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Augmented reality marketing in hospitality and tourism: a guide for researchers and managers

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Abstract

Purpose – The hospitality and tourism industry is strongly influenced by new and immersive technologies, such as augmented reality (AR), to enhance customer experiences across a diverse set of touchpoints throughout the visitor journey. This paper aims to provide a holistic understanding of AR marketing for this industry context, present a number of fundamental premises of AR marketing within it and establish an agenda for future AR research.

Design/methodology/approach – This study reviews current literature on AR marketing, hospitality and tourism and industry use cases for the creation of a proposed conceptual framework to guide scholars and managers. Based on that, the authors propose fundamental premises.

Findings – The three fundamental premises of AR marketing presented are the need to clearly differentiate between AR and virtual reality within hospitality and tourism; the use of AR for the on-trip experience; and the combined focus on content, context, customer and computing devices for a successful strategic implementation of AR.

Research limitations/implications – This study serves as a first point of reference for the strategic integration of AR into hospitality and tourism marketing, both from an industry and academic point of view.

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Practical implications – The authors provide a number of managerial recommendations based on our three fundamental premises.

Originality/value – To the best of the authors' knowledge, this study is one of the first to holistically characterize AR marketing in the hospitality and tourism context. It also highlights the fundamental premises of successful AR marketing and future directions of AR research today and in a spatial computing future.

Keywords AR, Augmented reality, Marketing, Hospitality, Tourism, Spatial computing, Extended reality

Paper type Research paper

1. Introduction

Augmented reality (AR) integrates context-related digital information into a user's real-time field of vision (Rauschnabel *et al.*, 2022b). Hospitality and tourism researchers have demonstrated the potential of AR in a variety of use cases, such as adding value through the visualization of complex information for hotel and restaurant guests (Ali, 2022; Batat, 2021; Buhalis *et al.*, 2019), guided city tours (Koo *et al.*, 2019), games (Williams and Slak-Valek, 2019), storytelling (Zhu *et al.*, 2023a, 2023b, 2023c) and providing information about historic buildings (Chung *et al.*, 2018), among others. Today, almost everyone has an AR-enabled smartphone or tablet and, in the near future, possibly headsets. Such wearables would allow long, permanent, hands-free experience of AR content almost anywhere and anytime (often subsumed under the umbrella terms “spatial computing”, “pervasive AR” or “metaverse”; see footnote [1]) – with strong implications for the hospitality and tourism industry.

Scholars have long recognized the potential of AR in the field of hospitality and tourism and have made important contributions in this area (Fritz *et al.*, 2005). Examples of projects demonstrate a wide range of applications: prototyping (Feiner *et al.*, 1997), concept testing (Han *et al.*, 2014), usability research (Hassan and Shabani, 2017), AR acceptance (Paulo *et al.*, 2018; Wu and Lai, 2021), education (Cunha *et al.*, 2023) and measuring real-world impact on destinations and attractions (Cranmer *et al.*, 2020). Rauschnabel *et al.* (2022a) also expect that the market for AR marketing will grow across industries, especially with the rise of wearable AR devices such as the Apple Vision Pro headset. However, marketing perspectives are scarce in hospitality research (for an exception, see Shabani *et al.*, 2018) and often limited to the “promotion mix”. In contrast, hospitality scholars (Guillet and Penfold, 2013; Lee and Oh, 2007; Kim and Hardin, 2010) have often focused on virtual reality (VR) or the combination of AR and VR (Bretos *et al.*, 2023; Moorhouse *et al.*, 2019; Yung and Khoo-Lattimore, 2019). From user and marketing perspectives, AR and VR are “distinct, both in the way they function and the way they are experienced” (Tan *et al.*, 2022, p. 49) – indicating the need to separate them conceptually from each other (Jingen Liang and Elliot, 2021).

Although these and many other studies make important contributions to specific aspects of AR issues in hospitality and tourism, the field is fragmented and lacks comprehensive theoretical guidance (Bretos *et al.*, 2023). More specifically, there is a lack of an overall conceptual umbrella that encompasses the various dimensions of effective AR marketing. This gap is surprising given that managers are aware of the many unique complexities associated with AR (Cranmer *et al.*, 2021), such as the importance of the type of content (Orús *et al.*, 2021), contextual embedding (Grubert *et al.*, 2016, Pfaff and Spann, 2023; von der Au *et al.*, 2023) and characteristics of specific devices (Orús *et al.*, 2019) – summarized in the 4Cs of AR (consumer, content, context and computing device; Rauschnabel *et al.*, 2024a), while also recognizing the disruptive potential of the discipline.

