

Cultural tourist and user experience with artificial intelligence: a holistic perspective from the Industry 5.0 approach

Alicia Orea-Giner, Ana Muñoz-Mazón, Teresa Villacé-Molinero and Laura Fuentes-Moraleda

Abstract

Purpose – The purpose of this paper is to analyse the future of the implementation of artificial intelligence (AI) technologies in services experience provided by cultural institutions (e.g. museums, exhibition halls and cultural centres) from experts', cultural tourists' and users' point of view under the Industry 5.0 approach.

Design/methodology/approach – The research was conducted using a qualitative approach, which was based on the analysis of the contents obtained from two roundtable discussions with experts and cultural tourists and users. A thematic analysis using NVivo was done to the data obtained.

Findings – From a futuristic Industry 5.0 approach, AI is considered to be more than a tool – it as an integral part of the entire experience. AI aids in connecting cultural institutions with users and is beneficial since it allows the institutions to get to know the users better and provide a more integrated and immersive experience. Furthermore, AI is critical in establishing a community and nurturing it daily.

Originality/value – The most important contribution of this research is the theoretical model focused on the user experience and AI application in services experiences of museums and cultural institutions from an Industry 5.0 approach. This model includes the visitors' and managers' points of view through the following dimensions: the pre-experience, experience and post-experience. This model is focused on human–AI coworking (HAIC) in museums and cultural institutions.

Keywords Artificial intelligence, Industry 5.0, User service experiences, Cultural institutions, Cultural tourist, User experience, Managers

Paper type Research paper

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1. Introduction

The use of artificial intelligence (AI) applications in the service sector has been linked to what is known as Industry 4.0. However, future conditions contemplate the establishment and development of Industry 5.0. Industry 5.0 is not a simple chronological continuation or alternative to Industry 4.0 paradigm (Carayannis and Morawska-Jancelewicz, 2022). Considered as the next industrial revolution, Industry 5.0 takes advantage of the creativity of human beings in collaboration with efficient, intelligent and precise machines to obtain efficient resources and solutions adapted to the user (Maddikunta *et al.*, 2021). According to Maddikunta *et al.* (2021), Industry 5.0 adds value through innovative additive manufacturing, predictive maintenance, hyper customisation and cyber-physical, cognitive systems. It facilitates robots and skilled individuals to work together to produce customised services.

The services sector has gradually adopted Industry 4.0 tools, as well as technologies such as robots, AI and service automation (Ruel and Njoku, 2020; Samala *et al.*, 2020). However, services sector requires taking a step further towards Industry 5.0 tools (Calero-Sanz *et al.*, 2022). Cultural institutions (e.g. museums, exhibition halls and cultural centres) fulfil a relevant role in many different

fields (e.g. education, exhibition, protection, conservation, tourism and research). These institutions are embracing Information and Communications Technology (ICT) to co-create and provide services that respond better to customer preferences in the experience society (Hanafiah and Zulkify, 2019; Marasco *et al.*, 2018) and to attract tourists as well as young users (Bonacini and Giaccone, 2021; Hausmann and Schuhbauer, 2021). However, cultural institutions need to thoroughly analyse all their data sources and implement AI to improve their decision-making processes in the future, focused on Industry 5.0 (Huang and Jia, 2022).

The literature review reveals that no study has investigated visitors' and managers' perceptions of AI applications in museums and cultural organisations from the 5.0 perspective. Recent research approaches AI implementation in cultural organisations (museums) from the users' perspectives and a quantitative prism (Webster and Ivanov, 2022; Fuentes-Moraleda *et al.*, 2021). Industry 5.0 is a new concept, and there is little literature around it. It has been gaining attention recently among the research community. Nevertheless, research under the 5.0 paradigm mainly focuses on the manufacturing landscape, considering Industry 5.0 around introducing a human-robot co-working environment and creating a smart society (Akundi *et al.*, 2022). In addition, although robots and other AI technologies have been used in museums and cultural institutions for more than a decade (Polishuk *et al.*, 2011), the potential of these technologies to create collaborative experiences remains unexplored. They can generate collaborative experiences – not mere interactions – which would facilitate the customisation of the technology's functionality and its adaptation to specific needs. Besides, AI plays a strategic role in influencing users' experience in art galleries and museums (Singh and Atta, 2021). To fill these gaps, and due to the topic's relevance, this study aims to analyse the future implementation of AI technologies in services experience provided by cultural institutions from experts', cultural tourists' and users' points of view under the Industry 5.0 approach.

The research focuses on Spain for several reasons. Spain is one of the most visited tourist destinations worldwide. Official statistics from Culture Ministry (2021) indicates that 10% of the total trips made by residents in 2020 for leisure, recreation or vacations were initiated mainly for cultural reasons. International tourists' trips reached 21.2% with cultural motivations. Altogether, the culture mobilised more than 8 million trips in 2020, with an associated expenditure of more than 5,000 million euros, figures close to 50% of the year pre-pandemic (2019). These data show that cultural institutions welcome tourism money, but they typically hesitate to present themselves as tourist attractions or pander to tourist tastes (Richards, 2019). Additionally, besides their economic impact, cultural institutions also influence the image of destinations in ways that can affect tourism and local inhabitants (Cristobal-Fransi *et al.*, 2021). This paper provides a holistic analysis of the application of AI in enhancing the service experience from both the users' and experts' perspectives.

