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ANALYSIS OF CROATIAN PUBLIC MUSEUMS' DIGITAL INITIATIVES AMID COVID-19 AND RECOMMENDATIONS FOR MUSEUM MANAGEMENT AND GOVERNANCE

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ABSTRACT

The COVID-19 pandemic has presented challenges for public museums in Croatia. This study examines how museum management and professionals have responded to the closure of museums during the pandemic by exploring digital initiatives and online engagement with remote audiences. The authors analysed data from 162 Croatian museums registered in the Museum Documentation Centre in Zagreb to investigate the relationship between socioeconomic and demographic indicators and museums' digital activities using multiple regression analysis. The findings revealed that half of the museums in the sample were active online, with social media being a commonly used platform. Interestingly, museums with a stronger online presence, lower regional unemployment rates, and a lower tourism development index were more likely to engage in activities during the pandemic. The authors conclude with recommendations for museum management and governance to embrace digital acceleration and adapt to the digital age. The study findings hold significant relevance for museums preparing for future pandemics or crises as they highlight the importance of digital initiatives and online presence in ensuring continued engagement with audiences during periods of closure. By leveraging digital tools and platforms, museums can overcome physical limitations and effectively reach remote audiences, thereby enhancing their resilience and adaptability in times of crisis. This study contributes to the understanding of museums' digital transformation in response to the COVID-19 pandemic and provides valuable insights for museum practitioners, policy-makers, and researchers to shape future strategies. Further research could explore the long-term impacts of digital initiatives on museums' sustainability and visitor engagement beyond the pandemic context.

KEYWORDS: *museum management and governance, digitisation, digital strategies, innovative museum experiences, digital transformation.*

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1. INTRODUCTION

The COVID-19 pandemic has significantly impacted museums, necessitating the adoption of new forms of expression, distribution, market access, promotion, and education, including increased digitalisation of museum experiences (Marty and Buchanan, 2021). The European Digital Agenda prioritises the use of digital technologies for better access to cultural content and greater integration of European citizens (European Parliament, 2020), while the 2018 European Year of Cultural Heritage and the European Framework for Action on Cultural Heritage emphasises the importance of making culture accessible to all, including through digital means (European Commission, 2018). However, the pandemic has widened the digital divide, particularly in Europe, exacerbating existing inequalities and social exclusion (BEREC, 2022).

As the world continues to grapple with the aftermath of the pandemic, it is evident that the museum landscape has changed irreversibly, with digital transformation playing a crucial role (Giannini and Bowen, 2022). Against this backdrop, this study aims to investigate how Croatian public museums utilised information and communication technologies during the COVID-19 pandemic to adapt their operations and enhance their online presence. This study addresses the following research questions:

1. Did museum managers and professionals in Croatia find ways to stay open and communicate with the public when museums were closed in 2020 due to the COVID-19 pandemic?
2. Is the level of tourism development in Croatian regions positively correlated with the digital initiatives of Croatian public museums?
3. Were relevant socioeconomic and demographic indicators (e.g. regional GDP, GDP per capita, average income per capita, average revenue per capita, unemployment rate, aging index, vitality index, and level of education) in the county associated with the promotion of digital initiatives undertaken by public museums in Croatia during the COVID-19 pandemic?
4. Does a stronger Internet presence correspond to increased online initiatives by museums?
5. Does gender in a strategic position in the museum hierarchy affect the implementation of digital activities in museums?

The research methodology involved desk research conducted from March to June 2020 utilising publicly available official data on the social, economic, demographic, and tourism characteristics of towns and municipalities where at least one museum is located. Public museums' online activities were examined by reviewing individual museum websites and their social media use. The findings of this study, along with limitations and areas for further research, are presented in the empirical section, followed by recommendations for museum management and administration in the concluding section.

2. LITERATURE REVIEW

To better understand the functions of a museum, it is important to keep in mind the following definition of the International Council of Museums (ICOM):

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 (ICOM 2022).

This definition, which is a contemporary extension of Hudson's (1975)[1] historical definition, assumes that museums are essential to humanity and should not be closed to the public; however, it does not specify the nature of being open to the public. Thus, one can conclude that museums can be open to the public in the digital age, even if they are only online. However, they must simultaneously maintain their mission and goals for the benefit of global society. There are examples where these institutions have not adhered to some parts of the definition but have still gone to great lengths to maintain their openness to the public using digital resources during the pandemic.

It should also be noted that the above definition does not include tourism for recreational purposes, although tourism revenue cannot be ignored, particularly in countries that depend on it. Although it was possible to achieve the goals of the ICOM definition, at least in part through digital means during the pandemic, the absence of tourists had a significant impact on the sector. The cultural (OECD, 2020) and tourism (see more in Abbas et. al., 2021) sectors were among the institutions most affected by the pandemic. Museums in tourist regions of the European

1 **Kenneth Hudson used the ICOM definition in his seminal work in the Introduction, and for the sake of comparison here it is in its entirety: "A museum [...] is a permanent establishment administered in the public interest, with a view to conserve, study, exploit by various means and, basically, to exhibit, for the pleasure and education of the public, objects of cultural value" (Hudson 1975:1).**

Union (EU) reported losses of income ranging from 75% to 80% (Network of European Museums Organisations, 2020). According to the same source, large and urban museums lost up to 600,000 and 20,000 Euros each week, respectively, while museums in the capital cities lost up to 40,000 Euros per week. Museums in rural areas has lost about 5,000 euros per week; however, some fundamental changes have been noted, such as the move away from an analogue world and the acceleration of society's transition to a more digital world.

