prolonged closures and the subsequent reopening, but with restrictions on the amount of allowed visitors and approaches to the visit, significantly undermined the economic sustainability of museums worldwide. According to a report conducted at the museum level by UNESCO, museums revenues dropped by 80% from 2019 to 2020 (UNESCO 2021, 4).

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Within this dramatic context, digital technologies have represented one of the limited possibilities for museums to remain alive, offering online access to cultural heritage and cultural experiences (e.g., Agostino, Arnaboldi, and Lampis 2020; Noehrer et al. 2021; Parker and Spennemann 2021), also improving the difficult situation of finances through a payment-based service. A report by NEMO (2020) showed that, even though 90% of European museums were closed, they have been particularly active in offering several digital initiatives, such as digital exhibitions, online tours, blogs, stories posted on Instagram and Facebook, or educational online activities. Similarly, a survey conducted on US museums by the American Alliance of Museums (2020) showed that video lectures, digital entertainment activities, and online educational resources for children, parents, and teachers were among the most diffused online services provided while museums were closed. Even though we have evidence of the usage of digital technologies by museums worldwide, we have less evidence on whether these technologies are also associated with new revenue models, representing a new source of economic sustainability for museums in the aftermath of the pandemic.

This study analyses the impact of COVID-19 on the economic sustainability of Italian museums and questions whether the wide diffusion of digital technologies can enhance new revenue models. More specifically, this study addresses the following research questions:

- RQ 1) How did COVID-19 impact the economic sustainability of Italian museums?
- RQ 2) How do Italian museums exploit digital technologies for online experiences and economic sustainability?
- RQ 3) How does the adoption of digital technologies impact the organization of museums?

These questions want to offer a threefold contribution. On the one hand, the paper wants to provide a snapshot of the impact of the pandemic on Italian museums, to compare these data with those from other countries in Europe and worldwide. Some studies have provided evidence on how museums in Europe, the US, and Eastern countries reacted to COVID-19; for example, empirical studies have been conducted in Portugal (Silva et al. 2021), Austria (Brimblecombe, Pachler, and Querner 2021), New Zealand (McNaughton 2020), China (Ou 2020), Singapore (Tan and Tan 2021) UK and US (King et al. 2021; Noehrer et al. 2021; Ryder, Zhang, and Hua 2021) and South America (Longhi-Heredia, Quezada-Tello, and Cappello 2021). Yet we have limited systematic evidence on the Italian setting. Some studies tacking an Italian view endorsed a qualitative methodology based on single or multiple case studies (e.g., Greco, Rossi, and Della Torre 2020; Massi and Turrini 2020; Raimo et al. 2021), or quantitative analysis, but based on a specific typology of museums (e.g., Magliacani and Sorrentino 2021) or adopting the perspective of the audience rather than that of the museum (e.g., Cicerchia and Solima 2020). This study, instead, wants to offer a systematic view of the Italian museums' response to the pandemic relying on a survey methodology and focusing specifically on the role of digital technologies in opening new revenue models.

The second contribution of the paper is on the opportunities offered by digital technologies to enhance new revenue models by museums. Current literature has explored the potentialities of digital technologies for the preservation of the heritage (e.g.,

Barrile et al. 2019; Giuffrida et al. 2019; Palermo, Gentile, and Pellegrino 2021; Saisto 2019; Zhang et al. 2021) as well as for the offer of novel experiences to visitors for accessing the cultural heritage (e.g., Liestøl, Bendon, and Hadjidaki-Marder 2021; Partarakis et al., 2022; Raimo et al. 2021; Siniscalco, Bellia, and Marchesi 2021). The pandemic has significantly accelerated the adoption of digital technologies by museums with many studies showing the precious support provided by digital technologies, and social media above all, to ensure an online fruition of the heritage assets when museums were physically closed (e.g., Agostino, Arnaboldi, and Lampis 2020; King et al. 2021; Ryder, Zhang, and Hua 2021). Yet these current studies do not tackle the economic dimensions, offering reflections on the extent to which digital technologies, other than offering online experiences, can also contribute to revenue generation. This paper addresses this gap by offering a snapshot of (i) the typologies of technologies adopted by museums to offer online experiences and (ii) the extent to which these technologies are associated with novel revenue models for museums finally supporting museum economic sustainability.

