

Perceived experience value within digital museums transformation: The case of active senior visitors

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Abstract

Purpose. The evolution of the digital world and ambiguous access to knowledge have created a bifurcation between those who have the right skills versus those who have insufficient skills to use the new technologies. Amidst the fast-technological development, this research will answer fundamental questions on perceived value of active senior visitors (55+ years old) in the context of cultural heritage sites, when using immersive technologies and social media.

Methodology. This work is based on a qualitative study. The single case study is considered a suitable research design when investigating in-depth a multifaceted social phenomenon such as active senior visitors' interactions with the new means of technological devices and immersive technologies at archeological museums.

Findings. The findings show how epistemic, hedonic, functional, and social value are triggered before, during and after the visit by the active senior visitors.

Practical implications. Our work provides several practical suggestions to museum managers specific for the four kinds of value and regarding traditional and non-traditional visitors.

Originality/value. This paper contributes to cultural heritage literature conceptualizing technological experience for active senior travelers through illustrating an extended space in the pre/during/post phases of visit.

Keywords

Active senior visitors; immersive technologies; level of engagement, perceived experience value; cultural heritage; digital transformation.

1. Introduction

Innovative technologies such as smartphone applications and wearables play a central role in the way people nowadays access, share and transfer information. In fact, the typical Internet user swims in a sea of social media (Kaplan and Haenlein, 2010). Museums serve and tend to evolve in line with developments that occur in society (ICOM definition, 22nd general assembly, Vienna, Austria, 2007). Consequently, this increased use of mainstream technologies and social media has created the need for museums to adapt to lifestyle changes aiming at engaging their visitors and in particular the young during their visit. This is why museums have started to devote increasing resources in order to digitize their collections and to publish information about them over the web (Hogsden and Poulter, 2012). In other terms, museums are looking into new developments in media and technology as a way to provide global access to their collections and exhibitions, from online galleries and virtual tours to mobile technology and smartphone applications bridging the way for innovative interaction with art consumption, thus providing a greater engagement with the exhibits and ensuring good customer service (Buhalis, 2003; Stogner, 2013).

However, despite the popularity of these types of new technological means and social media among millennials, senior citizens are unable to fully enjoy what is on offer. Much of the literature has concentrated on the digital divide that elderly seniors face when dealing with internet usage and their cognitive and physical difficulties (Welsh et al., 2009). In fact, Peng (2010) emphasized that studies and government statistics repeatedly show that access by seniors to computers and the Internet remains uneven compared to that of younger generations. Nevertheless, this divide is diminishing with time (McMurtrey et al., 2011) since seniors are showing more interest and motivation to learn and interact with Information and Communication Technological (ICT) products (Eriksson and Fabricius, 2015) and are using the internet and technological devices more (smartphone and tablets) during their daily life (Kim et al., 2016; Pesonen et al., 2015). However, their use tends to engage them in fewer activities that do not take full advantage of what the web provides (Haight et al., 2014). This led researchers to focus their studies on both seniors and ICTs', the Internet, and more recently on mobile applications, immersive technologies use such as Augmented Reality (AR), Virtual Reality (VR) and mixed reality, but most of these studies were conducted mainly in medical and healthcare disciplines (Caro et al., 2015; Im et al., 2015; Saracchini et al., 2015) and fewer studies were done in the tourism field.

The majority of research concerning technological developments and experiences to date has focused on holistic views studying different stakeholders' perspectives (Dieck and Jung, 2017) and many studies have focused on millennials perception within museum digital transformation (Simpson, 2017; Muskat, 2013) to ensure that museums are relevant and valuable to future generations (OP&A, 2007). However, few studies evaluated the perceived value of active senior travelers and their overall satisfaction when visiting museums that went digital, knowing that active seniors represent the biggest market for archeological museums and artistic ones.

Therefore, the present study will examine the perceived experience value of active senior travelers (55+ years old) in the context of cultural heritage sites and specifically at museums.

It is important to understand active seniors' travelers' perception over the whole experience within museum digital transformation to provide better services and equitable participation for all without marginalizing any group. Hence, the present work answers first fundamental questions on perceived experience value of "Active senior visitors" with regards to the fast technological change through illustrating an extended space in the pre/during/post phases of visit. Second, it provides detailed insights into the perceived value of immersive technologies and social media on a less studied population that is forecasted to represent a

third of the European Unions (EU) population in the next twenty years (Eurostat, 2016) and is considered an affluent fast growing market and a driving force in the tourism industry (Shröder and Widmann, 2007). Further, seniors who have high levels of purchasing power are becoming more active in the society and traveling much more (Huang and Tsai, 2003). Hence, this paper enriches the theoretical perspective of perceived value. Third, it entails the dimensions that are necessary from a managerial point of view, thus contributing to strategic planning for museum managers who are thinking of going digital in the upcoming years and creating further value and satisfaction for their active senior visitors at cultural heritage sites. Fourth, it reveals a better understanding of digital transformation opportunities and risks in the tourism industry and its related sectors *Vis a Vis* active seniors' travelers and provides some insights and tools required to follow.