This viewpoint paper conceptually approaches this issue through the lens of AR marketing and aims to provide answers to the following research questions:

RQ1. What is AR marketing in hospitality and tourism?

RQ2. What overarching factors need to be considered when designing and researching AR use cases in hospitality and tourism?

RQ3. What are areas for future research in AR marketing?

With these research questions in mind, we propose an overarching framework for AR marketing in hospitality and tourism to drive future research and successful implementation. The contribution is twofold. First, the paper summarizes basic AR concepts in a hospitality and tourism context, thus providing a conceptual foundation for future research. This offers new theoretical perspectives by examining AR research in hospitality and tourism through a marketing lens. Second, the paper presents a framework that proposes the factors that scholars and managers should incorporate when researching and designing AR experiences in this context. Overall, we attempt to bridge the gap between fragmented research and the overarching framework needed to navigate the evolving terrain of AR in hospitality and tourism by following the approach of previously published viewpoint papers (Ozdemir *et al.*, 2023; Rauschnabel *et al.*, 2022a).

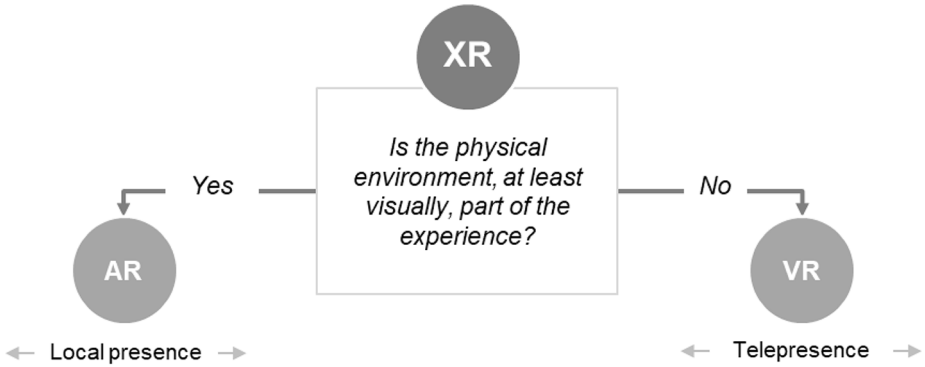
After introducing the research background and justification in the previous paragraphs, the remainder of the paper is organized as follows. First, there is an overview of AR in general and in marketing, followed by a focus on AR in hospitality and tourism. The next sections propose and discuss a framework for AR marketing in this field. Subsections discuss the issues of AR versus VR, the visitor journey and propose the use of the 4C framework (context, consumer, computing device and content) for successful AR integration in tourism and hospitality management. As part of this section, this paper proposes fundamental premises of AR marketing in this field. This discussion is followed by a research agenda and conclusion.

2. Augmented reality

Extant research has provided multiple perspectives on how AR can be defined, including as a technology (Peddie, 2017), a medium (Craig, 2013) or a device-independent experience (Kumar *et al.*, 2023; Rauschnabel *et al.*, 2022b). What these definitions have in common is that they describe people experiencing virtual content as part of their physical context through the use of a computing device (e.g. smartphone, headset or screen). Over the past few years, industry developments have raised the public's knowledge of AR. However, AR and the concepts related to it are not new. AR has long-established roots, with conceptual foundations dating back to early literary visions. L. Frank Baum's *The Master Key* from 1901 provides a vivid example in which the concept of overlaying virtual information in real-world contexts is captured by a "character marker", a set of electronic glasses that annotate individuals based on their characteristics (Rauschnabel *et al.*, 2022b). In contemporary discussions, AR is often intertwined and sometimes conflated with similar terms, such as VR (a computer-generated environment in 3D or 360 degrees), mixed reality (MR; a very "strong" form of AR for the seamless integration of physical and digital elements), assisted reality (a very "simple" form of AR, and xReality or extended reality (XR; an umbrella term for AR, VR and other related concepts), as well as with more futuristic "visions" such as the metaverse or spatial computing.

With the rise of AR research, scholars have made attempts to better understand the factors that make AR unique (especially when compared to other formats). For instance, Kumar *et al.* (2023) and von der Au *et al.* (2023) discuss contextual embedding as the core characteristic of AR that distinguishes it from other presentation formats.