To this end, a qualitative approach has been used for a deeper understanding of the experience of the cultural tourist as a user of cultural institutions. This is because it allows us to analyse much more than the experience of the visitor, who accesses the institution but does not receive a direct emotional link to it. The visitor does not visit cultural institutions as a passer-by (Falk and Dierking, 2016). However, the user identifies with the cultural institution and wants to be part of it by being involved in the whole process. It is also essential to involve managers and staff of cultural institutions in this process (Ferreiro-Rosende *et al.*, 2022).

2. Theoretical framework

2.1 Cultural tourism and the role of experience-based technological innovation in cultural institutions

Previous research has shown that AI may assist tourism businesses increase their efficiency, output and profitability (Yu *et al.*, 2020; Samara *et al.*, 2020). Culture has served as a tool for preserving identity as well as a method of social and economic growth under the canopy of resources provided by cities (Richards, 2018). Cultural tourists present an interest to engage in activities that satisfy their interest in art, architecture and history, with a special interest in satisfying

their quest for self-realisation and self-discovery (Niemczyk, 2014). Consequently, cultural tourists are interested in one of the most important aspects of AI application on tourism that is offering a personalised, convenient and rich experience (Gasteiger *et al.*, 2021).

As stated by previous studies (Ambrecht, 2014; Orea-Giner *et al.*, 2021a), museums have economic, social and environmental implications in addition to encouraging cultural tourists. Although there are great cultural institutions and museums of international importance that may be considered innovative organisations, museums and exhibition halls, as cultural institutions, are usually considered non-innovative (Camarero *et al.*, 2015; Capriotti, 2010; García-Muiña *et al.*, 2019). One of the main reasons for this is their size: most museums and exhibition halls in large cities are small or medium-sized (Capriotti, 2010); another reason is their public ownership (Hughes and Luksetich, 2004; Kirchner *et al.*, 2007).

Due to a push from the tourism sector, cultural tourism is generating changes in the adoption of AI tools considering that these technologies offer the ability to increase access to cultural institutions while also disseminating information about them (Solima and Izzo, 2018).

Museums and cultural institutions have implemented chatbots or computer programmes designed to simulate conversation with human users (Clarizia *et al.*, 2018). However, most of these chatbots do not provide a human-like conversation. They do not provide the complete knowledge requested by visitors (Varitimiadis *et al.*, 2021) during all phases of the visit. Varitimiadis *et al.* (2021) classifies chatbots into: informative chatbots (infobots), chatbots with predefined conversation paths, gamification and reward chatbots, conversational chatbots and (5) advanced conversational chatbots, where users can freely ask almost anything without following any rules or routes predefined.

In the past three decades, virtual reality (VR) and augmented reality (AR) have primarily been evolving entertainment (Majd and Safabakhsh, 2017). While VR and AR share similar technologies, such as various tracking sensors and displays, they represent two different approaches to blending the physical and virtual world realities (Scavarelli *et al.*, 2021). Museums and cultural institutions use VR/AR technologies to naturally engage with visitors in public while also fulfilling the mandates of imparting cultural heritage knowledge (Scavarelli *et al.*, 2021).

Social robots have been deployed in museums and cultural institutions settings. Social robots are categorised as robots with social capabilities that can interact and assist humans naturally (Gasteiger *et al.*, 2021). According to Gasteriger *et al.* (2021) results, positive perceptions of the museum robots are evident, highlighting that museums could be an appropriate setting for further development and implementation of a social robot. Using these robots has several advantages, such as the availability of a robot (Belanche *et al.*, 2019), the potential advantage of alleviating language barriers as opposed to the limited language skills of the staff (Ivanov *et al.*, 2018a,b) or the possibility of co-creating service experiences together (Kuo *et al.*, 2017). More often, it is observed that these robots operate side by side with human personnel. The combined presence of human staff and service robots further indicates that service robots are gradually playing a more decisive role in customer–enterprise interactions and are becoming an integral part of the service delivery system (Park, 2020). From the Industry 5.0 approach, it is essential to consider the users' emotions and sentiments when interacting with robots to avoid negative experiences (Orea-Giner *et al.*, 2022).