2. General framework

2.1. Museums transformation within societal lifestyle changes

In the last three decades, a wide range of private and public organizations in different fields have recognized the beneficial potentials of new digital technologies and have implemented strategies to deal with digital transformations in their organizations (Matt et al., 2015). Likewise, the tourism field has always been the forefront in embracing technological innovations (Gretzel, 2011) where information and communication technologies (ICT) continue to serve as the main driver for tourism innovations (Atembe, 2015).

Visitors nowadays expect to use integrative products that can help them find relevant information before and during the trip as well as manage to share and capture their experience within and after their visit (Johnson et al., 2015). In order to develop an adequate integrated system, a deep understanding of tourist needs with respect to technology development is required to generate valuable and enjoyable destination experience (McCabe et al., 2012). Likewise, museums are trying to better understand their diverse audiences to meet future visitor's needs (Hooper-Greenhill, 2006). In fact, they have gradually acquired visitor-based roles instead of museum based role (Weil, 2007) and have been trying to engage their visitors and co-create glamorous experiences for them (Sfandla and Björk, 2013).

Much of museums energy is spent on attracting people into their doors, which implies the need for making bold changes in marketing, programming and infrastructure to increase the participation gap that they are struggling to meet (OP&A, 2007). Introducing innovative and new means of technological devices was a step taken to appeal to the "internet generation" that has the need to be "always connected" by letting them use their smartphones and preferred means of media. Moreover, the rapid development of smartphone devices has made gaming popular and attractive to a broader group of players and started to be used in tourism (Xu and Buhalis, 2013). Hand-held gaming as touch screen audio-video guides and mobile augmented reality (AR) applications were introduced as innovative products of engagement.

Museum mobile applications give the consumer the ability to explore the exhibits before, during and after the visit (Economou and Meintani, 2011). These applications help tourists to be more prepared for their visit by providing them with the essential information about the services and accessibility that the establishment provides. Additionally, such applications personalize visitors' experiences during their visit, as users can save their preferences according to their interest. In fact, these applications take the form of a guided tour which exhibits a wide range of collections through touchscreen icons, and the visitor has the possibility to zoom in on pictures for a better detailed observation. Furthermore, these applications extend the consumer/museum relationship through allowing visitors to read, collect data and share their experiences on social media during or even after their visit. In fact,

augmented reality, not only provides a mechanism for further pushing the museum out into the world, but also allows the world to push into the museum (Ippolito and Bell 2015).

Meanwhile, changes bring challenges, since each organization is different than the other and needs tailored strategies to succeed (Johnson et al. 2015). In this line, Morison (2017) has emphasized the nature of museums by stating eight factors explaining why museums need distinctive digital strategies than those of the business world.

Yet, it is unclear how museums are dealing with their seniors' heterogeneity and their use of these new technologies.

2.2. Active senior travelers' heterogeneity and use of technology

The overall population of seniors is growing worldwide. In fact, according to the World Health Organization (WHO, 2015), the number of people aged 60 years and older will outnumber children younger than 5 years by 2020, and by 2050 they will represent nearly 22% of the world's population, totaling approximately 2 billion.

In effect, the senior market is considered one of the fastest growing segments and a driving force in the tourism industry (Shröder and Widmann, 2007). Seniors, nowadays are becoming more active in the society and traveling much more (Huang and Tsai, 2003). With an aging population in developed countries, tourism researchers are becoming more attentive to the quality of life and experiences of senior travelers covering a variety of related issues such as their behavioral patterns (Jang et al, 2009); travel expenditure (Jang and Ham, 2009); travel constraints (Kazemina, Del Chiappa and Jafari, 2015); travel motivation (Patuelli and Nijkamp, 2016; Jang et al., 2009; Jang et al., 2006) and satisfaction.

More recently, seniors are showing more interest and motivation to learn and interact with ICT products (Eriksson and Fabricius, 2015). This led researchers to focus their studies on both seniors and information communication technologies, the Internet, and more recently on mobile applications and augmented reality (AR) use (Im et al., 2015; Saracchini et al., 2015). Some of these studies have focused their attention on the search for new ways to help improve the self-esteem of seniors who were unfamiliar with the world of digital technologies, as a way to increase their independence and personal happiness, social inclusion, as well as the accessibility and affordability of related technologies.

In addition, much of the literature has concentrated on the digital divide that elderly seniors face when dealing with internet usage and their cognitive and physical difficulties (Welsh et al., 2009). In fact, Peng (2010) emphasized that studies and government statistics repeatedly show that access by seniors to computers and the Internet remains uneven compared to younger generations. Nevertheless, this divide is diminishing (McMurtrey et al., 2011) with time, as nowadays more seniors are using the internet and technological devices (smartphone and tablets) in their daily life (Kim et al, 2016; Pesonen et al., 2015). However, their use tends to engage them in fewer activities that do not take full advantage of what the web provides (Haight et al., 2014). Moreover, several studies in different fields have revealed the positive effects of internet use and ICTs on the wellbeing and quality of life of seniors (Caro, 2015; Fernandez et al., 2017; Gustafson et al, 2015).

Anabel Quan-Haase, Kim Martin & Kathleen Schreurs (2016) focused their study on the activities that motivate digital seniors to engage in the use of ICT in their daily life. The study revealed that when seniors, like any other segments of the population, are presented with technologies that are beneficial to their way of life, they tend to adopt them more readily (Kok, Williams and Yan, 2012) especially if such technologies increase the level of their mental well-being (Cotten & McCullough, 2013).