The third contribution focuses on museums' internal organizational practices, placing the emphasis on organizational processes and competencies needed in museums to manage digital technologies on a stable base as a new revenue model. A recent literature review on cultural and creative industries claimed that 'the digital capabilities of firms and their ability to adapt were crucial components of resilience strategies for the COVID-19 pandemic' (Khlystova, Kalyuzhnova, and Belitski 2022, 1201). Yet we have limited evidence on how museums are internally organizing to offer digital services. To the best of our knowledge, the majority of the literature on digital innovation in museums typically focuses on the experiences offered to visitors, neglecting the internal organization of the activities, especially in the pandemic context. There are some investigations on internal museum processes and competencies (e.g., Carvalho and Matos 2018; Jensen 2019; Taormina and Bonini Baraldi 2022), but without a specific focus on the internal management of digital technologies in an extraordinary context like the pandemic one. This paper wants to address this issue, by exploring whether and how museum reorganized their internal processes, and, in particular the digital competencies, to face the introduction of novel digital experiences.

Empirically the paper relied on two surveys delivered to a sample of more than 500 Italian museums, monuments, and archaeological areas (out of a population of 4900 Italian museums) in spring 2021 and spring 2022, asking for data about the previous years, respectively 2020 and 2021. These cultural institutions are heterogeneous in size, geographical location, typology of collection, and governance form. Results show that:

- RQ1) During the pandemic, Italian museums suffered a reduction in onsite visitors, and consequently, revenues decreased from 2019 to 2020 respectively by 57% and by 52%. However, starting from 2021 revenues and visitors are increasing, although without reaching the pre-pandemic values.
- RQ2) During the pandemic, 80% of Italian museums offered at least one online cultural experience leveraging digital technology. These experiences have been associated with the exploitation of new revenue models, such as freemium models, membership-based models, or the selling of packages of online experiences

- RQ3) The exploitation of digital technologies also highlighted some organizational gaps concerning the competencies, strategy, and skills needed to better exploit digital technologies to offer new online experiences. Data show that 21% of Italian museums in 2021 are leveraging a formal digital strategy and a few museums (11%) rely on an internal digital team.

These results offer some reflections, that will be discussed along the paper, on the role that digital technologies can have in enhancing new revenue models, representing a new source of sustainability for museums. These results are discussed highlighting the gaps in organizational competencies and skills that are now present in Italian museums.

Material and methods

This study relies on a survey delivered to Italian museums, monuments, and archaeological areas in the early months of 2021 and early months of 2022. The choice of Italian museums is justified by three main reasons. First, Italy is the country with more heritage sites worldwide after China and no systematic evidence exists on how museums in Italy have been affected by the pandemic, endorsing a digital technology perspective. Second, in 2014 Italy endorsed a significant museum reform that included, among others, a strong reliance on digital technology and digital innovation. To cite one of the interventions, in 2018 the Ministry for Cultural Heritage in Italy launched a project for the assessment of the reputation of Italian museums based on TripAdvisor and online data generated by users (Riva and Agostino 2022). It could be interesting to exploit the engagement by museums of digital technologies in a country that pushed digital innovation even before the pandemic. The third reason is represented by the need to provide a national view that could be used for comparison with museums in other countries.

In the period between February and April 2021 and the same period in 2022, an online survey was delivered to Italian museums. Two surveys were conducted to cover the variations in the responses to the pandemic and the role of digital technologies from one year to another, posing the same questions in the two time periods (2020 and 2021). This choice allowed us to grasp the pandemic context (the year 2020 with the survey delivered in 2021), but also the actions in place in the first months after lockdown (the year 2021 with the survey delivered in 2022). Questions covered by the survey were divided into four main areas (see Annex for more details). The first area covered personal data about the museum; these include its name, its geographical location, its governance form, and its size in terms of revenues. The second area focused on the impact of the pandemic on the economic sustainability of the museum. Questions in this area relate to the amount of visitors and the trend in the onsite visitors as well as the composition of revenue by source and the evolution from 2019 to 2022. The third area of the survey focused on the role of digital technologies during the pandemic with questions exploring whether the museum offered at least an online cultural content, the type of content offered, the presence of a pay-service or a for-free service, and a qualitative evaluation of this digital cultural experience. The fourth area of the survey focused instead on organizational processes and profiles to manage the digital offer. Questions in this area concerned: the presence of a digital strategy, the typology of digital investments, and internal digital competencies and roles.

