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# The Contribution of Technology-Based Heritage Interpretation to the Visitor Satisfaction in Museums

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## Abstract

The tradition of heritage interpretation is moving away from purely conservational and educational goals to an entertainment- and experience-oriented interpretative provision. New technologies are gaining prominence in museums to enhance visitors' mindfulness, subsequent learning outcomes and satisfaction. Extant research literature reflects technology-based heritage interpretation; however, such studies implement predetermined outputs which have never been tested by the demand side. This paper seeks to assess technology-mediated heritage interpretation, merging both theory from the museums management and customer satisfaction literatures, and applying Importance-Performance Analysis. Results reveal that new technology does not represent a substitute for other interpretative applications. Its appropriate use in those museums with a traditional interpretative layout enhances displays' multisensory provision and visitors' perceived interactivity. The use of technology is more appreciated in traditional museums than in those with live interpretation.

**Keywords** Tourism, ICT, Heritage Interpretation, Importance-Performance Analysis, Museums

## 1 Introduction

Information and Communication Technologies (ICT) are affecting the *modus operandi* of entire industries (Crowston & Myers, 2004). As it has progressively taken place in other areas, museums are increasing their use of ICT, not only to support management operations, through data collection and analysis (Sheldon, 1997), but also to be directly used by visitors, in an attempt to enhance their experience of the exhibition. Publications which examine the use of technologies in heritage interpretation - both from the computer science and museum curatorship perspective - emphasise the benefits of technology implementation in heritage interpretation (Chalmers & Rushmeier, 2002; Beeho & Prentice, 1995). Museums have changed from the imposing sites designed to preserve relics and to exhibit collections, to

places where a mix of enjoyment, learning and experience outcomes are also pursued (Moscardo, 1996). Furthermore, museums, as heritage attractions, are an important element of the tourism destination and must adjust to new consumers' needs (MacDonald & Alford, 1991). On the other side, some authors consider that museums should maintain strict guidelines in their exhibits, making sure that no place has been given to the misinterpretation of the past (Uzzel, 1989) and react against a possible "over-interpretation", which might not leave place for the imagination (Meyer, 1993). According to some authors ICT increase museums' potential to compete with the entertainment industry (MacDonald & Alford, 1991). However, little research has been carried out from the demand-side perspective and this study aims to address this gap in research using the Importance-Performance analysis to assess consumers' preferences in technology-based heritage interpretation.

## **2 Theoretical Background**

ICT in museums is no longer confined to the support of data entry operations (MacDonald & Alford, 1991). The increased demand for heritage-related activities, the continuous developments in technological appliances and museums' increased interest in attracting larger numbers of visitors have stimulated further developments in ICT usage to support heritage interpretation. Heritage interpretation - the process by which the history behind objects is packaged and offered to customers (Ashworth, 1990) - is considered an essential feature of the visitors' experience, due to the relevance that heritage has acquired as part of the tourism destination and the need to increase museums' competitiveness. The field of ICT and heritage interpretation has been extensively researched (Veltman, 2005). Some studies have approached the effectiveness of technological appliances in museums, such as Grinter, Aoki, Hurst, Szymanski, Thornton, and Woodruff (2002), whose research examined visitor use of mobile audio and visual devices. The work presented by these authors was carried out through interviews, bringing an insight in the understanding of how certain types of devices might enable social interactions when visiting a museum. Other works examine the introduction of specific technological devices, such as cinematic techniques in multimedia museum guide (Rocchi, Stock, Zancanaro, Kruppa, & Kruger, 2004), or three-dimensional audio devices (Hatala, Kalantari, Wakkary, & Newby, 2004). However, this line of research has been mainly carried out from the computer science perspective, in an attempt to augment the number of visits to museums by introducing 'high-tech' devices. Even though, theories of heritage interpretation have been considered to a certain extent in some of these projects – as for instance, the emotional significance of the exhibitions in Rocchi et al. (2004) – the validity of the adopted variables which measure the effectiveness of these applications has not been tested and arises from preconceived ideas of effectiveness outputs.