Because of the importance of analysing visitors' experiences through big data, machine learning is applied for visitation pattern prediction and experience evaluation (Calero-Sanz *et al.*, 2022). The application of AI to analyse and visualise these data brings an opportunity for museums and cultural institutions to understand their audiences better and create personalised and engaging experiences (French and Villaespesa, 2019). The use of technology in cultural tourism enables the tracking and analysis of tourist expectations and satisfaction levels, as well as the development of new and alternative financing sources (Di Pietro *et al.*, 2018). The combination of AI technologies can facilitate a new form of interaction called human–AI coworking (HAIC). In HAIC, field

collaborative AI applications (designed to operate cooperatively rather than substitute humans) can improve human efficiency and simplify processes (Maddikunta *et al.*, 2021). In this way, the collaboration between users and AI allows for the creation of value-added services and improvement in decision-making and offers a personalised experience to cultural tourist users. This HAIC can be considered a characteristic of Industry 5.0 (Demir *et al.*, 2019): robots and humans working together whenever and wherever possible.

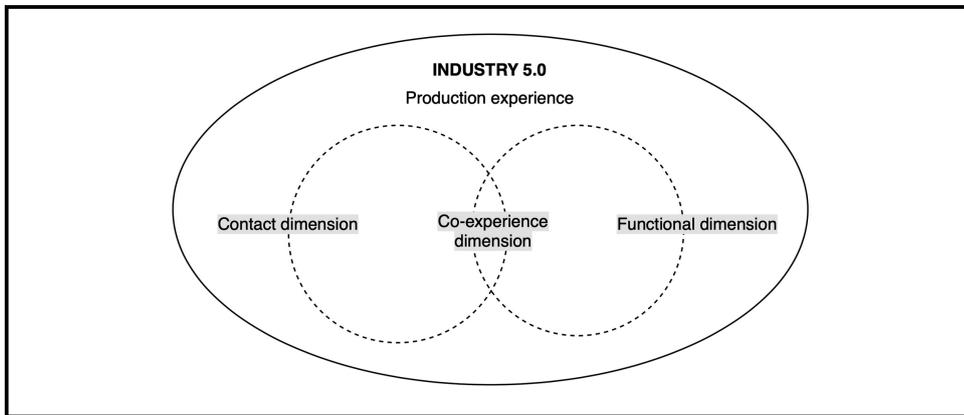
2.2 Dimensions of user–AI interactions in cultural institutions

Studies on interactions between users and AI have greatly increased in past years (Markovic *et al.*, 2021). Nevertheless, there is still a need for theoretical and methodological frameworks to advance knowledge in this area (Bartneck *et al.*, 2007; Ivanov *et al.*, 2019). Researchers have attempted to conceptualise and implement the different dimensions of interactions between users and AI applications to explain user satisfaction and experience (Tussyadiah and Park, 2018; Primawati, 2018). Based on previous theories (Venkatesh *et al.*, 2003; Wirtz *et al.*, 2018), researchers have attempted to conceptualise and operationalise the different dimensions of user–AI interactions. Other authors explain the user interactions with AI applications (Tussyadiah and Park, 2018; Primawati, 2018). Considering these previous studies, the dimensions of AI applications can be classified into three groups: functional, contact and co-experience dimension.

1. The functional dimension refers to the ease of use of technology and its usefulness and the adoption of social norms. Schepers and Wetzels (2007) say that there is a significant influence of subjective norm on the perceived usefulness and the behavioural intention to use. When cultural institutions consider AI-supported solutions in operational contexts, the value proposition continues to be unclear for many due to upfront resource investments and subsequent opportunity costs (French and Villaespesa, 2019). Nevertheless, understanding the drivers behind user attendance to cultural venues like museums and how to increase these numbers is important to museum and other cultural institutions' managers (Yap *et al.*, 2020).
2. The contact dimension is based on the proposal from Van Doorn *et al.* (2017), about the “automated social presence” in services which refers to the extent to which machines (e.g. robots) make users feel that they are in the company of another social entity. Social presence has been shown to affect trust-building since individuals are more likely to develop trust in another person when they meet personally. It can be assumed that social presence or the feeling that “someone is taking care” affects acceptance and consequently has an influence on customer behaviour (Wirtz *et al.*, 2018).
3. The co-experience dimension describes experiences regarding how individuals develop their personal experience based on their social interaction with others. The experience of visiting museums and cultural institutions can be enhanced with the application of AI to collaborate on their own experience by interacting with these tools. The USUS model (Weiss *et al.*, 2009) introduces the co-experience indicator within the context of user experience. For some services, the acceptance of AI applications will depend on the extent to which technologies can fulfil consumers' need for rapport (Wirtz *et al.*, 2018), co-creation (Tung and Au, 2018) or conversation (Bickmore *et al.*, 2013) that increases engagement and thus results in greater user satisfaction (Kim *et al.*, 2015).

From these bases, this paper proposes a conceptual framework that considers the three main identified dimensions (Figure 1). This framework will be used in the empirical study that is presented in the method section. From Figure 1, it can be observed that the co-experience dimension plays a central role in the interactions between AI applications and users because it constitutes the main source for the experience. The conceptual framework also considers the double perspective of production and experience domains along the three dimensions identified. Because all the dimensions are closely linked, collective management is the only way to create an innovation-based sustained competitive advantage.