The survey was developed and disseminated using Opinio, an online survey software program. Data collected through Opinio were analyzed using Excel to generate descriptive statistics for the numeric responses. Emails have been the preferred approach to disseminate the survey, which targets the directors of museums, monuments, and archaeological areas. The database has been constructed ensuring heterogeneity of the sample in terms of size, geographical location, and type of collection. Moreover, the survey has been further distributed to museums by museum associations and other networks, such as the National Association of Italian Municipalities or the network of business museums. Alongside the delivery of the survey, phone calls were organized to stimulate the response to the questionnaire.

Through these actions, the survey received 561 responses in 2021 and 511 responses in 2022, which correspond respectively to 13% and 12% of the total number of museums active in Italy. We were not able to keep the same amount of respondents over the two years, but we ensured consistency in the distribution of the sample, which was analogous in the two different periods. The respondents within each year of analysis were heterogeneous in terms of geographical location, size, governance form, and type of collection. Respondents are distributed between the North (61%), Center (19%), and South (20%) with a slight bias toward the North. About the size (intended as number of visitors) the panel is mainly composed of cultural institutions with less than 5,000 visitors (which represent 32% of the sample in 2019 and 54% in 2020). As far as the governance form is concerned, the sample of respondents is mainly constituted by civic museums (29%), followed by State museums (17%) and public-private foundations (14%). Smaller shares are attributed to business museums (6%), university museums (5%) and ecclesiastical or religious museums (3%).

Data have been analyzed relying on Microsoft Excel and Power BI for data visualization. Once data had been collected and analyzed in both years, they were presented to museum directors to discuss with them the empirical evidence that emerged and obtained a confirmation of the main trends evidenced. These presentations occurred respectively in June 2021 and June 2022 and were organized as follows: a plenary meeting with museum managers and representatives of museums was organized and data were presented by the group of researchers. After the meeting, a presentation with a detailed analysis of the survey was sent to participants and further feedback on the insights that emerged were collected. These presentations have been useful in identifying future trends in museum management, as reported in the last section of this paper.

Results

This section presents the findings from survey responses, distinguishing between the three research questions and with the final aim to provide a snapshot of the impact of COVID-19 on Italian museums and novel revenue models that are emerging to enhance online digital experiences.

RQ1) How did COVID-19 impact the economic sustainability of Italian museums?

The first analysis relates to the evolution of the number of visitors to Italian museums from 2019 to 2021, hence considering the year before COVID-19 (2019), the year mainly

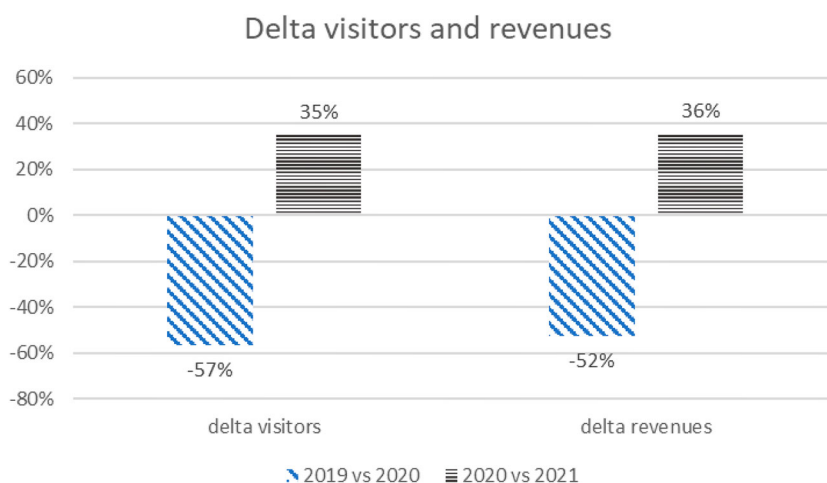


Figure 1. Delta visitors and revenues (2019–2021).