During the 17th century museums started to open their displays to the general public, as opposed to their previous exclusive dedication to scholars (Bennett, 1995). However, their interpretative provision was purely focused on educational outcomes (Moscardo, 1996). Nowadays, with the increased demand for heritage-related activities as part of the holidays, museums are becoming an important element of the tourism product, increasing the number of leisure-seekers visiting museums (Uzzel,

1989). On the other side, in social cognition research, entertainment and interactive displays are now considered to enhance visitors' interest, and therefore, mindfulness and learning outcomes (Mellor, 1991; Moscardo, 1988). Technology-mediated heritage interpretation has been suggested to increase interactivity (Moscardo, 1996), similarly to that one achieved through live interpretation in museums (Beeho & Prentice, 1995), i.e. introducing costumed staff who explain the exhibitions (Alsford & Parry, 1991). However, some authors consider that there is a risk of spoiling some of the special character which distinguishes museums as formal institutions by breaking the boundary between fantasy and reality and eventually affecting the number of visitors (Uzzel, 1989). On the other side MacDonald and Alsford (1991) argue that the developments in technology and mass media communication do not jeopardise museums' special nature, but enhance their exclusivity as the leisure-related institutions where knowledge transfer is research-based, as opposed to the entertainment industry, where reality is commonly not firmly documented. In addition, with the emergence of a more diversified visitor profile, interpretation will have to address very different motivations and knowledge backgrounds, from the educated and experienced consumer who commonly seeks an "individualised, personalised, participative experience", to a more passive tourist who hardly acquires any pre-trip information (Hooper-Greenhill, 1992).

Heritage-related activities, such as visits to museums and centres of heritage interpretation, play a fundamental role in the overall tourism experience – forty per cent of tourism trips have a heritage-related activity (Timothy & Boyd, 2003). Due to the importance of the tourism satisfaction in determining the success of destinations (Kozak & Rimmington, 2000), visitors' preferences need to be recorded and implemented. In tourism, as in other business environments, the concepts "satisfaction" and "quality" have been imprecisely used (Bowen, 2001). According to Tribe and Snaith (1998) questionnaires tended to evaluate satisfaction from the "researcher's view of the world" rather than from the customers' perspective. The attributes which determine the potential achievement of customer satisfaction were stated by the researcher rather than by customers. According to these authors, customers should not only be asked to rate companies' performance in the suggested features, but also the importance that they give to the specific attributes in the purchasing decision. The outputs commonly used for the assessment of technology usage in heritage interpretation is mainly based on those traditional theoretical frameworks, which assume that learning is the only pursued outcome when visiting one of these institutions. Heritage interpretation is commonly acknowledged as an essential element for the understanding of museums' displays (Moscardo, 1996; Prentice, 1993). Aiming to enhance the benefits of heritage interpretation, ICT is currently being introduced as an interpretative instrument (MacDonald & Alsford, 1991). However, no research has been conducted to evaluate the demand side perspective as regards to technology-based interpretative provision. Therefore, this study is a first step in approaching the assessment of tourism satisfaction, as regards to the use of technology in heritage interpretation.

### 3 Methodology

This research aims to introduce the demand-side assessment method for technology implementation in heritage interpretation. Therefore, the Importance-Performance analysis (IPA) - commonly used in customer satisfaction studies (Ennew, Reed, & Binks, 1993) - has been here implemented to study visitors' predilection/dislike of technology implementation in museums, enabling visitors to assess the validity of each dependent variable of the study. In addition, relationships between the use of specific technology and the potential effectiveness outcomes are assessed enabling the satisfaction-dissatisfaction evaluation.

#### 3.1 Importance-Performance Analysis

Importance-Performance Analysis (IPA) is the name given to the research instrument used in this investigation. This tool has been widely used in a variety of fields for the assessment of customer satisfaction (Tribe & Snaith, 1998). It stems from work developed by Fishbein (1967) where attitude is related to belief and evaluation and the method uses the confirmation/disconfirmation concept further developed by Oliver (1980) and Churchill and Surprenant (1982). In essence IPA brings together measures of both attributes "importance" and "performance" into a two-dimensional matrix (Fig. 1), in order to facilitate the data interpretation and analysis of results (Oh, 2001).