AR and VR can both be placed under the umbrella of XR, as shown in Figure 1. The demarcation between AR and VR is fundamentally rooted in the presence or absence of the physical environment. If an experience visually integrates the real-world environment, it aligns



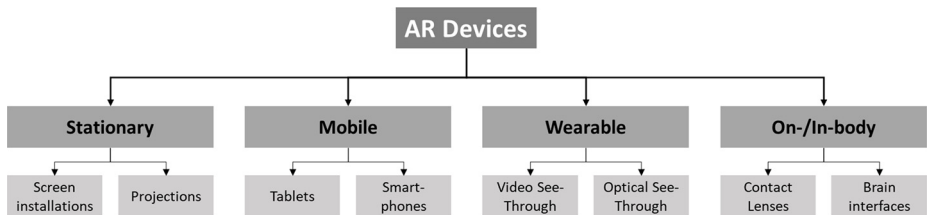
Source: Rauschnabel *et al.* (2022b)

Figure 1. Defining augmented reality

with AR; without this integration, it aligns with VR. It is important to note that this distinction is independent of hardware. For instance, devices such as the Meta Quest 3 or Apple’s Vision Pro allow users to experience both AR and VR. However, following the view used in this paper (Rauschnabel *et al.*, 2022b), users cannot be in AR and VR at the same time.

While VR experiences can fall along a spectrum of very low to very high levels of “telepresence” (the perception of actually being “there”), the core of AR is “local presence” [the degree to which virtual elements feel inherently part of the user’s real “local” environment; synonyms or related concepts in the literature are “realism,” “augmentation quality,” and “spatial presence”; c.f., Rauschnabel *et al.* (2022b)]. Low levels of local presence (e.g. textual information about a building) are referred to as “assisted reality”, whereas high levels (e.g. a dynamic, life-sized, interactive city guide) lead to “mixed reality”. In the most extreme form, users are no longer able to distinguish virtual objects from real ones.

It is important to note that although AR and VR are, from a user’s perspective, fundamentally different (Bretos *et al.*, 2023), they share several similarities regarding technology, such as similar development engines (e.g. unity), principles (e.g. tracking algorithms) and even specific hardware (e.g. XR devices that can execute both AR and VR; e.g. Apple Vision Pro). Furthermore, AR and VR can be used by marketers in combination (Hilken *et al.*, 2022). However, whereas VR is typically experienced via headsets, AR is not limited to a specific form of hardware. Common categories of devices are shown in Figure 2 and examples are provided in Table 1.



Source: Author’s own

Figure 2. Augmented reality hardware

Table 1. AR hardware and example applications

| AR hardware | Example of application | Description of functionality |
|-------------|---|---|
| Stationary | 3D projection mapping – Dinner in Motion Restaurant | The restaurant Dinner in Motion uses 3D projection mapping to create a multiple-course restaurant experience through immersive storytelling. Projected narratives through characters facilitate each course of the dinner to provide an immersive customer experience that can be enjoyed together. Similar approaches have been adopted by Ultraviolet by Paul Pairet (Ultraviolet, 2023) and Skullmapping (2023), offering entertaining experiences through table projections in a dinner setting Dinnerinmotion (2023) |
| Mobile | Augmented menu – QReal (formerly Kabaq) | QReal (2023), formerly known as Kabaq, was one of the first companies to create lifelike 3D models in AR to augment menu items in restaurants through hand-held mobile devices. As their initial success, use cases have been developed for various food items in restaurants, catering and for food delivery |
| Wearable | NSF EyeSucceed | NSF (2021) introduced food industry training solutions using Glass Enterprise AR smart glasses to attain consistency in the food preparation process. A remote trainer is projected through smart glasses into the user's peripheral field of view to allow for hands-free communication and feedback |
| On/in body | Smart contact lens | While there are well-established examples of AR hardware in the previous examples, on/in-body development is still in its experiential and development/concept phase. One example is the idea of a smart contact lens, which is 3D printed and allows for the provision of GPS navigation (Rosenberg, 2022) |

Source: Authors' own

As AR becomes more prevalent, marketers are increasingly exploring its potential to enhance stakeholder interactions (Rauschnabel *et al.*, 2022a). Notable AR marketing applications include virtual try-ons (synonym: on-body AR), which allow consumers to try on products such as makeup, and in-room product visualizers, which allow users to virtually place products in their environment (Ibáñez-Sánchez *et al.*, 2022). Other applications include AR-enhanced games and AR product features such as interactive manuals or gamified AR elements for toys (e.g. Lego).