There is no doubt that technological innovation has transformed the traditional competitive landscape and reshaped industry structures, processes, and practices (Buhalis et.al., 2019). Although COVID -19 has tremendously accelerated digitisation in culture, technology has been impacting museums for at least a decade. As a result, these institutions have begun integrating technology into their collections (Parry, 2013). Several years ago, museums began to shift their focus to their visitors due to the economic crisis and the challenges of declining attendance (Jones, 2017). Information and communications technology (ICT) is playing an increasingly important role in both preserving and transmitting culture and attracting new visitors. More than 60% of museums increased their online presence since the end of the pandemic. Most museums regularly use social media, employ hashtags, and showcase individual objects to their audiences. In addition, virtual tours and online exhibitions have become more prevalent (Network of European Museums Organisations, 2020).

Full digitisation of collections as a form of ensuring their security is an important task for museums and one of the most important benefits for museum management and governance generated by digital technologies (Mamrayeva and Aikambetova, 2014). ICT also directly impacts how cultural expressions are 'created, produced, disseminated, and accessed, and the way cultural heritage is experienced, safeguarded, and shared' (UNESCO 2016). However, Correira et. al. (2010) point out that museums' use of ICT requires special attention for two reasons: (1) ICT impacts audiences, artists, and curators and (2) ICT should provide beneficial experiences for critical audiences. ICT impacts people in several ways and can improve their quality of life. However, it may also impose a burden. For these reasons, it is imperative to strategically plan the introduction of digital technology into the human ecosystem (Bradley, 2010). If there were any lingering doubts about the urgency of digital transformation to ensure the longevity of the cultural sector, the coronavirus has certainly silenced them. The ways in which people consume, share, and create cultural content have also changed. Thus, prosumers (producers and consumers) have evolved. ICT has also radically transformed museums from spaces of viewing and learning to spaces of interaction, participation, and engagement (Carlsson, 2020). Tammaro (2016) promoted the concept of 'Doing It Together', in which adopting a participatory culture and approach proved useful for museums. This was also demonstrated by Yiannoutsou and Avouris (2012). According to this study, participatory activities (e.g., game design), when supported by ICT and integrated into museum activities, can provide useful learning experiences that 'reserve for the visitor the role of collaborator and partner and entail the creation of an enduring relationship with the museum' (Yiannoutsou and Avouris 2012:5).

Today's prosumers often turn to digital platforms to learn, search for information, communicate, exchange ideas, contribute to various projects, shop, or simply enjoy various entertainment activities. Thus, if museums wish to implement participatory practices, they need to grasp the concept of being 'communities of learning that share experiences, best practices, and learn from one another, adapting to various situations and circumstances' (Tammaro 2016:43). In addition to the aforementioned aspects, Campos et al. (2015) stress the importance of active participation and interaction as important factors in co-creating tourism experiences. Consumers are co-creators of their own experiences and designers of innovation (Binkhorst, 2005). However, co-creation increases the attention and memorability of the experience (Campos et. al., 2016). As Wei et al. (2019) highlight, memorable tourism experiences are influenced by 'novelty, involvement, and social interaction'. Neuhofer, Buhalis, and Ladkin (2014:346) similarly emphasise that technology is a fundamental component for enriching experiences. Indeed, technology is an excellent way of bridging the gap between museums and millennials. By utilising and enhancing the tools that millennials employ every day, museums can provide seamless experiences that mimic everyday interactions (Nolan, 2016).

Museums are places where learning should occur on every visit but thrive in parallel with digital transformation. UNESCO (2011, 3) defines the four goals of ICT in museum education: (1) creating favourable conditions for new experiences in the perception and interpretation of museum objects and spaces, (2) creating a multimodal interactive environment for the active adoption and exploration of museum values, (3) achieving a new quality of collaboration and interaction between museum educators and their audiences, and (4) enhancing their professional development and shaping visual culture as a key element for the development of personal creativity (UNESCO,

2011). Moreover, it should not be forgotten that these institutions can be incredibly successful in increasing motivation to learn, facilitating discovery, developing new passions, and making everyday facts meaningful and relevant (Olesen, 2016). The mission of museums to collect, document, preserve, exhibit, and interpret collections must be reinterpreted in the new context of learning societies and advancing digitisation. In any case, digital technologies should not be used as an end in themselves but rather as a means to promote deeper understanding, full enjoyment, and a more immersive experience for visitors (Olesen, 2016).

Effective use of digital tools to reach a wider audience includes both enhancing and complementing users' offline cultural experiences and disseminating cultural content and knowledge in innovative ways that can ultimately change the learning process itself, improve user experiences, and attract more visitors. Indeed, it is not just about offering different platforms, products, or services to different types of visitors but also about removing digital barriers for visitors with disabilities and providing them with access. Accordingly, it is necessary to accept and recognise visitors, their wishes, and their needs (Skov & Ingwersen, 2014; Papadopoulou, 2014; Camarero, Garrido & Vicente, 2015; Black, 2016). Harnessing the power of ICT enables visitors to access and disseminate museums' culture and knowledge. Museums should be able to provide outstanding informal learning experiences and can do so through the smart use of ICT to communicate effectively and attract more visitors (Chellini, 2012; Spector, 2013).