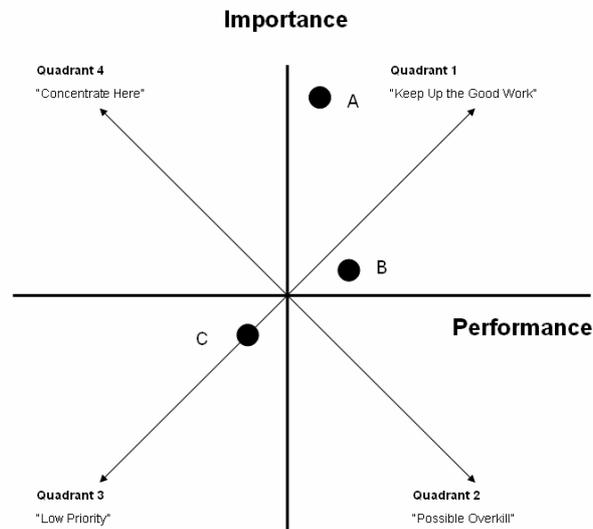


Fig 1. Traditional Importance-Performance Grid (Oh, 2001)

Quadrant 1, "keep up the good work", represents both those attributes which customers consider essential and in which clients have a positive perception of the

company's performance. Similarly, "possible overkill" in Quadrant 2 shows those attributes of relatively little importance for customers, but where the company performs well. The third quadrant, so-called "low priority", represents attributes which customers rated of the lowest importance and performance and which are expected to receive a low priority in management decisions. Quadrant 4 represents those attributes in which the company needs to focus their efforts, as customers identify those as the most important to their purchase decisions. The Importance-Performance matrix has been adapted in this project to identify visitors' preferences in technology use for heritage interpretation purposes. The study consisted in a survey, which was carried out in two museums with different types of interpretative provision. One includes live interpretation and another one has no live interpretation, but incorporates the use of technology in its explanatory provision. Both of them also introduced some traditional interpretation, whose effect on customer satisfaction has also been surveyed.

### **3.2 The Survey**

The survey evaluates the Importance-Performance of learning, entertainment and experience outcomes – commonly acknowledged as the main goals of heritage interpretation (Moscardo, 1996) - and the effectiveness of technology-based interpretative solutions in the enhancement of each of these outcomes. Furthermore, it compares the customer satisfaction achieved by technology-supported interpretation to those obtained through live interpretation and other more traditional forms of heritage interpretation. The questionnaire follows a paired structure, allowing customers to state the importance they give to each attribute and their perception of satisfactory performance as regards to each attribute. Tourism satisfaction occurs when companies' performances match customers' expectations. A simplified and adapted version of the methodology used by Tribe and Snaith (1998) has been applied in this study. Instead of the consumers being asked to rate their answers on a five-point scale, these surveys only establish two possible responses: yes and no.

A 120 questionnaire set was equally distributed in two museums with different interpretative provision, namely Beamish Museum ([www.beamish.org.uk](http://www.beamish.org.uk)), a regional open air museum where live interpretation forms a central approach and enables a high level of interaction with the costumed staff without any type of technology as part of the interpretative provision; and The Bowes ([www.thebowesmuseum.org.uk](http://www.thebowesmuseum.org.uk)), a museum with a more traditional interpretative emphasis and layout, which has introduced some ICT tools, i.e. audio devices and some touch screens. The museums were selected according to the convenience of their location - north east England – and their different heritage interpretation provision – i.e. immersive and traditional. The questions included in the survey were derived from heritage interpretation literature and site visits to the location before. A pilot study was carried out with five participants, previous to the development of the final questionnaire, and their suggestions were considered for the design of the final survey. The data was analysed using SPSS. Sign tests were conducted to analyse the relationship between the expectation and performance and whether "the perception is different to the expectation" (dissatisfaction) or "the perception is equal to the expectation"