Senior travellers comprise a quite heterogeneous market with respect to the use of tourism information technology. Pesonen et al. (2015) presented a tentative typology of three different types of senior travelers based on their use of online travel services: Adventurous

experimenters (seniors who are avid users of the internet; they prefer to be independent during their travel and select new destinations, have higher education achievements, better language skills and more adventurous mindsets); Meticulous researchers (they are mainly seniors who just log into the internet in search for information; they tend to prefer to book package holiday tours, want to learn new things, and value safety and certainty); and Fumbling observers (Seniors who do not use the internet since they have not had previous experience with computers; they value safety, so they focus on package holidays, and engage only in the mother tongue language. These travelers tend to have a low education level).

Many research works conducted experimental studies with senior citizens who had to learn how to use new devices and applications. These studies proved that once seniors have more knowledge regarding the usability of the technological devices in their daily life, they would be more motivated to deepen their learning and usage of ICT products (Caro et al, 2015, Alén et al, 2017).

According to NACA (National Advisory Council on Aging), technological products must be developed and designed in ways that recognize senior citizens diversity and meet their needs.

2.3. Customer perceived experience value in service industry

To satisfy customers, managers of tourism services need to understand their value requirements and then develop unique service value offerings based on those requirements (Gregory, Dess, Lumpkin and Einer, 2010). It is increasingly recognized that customer perceived experience value in the service industry matters greatly to managerial strategic planning and is considered one of the key determinants to an organizational success or failure (Stickdorn and Schwarzenberger, p. 261) when organizations satisfy people-based needs, they are delivering value, which puts them in a much stronger competitive advantage position in the long term (Grant, 1991).

Perceived value has long attracted much attention from both the industry and academia (Siu et al, 2013). It is a subjective, complex and multi-dimensional construct (Sánchez-Fernández and Iniesta-Bonillo, 2007) that varies among customers (Parasuraman, 1997), among cultures and at different times (Holbrook, 2006). This appreciation considers perceived value as a dynamic variable, experienced before purchase, at the moment of purchase, at the time of use, and after use (Sánchez et al., 2006, Sheng and Chen, 2012, Falk and Dierking, 1992).

Given this central role, the phenomenon of perceived value has been addressed with a set of rich theoretical perspectives (Zeithaml, 1988, Sheth, Newman and Gross, 1991, Sweeney and Soutar, 2001, Wang et al., 2004, Holbrook, 2006). Zeithaml (1988) suggested that perceived value is an assessment done by the consumer, to evaluate the utility and quality of the product that he or she is getting for the services that he or she is buying, where the main concentration was on the quality versus price paradigm. Moreover, Sheth, Newman and Gross (1991) provided the foundation for extending existing value constructs. They noticed the need for considering both the cognitive and affective nature of perceived value and regarded consumer choice as a function of multiple consumption value dimensions. They suggested five dimensions (Social, emotional, functional, epistemic and conditional values), out of which, Sweeney and Soutar (2001) developed the (PERVAL model), a four-dimensional scale of perceived consumer value managing to the functional (quality performance), emotional, price and social aspects. Thereafter, Wang et al. (2004) also adapted the framework suggested by Sweeney and Soutar (2001), but included non-monetary factors such as time, effort, and energy.

Hoolbrook proposed a typology of consumer value that captures all of the economic, social, hedonic and altruistic components, out of which, eight subcategories were formed:

efficiency, excellence, status, esteem, ethics, play, aesthetics and spirituality. He acknowledged that at each consumption use these eight subcategories occur together to various degrees (Holbrook, 1999).

Gallarza and Saura (2006) tested the utility of Holbrooks' paradigm for tourism experiences and found a clear pattern in the quality-value-satisfaction-loyalty chain. They elaborated by explaining that: "Quality is perceived as an antecedent of perceived value and satisfaction is the behavioral consequence of perceived value, loyalty attitude being the final outcome".

In museum experience, Falk and Dierking (1992, p.83) referred to museum experience as a gestalt (learning experience) that can vary from one person to another when three contexts interact or overlap at three different phases of the visit: 1) the "Personal context" which occurs prior to the visit. It mainly refers to visitor's education, expectations, prior knowledge, experience, prior interest, belief, the choices that the visitor had and control over his choices; 2) the "Physical context" that occurs during his visits and it refers to museum object display and services provided to visitors, and finally, 3) the "Social context" which occurs after the visit reflects visitor's identity status within his/her social entourage and lately through his/her use of social media.

2.3.1. Pre-visit (Needs – expectations – planning – Mastering use of technology)

In order to probe visitor experience, it is necessary to understand visitors' expectations before the visit (Sheng and Chen, 2012). Falk (2009) argues that museum managements should think about users in terms of their needs. He then came up with five "experience types" that describe basic human needs: 1) Explorers: they are motivated by personal curiosity; 2) Facilitators: they are motivated by other people and their needs; 3) Experience-Seekers: they are people who are motivated by the desire to see and experience a place (i.e. tourists); 4) Professional/Hobbyists: they are the ones motivated by specific knowledge-related goals (i.e. scholars researching a specific topic) and finally, 5) Rechargers: they are people who are motivated by a desire for a contemplative or restorative experience.