However, innovative technologies should not only communicate concepts to visitors but also facilitate their learning through emotional engagement (mu. SA, 2019). A good example of individually contextualised informal learning in museums is the gamified approach, based on the concept of a sticker album collection, and its integration into an augmented reality (AR) mobile application, as proposed by Coelho and Costa (2017). Other good examples, such as the museum Scrabble game, have proved to be a joyful and engaging experience for elementary school children Sintoris et. al., 2010). Additionally, a specific mobile application developed to enhance the learning process in museums made it more creative (Tselios et. al., 2008).

Various other technological tools have been found to improve the user experience and attract younger generations to museums. Previous studies have identified digital games, quick response (QR) codes, apps, AR, virtual reality, and gamification have been identified as influential tools for enhancing museum experiences.

Ovallos-Gazabon et al. (2020) found that these technological tools can be effective in engaging visitors, especially younger audiences. For example, two-way QR codes allow visitors to not only access information about exhibits but also leave reviews, making them more engaging than traditional QR codes, particularly for college-age visitors (Pérez-Sanagustín et al., 2016). Attractive mobile guides can also be tailored to visitors' specific interests, resulting in increased engagement and longer time spent in exhibitions (Eghbal-Azar, 2016).

Mobile games have been shown to improve engagement, motivation, and knowledge of museum exhibits (Avouris & Yiannoutsou, 2012). However, scholars have noted that visitors ought to play a central role in designing mobile games to ensure they are effective in enhancing the museum experience. The use of technologies, such as the ambient information visualisation concept (AIVC) and Microsoft HoloLens for storytelling, has also been found to positively influence communication, interactivity, and visitor experiences in museums (Hammady, Ma & Strathearn, 2020). Virtual reality (VR) technologies have been suggested as a means of providing visitors with animated, amusing, and realistic experiences, especially for exhibits that are no longer accessible or are only temporary (Lepouras & Vassilakis, 2004).

Museum websites also play an important role in influencing visitors' experiences. Richer website content has been shown to positively influence revisiting intentions, individual visits to the museum, and recommendations to friends and family (Lončarić, Bašan & Sinkovič, 2014). Website quality and user attitudes towards websites have also been found to influence users' willingness to participate in online co-creation experiences (Jiménez-Barreto & Campo-Martínez, 2018). Some studies have proposed fully dynamic web-based virtual museums that rely on user creativity and rich content in distributed web resources (Kiourt, Koutsoudis & Pavlidis, 2016).

Social media has also been demonstrated to impact tourist behaviour at destinations, including the quality of cultural exchanges, engagement, and services offered, which, in turn, influences tourist experiences (Javed, Tučkova & Jibril, 2020; Seyfi, Hall & Rasoolimanesh, 2019). However, implementing innovative digital technologies in museums is valuable only if it adds value to existing offerings in innovative and creative ways (Kabassi, 2017).

Several factors influence the design and implementation of digital technologies in museums, including budget constraints, museum policies, relationships with the social environment, the popularity of exhibits and collections, and visitor and museum staff considerations (Papadopoulou, 2014; Lindqvist, 2012).

Since the beginning of the COVID-19 pandemic in March 2020, there has been extensive discussion

and research on how museum closures will impact the museum sector and how museums can maintain their missions without physical visitors for an extended period. Museums had to reinterpret their offerings and find ways to generate income to retain staff (Antara & Sen, 2020; Magliacani & Sorrentino, 2022). Resilience and futurology are research avenues that address the challenges posed by the pandemic (Tully, 2020). For example, the pandemic has accelerated the adoption of digital technologies in Italian public museums, primarily due to the pre-pandemic imbalance between on-site and online services (Agostino et al., 2021). This change has also been evident on visitor side, with increased demand for online content in countries, such as Spain, when quarantine periods were extended (Pourmouradian et al., 2021). Museums already affected by the 2007 financial crisis were further impacted by the pandemic, making digitisation an opportunity to revitalise the stagnant museum sector and art markets (Markopoulos et al., 2021).

Similar to how the war in the Ukraine and the resulting fossil fuel crisis spurred the adoption of green technologies, the COVID-19 crisis accelerated museum digitisation. Although these crises are not considered normal, they have prompted breakthroughs. Thus, while digital innovation is not a panacea, major changes are clearly underway (Tranta et al., 2021).

The results of empirical research are presented and discussed in the next section.

3. EMPIRICAL RESEARCH

3.1. Methodology

This study, conducted between March and June 2020, involved three steps. First, data from 162 Croatian museums were collected from the Museum Documentation Centre database of Zagreb. Information on the online activities of these museums during the COVID-19 pandemic was collected from their websites and social media platforms, such as Instagram, Twitter, and Facebook. Second, official data were gathered on the socio-demographic, economic, and tourism characteristics of cities, municipalities, and regions in Croatia where at least one active museum is located. Finally, multiple linear regression analysis was performed on the collected data, with the dependent variable in the regression being 'activities during the COVID-19 pandemic'. The measures used in the analysis are presented below.

The *measurement of a museum's Internet presence* was based on the presence (yes [1]/no [0]) of the following factors: (1) museum website, (2) Facebook page, (3) Twitter account, (4) Instagram account, (5) virtual walk, and (6) representation in the Europeana database. The scores were summed, resulting in a range of 0 (not present on the Internet) to 6 (fully present). The mean score (M) was 2.88 with a standard deviation (SD) of 1.4.