(satisfaction). Furthermore, a crosstabulation (see Table 1) was also carried out aiming to describe the specific nature of the satisfaction-dissatisfaction results for each attribute and whether visitors considered that each of these attributes were “performed and expected”, “not-performed but expected”, “performed but not-expected” or “not-performed and not-expected. Finally, the results have been graphically represented in the Performance-Expectation Grid (Figure 2) which is an adaptation of the “Importance-Performance Grid” introduced by Oh (2001). Each attribute has been represented in the relevant/s quadrant/s, according to the results from the crosstabulation.

## 4 Results

The results are presented in two different sections; one is related to the analysis of the different interpretative elements which have been included in the research and the other one relates to the achievement of the studied outcomes “learning”, “entertainment” and “experience” through technology-based interpretation as opposed to “live interpretation” and traditional interpretative devices. Both types of results will refer to the sign tests which have been carried out as part of the exploratory stage, the Crosstabulation which brings in a deeper understanding of the results (Table 1) and the Expectation-Performance Grid (Fig. 2 and Fig. 3) which graphically represents the results for the specific devices (Fig. 2) and for the specific outcomes (Fig. 3).

**Table 1.** Crosstabulation and Chi-square - Comparison between Museums

	Perf.-Exp. (%)		N. Perf.-Exp. (%)		Perf.-N.Exp. (%)		N.Perf.-N.Exp. (%)		Sig.
	Bea	TBw	Bea	TBw	Bea	TBw	Bea	TBw	
Entertainment Outcomes	96.7	93.3	1.7	5.0	0.0	1.7	1.7	0.0	0.386
Learning Outcomes	65.0	61.7	21.7	36.7	10.0	0.0	3.3	1.7	<b>0.034*</b>
Experience Outcomes	88.3	81.7	1.7	18.3	5.0	0.0	5.0	0.0	<b>0.020</b>
Interpretation Provision	65.0	63.3	28.3	36.7	6.7	0.0	0.0	0.0	0.098
Staff Explanations	81.7	96.7	5.0	1.7	11.7	1.7	1.7	0.0	0.064
Written Information	20.0	93.3	58.3	0.0	0.0	6.7	21.7	0.0	<b>0.000*</b>
Touch Screens.	0.0	5.0	28.3	33.3	0.0	0.0	71.7	61.7	0.158
Audio Devices.	6.7	76.7	25.0	5.0	0.0	15	68.3	3.3	<b>0.000*</b>
Interaction with Objects	30.0	55.0	11.7	18.3	10.0	13.3	48.3	13.3	<b>0.001*</b>
Poster	8.3	88.3	23.3	5.0	1.7	5.0	66.7	1.7	<b>0.000*</b>
Combination of Elements	28.3	88.3	28.3	8.3	3.3	3.3	40.0	0.0	<b>0.000*</b>

\*  $p < 0.05$

This table represents the percentage of people who falls into each category, being the categories “People who found and have expected the attribute” (Perf.-Exp.), “People who did not found but have expected the attribute” (N.Perf.-Exp.), “People who found but did not expected the attribute” (Perf.-N.Exp.) and “People who did not found have not expected the attribute” (N.Perf.-N.Exp.). Both museums are presented within this table, Beamish Museum (Bea) and The Bowes (TBw).

Demographic data was recorded but no significant differences in the results, related to the respondents' profile, were identified. So it was decided to skip this information in favour to other.