Furthermore, Larsen (2007) asserts that planning in advance would influence the actual experience as tourists would expect possible events that would influence their emotional and cognitive aspects before and even after the visit. This is where Websites play their roles in preparing visitors for their experiences.

In industries where new technologies have to be utilized Chung et al (2015) found three factors that encourage the use of AR mobile application. The first aspect is technology readiness, the second is the visual usage and the third is the situational factor.

2.3.2. During-visit (experiencing new products: functionality and emotional dimensions role in adoption)

Tourists play an active role in co-creating value-in-use through resources input that they counter during their visit (Presbensen et al, 2013). Moreover, introducing new products in any business is pivotal as they affect long term business plans, and have a positive effect on both financial (enhance sales) and non-financial (creating competitive advantage, loyalty and meaningful experiences for its customers) aspects (Siu et al, 2013).

Further, Kourouthanassis et al (2015) significantly showed that the functional properties of Mobile Augmented Reality (MAR) application evokes feelings of arousal, which, in turn, influence the behavioral intention of adopting it. In addition, de Rojas and Camero (2008) examined the dynamic interaction between quality and emotion as a determinant of satisfaction

2.3.3. Post-visit (Evaluation of experience: Intention to recommend through social media)

Jung et al (2015) revealed that content, personalized service, and system quality affect users' satisfaction and intention to recommend AR applications. This is in line with the study of Wang and Chen (2011) that stresses on quality dimension of technological devices that are essential for acquiring customers' satisfaction and thus his loyalty. Visitors tend to express their emotions of satisfaction through social media. Cabiddu et al (2014) identified three distinctive social media affordances for customer engagement in tourism: Persistent engagement, customized engagement, and triggered engagement.

In turn, museum operation managers must consider, in their digital strategies, to carefully order and structure their exhibit digital data with care especially outside the walls of the museums, in order for its content to reach a greater audience as it can and be useful for anyone who would like to view, share, re-purpose and re-contextualize museum data (Kraemer & Kanter, 2014)

3. Methodology

3.1. Research design and settings

This work is based on a qualitative study. Qualitative research allows for more detailed accounts of the processes and nuances under investigation. An inductive, single case research design was used. It is argued that the adoption of formal inductive procedures can represent an important step towards assuring conviction in qualitative research findings (Baxter and Jack, 2008). According to Yin (1994), the single case study is the preferred research approach when "How" or "Why" questions are being posed. Further, the single case study is considered a suitable research design when we want to investigate in-depth a multifaceted social phenomenon (Merriam, 1998).

The main focus of our study is understanding how the introduction of new means of technological devices and immersive technologies at archeological museums is perceived by senior visitors as well as if it is affecting their overall satisfaction.

First, museums among other constellation of cultural heritage sites were chosen because they summarize the historical and archeological heritage in a relatively small space. Moreover, since we are considering studying senior travelers, a population that might have physical constraints, it was preferred to select a cultural heritage site where seniors can relevantly feel safe, have easier access to its facilities (toilets, elevators and air-conditioning) and be able explore and get in touch with their cultural side.

Second, we selected the case study according to the following criteria: 1) transparency: since we had full access to key information (Pettigrew, 1990; Tsoukas, 2010) and a good background knowledge of the museum and its environment, such as its history, visitor segments, competitors, work habits and routines, (Sandberg and Tsoukas, 2011); 2) the occurrence of investments in immersive technologies in the establishment to face the digital transformation; 3) and the exploitation of a unique archeological attraction.

Applying the criteria, we selected the National Archaeological Museum of Cagliari as the site of the current research. In 2013, the National Archaeological Museum of Cagliari implemented the first part of the digitalization investment plan developing its virtual building tour available on its blog. In the same year, the museum created its social media channels, another step towards the digitalization and its first attempt to a new way to communicate with its visitors. In 2016, the museum became "liquid". In fact, it was renovated with latest technologies and special attention was given to its content exhibited to be accessible for all. Finally, it is the only museum in the world which has managed to show the Nuragic

Civilization Era with media and technological tools. Consequently, the National Archaeological Museum of Cagliari sets as a suitable entity for the study since it lets us observe the phenomenon at the very moment it is occurring.

3.2. Data Collection

In the tourism industry, most customer feedback and search for relevant information take place online. However, since we are studying a population that is so far not fluent with the means of digital opportunities, we conducted two quick semi-structured interviews before and after the visit to the museum to lower the level of emotional bias responses. Moreover, observations of the participants' interaction with technological devices were assessed. Further, we had a look as well at the reviews that were posted on the official Facebook page to have more insights on technological use and evaluate experiences.