Figure 1 Dimensions system: interactions between user–AI applications in service experiences of cultural institutions from the Industry 5.0 approach



3. Method

3.1 Design of the research and approach

The study adopts a deductive approach (Bingham and Witkowsky, 2021), starting from the literature review and previously presented conceptual framework (Figure 1). This approach is based on qualitative methods allowing to examine two roundtable discussions (Zheng *et al.*, 2020; Orea-Giner *et al.*, 2021b; Damian *et al.*, 2021). The objective is to identify the potential and the challenges to the usage of AI applications in cultural institutions from the perspective of cultural institution experts and cultural tourists.

3.2 Roundtable discussions' guide and organisation

The roundtable guide considered previous studies, and it was divided into three blocks: (1) the functionality of AI (Pinillos *et al.*, 2016; Wu and Cheng, 2018; Wirtz *et al.*, 2018; Ivanov *et al.*, 2018; Tussyadiah and Park, 2018; Ivanov *et al.*, 2019; Li *et al.*, 2021), (2) the contact of AI with users (Primawati, 2018; Tussyadiah and Park, 2018; Gaia *et al.*, 2019; Fuentes-Moraleda *et al.*, 2021) and (3) the co-experience dimension of AI (Heerink *et al.*, 2010; Van Doorn *et al.*, 2017; Stock and Merkle, 2018).

The roundtable discussions were held on 11 November 2021, with an average length of each session of 105 min. Each roundtable discussion was conducted by a moderator. Due to health restrictions, the roundtable discussions were conducted in a mix format, combining the physical presence of participants and the online participation of some of them. Both roundtable discussions were done in Spanish, and Microsoft Teams was used for recording and connecting with online participants. Previously, this approach was regarded as a reliable and viable way for doing qualitative research (Cachia and Millward, 2011; Fuentes-Moraleda *et al.*, 2021). The roundtable discussions were videotaped with the participants' permission.

3.3 Participants

The two roundtables' participants were (1) professionals from cultural institutions (2) and participants who engage in cultural tourism activities and visit cultural institutions during their holidays and daily life. For the first roundtable discussion, the participants were chosen through purposeful sampling based on their expertise (Patton, 1990) linked to cultural institutions' management or technology enterprises focused on the cultural institutions' solutions.

According to previous research, each study has its own set of traits and criteria, making it impossible to establish a standard sample size for this approach (Hennik *et al.*, 2019). Based on the data and orientations supplied (Hennik *et al.*, 2019), our study comprised 6 different participants in each roundtable discussion. These participants were chosen so that there was an equal number of each gender and that their profiles were similar.

The first roundtable discussion includes professionals from cultural institutions with previous AI experiences. The researchers made a list of professionals working in or for cultural institutions and connected with technology aspects (marketing, communication, cultural management, AI development, etc.). This list contained 18 names from different institutions. These professionals were contacted, and, finally, 6 participants participated (Table 1).

The second roundtable discussion was focused on the cultural institutions' users selected on the basis of their background in visiting cultural institutions and museums, as well as their interest in cultural activities during their travels. All participants must have previous experiences with AI. In this way, it is possible to get a broader view on their contact with technology and the needs of the cultural tourist as a user of cultural institutions and not only as a visitor (Table 2). This group can be divided into the following categories: Generation Z, Millennials, users with children and users with disabilities. The researchers used snowball sampling (Noy, 2008) to find individuals from different profiles and contacted them. Initially, 22 people were contacted, and, finally, 6 individuals having previous experiences with AI accepted to participate in the roundtable discussion.

Table 1 Cultural institutions experts participating in discussion 1 of the roundtable

<i>Gender</i>	<i>Expertise</i>	<i>Position</i>	<i>Previous interaction with AI</i>	<i>Code</i>
Female	Marketing	Director of marketing and strategic business development at a museum	Yes	RTD1P1
Male	Marketing	Head of the commercial and educational area at a cultural institution	Yes	RTD1P2
Male	AI developer	CEO of a technological company	Yes	RTD1P3
Female	Communication	Deputy director for scientific communication and culture	Yes	RTD1P4
Male	Communication	Dissemination department	Yes	RTD1P5
Female	Expert in management of cultural institutions	Academic	Yes	RTD1P6

Table 2 Cultural tourists and users participating in roundtable discussion 2

<i>Type</i>	<i>Gender</i>	<i>Profession</i>	<i>Previous interaction with AI</i>	<i>Code</i>
Generation Z	Female	Student	Yes	RTD2P7
Generation Z	Male	Student	Yes	RTD2P8
Generation Z	Female	Graphic designer	Yes	RTD2P9
Millennial	Female	PhD candidate and worker in a tourist information office	Yes	RTD2P10
Millennial	Female	Curator candidate	Yes	RTD2P11
Person with children	Female	Community manager	Yes	RTD2P12
Person with children	Male	Aerospace engineer	Yes	RTD2P13
Person with disabilities	Female	Artist	Yes	RTD2P14

3.4 Data processing and analysis

The initial step was transcribing all the roundtable discussions. The transcription was done in Spanish (primary language utilised) using the Amberscript tool. Transcriptions were reviewed manually to ensure their accuracy.

