



# When art meets tech: The role of augmented reality in enhancing museum experiences and purchase intentions



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## HIGHLIGHTS

- This study examines the effects of AR technology's design elements on visitors' museum experiences and purchasing intentions.
- Information type and environmental augmentation were found to jointly influence visitors' willingness to pay a higher price.
- Imagery vividness and experiential value were verified astheoretical processes that explain the effects.

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## ABSTRACT

As augmented reality (AR) has been increasingly adopted by various industries as a marketing tool, tourism practitioners have come to recognize its promising potential in staging experiences. Despite the extensive discussions around AR's managerial implications, academic inquiry into how to adopt AR technology in museum tourism contexts remains rare. Building on this emerging stream of scholarly literature, the current study attempts to examine the impact of information type (dynamic verbal vs. dynamic visual cues) and augmenting immersive scenes (high vs. low virtual presence) on visitors' evaluation of the AR-facilitated museum experience and their subsequent purchase intentions. Using an experimental approach, the results demonstrate that compared with dynamic visual cues, dynamic verbal cues lead to visitors' higher levels of willingness to pay more and such effect is more salient when environmental augmentation provides a high level of virtual presence. Such effects can be explained by the psychological mechanism of mental imagery.

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*The eyes see only what the mind is prepared to comprehend.*

– Robertson Davies

## 1. Introduction

Augmented reality (AR) technology is one of the most revolutionary inventions in recent years. Crowned the most frequently searched term on Google in 2016, “Pokémon Go” successfully introduced AR to a mass audience (Wingfield & Isaac, 2016). By augmenting a display of real-world objects and spaces with virtual information (Milgram & Kishino, 1994) to seamlessly integrate virtuality and reality (Tussyadiah, Jung, & tom Dieck, 2017), AR shows

great potential as a design tool to craft innovative customer experiences across industries. AR's popularity is expected to continue with the market estimated to reach \$117.4 billion by 2022 at a compound annual growth rate of 75.72% (Forbes Agency Council, 2017).

At the forefront of staging experiences in the experience economy (Pine & Gilmore, 1999), the tourism industry has seized the opportunity to use AR technology to develop never-before-seen tourism experiences. For instance, outdoor applications such as ViewRanger and AR Mountains Map have introduced augmented trail information as tourists navigate and tag their adventures (Gooding, 2016). Indoor attractions have begun to enhance visitors' experiences with AR, such as the new “Terracotta Warriors of the First Emperor” exhibition at the Franklin Institute in Philadelphia, which digitally showcases warriors and their weapons (Hurdle, 2017).

Research on AR in tourism and travel has been spurred by these emerging trends. Extant body of tourism and travel literature has focused mainly on the prospects and challenges of AR adoption (Kounavis, Kasimati, & Zamani, 2012), potential usage scenarios (tom Dieck, Jung, & Han, 2016; Scarles, Casey, & Treharne, 2016, p. 1177;

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Hassan & Ramkissoon, 2016; Chung, Han, & Joun, 2015), user readiness and acceptance of AR (Chung et al., 2015; Jung, Chung, & Leue, 2015), unique user experiences with AR (Tussyadiah et al., 2017), and consumers' attitudes and behavioral intentions around AR adoption (Chung, Lee, Kim, & Koo, 2017). While experience design researchers argue that well-designed experiences may increase customers' willingness to pay (Pine & Gilmore, 1999), the relationship between AR design elements and customers' paying behavior warrants further investigation. Yet, to the best of the authors' knowledge, no prior research has looked at the impact of AR design elements on the tourism experience and subsequent behaviors.

The current study seeks to fill this gap in the literature via mental imagery theory (Thomas, 1999) and attentional control theory (Kim & Cave, 1999). Specifically, this research examines how and why two AR design elements, information type (i.e., dynamic verbal vs. dynamic visual cues) and level of virtual presence (i.e., high vs. low), influence visitors' museum experiences and subsequent behavioral intentions, particularly their willingness to pay more (WTPmore). As an important product that museum tourism belongs to, cultural tourism has been recognized as "one of the most important forms of tourist traffic" and is estimated to become one of UNWTO's main focus by 2020 (Niemczyk, 2013, p. 24). In addition, cultural institutions particularly museums, are acknowledged to be premier attractions of tourism destinations that tourists tended to visit regardless of destinations (McKercher, 2004, p. 498; Stylianou-Lambert, 2011). However, with challenging economic environment and significant declines in government support, museums are facing severe financial challenges and are eager to convince visitors to pay more for distinct experiences in order to alleviate budgetary pressure and generate revenues (IBISWorld, 2017; Silberberg, 1995). Moreover, AR innovation represents a new method for enhancing visitor experiences in the museum industry despite concerns over its return on investment (Center for the Future of Museums, 2016). To that end, the current research aims to explore how AR may help museums overcome budgetary pressure by increasing visitors' willingness to pay. The results of this study will provide meaningful and specific insights for practitioners regarding how to design AR applications to enhance the tourism experience and improve their financial prospects.