Academic interest, particularly from economists, has grown rapidly over the past decade, as various literature reviews and bibliometric analyses reveal (Javeed *et al.*, 2024; Shahab, 2023; Jayaswal and Parida, 2023; Kumar, 2022). Research has primarily examined how AR applications showcasing a brand's products or services influence consumer response compared to traditional presentation methods (e.g. websites). Findings consistently show that AR outperforms other formats by providing greater hedonic and utilitarian benefits (Hilken *et al.*, 2022; Kumar *et al.*, 2023), facilitating easier and more effective product evaluation (Song *et al.*, 2020), increasing perceived proximity with a brand or product (Rauschnabel *et al.*, 2024b; Uhm *et al.*, 2022), and fostering greater levels of inspiration (Zanger *et al.*, 2022), engagement (Jessen *et al.*, 2020) and self-projection (Hilken *et al.*, 2022).

However, a review of recent marketing practices provides anecdotal evidence that many marketers are not taking advantage of the unique characteristics of AR and therefore not (fully) exploiting its benefits. For instance, “many applications simply overlay existing

content on top of the physical world” (Rauschnabel *et al.*, 2024a, p. 1) rather than connecting it with a user’s physical context. Likewise, using AR on a mobile device requires holding it with at least one hand, which can limit free interaction and immersion in the AR experience with in-room AR content, a fact that many developers tend to ignore. Later, we will discuss and apply the 4C framework (Rauschnabel *et al.*, 2024a) to the tourism and hospitality context to bring AR’s complexity to researchers’ and managers’ attention.

3. Augmented reality in hospitality and tourism: an overview of the research landscape

Recently, researchers have conducted structured literature reviews and used text-mining approaches to examine AR, immersive technologies and tourism/hospitality, providing readers with useful summaries of the studied topics, theories and research directions (Bretos *et al.*, 2023; Loureiro *et al.*, 2020; Wei, 2019; Yawised *et al.*, 2023; Yung and Khoo-Lattimore, 2019). One of these works, by Jingen Liang and Elliot (2021), provides a strong overview of recent AR research within the domain of tourism. According to their analysis, there are five emerging clusters within tourism: “(1) AR design and development; (2) user acceptance of AR; (3) user experience, satisfaction, and behavior intention; (4) AR implementation and management; and (5) gamification and AR” (Jingen Liang and Elliot, 2021, p. 17). This strongly suggests that a marketing focus in this research has been limited, evidenced by the fact that it has not been specifically discussed in any of the structured reviews on AR within the hospitality and tourism context that were examined (Bretos *et al.*, 2023; Wei, 2019; Yawised *et al.*, 2023). For instance, Yawised *et al.* (2023) found research within an AR marketing context and within an AR tourism and/or hospitality context, but not in combination. In fact, within hospitality and tourism, AR design and development was dominant in the early stages of this research area, with scholars such as Fritz *et al.* (2005) and Yovcheva *et al.* (2013) publishing mostly in conference proceedings. User requirement studies were most prevalent in this area, calling for a more tourist-centered design (Han *et al.*, 2019a; Han and tom Dieck, 2019; Williams *et al.*, 2018). In terms of theory, Bretos *et al.*’s (2023) systematic review confirmed that most hospitality and tourism AR studies focused on the use of the technology acceptance model and related acceptance theories, such as the unified theory of acceptance and use of technology (Cheng *et al.*, 2023; Chung *et al.*, 2015; Huang *et al.*, 2019; Paulo *et al.*, 2018; Wu and Lai, 2021). Some more recent user experience papers focused on the “experience economy” framework, emphasizing the balance between education, esthetics, entertainment and escapism (Jiang *et al.*, 2023; Olya *et al.*, 2020). Noticeable in the literature represented by the preceding examples is the limited number of published articles that provide a comprehensive understanding of AR marketing within the field of tourism and hospitality (Shabani *et al.*, 2018). Wu *et al.* (2023) focused on inspiration and motivation to change museum visitors’ attitudes toward actually visiting a museum after experiencing AR. Although broadly focused on AR marketing, their study did not introduce a “big picture” or a framework for AR marketing within hospitality and tourism. Instead, it applied existing variables (utilitarian and hedonic benefits; cf. Ibanez-Sanchez *et al.*, 2022), and augmentation quality (Ahmad *et al.*, 2023) to a museum context. Zhu *et al.* (2023a, 2023b, 2023c) explored the promotion of destinations and focused on attachment and authenticity. These studies, although aiming to provide recommendations for “advertising” and “promotion”, focused more on tourists’ behavior without actionable guidance for researchers and practitioners aiming to implement AR as part of a marketing strategy. Another interesting example of a marketing study within the tourism field was published by Ahmad *et al.* (2023). It tested the Flyover application, a virtual flight over cities

and landmarks, and referred to this as AR and destination marketing to test future visit intentions.