The second phase involved manually coding and analysing the data using NVivo. A thematic analysis was done. This method allowed for the identification, dissection and announcement of subjects in the data (Braun and Clarke, 2006). A search for and an identification of recurring themes in the qualitative data gathered from the roundtable discussions was done. The analysis was performed by one researcher and checked later by another one, having a 96% of coincidence. After solving the detected disagreements, the findings were organised into categories based on the framework (Figure 1).

4. Results and discussion

The complementarity between the two roundtables necessitates us to present the main results in an integrative manner according to the structure of dimensions that shape the framework employed: (1) functional dimension, (2) contact dimension, (3) co-experience dimension. Participants' comments from the roundtable composed of experts and cultural tourists and users are codified using "RTD1P1" and "RTD2P2", respectively.

4.1 Functional dimension

The functional dimension is fundamental in offering an integrated experience with respect to the rest of the existing tools and resources in cultural institutions. AI is used to attempt to automate communication, observation, knowledge, decision-making and response and reasoning by replicating users' thinking and learning processes. All these skills are as interrelated as are the corresponding subfields of AI, which are distinguished by their techniques and applications (Mich, 2022). In AI, users must be maintained in the loop of automation processes using a semi-automatic approach any time technologies are unable to totally replace users' intelligence (Mich, 2022). The following quotes are from the roundtable discussion data:

In some museums that have installed smart speakers [. . .] Then the user would arrive, the voice assistant would speak and there would be a dialogue about the work with the speaker [. . .]. You were talking to a speaker, and it was giving you information that you were specifying in a conversation [. . .]. (RTD1P2)

This type of technology is not applied in all cultural centres, but the participants considered that it would be interesting to be able to consult the information about the works exhibited in museums, about access to the rooms and about other aspects related to obtaining information quickly. Another AI function mentioned during the discussion is the use of beacons to connect with a user's smartphone and thus to be able to offer information. Beacons are seen by cultural institutions as being simpler to use and to implement in terms of costs than other systems, such as robots. Because of this, many cultural institutions now incorporate AI, but just a handful deploy a robot system in their rooms or spaces (Fuentes-Moraleda *et al.*, 2021). The most notable and intriguing characteristic of a museum service robot is its capacity to present as much information as feasible about the culture that a museum represents. The robot knows where every piece is – not just the museum's showpieces – and can encourage users to go see less well-known items, thus giving users the opportunity to expand their artistic knowledge while providing the museum with a means of developing the artistic potential of often-overlooked pieces. Another need for the use of social robots in museums arises due to their capacity to communicate and display moods and emotion (Kirby *et al.*, 2010). However, the application of robotics in museums is seen as problematic, as can be seen in the following statement by one of the participants:

Talking about robotics, [. . .] when you want to introduce an element into, for example, a workshop, the prices are very high, or you must go for simpler robots that allow you to do fewer things in order to have a reasonable cost. [. . .] Another handicap that I think has already been mentioned with robotics is what

happens when we have very large flows of visitors, which is one of the hallmarks of our identity. (RTD1P5)

Therefore, the different functionalities that robotics can provide are affected by a series of difficulties to their implementation in the space of cultural institutions both because of their high cost and their difficulty to operate in certain spaces. Under this category, the quote below was frequently discussed:

The robot is an object that is part of the museum, in addition to the visit you are making. So, I mean that the secret is to integrate it well. The user's experience is a fluid experience, where that element links directly. It is not something forced that you want to put in, but something that forms part of that experience. (RTD1P3)

Participants consider that to implement robots in cultural centres, this challenge related to the problems they can generate and that could affect their experience must first be addressed. However, there are other AI functionalities that can be applied in cultural institutions. One of the functionalities is the ability to generate a more complete experience for cultural tourists and users during the pre-experience, experience and post-experience so that it is possible to select the elements to see and make a personalised experience, as can be seen in the following quote:

I would like a lot as a user the possibility [. . .] of making a selection of the work I want to visit so I can get information about it and get a more personalised tour and be able to take advantage of the time I want to invest. (RTD2P7)

In addition, this personalised visit function through AI could be used to generate accessible itineraries with functional diversity for people. The potential of implementing these technologies in the future is linked to the creation of collaborative experiences. It is a field yet to be explored despite the advantages of their application for all audiences and especially for users with disabilities during pre-experience and experience. The following quote highlights the possibility of using this functionality to offer an accessible itinerary:

Once you get to the museum, it's true that I don't know of any museum that has an accessible itinerary to be able to move from the entrance of the museum, to know where you enter and maybe get to a specific floor [. . .]. I understand that not all the resources are going to be accessible. (RTD2P14)