The remainder of this article is organized as follows. The theoretical background provides a literature review of the key constructs related to AR-mediated museum experience, including experiential value, AR design elements, and visitors' willingness to pay more. The hypotheses development section introduces mental imagery theory and attentional control theory, which underpin our hypotheses regarding the effects of key AR design elements on visitors' willingness to pay more; this section also outlines the potential mechanism that explains these effects. Following that, the methodology section details the research design and procedure. The results section presents the data description and major findings, and the article concludes with a discussion and study limitations.

## 2. Theoretical background

### 2.1. The museum tourism experience and experiential value

Museums, especially art museums, have been widely recognized as a major tourist attraction for domestic and international visitors in many destinations. Art museums are at the helm of staging experiences in today's experiential economy. As museums face serious financial challenges (Pogrebin, 2017), they are turning their focus on enhancing the visitor experience in order to increase admission rates (IBISWorld, 2017; Kelly, 2004). Driven by service co-creation logic (Prahalad & Ramaswamy, 2004), the service experience literature indicates that both the visitor and managerial

perspectives should be considered in order to successfully manage visitors' experiences (Johnston & Kong, 2011).

From a visitor's point of view, a key construct that captures the success or failure of the entire museum experience is perceived experiential value (Chan, 2009). Perceived experiential value is based on the transaction or co-creation of experience between the service provider (i.e., museum) and the customer (i.e., visitor), particularly interactions involving direct either usage or distant appreciation of goods or services (Wu & Liang, 2009). In the context of museum tourism, previous research has suggested that the generation of visitors' experiential value is tied to their aesthetic appreciation process (Chung et al., 2017; Csikszentmihalyi & Robinson, 1990). An aesthetic response to the museum experience contains two dimensions: 1) direct visual appeal of the museum exhibition's design; and 2) spectacular aspects of the experience (i.e., perceptions of entertainment and amusement) (Mathwick, Malhotra, & Rigdon, 2001). As visitors transform from spectators to participants, their distant appreciation of aesthetic elements shifts to value generation (Deighton & Grayson, 1995), specifically intrinsic value. Enjoyment, as one of the core intrinsic values in this context (Beardsley, 1965; Chung et al., 2017), results from participation in absorbing immersive activities or processes that offers a sense of escape from everyday monotony (Mathwick et al., 2001; Unger & Kernan, 1983). Based on these conceptualizations, experiential value in a museum context contains several key aspects: visual appeal, entertainment, enjoyment, and escapism (Mathwick et al., 2001; Shih, 2015).

From a managerial viewpoint, the management of the museum tourism experience relies on delivering inputs (i.e., the core product and the physical environment in which the product is embedded) (Falk, Koran, Dierking, & Dreblow, 1985) by stimulating attention, interest, and engagement (Goulding, 2000). One of the two key orientations to look at the management of museum experience are the notions of "exhibit" and "setting" (Falk et al., 1985). The former maintains that the nature of an exhibit is the dominant driver behind the museum experience. The latter is more holistic; it regards the museum as a social and physical setting where individuals are constrained by social norms or physical spaces to react in a predictable way (i.e., aesthetic appreciation). Therefore, in addition to various exhibits and displays, visitors' responses can be shaped by social and physical settings. Based on previous understanding from both perspectives, it is thus essential for museums to generate compelling stimuli through myriad exhibits and settings to successfully engage tourists in the co-creation of aesthetic experiences. Given this managerial need, the design and implementation of AR technology in museum contexts should attend to both exhibit and setting.

### 2.2. Augmented reality (AR) technology

As the midpoint of the reality-virtuality continuum, AR can be defined as the technique that "augmenting natural feedback to the operator with simulated cues" (Milgram, Takemura, Utsumi, & Kishino, 1994, p. 283). With the unique ability to superimpose virtual information onto physical objects and environments (Chung et al., 2015), AR can either bring real-world objects into a virtual environment or bring virtual objects into reality (Milgram & Kishino, 1994). It also has the potential to reshape the design of museum exhibits and environments and to influence users' attention allocation (Yeh & Wickens, 2000); thus, AR can be utilized as an auxiliary tool in the management of tourists' museum experiences. Previous studies on AR in the tourism context have investigated the challenges and prospects of AR adoption for tourism needs (Kounavis et al., 2012). Other studies have explored tourists' readiness and acceptance of AR technology (Chung et al., 2015),

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