The *up-to-datedness of museum websites* was rated on a 4-point scale comprising no website (0), outdated (1), quasi-modern (2), and modern (3). The ratings were based on the authors' qualitative assessment of the websites, considering criteria such as current news, ease of use, updated information sections about the museum, and the overall design experience (Mean (M)=2.05, Standard deviation (SD)=1.1).

Pandemic activities were reviewed for all 162 museums. We considered the following types of digital activities: online collections, 360° tours, virtual museums, online publications, and digital exhibitions, consistent with the categories used in a 2020 study conducted by UNESCO on museums worldwide during the COVID-19 pandemic. The authors assigned codes based on the presence or absence of these activities: 1) museums had at least one type of mentioned activity and 0) museums had no activities. The authors did not quantify each activity as the activities were not balanced and a museum could have a single activity with a higher intensity than multiple activities with a lower intensity in another museum.

The parameters used for the explanation of the differences among the museums (*local/regional statistics*) included the number of inhabitants of a town/city/municipality based on the 2011 Census (M=181829.04, SD=299985.12), the number of inhabitants in the county[2] based on the 2011 Census (M=343159.91, SD=245616.18)[3], the county GDP (Gross Domestic Product) (M=40062.59 kn, SD=45812.13), the county BDP per capita (M=96313 HRK, SD=40918.49), the standardised average income per capita at the municipal level (M=113.76, SD=11.98), the standardised average (source) revenues per capita at the municipal level (M=107.31, SD=10.45), the municipality development index in 2018 (M=107.52, SD=6.38), the standardised unemployment rate in 2018 at the municipal level (M=104.11, SD=6.25), the standardised aging index (M=101.96, SD=3.43), the standardised vitality index 2006–2016 (M=103.80,

2 'County' and 'region' are both used in the literature for Croatian administrative territorial subdivisions, many times interchangeably.

3 Data were taken from (Croatian Bureau of Statistics n.d.)

SD=5.66), the standardised level of education[4] (M=118.59, SD=14.25), the 2020 tourism development index at the municipal level (M=23.43, SD=7.82) and the gender of the manager[5] (0=male, 1=female; 98 females, 60.5%).

Vaz et al. (2018) and Esposito and Ritchi (2020) employed a methodology similar to that used in the present study. Their research focused on investigating, presenting, and discussing various interactive technologies employed in museum exhibitions on a global scale. Similarly, Agostino, Arnaboldi, and Lampis (2020) adopted a comparable methodology in their examination of the response of Italian state museums to the closure of their physical locations during the COVID-19 pandemic. Pop and Borza (2016) conducted a similar study, albeit with a smaller sample of museums in Baia Mare, Romania, in which they explored museums' technological innovations and online communication. Their findings highlighted that museums tend to make limited use of modern technologies, with only a few employing ICT for interactive and visitor engagement purposes. The methodologies employed in these studies were also consistent with those used by Lepouras and Vassilakis (2004) and Chivarov et al. (2013), who proposed the potential application of mobile digital technologies such as QR codes and mobile devices for the presentation and promotion of cultural heritage in cultural institutions. Both studies discussed the benefits of such initiatives and emphasised the sustainability and replicability of the results.

3.2. Research results

Table 1 shows that three regions, i.e., the city of Zagreb, the Dalmatia-Split region, and the Istria region, stand out in terms of the number of museums. Museums are located in 37 towns/cities and municipalities, 16 of which have more than one officially registered museum. Notably, Zagreb had the highest number of registered museums with 31 (19.1% of the total), followed by Split with nine (5.6%), Rijeka with five (3.1%), Dubrovnik with four (2.5%), Zadar with four (2.5%), Pula with four (2.5%), Osijek with three (1.9%), and Samobor with three (1.9%) museums. These eight cities account for 39.10% of all public museums in Croatia.

Most museums in Croatia (86%) had websites, indicating a strong online presence. Among the various social media platforms, Facebook was the most commonly used, with 88.3% maintaining a presence on the platform. In contrast, only 31.5% of museums used Instagram, which is known to be more popular among the younger generations. Additionally, 20.4% of museums published content on Twitter, which was the least widely used social media platform among museums, as illustrated by Figure 1.

During the COVID-19 pandemic, 87 public museums in Croatia engaged in various online activities, as listed in Table 2. Notably, 31.5% of these museums (51 in total) offered virtual walks as part of their online offerings, allowing audiences to explore exhibits and collections remotely, which highlights the growing trend of museums leveraging digital technologies to adapt and continue engaging with audiences during challenging times.

The findings presented in this study differ from those of Domšić, Franić, and Perić (2022), who reported that a higher percentage (77.8%) of museums in Croatia were digitally active during the pandemic. Domšić, Franić, and Perić (2022) also identified 15 distinct categories of online activities, although not all of these activities were specifically tailored to the unique circumstances of the pandemic. These variations in findings may be attributed to the differences in methodology, sample size, or data collection periods between the two studies. Nonetheless, both studies highlight museums' increased adoption of digital activities in response to the pandemic, showcasing the growing significance of digital engagement strategies in the cultural sector.