affected by the pandemic (2020), and the year of the new normal (2021). The analysis (see [Figure 1](#)) shows that, on average, the number of museum visitors decreased by 57% between 2019 and 2020, but with a positive increase in 2021 (+35%). Similarly, the same trend is visible for revenues, which decreased in 2020 and increased, although not at the same pre-pandemic values, in 2021. These data were collected by asking respondents to provide data on the number of visitors and revenues over the three years.

The decreasing trend in the number of visitors and associated revenues from 2019 to 2020 reflects the onsite closure of Italian museums for three months, from the beginning of March until the end of May. From May on, depending on the geographical location, museums could reopen, although with contingency measures related to the maximum amount of people present at the same time in the physical place. It is interesting to notice that, despite some closing periods in 2021, the amount of visitors increased, although without reaching pre-pandemic values. Similarly to the reduction of the number of visitors, also revenues from tickets decreased and increased accordingly.

Both these data on the reduction in the number of visitors and revenues from tickets showed the severe impact of the pandemic on the economic sustainability of museums. Notwithstanding the closure and the impossibility of accessing cultural places, museums were open online (Agostino, Arnaboldi, and Lampis 2020) offering a set of online content and activities to ensure entertainment and cultural activities to a wide online audience, as it will be further expanded in the next section.

RQ2) How do Italian museums exploit digital technologies for online experiences and economic sustainability?

The second research question was specifically focused on digital technologies, exploring the type of online experience offered through technologies and revenue models associated with such online experience.

As far as the online experience offered is concerned, it is interesting to notice some differences between 2020 and 2021. Focusing on 2020, the analysis showed the existence

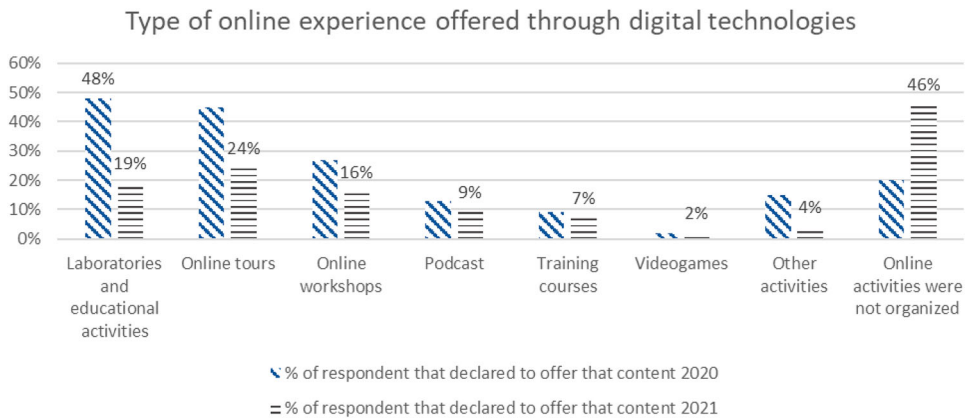


Figure 2. Type of online experience offered through digital technology (2020 vs 2021)

of heterogeneous approaches to the online activities offered by the museums. [Figure 2](#) shows that in 2020 Italian museums offered a wide variety of online experiences, which include: online laboratories and educational activities (48%), online tours (45%), online workshops (27%) or courses (9%), and videogames (2%). It is interesting to notice that, even though 20% of the museums did not offer any online experience, the remaining 80% of museums in the sample offered and experimented with more online experiences during the pandemic. For example, one museum declared to offer three different types of online experiences.