#### **4.1 Interpretative Devices**

Different results have been achieved within the technology-related devices. According to the results arisen on the sign test, high levels of customer satisfaction were achieved in both museums as regards to the attribute "touch screens" as 83 out of the 120 respondents were satisfied. Table 1 shows that 66.7% of the sample stated they did not expect and did not find touch screens in any of these museums. According to Moscardo (1996) touch screens are considered to enhance visitors' interactivity with objects, they increase the sense of control over their experience of the place and can provide a large amount of information about the collection in a reduced space. Even though the majority of the visitors stated they did not expect them, as reflected on Fig. 2 still a high percentage of visitors - 33.3% from The Bowes and 28.3% from Beamish – would have appreciated these interpretative devices being included in both museums. No significant differences have been identified when comparing the results from both museums in this attribute. As regards to the audio devices, the sign test reflected that 93 people out of the 120 who participated in the survey evaluated both museums' performance as satisfactory. Table 1 reveals that this satisfaction is due to two different results, 41.5 % of the people expected to find audio devices and did satisfy their expectations, while a still high percentage of people - 35.8% - stated their lack of expectation and performance as regards to this attribute. There are some significant differences between museums as regards to the feature "audio devices". As reflected on Table 1, people who visited Beamish did not expect these devices being introduced and did not find them (68.3%); while in The Bowes they did expect them and found them (76.7%). These results show high levels of satisfaction in both museums, although in opposite directions (see Fig. 2).

As opposed to the use of technology, the traditional types of heritage interpretation were also evaluated in this study. The sign test revealed that 99 visitors were satisfied as regards to the use (or otherwise) of posters for heritage interpretation. Table 1 reveals the different proportions of visitors who expected and achieved this attribute being performed by the visited museum (48.3%) and the people who didn't expect this interpretative provision and did not find it in the visited museum (34.2%). The reason for these contradictory figures is shown on Fig. 2. There are significant differences between museums. The majority of the people who visited The Bowes (93.3%) expected posters been displayed, and 88.3% of the people stated their satisfaction as regards to this attribute. However, only 31.6% of the people who visited Beamish Museum expected to find posters, and the majority, 58.3% did not expect to find them at all in Beamish. This indicates the higher importance of posters in traditional museums as opposed to those with live interpretation. As regards to staff explanations, the sign test has revealed a high level of equality in visitors' responses as 89.2% of them said to both have expected and obtained staff explanations during their visit to the museums and no significant differences have been identified between

these museums, 96.7% in The Bowes and 81.7% in Beamish. Finally, Fig. 2 reflected that only 58.3% of the visitors expected and achieved to find a combination of elements within the interpretative provision of these museums and a still important percentage of the visitors, 20%, did not expect to find a combination of elements and did not find it in the museum they have visited. The vast majority of the visitors to The Bowes (88.3%) did expect and report a positive performance by the museum as regards to this attribute. However, Beamish does not show such a satisfactory result and only 40% of the visitors was satisfied by not finding combination of elements.

Generally, visitors reported a high level of perceived interactivity with the objects in both museums. The sign test stated that a total of 88 people out of the 120 participants have reported that they have fulfilled their expectations as regards to this attribute. The results from Table 1 and the Expectation-Performance Grid in Fig. 2 show important differences between museums as regards to this attribute. The majority of the people who visited The Bowes (55%) expected and found their expectations fulfilled, while in Beamish the highest percentage (48.3%) corresponds to those who did not expect and did not find interactivity during their visits. According to Koran , Morrison, Lehman, Koran, and Gandara (1984) visitors are more attracted by those objects that can be touched. Even though live interpretation - performed in Beamish Museum - is considered to improve visitors' interactivity with the exhibition (Timothy & Boyd, 2003), this traditional museum has shown to enhance interactivity with the objects at a greater extent than the museum which provides live interpretation.