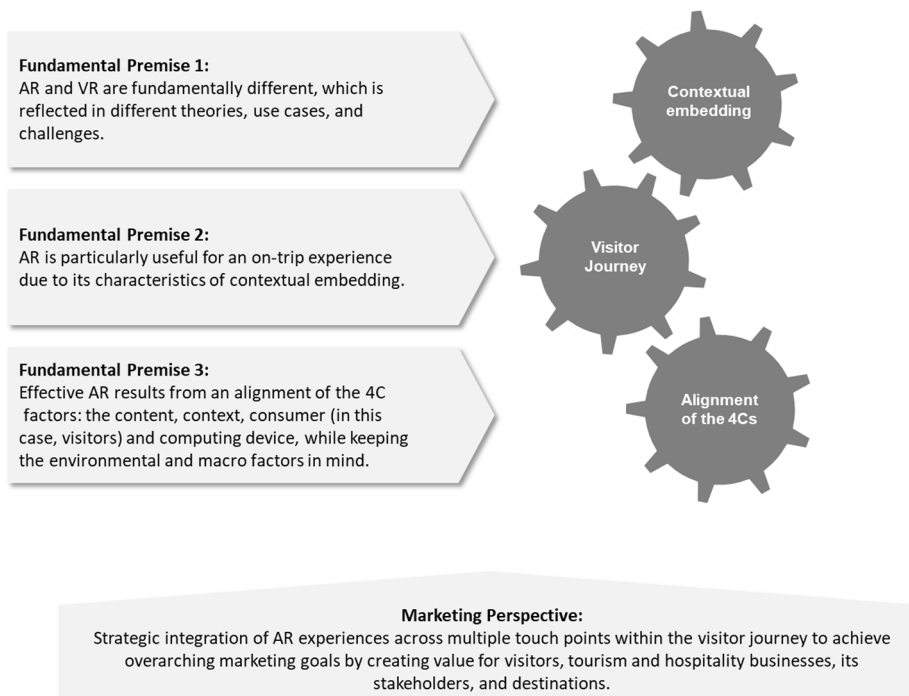
To summarize, the literature provides various important yet specific contributions to the role of AR in marketing in the field of tourism and hospitality management. Therefore, a suitable next step is to consolidate this work with the general AR marketing literature to propose an overarching framework. Such a framework should inspire and facilitate further research and guide practical implementation.

4. Framework for augmented reality marketing in hospitality and tourism

The framework proposed in this paper (see [Figure 3](#)) clearly distinguishes the technological capabilities of AR and VR applications and integrates key AR-enabling criteria into the visitor journey prevalent in the hospitality and tourism context. The application of AR across a visitor journey requires four key pillars (i.e. the 4Cs) for successful integration.

4.1 Augmented reality compared with virtual reality in hospitality and tourism

As discussed, AR and VR share several technological similarities ([Scavarelli et al., 2021](#)). However, technical aspects typically do not influence consumers, but the user experience does. Because marketing is a human-centered discipline, the first fundamental premise calls for a strict separation of AR and VR. To justify this, we review user-focused differences and



Source: Author's own

Figure 3. AR marketing framework

contrast VR's relevant yet different roles in marketing with a specific emphasis on hospitality and tourism.

Considering AR and VR as similar or even identical concepts is a conceptual misstep in user research because of the fundamentally unique experiences each provides. By merging virtual elements with the real world, AR delivers a “phygital” experience on multiple devices, ranging from smartphones or tablets to advanced headsets (e.g. Microsoft HoloLens, Apple Vision Pro, MagicLeap; often also discussed as MR or spatial computing headsets) or stationary installations (del Vecchio *et al.*, 2023; Rauschnabel *et al.*, 2022b). A central theoretical mechanism in AR is local presence, i.e. as discussed, the perception that virtual elements are perceived as being actually “here”. In tourism, AR can transform an experience by providing real-time information. For instance, AR can enrich historical sites by overlaying ancient ruins with reconstructions of original structures. Interactive AR maps can provide wayfinding and navigation and, by doing so, enrich a traveler's exploration and understanding of hospitality and tourism providers (Han *et al.*, 2014).

In contrast, VR offers complete immersion in artificially created environments, isolating users from the real world. In hospitality and tourism, VR can immerse users in distant locations (e.g. hotels, amusement parks and tourist destinations) and allow them to explore them virtually (Fan *et al.*, 2022), regardless of their actual physical location. An example is the “Wander” app in VR that uses 360-degree content. Hence, VR is all about “telepresence”, i.e. the feeling of being “there”.