Another aspect of the application of AI is the technological difficulties in its application due to a lack of funding from cultural institutions. This affordability problem can be overcome by using cheaper systems that are easier to implement, such as web pages with integrated chatbots. Consumers are beginning to embrace chatbots despite their limitations, such as a lack of support of the client's mother tongue in chatbot conversations and the mismatch that sometimes happens between a chatbot's pace and that of the customer. More personalisation and customisation are required (Pillai and Sivathanu, 2020). Some museums in different countries are developing chatbots to assist their users and provide a different and enhanced user experience (Varitimiadis *et al.*, 2021). Participants consider that the website is the first contact with the cultural institution, being in the future an opportunity to create personalised visits, by implementing, for example, chatbots. The following are the frequently mentioned quotes in this category:

I work in digital marketing, and I also miss a lot on the websites of the museums themselves. It would be interesting if there were chatbots through which I could make quick and immediate enquiries. (RTD2P12)

A key aspect is the desire by cultural institutions for apps to plan, organise and receive information. These types of apps are considered inefficient, and it has been stressed that it is possible to create a web app which is more accessible and interactive than an app that is used during a pre-experience, experience and post-experience. The following sentence summarised this:

You don't really need to download an application nowadays either. Web applications work in the good old-fashioned way that you go to a website and are fully interactive and have all the possibilities that you really need in an app nowadays. (RTD2P13)

Finally, functions must be monitored and reviewed on an ongoing basis so that information is reliable – especially if the functions are used to provide information regarding the visit of persons with vulnerabilities due to their special needs. [Guo et al. \(2020\)](#) examine how AI may harm specific handicap groups if it is not designed, developed and tested with care. Furthermore, [Smith and Smith \(2021\)](#) report that AI systems do not yet work properly for disabled people or, worse, may actively discriminate against them. Future technology implementation should evaluate the accessibility, not only regarding the physical aspects of cultural institutions but also the technology itself. The following quote sums up the dangers posed by AI to people with disabilities:

I wouldn't trust technology one hundred percent especially depending on the information it gives. And regarding what is in a museum, maybe if it's about the life of an artist, of course, I'm going to trust what they tell me. (RTD2P14)

4.2 Contact dimension

AI makes it easy to reach different audiences and personalise a visit, so it is essential in reaching out to digital natives. For example, Gen Z's tastes differ from those of previous generations. In general, Gen Z is a generation that employs time-saving smart gadgets, seeks a one-of-a-kind experience and authenticity and plans its own budget and journey ([Ozdemir-Guzel and Bas, 2021](#)). According to [Vitezić and Perić \(2021\)](#), hedonic motivation (rather than anthropomorphism, effort expectation, performance expectations and social influence) had the greatest impact on Gen Z's emotions and, as a result, their willingness to use AI devices. They also observed that the frequency with which people used their smartphones had a moderating influence on the association between perceived effort of utilising AI and emotions. The following are some of the most referenced quotes in this category:

It fascinates me when you see those videos on YouTube . . . of a child, the one-and-a-half-year-old girl who still can't read [. . .] How is she going to face a painting when she's 18? (RTD1P3)

The type of contact with AI is crucial. In the case of user–robot interaction, robots can be classified as utilitarian, cartoonish, human-like or mixed based on their appearance ([Tung and Au, 2018](#)). The type of user, the form, voice and other factors related to the design of the AI device that is in contact with a user can cause either rejection or acceptance by the user. During the roundtable discussions, this fact was commented on:

I think a humanoid robot would be very off-putting to me and I think it also takes the attention away from the museum. I think it's not something that people are used to seeing, so I think in a museum that would be the focus of attention, and I think it's not appropriate because the focus should be the museum itself. [. . .]. (RTD2P13)

[Chuah and Yu \(2021\)](#) point out that the development of emotional intelligence in robots also brings about a huge paradigm change in how people interact with them. This statement is linked to the search for a more emotional and sensory AI, which, through contact with a user, allows for the development of an inclusive, immersive and interactive experience when considered in a holistic way, including the pre-experience, experience and post-experience. At present, these aspects are not implemented in cultural institutions. This aspect is discussed using an example of a visit made by one of the participants:

It is quite a sensory visit. It plays a lot with the theme of temperature and even smells, and you are given a little bracelet at the entrance to the museum. As you enter the different rooms, you pass it through a reader, and it welcomes you to the room in a personalised way. It can even give you complementary information in some areas. You can even take a photo and it automatically arrives in your mailbox. I understand that for them it is also a very big source of information [. . .] I felt very included in the museum because they are welcoming you and I felt connected to that world. (RTD2P10)

This search for an interactive and immersive experience is notable among members of Generation Z, who are looking to AI for a transmission of information that is not only purely theoretical about the content of cultural institutions but that also allows them to transmit and awaken emotions and

feelings before, during and after a visit. To this end, they emphasise that the form of contact is fundamental. This aspect can be seen in the following quote:

[...] I would like to know or feel what people perceive when they are looking at that painting, what sensations you can get [...]. For example, you could have a tablet with which you could personalise the visit, for example, with a QR code acquired when you buy the ticket, and you can navigate through the museum with this code while asking yourself, 'What do you feel when you see this, and what do you like about it?' Thus, ensuring that not only is the user seeing the exhibition but that you are also giving feedback while you are seeing it while receiving a result. (RTD2P9)

This contact with AI does not replace the contact with the staff of cultural institutions but is interpreted as another resource of the cultural institution for generating a satisfactory overall experience for the user (tom Dieck *et al.*, 2018).