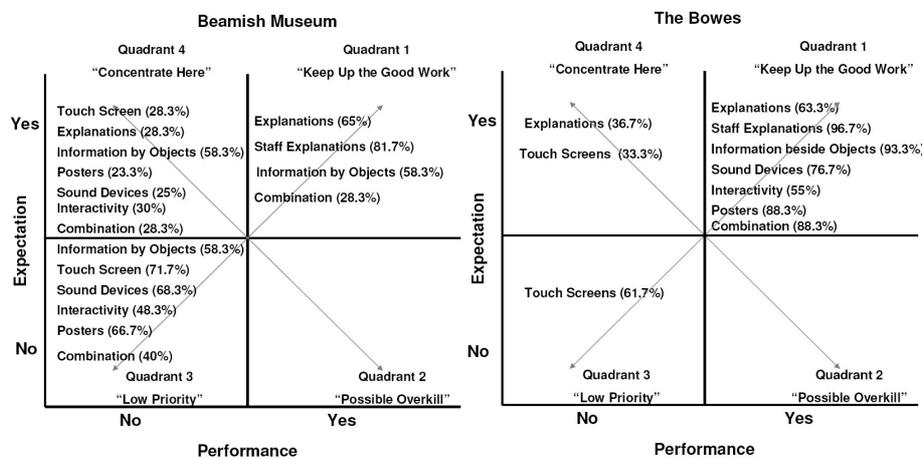
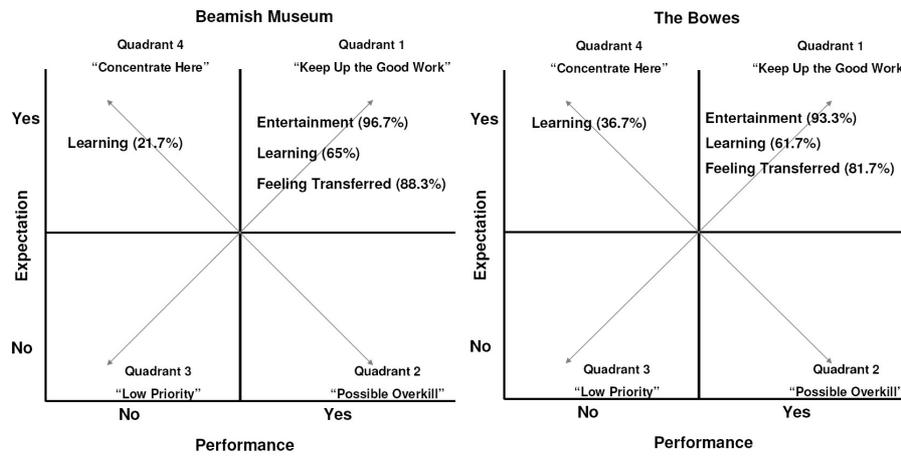


Fig. 2. Expectation-Performance Grid for Interpretative Devices in Beamish Museum and The Bowes.

#### 4.1 Technology-Based Learning, Entertainment and Experience

The different outcomes considered in the heritage interpretation-related literature - learning, entertainment, and experience - have been examined within this study, as well as differences in expectation and performance related to the diverse types of interpretation techniques, namely live interpretation, technology-based and traditional interpretation. The results have been also obtained from the sign test and Table 1 and have been graphically presented in Fig. 3.



**Fig. 3.** Expectation-Performance Grid for Learning, Entertainment and Experience Achievement in Beamish Museum and The Bowes.

Learning, entertainment and the experience have been considered similarly important by the visitors to both museums. As shown on Fig. 3, visitors' satisfaction has been achieved as regards to all these three elements. The results show that both museums have similar outcomes regarding the learning attribute, even though still an important percentage (29.2%) of the visitors aim to learn more than they actually did. Nevertheless, the figures show an interesting variation from the percentage of visitors who expected to learn during their visit to Beamish Museum (86.7%), with live interpretation and the visit to The Bowes (98.4%), which could be related to the different types of motivation for visiting a traditional museum, with a higher level of educational purpose or one whose design is based on live interpretation, where visitors might have lower learning motivation.

There are no significant differences between museums as regards to the attribute entertainment, both museums show similar results, with the 96.7% of the visitors from Beamish expecting and achieving to be entertained, and the 93.3% of those who visited The Bowes also expecting and fulfilling this attribute. In Addition, more innovative formulas of interpretative provision, such as the one in Beamish Museum, which fully recreates the era to be displayed and could therefore enhance visitors' experience, do not seem to improve those learning outcomes. The results show that

the examined museums have been generally satisfactory in terms of visitors' experiences. The majority of the visitors stated that they expected the feeling of being transferred before coming into the museums and their answers to the survey prove that they have achieved that prospect. Besides, there are no significance differences between both museums' results. The majority of the people who visited Beamish Museum and The Bowes confirmed they have learned, have been entertained and have had a fulfilling experience when visiting these museums.