The interview questions were all open-ended. Three main phases of the tourism process were taken into consideration to evaluate the overall experience and level of engagement of active senior travelers with their environment when using new technologies implemented at the archeological museum. Our design embeds four perception value dimensions through an extended space in the pre/during/post phases of visit: 1) during the pre-visit, we studied the "Epistemic value dimension"; 2) during the visit we handled the hedonic and functional dimensions; and 3) during the post-visit we concentrated on the social value dimension. In the first interview, we asked screening and background questions to better understand active senior travelers' motivations and expectations: it was important to understand what pushed travelers to visit the destination, how the searching process took place, and what previous expectations the visitors had before using the services provided (Customer orientation). The second interview concentrated on the evaluation of technological immersive devices (interactive touch screens and videos). We asked the visitors to provide information about the content, functionality, and utility of the used devices. This part gave us an idea about how visitors perceived the interface of the device and if the information provided by the device was useful, simple, smooth and easy to be used. Thus, visitors might point out some concerns related to the functionality of the device in order to be fixed, if needed (Perceived value in use). Moreover, concerning the hedonic dimension, we asked the visitors if their experience met their prior expectations and asked them to assess their emotional state of the overall experience when using ICT products (interaction between the user and the product). For example, they were asked if it was fun and pleasurable to use or not, if it had enriched their knowledge, the overall level of satisfaction of the visit and most importantly if they would repeat the same experience and recommend it to others. It is worth noting that the interviewees were not asked about the economic value of the experience as all of the technological services were offered for free. Furthermore, demographic information such as name, gender, age, education, income, occupation, nationality, and level of interaction with technologies was collected.

Snowball sampling was used to recruit interviewees since patterns could only be identified after the coding of the initial interview with active senior travelers (Biernacki and Waldorf, 1981).

When new patterns stopped emerging, no more interviews were conducted. In total, the data were collected from 23 interviewees. The following table summarizes the main characteristic of the interviewees (see Table 1).

Table 1. Summary of the interviews

Interviews	Interviewees	Duration (minutes)	Age	Gender	Nationality	Education level	Occupation	Level of interaction with technology
Interview 1	Jean	6:48	70	Male	French	Ph.D.	Neurological doctor	Good
	Catherine		68	Female	French	University	Psychologist	Good
Interview 2	Danielle	5:20	71	Female	French	University	Professor	Fair
	Alain		72	Male	French	University	Engineer	Fair
Interview 3	Peter	6:26	61	Male	Sweden	University	Professional sailor	Good
	Elizabeth		60	Female	Sweden	University	Professional sailor	Good
Interview 4	Franca	6:49	60	Female	Italian	High school	Employee	Good
	Mauro		62	Male	Italian	Technical institution	Employee	Good
Interview 5	Carla	5:56	69	Female	Dutch	University	Medical Doctor	Bad
Interview 6	Sara	10:26	59	Female	New Zealand	Graduate	Teacher and jewelry designer	Good
Interview 7	Defrish	14:14	62	Female	Dutch	University	Social worker	Good
Interview 8	Marc	5:43	63	Male	England	University	N.A.	Good
	Gill		61	Female	England	Professional	N.A.	Good
Interview 9	Margo	7:28	56	Female	French	University	Digital marketing	Very good
	Herve		57	Male	French	University	Commercial marketing	Good
Interview 10	Mr. Smith	6:06	65	Male	US	University	Lawyer	Good
	Mrs. Smith		65	Female	US	University	Lawyer	Good
Interview 11	Hedda	8:47	74	Female	US	College	Architect	Bad
	Garry		67	Male	Austrian	College	Architect	Fair
Interview 12	Alberto	9:19	55	Male	Italian	University	Employee	Good
	Tiziana		59	Female	Italian	University	Employee	Good
Interview 13	Zomar	9:22	60	Female	Dutch	Ph.D.	Psychiatry	Good
Interview 14	Milena	7:14	56	Female	Italian	University	Teacher	Bad

The interviews were conducted while in the field. They were recorded and stored in electronic format on a Dictaphone before being translated, where necessary, and then transcribed.

NCapture, a browser application of NVivo software was used to collect data from the National Archaeological Museum of Cagliari official Facebook page. From all multimedia contents shared on the official Facebook page, our attention was focused on reviews made by active senior travelers that were related to technological use. This means that the age of the people who did the review was checked (when available) and only visitors older than 55 and who explicitly mentioned their use of technologies during the visit were selected. Thanks to this tool, a rich collection of data was gathered, which allowed to go deeper into the analysis.

In addition, visitors' comments on museum posts and other multimedia contents were selected with the same criteria (age +55, explicit mention to technologies) were included.

In addition, three direct observations were conducted in three distinct days. These observations were made during the museum opening hours. We observed how active senior travelers are interacting and the using technologies made available by the museum. Moreover, we took notes during the observations and we used the thick description technique to enrich the content (Geertz, 1973) combining the observations of different authors in case of differences (Yin, 1994).

The analysis of such largely qualitative data was done through the software package Nvivo11 since this supports the storage, cross-referencing and analysis of large amounts of data in multiple different formats – text, images, audio files, etc. (Bazeley and Jackson, 2013). Differentiating the data sources and collecting data from three sources were employed to triangulate the analysis in an attempt to generate robust conclusions (Benbasat 1987; Eisenhardt 1989; Yin 1994; Dubé and Paré 2003).