4.3 Co-experience dimension

The co-experience dimension is linked to the concepts of co-creation and co-production (Minkiewicz *et al.*, 2016). To co-create as an inherent aspect of service, the interplay between consumers, workers, cultural institutions and technology must be considered (Sarmah *et al.*, 2018). AI can be used as a tool for creating a community around the cultural institution from a holistic perspective, specifically in the post-visit phase. The following statement sums it up:

It could also help us to be more involved in the life of the museum, like trying to co-create a little bit with it. [...]. Everything as a process, [...] as a tool that can be used as a tool to help us to create community. (RTD2P11)

AI can be used to create continuous collaboration during all phases of the user experience (pre-experience, experience and post-experience) between users, employees and the cultural institution to generate immersive, integrated and collaborative experiences. By using AI, it is possible to collect user data to create a personalised visit as well as to generate continuous feedback to the cultural institution. This can be seen in the following statements:

There is a lot of technology which, based on all the extraction of this data, personalises your visit and offers one content or another based on your behaviour and your interests. If you are registered, [...] it knows absolutely everything about you. [...] what we need is to make that information actionable so that that digital experience is good, satisfactory and memorable. (RTD1P4)

Roundtable participants highlighted that this technology would be very useful in the future to be able to personalise their visit to cultural centres. However, at present, they have not been able to make use of it because it is not yet implemented. This collection of user data enables the application of machine learning techniques.

Previous studies have demonstrated the possibility of predicting consumer behaviour by applying machine learning based on previously collected data (Arefieva *et al.*, 2021).

It is possible to use artificial intelligence and machine learning to guide the visit and also if you share your visit with other people who can interact together and change a little bit as well. (RTD2P12)

The use of AI to generate co-experiences also creates an emotional link with a user, which goes beyond the visit because it can allow contact before, during and after the visit, creating a personalised experience for the user and guaranteeing access to information for the managers of cultural institutions to improve decision-making in the future. This connection, which is currently non-existent, would be based on obtaining recommendations on cultural institutions and would create a flow of connections and relationships with the cultural institution, as the following commentary shows:

I think it can connect, just as we do with Netflix, when it gives us recommendations. [...] Maybe the works you've visited the most, and the time you've invested in each one of them. If you have viewed more information about a particular type of work, that exhibition will send you an itinerary – even more additional information – afterwards. [...]. (RTD2P12)

However, the main problem detected with the co-experience dimension is the possibility of collecting data on users to personalise the experience based on their profile, interests and behaviour. Data sharing is key to promoting this collaboration and generating experiences, but reluctance to share data can be an impediment to the implementation of this AI function. Previous studies confirm that principles and guidelines for ethical AI must be applied in these types of contexts (Jobin *et al.*, 2019). This use of data to personalise the visit to cultural institutions is not currently applied, but it is an aspect that would enhance the visitor experience, as the following sentence shows:

I am personally very reluctant to give my personal data to anyone because in the end it is shared with third parties. You are never really in control of your information. (RTD2P8)

Therefore, in the application of AI in cultural institutions, ethical and security principles must be considered when collecting data, which can be achieved through the creation of a community based on the co-experience dimension.

5. Conclusions

Cultural institutions are a type of tourist resource that can enhance the brand image of cultural destinations (Lindsay, 2018) as well as to promote the arrival of tourists (Gravari-Barbas, 2020). Cultural institutions are in continuous change given that their basic aim of protecting culture is going to be maintained, as the results show. However, the approach of interacting with users must be adapted to the transition to Industry 5.0 tools to create collaborative experiences and customise the experience in the future. These technology applications enhance access to collections rather than minimising the relevance of the content (Koukoulis and Koukopoulos, 2016). Cultural tourists and users of cultural institutions are experimenting a change on their profile linked to technology development. The elite position of culture will be eroded as high culture is replaced by “the local” in many places (Russo and Richards, 2016). Considering different local and tourist segments, digital natives, such as Gen Z (Ozdemir-Guzel and Bas, 2021), seek a different approach to cultural institutions than digital immigrants, as the analysis confirms. These audiences do not have the same concept of cultural institutions and visit them in completely different ways.