The multiple linear regression analysis was conducted with the dependent variable 'activities during the COVID-19 pandemic' and four blocks of predictors The first block includes the following variables: the number of inhabitants in a town/city/municipality (the 2011 Census), the number of inhabitants in the region (the 2011 Census), the aging index, the level of education index, and the vitality of the population index. The second block included predictors such as the development index, the average income per capita, average source income per capita, the average unemployment rate, and the tourism development index. The third the block included predictors related to website up-to-datedness and Internet presence. Finally, the fourth block had only one predictor: the gender of museum employees. Multiple linear regression analysis is a statistical method used to examine the relationship between multiple predictors and a single dependent variable and can provide insights

4 Data for the standardised average income per capita, the standardised average (source) revenue per capita, the municipality development index in 2018, the standardised unemployment rate in 2018, the standardised ageing Index, the standardised vitality index 2006–2016, and the standardised level of education were taken from the site of the Croatian Ministry of Regional Development and EU Funds (Ministry of Regional Development and EU Funds 2018).

5 Retrieved from (Muzejski dokumentacijski centar n.d.).

TABLE 1. County distribution of museums

County	Freq.	%
Zagreb County	10	6.2
Krapina – Zagorje County	6	3.7
Sisak – Moslavina County	5	3.1
Karlovac County	3	1.9
Varaždin County	4	2.5
Koprivnica – Križevci County	3	1.9
Bjelovar – Bilogora County	2	1.2
Primorje - Gorski Kotar County	10	6.2
Lika – Senj County	4	2.5
Virovitica – Podravina County	2	1.2
Požega – Slavonia County	2	1.2
Brod – Posavina County	4	2.5
Zadar County	7	4.3
Osijek – Baranja County	8	4.9
Šibenik – Knin County	4	2.5
Vukovar – Srijem County	6	3.7
Split – Dalmatia County	24	14.8
Istria County	13	8.0
Dubrovnik – Neretva County	12	7.4
Međimurje County	2	1.2
City of Zagreb	31	19.1
Total	**162**	**100.0**

Source: Authors.

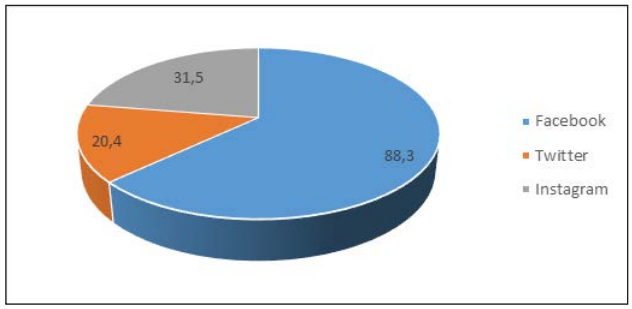

FIGURE 1. Use of social media in Croatian public museums (%)

SOURCE: Authors.

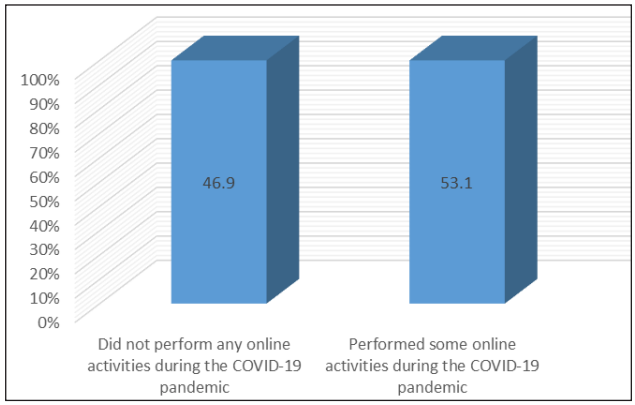

FIGURE 2. Online activities offered to remote audiences during the COVID-19 pandemic

SOURCE: Authors.

TABLE 2. Correlations of all the variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 – Activities During COVID-19 Pandemic														
2 - Internet Presence	.354**													
3 – Nr. Inhabitants Municipality (Census 2011)	.224**	.069												
4 - Nr. Inhabitants Region (Census 2011)	.243**	.039	.907**											
5 – Website Up-to-Datedness	.228**	.543**	.124	.059										
6 – GDP per Capita - Region – in HRK	.139	-.011	.882**	.796**	.039									
7 –Municipality Development Index/ Town	.151	.047	.713**	.691**	.071	.804**								
8 – Average Income per Capita in Town/ Municipality – in HRK	.166*	.090	.763**	.696**	.097	.811**	.918**							
9 – Average Source Revenue per Capita	.107	-.035	.576**	.568**	-.001	.723**	.887**	.758**						
10 – Average Unemployment Rate	-.112	-.078	.277**	.219**	.090	.515**	.696**	.608**	.633**					
11 – Standardised Vitality Index (2006–2016)	.050	-.089	.363**	.466**	-.012	.477**	.700**	.429**	.665**	.576**				
12 – Standardised Aging Index	.061	.036	.017	.052	.028	-.153	-.147	-.215**	-.341**	-.292**	.131			
13 – Level of Education	.236**	.187*	.755**	.724**	.099	.739**	.865**	.847**	.699**	.369**	.428**	-.158*		
14 – Municipality Tourism Development Index /Town 2020	.021	.032	.341**	.389**	-.038	.527**	.729**	.533**	.767**	.526**	.602**	-.373**	.662**	
15 – Management (Gender)	.111	-.054	-.025	-.043	.029	.039	.051	.046	.151	.120	.008	-.153	-.056	,019

NOTE: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).
SOURCE: Authors.

into the significant predictors that contribute to the variance in the dependent variable 'activities during the COVID-19 pandemic'. Table 2 presents the correlations of all variables.