Some use cases clearly lend themselves to AR over VR due to the inherently different ways in which each technology interacts with reality. For example, AR applications such as interactive and augmented hotel menus or real-time navigation aids enhance the visitor experience through a seamless integration with and enrichment of the users' immediate environments. This provides valuable contextual information or services without severing the connection with the real world. Visitors exploring a city with AR can instantly receive historical information, recommendations or directions overlaid on their views of the real world, allowing them to engage more deeply with their surroundings while maintaining awareness of the actual environment (Han *et al.*, 2014). An example is the “Merli's immersive adventure” by Google and the Singapore Tourism Board that guides tourists through “Singapore's landmarks and best hidden secrets” (Google, 2023). In contrast, implementing these use cases in VR would not be as effective, as it would isolate users from their real-world environment, negating the contextual benefits and immediacy provided by AR (Rauschnabel *et al.*, 2022b). The immersive nature of VR makes it less suitable for applications that require real-world interaction or augmentation because it places users in a completely different, self-contained reality (Çöl *et al.*, 2023). For example, a VR-based navigation aid or interactive menu would remove users from their actual environments, creating a technological barrier to the desired connection between visitors and destinations.

It is important to note that this paper is not stating that AR is superior to VR, it simply argues that these experiences are fundamentally different. Because the focus of this article is AR, we intentionally kept detailed use cases and benefits of VR short and used them only for contrast. Table 2 summarizes the key differences.

Thus, although both AR and VR have immense potential to transform experiences in hospitality and tourism, the inherent practical and theoretical differences (Table 2) between augmenting reality and creating new realities require careful consideration of the most appropriate technology for each specific use case. This is important for academics developing and studying XR, as well as for hospitality and tourism managers implementing use cases in their marketing strategies. Thus, we formulated the following:

Table 2. AR compared with VR in hospitality and tourism

| | AR | VR |
|---------------------------------------|---|---|
| Principles in hospitality and tourism | When tourists use AR, they perceive the real world and virtual content simultaneously. In other words, the real world is part of the experience | When tourists use VR, they perceive an all-encompassing virtual environment (usually through a VR headset). In other words, they are closed off from their physical environment |
| Core theoretical mechanism | Local presence is the degree to which tourists perceive virtual content as actually being here. Low levels of local presence can be signs and textual information (“assisted reality”), whereas high levels of local presence can be indistinguishable from physical objects (e.g. a virtual city guide; “mixed reality”) | Telepresence is the degree to which a tourist feels that he or she is actually present in a virtual environment |
| Common devices | Tourists can use (their own) smartphones with AR apps or AR features on websites (web AR). stationary devices, such as public displays, can present publicly available AR content. Wearable devices, particularly AR glasses, can also be used | Typically only VR headsets are used |

Source: Authors’ own

Fundamental Premise 1: AR and VR are fundamentally different, which is reflected in different theories, use cases, and challenges.

4.2 Visitor journey

In marketing, a journey model is a way to represent and visualize the different stages (often prepurchase, purchase and postpurchase) and interactions a typical customer has with a brand – from the initial engagement to the final outcome (e.g. purchase and loyalty). It is essentially a user-centric tool, used to gain insights into needs, expectations, preferences and pain points across various touchpoints (e.g. a hotel’s website, hotline, third-party online reviews or the actual hotel). This concept stands out from related models, such as flowcharts or process maps, which typically focus more on procedural or operational aspects and less on the individual user’s subjective experiences and feelings throughout the interaction.

It is important to note that journey models can be refined and adopted for specific brands, industries or even media. For instance, the German Railway company Deutsche Bahn includes stages and touchpoints such as “Onboarding”, “Travel Desire”, “Before the Trip”, “During the Trip”, “Arrival” and “After the Trip”, while assessing touchpoints such as their app, website, trains, platforms and stations. Likewise, [Rauschnabel et al. \(2022a\)](#) proposed a journey model consisting of “awareness”, “exploration”, “planning”, “purchase”, “use” and “loyalty” for AR marketing, mostly in a consumer goods context, and concluded that “successful AR marketing depends on understanding the user experience and unique characteristics within the AR customer journey” (p. 1147).

Because the focus of this article is the tourism and hospitality context, it applies an established visitor journey model consisting of the pretrip, during and posttrip experience ([Buhalis et al., 2022](#)). [Lane \(2007\)](#) demonstrates the use of a holistic approach to tourism strategy known as the “Visitor Journey Framework”. The framework is based on two

fundamental principles: visitors are the essence of tourism and therefore must be central to any strategic framework. As such, it is essential that consideration of the visitor journey extends from the initial consideration of destinations to postvisit reflection; the selection of stakeholders and the involvement of all touchpoints in the visitor journey are critical. During their journey, visitors often interact with different organizational entities whose collective contributions shape the holistic visitor experience. Enhanced cohesion among these entities in both strategy development and execution is therefore essential for optimal visitor satisfaction. Because “customer journeys in tourism are becoming more complex” (Krey *et al.*, 2023, p. 39) due to a rapid change in information technologies, a high-level model to theorize AR’s role is most suitable, especially one that allows scholars and managers to adapt it to their specific needs.