4.3. Data analysis

Inductive logic was used to analyze the data set and arrive at conclusions about the information gathered, formulating a theory based on the interpretation of the data, rather than setting out with a predetermined hypothesis to prove or disprove. In doing so, a within-case analysis was performed (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). In-depth theoretical categories were examined during the coding procedures (Strauss and Corbin, 1998). To analyze each interview and the rest of the dataset, a three-step coding process was used. First, the three authors coded the phrases considered as good unit of text. Codes, such as “Perceived value” and “Satisfaction” were used to illustrate units of text. When a new potential code was identified, a definition and an example of codes were provided (See Table 2) (Miles and Huberman, 1994; Boyatzis, 1998). The code structure was implemented and enhanced during the coding process. In the second step, the coding outputs were compared to pinpoint mutual problems and differences to develop the first structure of emerging themes and their links. As the coding process continued, the list of codes changed, new codes were introduced and some others were merged. Throughout the data analysis process, the new transcripts were compared with the already coded data (Strauss and Corbin, 1998). We stopped conducting interviews (so the coding process) when we found no emerging themes from the dataset arriving at the theoretical saturation (Strauss and Corbin, 1998). At this point, reliability was checked and found satisfactory, coefficient K was above 0.8. Further, the main codes were ordered into two mother nodes (Perceived value and Satisfaction) of similar categories. Perceived value had four dimensions out of which subcategories were drawn. Satisfaction, on the other hand, had three subcategories. The third stage of the coding concerned a process of pattern identification (Miles and Huberman, 1994). Here, great volumes of data from the two previous steps of coding were condensed into a smaller number of constructs that were considered relevant to understanding the emerging theory. The findings from the above-mentioned coding process are displayed in the next paragraph. Table 2, shows the major patterns and their labels, definitions, descriptions, and illustrative examples.

Table 2. Summary of the second step of analysis: Concepts, dimensions and their labels, definitions, and examples

Concept	Dimension	Definition	Example
Perceived value	Epistemic value	Is a kind of value which attaches to cognitive successes such as true beliefs, justified belief, knowledge and understanding	“Essentially for the Nuragic sites, to understand the archeological sites”
	Functional value	The things that are held or included in something, information made available by electronic medium.	“Third floor it was very little English opposed to Italian descriptions we didn’t understand that totally”.
	Economic value	It is a measure of the benefit provided by a good or service to an economic agent. It is generally measured relative to units of currency, and the interpretation is therefore: what is the maximum amount of money a specific actor is willing and able to pay for the good or service	“The price of the entrance ticket was very fine, we come from France and we are used to pay between 10 to 20 euros for museums. So 5 euros for entrance ticket is very fine.”
	Hedonic value:	Desirable objects that allows the consumer to feel pleasure, fun and enjoyment	“I think that was my emotional state, I was quite happy. You know for me I felt quite fortunate and lucky to see these beautiful ancient art effects and it was very interesting to me because before I visited other archeological museums in other places like in Pulia and Toronto and Napoli and Sicilia or in Crete also and some of the items in the exhibition I can see some correlation with other classical civilizations around the Mediterranean. So I felt very happy to see these things.”
	Social value:	Social norms: rules of behavior that are considered acceptable in a group or society	“I have already sent some pictures in groups of WhatsApp”
Satisfaction	Overall satisfaction:	It is a measure of how products and services supplied by a company meet or surpass customer expectation.	“Exceeded, because it’s very experimental and some of it is going to work very well”
	Recommend:	Put forward (someone or something) with approval as being suitable for a purpose or role	“I have already sent some pictures in groups of WhatsApp and definitely would share my review with the people around me and recommend it.”
	Intention to repeat experience:	Is often considered as a measure of loyalty by the consumer.	“We usually come and pay a visit from time to time to see all the new things that they discover”

4 Findings

In this section, some of the key findings into technological perceived value of active senior visitors within museum digital transformations are outlined.

4.1. Epistemic value

All visitors were particularly motivated to visit the archeological museum to have an overview of Sardinia’s history, deepen their knowledge and curiosity related to the Nuragic civilization. For some, the museum was a good starting point of their trip to check what touristic sites they were interested in visiting during their stay: “*we were interested to go there so we can prepare our trip effectively and know better where to go outside of Cagliari*”. For others, it was their last stop as they found it as a good place to summarize what they have

already seen in previous sites and get to see the missing historical monuments to complete the picture in their heads.

Herve: *“Yes well as we already visited the cities of Nora and Tharos, we had much information that were general, in fact to visit the museum gave us a global understanding of the history of the island “Sardinia”. Moreover, to go and check other sites that we couldn’t visit. Have a better chronological understanding of several civilizations... Phoenician, Nuragic, and Roman etc.”*

Further we investigated whether seniors have gained their prior knowledge through the website of the museum. In fact, none of the participant used the website to have general information. They all preferred to gain their knowledge through traditional means like guide books, tour guides and friends. Titziana and Alberto mentioned that they would prefer to access the website after their visit, as a way to remember what they have seen and go deeper by reading more about pieces that caught their attention during the museums’ visit.

Word of mouth played and guide books played an important role in the formation of tourist prior expectation about the visit. *“We have met a lot of friends that have been in here and said it is a fantastic museum and we agree!”*

4.2. Interest in use: Challenges and opportunities brought to life

4.2.1. Some are concerned about the use of technology

Concerns about not knowing how to use the device were obvious; Carla explained: *“We won’t use it, because we are old for this technology (laughing)”*. Moreover, Danielle pointed out that she had never used an immersive mobile application but was interested and willing to try. On the other hand, Marc was only interested to try it if it was “easy to be used” Catherine noted a new insight related to her acceptance to try new technologies and explained that she would be interested in trying it, as long as it was not something she must put on her head. The expression on her face exactly explained concerns related to hygiene. As she prefers to experience immersive technologies through her phone that she was actually able to use comfortably at the age of 71, without having to touch a device that has been used by many tourists.