The multiple linear regression analysis revealed that three variables had a significant relationship with the 'activities during the COVID-19 pandemic' variable. These variables were: (1) the average standardised un-

TABLE 3: The relationship between online digital activities of Croatian museums and selected indicators

	Existence of relationship	
Socio-demographic indicators	Number of Inhabitants in the Municipality	No
	Number of Inhabitants in the Region	No
	Level of Education	No
	Management Gender	No
Economic growth and development indicators	GDP per Capita - Region – in HRK	No
	Municipality Development Index	No
	Average Income per Capita in Town/ Municipality	No
	Average Source Revenue per Capita	No
	Standardised Unemployment Rate	Yes
	Standardised Vitality Index	No
	Standardised Aging Index	No
Tourism indicators	Tourism Development Index	Yes

SOURCE: Authors.

employment rate, (2) the tourism development index, and (3) Internet presence. Statistical significance was determined using the F-test, with a significant F-value of F (15, 146) = 3.538 and a p-value of less than 0.000. The R^2 value, which represents the proportion of variance in the dependent variable explained by the predictors, was found to be 0.267, indicating that the model explained 26.7% of the variance in 'activities during the COVID-19 pandemic'.

The results also showed that the other analysed variables did not have a significant relationship with the online activities of public museums during the COVID-19 pandemic; therefore, they were not considered good predictors in this model (see Table 3). This suggests that the variables included in the first three blocks of predictors (number of inhabitants, aging index, education level, vitality of the population, development index, average income, average source income, website up-to-datedness) did not significantly contribute to explaining the variance in 'activities during the COVID-19 pandemic'. However, the variables related to the average standardised unemployment rate, tourism development index, and Internet presence were found to be significant predictors in this analysis.

Based on the results of the multiple linear regression analysis, three variables were found to be significant predictors for a museum to have 'activities during the COVID-19 pandemic': the standardised unemployment rate, the tourism development index, and Internet presence.

- *The standardised unemployment rate* was a significant predictor, with a beta (β) coefficient of -0.497, a t-value of -2.63, and a p-value of 0.010. The negative beta coefficient indicates that for every 0.040 decrease in the average unemployment rate, museums become more likely to engage in more online activities during the COVID-19 pandemic. The 95% confidence interval for the beta coefficient was [-0.070, -0.010], suggesting a statistically significant effect.
- *The tourism development index* was also found to be a significant predictor, with a beta (β) coefficient of -0.377, a t-value of -2.10, and a p-value of 0.037. The negative beta coefficient indicates that for every 0,024 points decrease in the tourism development index, museums become more likely to engage in more online activities during the COVID-19 pandemic. The 95% confidence interval for the beta coefficient was [-0.047, -0.001], suggesting a statistically significant effect.
- *The Internet presence* was also found to be a significant predictor, with a beta (β) coefficient of 0.305, a t-value of 3.35, and a p-value of 0.001. The positive beta coefficient indicates that for every 0,109 points increase in the Internet presence, museums become more likely to engage

in more online activities during the COVID-19 pandemic. The 95% confidence interval for the beta coefficient was [0.045 , 0.174], suggesting a statistically significant effect.

These findings suggest that museums in Croatia were more likely to engage in online activities during the COVID-19 pandemic when the unemployment rate was lower, when there was more tourism development, and when their Internet presence scores were higher.

4. DISCUSSION

The COVID-19 pandemic has forced museums worldwide to adapt and evolve and Croatia is no exception. Most museums in Croatia have a limited online presence, with only websites and Facebook pages. However, according to the multiple linear regression and data analysis results, museums with a larger web presence, a lower average unemployment rate in the town or municipality in which they are located, and a lower tourism development index were more likely to conduct at least some minimal activities during the pandemic (Franulić, n.d.).

In addition to the challenges posed by the pandemic, Croatian museums also face institutional constraints. Following Croatia's independence in 1991, the country underwent administrative reorganisation with the establishment of 20 administrative regions and the city of Zagreb as the capital. Subsequently, new laws were adopted to accommodate the fledgling administrative system and address issues related to cultural heritage and international associations for professional associations (Franulić, n/d). The first law specifically addressing the establishment of public museums in Croatia, enacted in 1998, provided a clear definition of museums and institutions responsible for movable cultural heritage (Franulić, n/d). The laws on museums (*lex specialis*) and institutions (*lex generalis*) serve as foundational laws that regulate the legal status, structure, and operations of public museums in Croatia.

Unlike other countries where the museum founder is typically also the owner of museum content, in Croatia, much of the museum content still belongs to the state, a legacy that has persisted from the socialist era. The organs of a public museum in Croatia include the director, experts, and the management council, all of whom are tasked with the obligation to establish a management and expert council related to the number of museum employees. If a public museum has more than five employees, the founder must establish a management council, with members selected from various fields of expertise (Franulić, n/d). All public museums in Croatia are connected to the Museum System of the Republic of Croatia, which promotes a unified professional approach to museum activities and ensures that museum employees participate in the same educational programmes at the national and international levels, possibly contributing to the similarity in museum operations across the country.