## **5 Conclusions and Outlook**

Previous research in technology implementation for heritage interpretation purposes has adopted learning as the only output to determine the devices' effectiveness. Several outputs have been identified during the examination of the heritage interpretation-related literature; these are not only learning but also entertainment outcomes as well as the experience itself. However, no consumer input has been considered for the establishment of these effectiveness indicators. Research in customer satisfaction states the need to identify the importance that customers assign to each attribute when assessing their overall satisfaction rate, in an attempt to understand the specific weight of each element in their purchasing decision. This research therefore combines both, tourism and customer satisfaction literature and major heritage interpretation theories, building a bridge between these two cognitive fields to analyse the use of technology implementation in museums. The Importance-Performance theory and the Expectation-Performance Grid have been proved to be of special usefulness in assessing visitor satisfaction as regards to the use of technology for heritage interpretation in museums.

The results show that different requirements apply to the diverse types of museums. The use of a combination of diverse interpretative tools such as posters, audio-visual devices described by Moscardo (1996) as facilitators of a multisensory provision seem not to play an essential role in immersive museums. The live interpretation provided in Beamish Museum seems to facilitate itself visitors' stimulation and as a result the combination of diverse interpretative tools such as posters and audio devices might not be needed for the enhancement of visitor satisfaction. The three elements considered in the literature as the main outcomes of heritage interpretation - learning, entertainment and experience - have been confirmed in the study as highly important for visitors to museums. Both visitors to Beamish and The Bowes have learnt in similar percentages, however, there are some differences between museums as regards to their learning expectations. A higher percentage of visitors to The Bowes than those who visited Beamish Museum have expected the achievement of learning outcomes. Visitor motivations vary should be addressed in further research from the consumer behaviour perspective.

As regards to the use of technology, people were in general terms satisfied without the availability of touch screens, nevertheless, a high percentage of visitors would have appreciated them in both museums. The use of audio devices was appreciated in the traditional museum, while those visiting the immersive museum didn't expect this type of device. Live interpretation seems to provide a state of mindfulness which

allows museums' management to dispense with the combination of interpretative devices that would become essential in museums with traditional interpretative provisions. This suggests that technology seems not to represent a substitute for other interpretative applications, but when appropriated used does complement the interpretative provision in traditional museums, enhancing the interactivity and multisensory provision of the exhibition. Furthermore, interactive and multisensory devices, as well as the combination of different elements within the interpretative provision are more appreciated in the general understanding of the collection of traditional sorts of museums than in those with live interpretation. These differences between museums suggest that further research should then be directed to identify devices which enhance visitors' mindfulness in traditional museums, as a way to increase their competitiveness with museums that provide live interpretation.

Although there are some attempts in the literature to classify the different types of interpretation which might be offered by museums, these are too general and do not include the specific devices into specific categories. Therefore, further research aiming to define the different levels of heritage interpretation is required, developing categories from the most basic interpretation, which would be brought by the merely display of artefacts to the most sophisticated one which would be represented by the live interpretation/virtual reality, where the past is fully recreated and visitors' mindfulness and attention is at its highest. This study has practical implications for museums management, related to technology enhancement. Especially traditional museums are expected to engage in IT-related interpretation to enhance learning, experience and entertainment. The sector still needs more innovative ideas, and further research is needed to analyse the status quo of current IT use in museums.

There were some restrictions in the scope of this work, but these also point to opportunities for further research, e.g. the small museums' sample - only two - constrained the suitability to generalise the findings. This is thus a foundation study which aims to set the basics for further research, and should therefore be extended including examples from more museums. Furthermore, the application of this method to museums where a wider range of ICT applications were available would increase the validity of the results.

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