Missing the real experience: Many has pointed out their lack of interest in using AR not because they did not have enough knowledge or interaction with the digital world, but because they would appreciate seeing the pieces or exhibits as Herve stated: *“in their classical form”*. Alberto explained that he preferred to be in the moment then be distracted by digital layering that could inhibit him from seeing and appreciating the real archeological piece.

Sara supported Hervés’ and Albertos’ opinion about “being there at the moment” stating that she “did not feel related to the use of new devices” and referred its use “to younger generations”.

“No, I didn’t use them. I am not so interested in these kinds of things. I am more interested in seeing the art effects. But maybe for children or students, young students! It’s more interesting to have these technological things, but I am not so attracted.”

In contrast, she continued by explaining that she would be interested in using mobile applications, only if the device would demonstrate intangible aspects that are hard to exhibit in real life.

“I mean... maybe if there was some recreation of how the life was in classical times, like I am very interested in humanities, like how the people were living in that time. Like for example, I really enjoyed anthropological and ethnographical museum here which has the textiles and the jewelry and the ancient classical jewelry. I like to see objects that people were using. So maybe, if there were some recreations of how life was for the people, imagining how their houses were, how their markets were, something like that would be nice! But generally! I am not interested in using an app when I go to a museum, I’d rather see the real art effect.”

Likewise, Tiziana added that she is not interested in using mobile applications but maybe people who love to use their cellphone would.

Losing human interaction: Milena stated: *“I am against this technology, because I found, it’s more useful to touch the objects... We would prefer if there was a tour guide, yes! A person that respond to our questions and not general questions registered on a machine.”*

4.2.2. Others are support the use of mobile application.

On the other hand, as mentioned, seniors nowadays are more interested in using ICT products in their daily life and are adopting them faster when they are perceived beneficial to their way of life (Kok et al., 2012; Anabel et al., 2016).

- **Bring the hidden to display:** In fact, Zomar told us: *“I am pro, because you have more insight on the things that are on display and it can relate to something that happened thousands of years ago and make it your own. If you have something to see and watch how people maybe looked like thousands of years ago, it would be nice!”*
- **Getting overview** Gill said *“I didn’t want to read too much. I personally wanted an overview. So, I didn’t need to read about every art effect, but there were something’s that I was more interested in than others. I was more interested in learning more about the Nuragy and the burial tombs. I was interested in the jewelry in the different sections. So, I didn’t read everything. I walked quite quickly through”.*
- **Listen instead of reading:** Moreover, Hedda our oldest participant (74 years old) was interested in using videos and immersive technologies as she has visual constraints, she stated: *“I would, [use of ICT] well because I can listen to it instead of reading”.*

4.3. Functional value

We concluded from seniors’ answers that they require simple, user-friendly devices to navigate with labeled explanations in four different languages along with panels aside to elaborate the theme of each part in the museum.

Suggestions were given to provide differentiated applications where visitors can select their preferred language and interact more with visual representations from videos with sound effects.

“The only enhancement is to have the information in English as well, that would be perfect and I think that if technology was more included, our experience would be better. I recommend like a touch screen where there are four languages and at the screen that explains about the Nuragy civilization”

Milena in fact claimed that she needed more engaging videos that stimulate the mind: *“No (with a laughter) they [videos] were beautiful but not interesting. Because they do stimulate the imagination”.*

4.4. Emotional value

When visiting museums visitors expect to experience easiness and fun, cultural entertainment, personal identification, historical reminiscence and escapism (Sheng & Chen, 2012).

Emotional value plays an important role in consumers’ behavior and their intention to repeat the use of the device. Zomar explained about her positive past experience with the Louvre mobile application and her satisfaction with past experiences pushed her to consider the use of the same type of technologies at a different touristic site.

“I would definitely use it! Well, I went a few times to the Louvre museum. AR is a step further than downloading an app, but that already is very convenient because you can download the application of the Louvre and then read and go through the hallways with your mobile phone and look at whatever you want to see”

Mrs. Smith added by stating her excitement when evaluating her level of satisfaction: *“I feel it brings me back to those times, I mean when I see things like little buttons they made like*

what almost 8000 years ago?! I mean, how mankind was so smart back then! They weren't dumb! They made wonderful things (impressed) and I went to the floor where they had a roman mask. I mean I could visualize these people that these masks belong to. I was excited."

4.5. Social value

Many of interviewed seniors were satisfied with their overall visit of the museum and would recommend it to their friends and family. However, they would not repeat the visit as they are travelers and would not know exactly when they will revisit the island. As per the locals, they have stated that they would revisit the museum in case new objects were introduced to the exhibition. As for re-using the same technological devices in another touristic context, the people that were pro-use would repeat the use while the ones who are against using new technological devices would not. Milena told us "*I have already sent some pictures in groups of WhatsApp and definitely would share my review with the people around me and recommend it*".