Despite the aforementioned legal and institutional frameworks, Croatian museums face challenges related to budgetary constraints. Most funds for daily museum operations, including salaries, programs, material expenses, investments, maintenance, and purchase of museum inventory, are provided by the founders. In addition, special program funds may be provided by founders, public administrative bodies, other legal entities, or individuals based on special interests (Franulić et al., 2023). To supplement their funding, museums generate income through ticket and souvenir sales and other means. However, budget limitations often hinder museums from fully capitalising on technological advancements and offering innovative technology-enabled cultural experiences to their audiences.

Moreover, Croatian museums encounter challenges in terms of human resources, with a shortage of professional staff such as marketing experts and museum educators. For example, according to the available data, museum educators constitute only 3% of the professional staff in Croatian museums, (Jelavić and Bertek, 2019). This lack of expertise in areas such as marketing and education hampers museums' capacity to effectively engage audiences and generate revenue through creative means, including digital experiences.

In terms of visitor demographics, the latest data from the Museum Documentation Centre indicate that in 2021, public museums in Croatia welcomed 2,549,841 visitors. The majority were adults and individual visitors, accounting for 48.94% of the total, followed by foreign visitors (i.e. tourists) at 26.57% (Museum Documentation Centre, 2022).

The results indicate that the relationship between museums and local or regional governments is crucial for obtaining funding for the digital promotion of heritage. Cities and municipalities with lower unemployment rates may have more resources to allocate to museums to indirectly or directly support their digital initiatives. Museum professionals, directors, and management councils have the final say in museum programs and budgets; thus, their willingness to embrace innovation and invest in digital experiences is pivotal.

In less developed communities and regions with limited budgets, museums can explore alternative

funding instruments such as national government subsidies, EU funds, special tenders for the digitisation of culture, and cooperation with educational institutions. Collaboration with destination management organisations and local governments can also be beneficial as they share the goal of attracting more visitors to the destination, leading to economic benefits that can be reinvested in culture and heritage promotion.

The study findings also highlight the importance of Internet presence, with websites and social media platforms serving as the 'museum experience' during the COVID-19 pandemic. Some museum professionals and directors recognise the value of digital transformation and invest in updating their online offerings. Additionally, gender does not seem to play a role in the implementation of digital activities, suggesting that institutional and legal factors have a stronger influence.

Institutional isomorphism (coercive, mimetic, and normative), as proposed by DiMaggio and Powell (1983), could help explain the study results . Coercive isomorphism refers to pressure from laws and regulations, mimetic isomorphism involves emulating successful models, and normative isomorphism relates to adherence to professional norms. These forms of isomorphism may shape museums' decision to adopt digital activities. However, other theoretical approaches and the unique context of museums in Croatia should also be considered, such as innovation diffusion theory (Rogers, 1962), resource dependence theory (Pfeffer and Salancik, 1978), and strategic management theories (e.g. Porter, 1980), could provide further insights into the factors influencing museums' digital activities. Finally, the specific context of museums in Croatia, along with the unique organisational dynamics and external factors at play, should also be considered when interpreting the results and applying theoretical frameworks.

5. CONCLUSION AND RESEARCH LIMITATIONS

The authors of this study contributed to the existing literature by analysing the impact of different development indicators on the decision-making process of museum management when it comes to implementing digital activities for promoting access to museum heritage and maintaining a relationship with the public. While digitisation may be considered a buzzword and a fad in today's museums, it is a path that museum management is increasingly pursuing. To adequately prepare for a successful digital future, museum management and expert councils, directors, and professionals must move away from one-size-fits-all solutions and instead focus on customised approaches based on the specific content to be delivered to the specific target audience. Given museums' educational mission, among other responsibilities, it is time to reimagine audience engagement and education using diverse digital approaches.

The COVID-19 pandemic has significantly impacted museums, underscoring their need to rethink their roles and address long-standing challenges. To avoid reverting to traditional ways of operating in society, museums must transform into adaptive institutions that can create sustainable cultural models with new ideas to strengthen the resilience of the cultural sector as a whole. This requires a thorough analysis and revision of a range of interrelated elements from museums' internal and external environments, including human and physical resources, infrastructure, accessibility (both physical and marketing), design, and technology.

It is imperative for Croatian museum experts, management councils, directors, and professionals to take several strategic actions. First, a re-evaluation of internal capabilities is necessary, which includes assessing the skills, expertise, and resources available within the museum. Second, a rethinking of organisational culture is required to determine which technologies are more or less relevant to the museum's purpose and audience and to foster a culture of innovation and digital readiness. Third, a change in operating models may be necessary to ensure museums are well aligned with the digital future, which could involve restructuring processes, workflows, and museum roles. Fourth, it is crucial to develop strategies to enhance resilience to future crises, including contingency planning and risk management. Fifth, changes or redevelopment of communication and marketing strategies are needed to effectively promote museum offerings in the digital realm. Sixth, planning for digital transformation should be prioritised, including investments in the necessary technologies, infrastructure, and training of museum staff. Seventh, creating networks among museums, local and regional governments, destination management organisations, destination management companies, educational institutions, and the local community or public can foster collaboration, knowledge-sharing, and joint initiatives to benefit both the cultural sector and the destination. Finally, investing in socially responsible advocacy can help improve government responses at the national level and create an environment conducive for museums to thrive during the digital era.