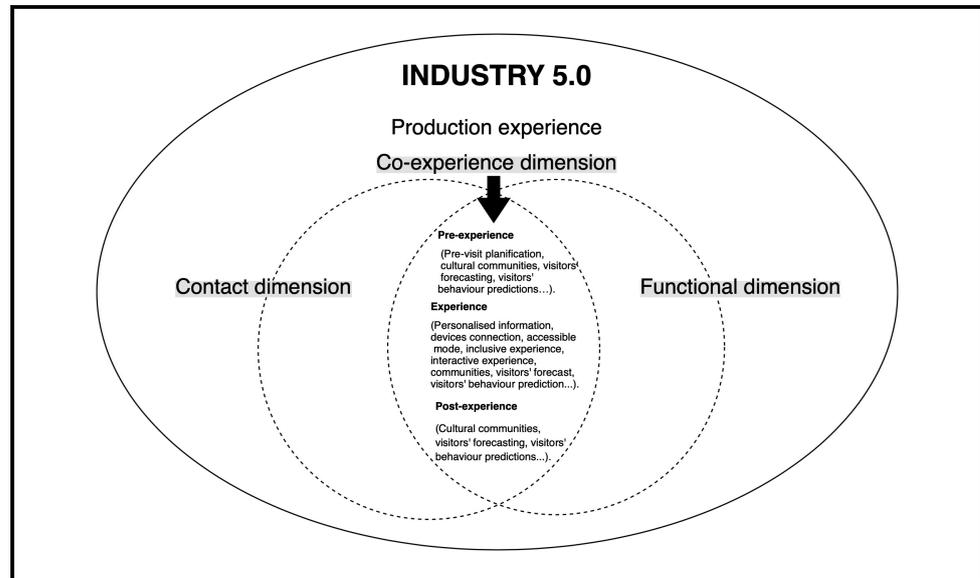
As the results shows, this fact makes the advanced development and application of AI unfeasible because of the requirement of a large investment and the long process of checking and testing the functionality of this technology. This means that cultural institutions end up using simple AI systems that do not work well and can generate problems for users. They also neither personalise the experience nor make use of Industry 5.0 approach. In conclusion, cultural institutions must use AI in an integrated way to create a community in the context of the Industry 5.0 approach while considering all the key actors. AI is not just another tool and does not replace staff, but rather helps to connect with cultural tourists and users. It allows staff to get to know the users better besides generating an immersive experience. Moreover, AI is essential in creating a community and building it day by day. Therefore, AI is not seen as just a tool but as a part of the whole. Users want to be part of the community and to participate by co-creating personalised experiences focused on attracting tourists and local users in the future.

5.1 Theoretical implications

The main theoretical implication is the definition of a model (Figure 2) including a holistic perspective of user experience of AI applications in services experiences of cultural institutions, considering the three dimensions. This model arises from the analysis of qualitative data from the point of view of users and experts participating in this study.

This model sets out the fundamental aspects to be developed through AI tools in a user’s journey map from both managerial and users’ perspectives. The visit (virtual and face-to-face) is considered an experience. These tools could be implemented at the pre-experience, experience and post-experience phases around the three dimensions considered. In the model (Figure 2),

Figure 2 User experience and AI application in services experiences of museums and cultural institutions from an Industry 5.0 approach



the HAIC is the centre that emerges from the functional and contact dimensions. During the pre-experience phase, communication strategies of cultural institutions could reinforce the planning of the visit through the implementation of AI. These strategies include pre-visualisation of the spaces, schedules and reservation of experiences. During all the experience phases, AI applications can be implemented in an inclusive, immersive and interactive way. In addition, there are other aspects such as community building, collaboration and emotional links where users and managers are involved. For instance, machine learning methods can be applied to collect data from the visitors' physical experience and from all the different digital touchpoints of that journey, like the website, social media, ticketing and mobile apps (French and Villaespesa, 2019). From another perspective, in museums and cultural institutions, recommender systems can prevent information overload for visitors by presenting interesting items based on the visitor's interest in the already seen items.

5.2 Practical implications

Regarding the practical implications, the application of AI from an Industry 5.0 perspective allows cultural institutions to interact with users during the pre-experience, experience and post-experience; learn more about their profile and interests to personalise their experience; and introduce elements of brand value such as co-creation of experiences and community-building.

Some AI applications that can improve the visitors' experience are chatbots helping visitors organise their visit and offering a personalised experience. Virtual reality can offer broader access, particularly to remote visitors, providing "virtual tour" experiences. Moreover, social robots' implementation in museums and cultural institutions can improve the visitors' experience due to the possibility of offering services in different languages, creating inclusive experiences for disabled people and being available 24/7. In addition, managers of cultural institutions focused on user care can obtain crucial data and information to develop visits by creating inclusive, immersive and interactive experiences.

5.3 Limitations and suggestions for further study

There are some limitations to this study. First, because of the health crisis, the three roundtable conversations were held in a hybrid format (online and face-to-face), and the selected roundtable

discussion format may have influenced the participants' responses owing to its public event status. Second, in terms of the flexibility of the thematic analysis, which might have led to inconsistency and lack of coherence (Terry *et al.*, 2017), each member of the research team validated the analysis.

Future research should consider the actual and specific application of AI tools in cultural institutions, as well as considering different characteristics (e.g. size, type, place of cultural institutions) to obtain conclusions about the different dimensions identified in this study. Future research will be conducted considering the case vignette method, previously used in qualitative studies (Fritzsche and Bohnert, 2021).

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