The same question posed one year later showed a different picture with the same type of online experiences offered, but by a decreasing amount of museums. If in 2020, 20% of the museums in the sample did not provide any online experience, this percentage increased to 46% in 2021. The online laboratory activities, that were offered by 48% of the museums in 2020, dropped to 19% of the museums offering them. This result seems to suggest that for some museums, the online experience offered was an exceptional condition to manage the onsite closure and, with the reopening, it seems to be a preference to remove those activities in favor of a more active onsite experience. On the contrary, for 54% of the sample, these online activities were confirmed even in the new normal times.

A second type of analysis was related to the revenue mechanisms through which these online experiences are provided ([Table 1](#)). More specifically, we distinguished between

Table 1. Typology of online experience offered.

Typology of online activity	% of respondents that offered the online experienced under payment	
	2020	2021
Laboratories and educational activities	17%	13%
Online tours	11%	10%
Online workshops	5%	5%
Podcast	0%	0%
Training courses	3%	3%
Videogames	0%	0%
Other activities	0%	0%
Online activities were not organized	0%	0%

paid services and free services, and, concerning the paid services, we further analyzed the specific type of revenue model. It is possible to observe that, on average, online experiences have been offered for free (78% of respondents), although a smaller portion of museums experimented with a paid approach. When we asked the reasons behind the choice to offer the experience for free, the museum directors explained to us that they were not ready to offer a structured online experience and experimented with novel online formats without particular analysis. To say it differently, one week after the closure in March 2020, some museums already started offering some online content; this content was considered an experiment and was not planned before. For this uncertainty on the quality and the structure of the content, the choice for some museums was that of offering the online experience for free. On the contrary, those museums that already planned or have in their cultural offer some online activities were more structured and experimented also a paid-based service. After the emergency in 2020, museum directors decided to keep those experiences mainly for free because they find it difficult to turn a service, previously offered for free, into a payment-based mode. It is interesting to notice that, despite the number of museums offering online experiences dropping from 2020 to 2021, the choice of paid service remains the same over the two years (see [Table 1](#)).

As far as the paid service is concerned, we asked specifically about the type of revenue model adopted. Results are shown in [Table 2](#).

Data show that those museums that opted for a paid service, exploited different types of revenue models, depending on the role of the user. These models comprise:

- Selling mechanisms, both concerning the selling of an individual experience (13% of respondents) or the selling of a package of experiences (9%). This revenue model is associated with the selling of single or multiple online experiences to a 'generic' user who does not gain any particular benefit other than the online experience purchased.
- Subscription (3% of respondents). This means that a subscription was required for a paid service to access that online experience. This revenue model offers a different mechanism compared to the previous one as users are required to subscribe to the service, hence this approach offers more information in terms of user profiling. Moreover, the user has access to other activities and information shared by the museum other than the purchased service.
- Donation (2% of respondents). In this case, a selling price was not defined, but the online user was required to donate an amount of money (without any constraints or limits) to access the online experience. In this case, the user gains the role of

Table 2. Typology of revenue model adopted.

Typology of revenue model	% of respondent that adopted that model
Selling of the single online experience	13%
Selling of a package of experiences	9%
Subscription or membership	3%
Donation	2%
Freemium service	1%
Service for free, but revenues from advertising or sponsorship	4%
Service entirely for free	78%

'donator'. This profile is sometimes associated with explicit recognition on online channels or additional services offered by the museum.

- Freemium service (1% of respondents). This means that a free version was provided to online users, but a fee was requested to access more dedicated online content. This revenue model is associated with the free offer mechanism to attract more visitors, with the idea to convert into payable users after the exploitation of some online experiences to access advanced content.
- Revenues from advertising (4% of respondents). In this case, the content is provided for free to the final users, but the museum has revenues from the connected advertising. In this case, the profile is not that of the single user, but that of the company, hence enhancing the business-to-business revenue model.

These data offer a snapshot of the different revenue models that could potentially be exploited by other museums to enlarge their revenue streams from online experiences. Yet, a further aspect of the existence of resources to properly exploit digital technologies needs to be investigated. This aspect is the focus of the next section.

RQ3) How does the adoption of digital technologies impact the organization of museums?