5. Discussion and theoretical contribution

This study extends our knowledge on perceived consumers' value of active senior visitors to archeological museums. Although previous research on perceived value in the tourism field has been extensive, this literature lacked cohesive approach to understanding "How the introduction of new means of technological devices and immersive technologies at archeological museums is perceived by senior visitors." Rather previous work has tended to focus on millennials. We therefore, began with a research question seeking to explore different dimensions of perceived value of active senior visitors within museum transformation. We thus studied the case of Cagliari archeological museum as it is the most visible by tourists for preserving Sardinian "Nuragic" heritage, is more successful than other ventures in the area and has recently introduced digital services aiming at engaging its customers. Our inductive single case study addressed the research question yielding four perceived value dimensions.

Recognition of the importance of the different dimensions of value should enable retail marketers to develop more sophisticated positioning strategies (Sweeney and Soutar, 2001).

With regard to generalizability, it is critical to note that this museum struggled for many years to push people into its doors, which led its management to introduce immersive technologies to its compound

5.1. Managerial implications

The results of this study show that efficient museums should consider, when introducing new technological devices, input criteria included that of the epistemological, economic, social, functional and hedonic values through illustrating an extended space in the pre/during/post phases of visit. (See table 3)

Table 3. Managerial recommendations for traditional and non-traditional visitors through the extended space of pre/during/after visit dimensions when perceiving value

		Traditional visitors	Non-traditional visitor
Pre-visit	Epistemic value	Application with essential information + optional free tour guide	Application with detailed information + optional free tour guide
During the visit	Hedonic value	Market “highlight” pieces at the museum	Market small exhibitions with locals artisans
		Employee /visitor interaction	Employee /visitor interaction
	Functional value	Make sure to offer the information in four different languages	Make sure to offer the information in four different languages
		Less information	Detailed information
	Short attractive videos	Long attractive videos	
After the visit	Social value	Recommend to follow Facebook page	Join the Blog of the museum and advise to contribute in writing an article

Initially, we viewed the epistemological value related to technological use that enabled us to categories digital seniors into two groups according to their interest: 1) Seniors who are motivated to use technology but prefer to have a fast general view over the exhibits at the museum: the “Traditional visitors” whereas, 2) “Non-traditional visitors” are seniors who are more in depth oriented and demand richer detailed applications content.

We believe that archeological museums should understand digital seniors’ heterogeneity and interest, by that, create differentiated applications accessible in four different languages, that suits different types of visitors, we can propose the following:

- General Application: for people who would like to have fast general overview of the museum;
- Specialists Application: for people who would like to deepen their knowledge by focusing in detail on their interest while skipping the rest.
- And Experts Application: for people who would like to keep the technology as well as the human interaction. Visitors have the option to be accompanied by a professional local tour guides, along with the devices to support the tour guides explanations which give them the possibility to ask any related question.

More significantly, perceiving the value of traditional and non-traditional senior customers was important to understand the right implications that might affect the museum when going digital. During the visit, we used two perceived values dimensions: Hedonic and Functional values. It is recommended that the management invest in training its employees specially Security Guards since they are the people who spend the most time close to these art pieces and have direct contact with tourists. It will be an added value to visitors to have additional information and assistance by any encountered employee at the museum. Moreover, the management should market the museum by highlighting one or two artifacts as main attraction points making the museum easily mentioned in articles, magazines and online websites, hence pushing traditional visitors to take action and choose this location as a must see museum.

Regarding targeting non-traditional visitors, it is recommended to organize events that engage these visitors such as involving them in actively doing or watching an artist in action.

In order to ensure a high level of functional values, the application should have entertaining videos with general overview info, skipping non-important information details, while keeping videos simple and entertaining. It is also recommended that the application be provided in multiple languages.

As for the non-traditional, the application should focus on details while giving the option to skip, shift or choose the topic of interest.

After the visit, it is advised to create a professional photo booth with the same museum ambiance with figurines of the highlighted pieces of art pushing traditional visitors to log into

their social media account and follow the museum social page to retrieve their picture, and hence not only share their personal details with the museum but also indirectly market the location with their social media friends.

As for the non-traditional visitors, offering them the opportunity to share their experience on the museum's blog by writing articles and sharing their art or creation would attract other non-traditional visitors.

5.2. Study limitations and future research

The present study has some limitations. First, this study was conducted in Sardinia archeological museum, south of Italy. Therefore, the strategic approach that was unveiled cannot be generalized to other types of museums elsewhere. Second, we opted a qualitative research strategy; however, the next step would be to use a quantitative approach to generalize better our findings. Third, the present study focused on the perceived value of seniors using the technology within indoor environment. It would be interesting to check if the perception of seniors might change within outdoor environments usage. Fourth, as mentioned in the methodological section, we excluded from our study the economic value from perceived value dimensions as the devices offered at this museum were offered for free. So, it would be more interesting to evaluate the economic dimension implication on the overall experience at the museum in future studies.

And finally, Wilkening and Chung (2009) emphasized that museum visitors, as they do at different stages of their lives, will have different needs and perceptions. Having a longitudinal study evaluating the same population of seniors over a long period would enhance our understanding of perception and adoption behavior of non-users.

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