In terms of marketing and communication, visitors search for and gather the most information about their trips prior to deciding about their vacation choice. During the trip, communication channels are heavily used for experiencing services and products (i.e. information about tours/museums and visits/entertainment). Posttrip communication mostly involves sharing experiences with family and friends via social media and review sites. In contrast to VR applications, which have been argued as adding value to the previsit stage for its potential to allow virtual travel to destinations (Gibson and O’Rawe, 2018), it becomes apparent that the majority of AR use cases are described as occurring during the trip. This is enabled through the characteristics of AR (i.e. the importance of contextual embedding digital content in the real environment) and for practical reasons, such as the fact that visitors often have an AR-capable smartphone on hand most of the time. Through seamless interaction with the physical world, the overall user experience can be enhanced, making virtual content feel like a natural part of a user’s surroundings. To achieve this, it is imperative that an AR system interprets the real-world context in terms of physical space, objects in the environment and a user’s position/perspective in space, which are subject to various integrated technologies, such as cameras, depth-sensors, Global Navigation Satellite System (GNSS) and Inertial Measurement Unit (IMU). Previously, research explored how AR could be suitable for the pretrip experience (Ahmed *et al.*, 2022). However, the study by Ahmad *et al.* (2023) acknowledged that VR features (e.g. a virtual flight over destinations and attractions) are often mistaken as AR, and conclusions drawn may be attributed to the suitability of VR for the promotions of destinations instead of AR. In contrast, a characteristic of meaningful AR integration requires the augmentation of time-, space- and subject-relevant content. As such, the use of AR is highly dependent on a user’s immediate environment and situation. This reiterates the perspective taken in this study that AR is most relevant when tourists visit actual places and retrieve contextual content while being present in a destination or attraction.

Since the introduction of AR in the consumer market, it has evolved from the information overlay of static content into interactive and dynamic content that allows for real-time rendering to match a user’s perspective, thus enhancing the user experience. These capabilities have been argued to offer several advantages to enhance the visitor experience throughout the entire journey in a tourism and hospitality setting. For instance, AR can bridge the digital and physical worlds, allowing visitors to interact with their surroundings to keep them engaged in the experience (Chen, 2023). Similarly, better tracking and sensor technology can deliver more personalized experiences based on a user’s preferences and behavioral metrics. In the context of hospitality services, the ability to reinterpret experiences and customize them to visitors’ interests could increase the relevance of service encounters when consumers are overexposed to digital marketing content. Sung *et al.* (2022) further emphasized the potential of immersive storytelling through incorporating digital humans in the augmented experience. In a study using impressionist European art, they revealed that

immersive storytelling through digital humans had the potential to capture visitor attention and create more engaging experiences for technology-enhanced environments that can contribute to the visitor journey during and after the experience. Table 3 presents several use cases across the hospitality and tourism sector of AR's contribution to the visitor journey. In addition, we formulated the following for hospitality and tourism practitioners as well as application developers in order to implement meaningful use cases:

Fundamental premise 2: AR is particularly useful for an on-trip experience due to its characteristics of contextual embedding.

4.3 The 4C framework in hospitality and tourism: consumer, content, context and computing devices

The previous sections discussed several complexities associated with AR – most notably contextual embedding and the availability of many different devices. We argue that effective research and management in hospitality and tourism require a holistic understanding of relevant factors, such as the physical context (which is typically associated with the destination or location). To elaborate on these complexities and interactions, we build on the 4C framework, which was specifically developed for the understanding and design of AR use cases (Rauschnabel *et al.*, 2024a).

The 4C framework is a conceptual, cross-disciplinary model grounded in the AR literature and complexity theory. Applied to the tourism and hospitality discipline, it proposes that visitor engagement occurs when four broad factors are well aligned: the consumer (who the person is), content (i.e. what is presented in AR), context (where the person is and in which situation) and computing device (e.g. smartphone versus wearables). The initial work on the 4C model proposes three subcategories for each major category (i.e.