The third research question is focused on the internal management of the digital transformation to ensure online access to heritage assets and the cultural offer of a museum. The internal structure has been explored considering the following aspects: the presence of a digital strategy, the investment priorities, and the internal competencies with particular references to the presence of profiles specifically devoted to digital transformation.

As far as the strategic approach to digital transformation is concerned, results from the 2020 analysis showed that 76% of museums do not have a strategic plan to envision the digital strategy (see [Figure 3](#)). In the remaining cases, the digital strategic plan is a stand-

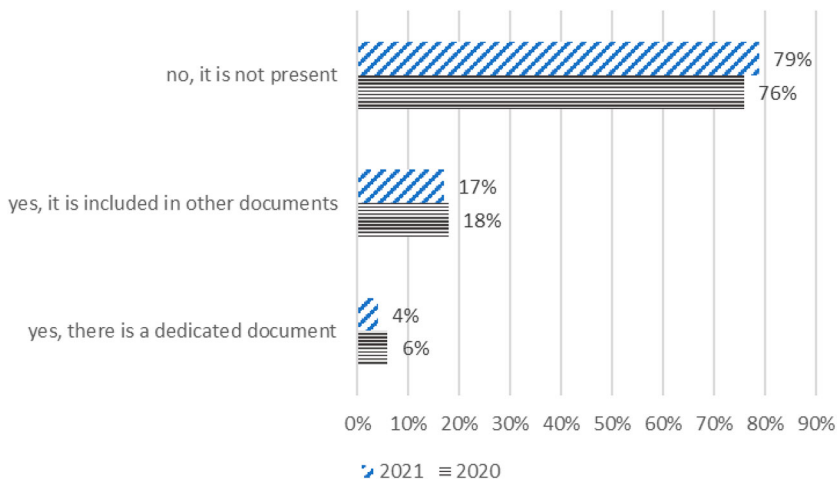


Figure 3. Level of adoption of a plan for digital strategy (2020 vs 2021).

alone document (6%) or it is included in another document (18%). It is interesting to notice that data are very similar over the two years of analysis without any significant variation in the percentages of adoption of a digital strategic plan. This result seems to suggest that, even though 2020 has been associated with an increasing number of museums leveraging online and digital experiences, these effort has not pushed museums to formalize a digital strategy.

The internal structure has been analysed also concerning the priority of digital investments for the future. Results are provided in [Table 3](#) and showed that the priorities of digital investments are mainly related to the digitalization of the collection (24% in 2020 and 28% in 2021), which is considered a necessary step to offer online experiences. It is interesting to notice that, in both years, the number of museums that do not consider digital investments as a priority was limited (2% in both years). Moreover, some changes in priorities from 2020 to 2021 are visible. If the investment in educational activities was considered a priority in 2020, its importance decreased in 2021 in favor of major interest for investments in the onsite visits and digitalization of the collection.

Finally, the last investigated aspect concerned the presence of digital competencies. This aspect has been analyzed concerning the presence of staff with digital competencies and the type of profile.

As far as the presence of digital competencies is concerned, it is interesting to notice that data are very similar comparing 2020 with 2021. 39% of the respondents (37% in 2020) do not have any professional specifically devoted to digital innovation. In the 10% of museums in the sample (11% in 2020), a digital team is present, while in the remaining cases, there are external consultants (18%/17%) or heterogeneous internal professionals without a dedicated team (34%). ([Figure 4](#))

Discussion and conclusion

The analysis of the responses of Italian museums to the pandemic highlights three main results.

The first result is related to the **economic sustainability of museums** during the pandemic, showing some trends for the new normal. As already underlined by similar research conducted in other countries (e.g., Brimblecombe, Pachler, and Querner 2021; King et al. 2021; McNaughton 2020; Noehrer et al. 2021; Ou 2020; Ryder, Zhang, and Hua 2021; Silva et al. 2021; Tan and Tan 2021), the economic sustainability of museums, with particular reference to revenues from tickets, dropped by 52% from

Table 3. Typology of digital investment.