A key aspect of the digital transformation plan for Croatian museums is offering a wide range of digital experiences to generate revenue. This could

include special online stories, events, virtual and virtual educational courses, and other innovative offerings that could be monetised through admission charges or other revenue streams. In countries that heavily rely on tourism, such as Croatia, collaboration between destination management organisations and museums is crucial. Such collaboration can help museums implement innovative digital technologies that add value to the destination and enhance visitors' experiences while also promoting museums as attractions that incorporate digital innovations into their offerings. Research on the topic of stronger Internet presence and the application of various digital activities in museums should continue, with a particular focus on determining the challenges regarding the financial and human resources needed to intensify these activities. Conducting on-site or online interviews with expert councils, directors, and museum professionals can provide deeper insights into funding and staffing challenges and help identify possible solutions to overcome these obstacles.

6. THEORETICAL AND PRACTICAL IMPLICATIONS

The COVID-19 pandemic has highlighted the importance of a strong digital presence in museums and other cultural institutions. Although it may be challenging to monetise online offerings during a crisis, it is vital for museum management and other stakeholders to continue exploring innovative ways to generate revenue through digital means. This may involve implementing online ticketing, creating paid virtual tours or educational courses, offering exclusive content to members or donors, or partnering with sponsors or advertisers for digital collaboration. It may also be necessary to rethink pricing models and find and establish a better balance between accessibility and sustainability.

Additionally, the current study's results can serve as valuable resources for policy-makers, benefactors, and other stakeholders involved in supporting the cultural sector. Understanding the challenges and opportunities of digital transformation in museums can inform decision-making at the national, regional, and local levels. This may include allocating funding and resources to support museums in their digital endeavours, promoting policies that foster innovation and collaboration, and creating a supportive ecosystem for museums to thrive in the digital era.

It is also important to acknowledge that digital transformation is an ongoing process rather than a single event. Museums must adapt accordingly as technology continues to evolve. This may involve regularly reassessing their digital strategies, investing in staff training and professional development, and staying abreast of emerging technologies and trends in the cultural sector. Collaboration and knowledge-sharing among museums and with other relevant stakeholders can play a crucial role in navigating the digital landscape and ensuring the long-term sustainability of museums in the digital age.

In conclusion, the study findings shed light on the complexities and opportunities of digital transformation in museums and provide valuable insights for museum management, expert councils, directors, professionals, policy-makers, and other stakeholders. By following the strategic approach outlined in this study and continually adapting to the changing digital landscape, museums can enhance their digital presence, improve audience engagement and education, generate revenue, and contribute effectively to the resilience and sustainability of the cultural sector. With careful planning, strategic investments, and a forward-thinking mindset, museums can thrive in the digital era and continue to fulfil their mission of preserving and promoting shared cultural heritage.

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ANALIZE DIGITALNIH INICIJATIVA HRVATSKIH JAVNIH MUZEJA U DOBA COVID-19 I PREPORUKE ZA UPRAVLJANJE I UPRAVLJAČKU STRUKTURU MUZEJA

SAŽETAK

Pandemija COVID-a 19 dovela je do novih izazova za hrvatske javne muzeje. Ova studija ispituje načine na koje su se menadžment i stručnjaci muzeja odazvali na zatvaranje muzeja tijekom pandemije, korištenjem digitalnih inicijativa i on-line odnosom s publikom na daljinu. Autori analiziraju podatke iz 162 hrvatska muzeja, upisana u Muzejskom dokumentacijskom centru u Zagrebu, kako bi istražili odnos socioekonomskih i demografskih pokazatelja s digitalnim aktivnostima muzeja, koristeći višestruku regresiju. Rezultati otkrivaju da je polovina muzeja u uzorku bila aktivna on-line, uz često korištenje društvenih medija. Zanimljivo je da su muzeji s jačom online prisutnošću, nižom stopom regionalne nezaposlenosti i nižim indeksom razvoja turizma bili skloniji uključivanju u aktivnosti tijekom pandemije. Autori pružaju preporuke za menadžersko i vlasničko upravljanje muzejima, kako bi se prihvatio digitalni razvoj i postigla prilagodba digitalnoj eri. Rezultati ove studije imaju značajne implikacije za muzeje u pripremi za buduće pandemije ili krize, jer ističu važnost digitalnih inicijativa i on-line prisutnosti u osiguravanju kontinuiranog odnosa s publikom tijekom razdoblja zatvaranja. Iskoristivši digitalne alate i platforme, muzeji mogu prevladati fizička ograničenja i dosegnuti udaljenu publiku, čime poboljšavaju svoju otpornost i prilagodljivost u kriznim vremenima. Ovo istraživanje doprinosi razumijevanju digitalne transformacije muzeja u odgovoru na pandemiju COVID-a 19 i pruža vrijedan doprinos, značajan za praktičare u muzejima, donositelje javnih politika i istraživače, u oblikovanju strategija za budućnost. Daljnja istraživanja trebaju istražiti dugoročne učinke digitalnih inicijativa na održivost muzeja i angažman posjetitelja izvan konteksta pandemije.

KLJUČNE RIJEČI: *menadžersko i vlasničko upravljanje muzejima, digitalizacija, digitalne strategije, inovativna iskustva u muzejima, digitalna transformacija.*