Digital investment	2020	2021	DELTA (2021 VS 2020)
Digitalization of the collection	24%	28%	4%
Educational activities	17%	12%	-5%
Marketing, communication	16%	16%	0%
Online experiences	17%	11%	-6%
Onsite visits	14%	19%	5%
Ticketing and access control	6%	6%	0%
Preservation of the collection	2%	4%	2%
Other	2%	2%	0%
Digital investments are not considered a priority	2%	2%	0%
TOTAL	100%	100%	

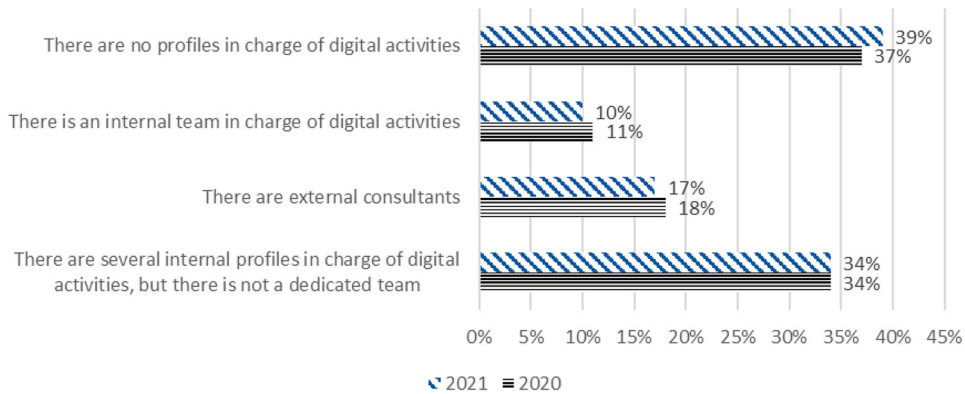


Figure 4. Type of digital competences (2020 vs 2021).

2019 to 2020. This is connected with a reduction of 57% in the number of visitors reflecting the lockdown and the onsite closure of museums. Notwithstanding this reduction, data from 2021 provides positive signals with the number of visitors and revenues increasing again, although without reaching the pre-pandemic values.

The second result is related to **the emergence of new revenue models enhanced by digital technologies**. Results show that, during the pandemic period, museums exploited digital technologies to offer new online experiences. At the Italian level, 80% of the museums offered at least one online content. Interestingly, some of these online experiences were offered under a payment mode. These payment-based services include a freemium-based model, membership-based model, single or package revenue model, and donation or sponsorship, which offer some reflections on other possible revenue streams for online content. The difference between these revenue models relies on the role of the users, who move from individual buyers to members, donators, and sponsors. The identification of different categories of users for different revenue models can also enhance different fundraising and promotion strategies to attract each typology of users.

The third area of results concerns the **internal organizational processes** with data showing that museums are still reluctant to adopt a formal digital strategy (21% of museums in 2021 have a strategic plan, either as a standalone document or included in other documents), notwithstanding the increasing adoption of digital technologies and the desire to invest in digitalization activities (such as digitalize the collection). Finally, digital skills by museum professionals are still in their infancy with the majority of museums without an internal role devoted to digital innovation or, alternatively, leveraging on external sources.

These results prompt some reflections on the possible trends for the economic sustainability of museums in the upcoming year.

The first trend is given by the **diversification of revenue streams**, highlighting that online experiences can represent a source of revenue. Data show that museums are leveraging both onsite and online experiences and that some trends that emerged during the pandemic are still in place after the emergency period. COVID-19 has accelerated the development of novel online experiences (such as online tours or online workshops),

some of which remain even after the emergency period. For example, online tours or online educational activities tested during the pandemic are still in place, although for a smaller amount of museums. This finding suggests the possibility of hybridizing the visitors' experience joining onsite and online experiences, and associating each of them with a revenue stream. The main challenges are related to the identification of how to balance between the two revenue streams and to properly select the revenue model. While in the pandemic period, the online mode was the unique approach applicable, the reopening of museums and the new normal requires museum managers to rethink how to balance between online experiences developed during the pandemic and the onsite fruition. As far as the revenue model is concerned, our study shows that Italian museums have experimented with novel approaches, such as the membership mode, the freemium services mode, or the free donation mode.

A second trend is related to the **competence gap** presented in museums nowadays to properly manage online offers. While the online offer was somehow managed in an emergency mode during the pandemic with the available resources, data from the surveys show that ad hoc staff with digital skills is often missing with 39% of respondents in 2021 who declared to have no internal profiles devoted to the management of digital innovation. Moreover, the majority of museums are leveraging external resources to exploit digital innovation (17% of museums in 2021). These data indicate that, if museums want to exploit the digital wave by leveraging online experiences as a new source of revenue, they need to invest in digital innovation profiles, which can be hybrid. On the one hand, we could assist with a hybridization of the competencies, with curatorship competencies being blended with digital skills. Digital humanities play a key role here, alongside the need to have educational courses that support the development of these hybrid competencies. On the other hand, we could also assist in a hybridization of the business models with technology providers evolving into a role of strategic partners, rather than representing a simple supplier of technology. In this way, the technology provider can become a strategic partner in the development of hybrid experiences, bridging at the same time the digital competence gap often present in museums.

A third trend is about **strategizing the digital transformation**. The analysis has shown that in 2020 the exploitation of digital technologies to offer online experiences has been emergent and based on a trial-and-error approach. This happened because of the unpredictable situation and the need to be fast in keeping alive the cultural field. The pandemic period has been a precious gym to test and try in a short period technologies and activities that in other periods would have taken years before their development. Yet museum managers are called to value the experience developed during the pandemic and evolve some good practices into novel services or novel approaches to cultural fruition. The role of technology is central here, alongside the ability to plan the role of technology in the future activities of museums. To what extent can technology enhance the capability of museums to create value? Which type of technology is the most appropriate for the museum to achieve its objective? How to maintain the digital experience sustainable over time? For digital technology to make an impact within the museum and generate value, a deep reflection on its role within the overall strategy of the museum is needed. As other sectors have already demonstrated, for a digital transformation to take place and last over time, a strategy is needed to give a vision of where to go and how. For this reason, we think that the second major trend for

museums in the new normal will be represented by the development of a digital strategy, which will provide a guideline to professionals inside the organizations on where to go and how to reach some objectives.

All in all, this study underlined that the pandemic has significantly affected the sustainability of Italian museums, while at the same time encouraging the development of novel online experiences associated with new revenue models. This study highlights the possibility of exploiting such new revenue models to enhance the economic sustainability of museums even in the aftermath of the pandemic. Data from the survey show that different types of revenue models can be identified, depending on the role of the user. These revenue models include single or package purchase, membership, sponsorship, donation, and freemium service. Finally, the paper underlines that these new revenue models can be implemented, but a reflection on the internal competencies to properly manage digital innovations is needed. Even though the analysis has been conducted on Italian museums, therefore offering a snapshot of the Italian experience, insights about new revenue models for online experiences could be adopted even by other museums in other countries.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

Deborah Agostino is an Associate Professor of Accounting, Finance and Control at Politecnico di Milano, where she is the Director of the Observatory on Digital Innovation in Arts and Cultural Activities. She is co-director of the Executive Master in Management of Cultural Institutions at Polimi Graduate School of Management. Her research activities are focused on data analytics and digital innovation in cultural institutions. She is author of over 40 publications in national and international journals on performance measurement and management in public institution.

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Annex. Structure of the questionnaire

Section A

- Name of the institution
- Geographical location (address, city, Region)
- Governance model of the museum
- Type of collection

Section B

- Number of visitors per year
- Range of revenue per year
- Revenue composition by source (ticket selling vs government and other funding)

Section C

- Presence of an online offer during the year
- Typology of online experience offered
- Presence of a payment mechanisms
- Typology of payment
- Perception of the online experience offered

Section D

- The presence of a digital strategy (formal vs informal)
- Priority of investments in digital innovation for the upcoming three years
- Presence of internal roles with digital competencies
- Typology of digital competencies available