Table 3. Current use of AR marketing in hospitality and tourism

| Sector | Organization | Use case | Tourist journey phase | Reference |
|-------------|---|---|---------------------------|---|
| Transport | KLM | Hang baggage size check | Pretrip | https://news.klm.com/klm-launches-augmented-reality-for-hand-baggage-check/ |
| Destination | City of Magdeburg | Dinosaur tour | During trip | https://3dqr.de/augmented-reality-stadtmarketing-in-magdeburg-dino-city/ |
| Hotels | Best Western Hotel | Meeting Disney characters | During trip | www.revfine.com/augmented-reality-hospitality-industry/ |
| Restaurants | Taco Bell | Cinco de Mayo Snapchat lens | Pre-, during and posttrip | www.sciencedirect.com/science/article/pii/S0747563223004569 |
| Museums | Metropolitan Museum of Art | Virtually recreate a Greek sculpture through AR | During trip | www.metmuseum.org/exhibitions/listings/2022/chroma-chroma-ar |
| Events | Coachella Valley Music and Arts Festival 2019 | AR-equipped event stage | Pre-, during and posttrip | https://vrscout.com/news/coachella-ar-interactive-stage/ |

Source: Authors' own

one of the 4C's for which the model is named), yet calls for purpose-specific adjustments, such as the identification of specific variables of interest.

Consumers represent “any type of person engaging in AR consumption (i.e. use)” (Rauschnabel *et al.*, 2024a, p. 2); that is, in our context, they are mostly visitors. Consumers can be characterized by different demographics, traits and knowledge bases, each of whom responds to and interacts with AR in unique ways (Priporas *et al.*, 2017). For example, older visitors may prefer intuitive AR interactions that focus on essential information, such as hotel amenities, whereas the younger cohort may be drawn to more interactive and social AR experiences at theme parks or resorts. Likewise, income might determine access to specific technology in terms of devices. However, Schein *et al.* (2023) showed that demographic variables are less relevant in explaining tourists' acceptance of AR use cases; in contrast, travel motivations tend to be a relevant factor. For instance, one might argue that frequent travelers might use AR to explore unknown places and exotic cuisines due to their adventurous nature, as opposed to occasional travelers, who might seek relaxation and familiar experiences. The literature has also repeatedly shown that people with a general level of familiarity with technology (or, in particular, AR) evaluate AR more positively than compared to consumers new to AR.

The quality of content is the foundation of a smooth integration of virtual information into the tourist's experience of the real world (Huang *et al.*, 2021). Practical, utilitarian content, such as augmented navigation aids, instant translations, or augmented menus, can provide tangible benefits to visitors, offering convenience and clarity in unfamiliar environments (Özkul and Kumlu, 2019). In addition, hedonic and entertainment-based content, such as immersive historical recreations or interactive dining experiences, can significantly enhance the enjoyment and cultural richness of a visitor journey (Han *et al.*, 2019b). Furthermore, the infusion of social content into AR enables the creation of a shared experience and community among travelers, allowing them to exchange reviews, experiences, or even customized AR postcards (Sung *et al.*, 2022). Furthermore, Rauschnabel *et al.* (2024b) showed that AR can increase proximity; that is, the same content or entity (e.g. a touristic brand) can be perceived as psychologically “closer” when experienced via AR compared to other forms of media. Such proximity-perceptions can create emotional bonds between people and brands (e.g. between visitors and a hospitality brand; c.f., Rauschnabel *et al.*, 2024b). Developments in technology (e.g. a *computing device*) and infrastructure will allow persistent and public AR content – that is, AR content attached to a specific geographic location and accessible to a variety of people. Such developments will allow players in the tourism and hospitality industry to develop a plethora of new, potentially even revolutionary AR experiences (often discussed as “spatial computing”, “pervasive AR”, “ubiquitous AR” or the “AR metaverse”).

Moving on to context, it becomes clear that the environments and situations in which visitors find themselves have a significant impact on their interaction with and perception of AR content (von der Au *et al.*, 2023; Pfaff and Spann, 2023). The physical context, whether it is a bustling urban hub or a tranquil beach, can dictate the nature of an AR engagement, from navigating crowds in cities to identifying marine life at seaside locations. The situational context, reflecting the immediacy of needs, can also influence AR interactions, such as urgent searches for nearby amenities or emergency services (Hoffmann *et al.*, 2022). In addition, the social context, depending on whether the visitor is traveling alone or in a group, can guide the use of AR for collaborative decision-making, shared experiences or social connections and recommendations.

Finally, the computing device represents the various media through which users access and interact with AR content (Rauschnabel *et al.*, 2024a). Hotels can deploy stationary AR

installations in lobbies for guests to explore services and local attractions interactively. At the same time, the ubiquity of smartphones allows visitors to use a variety of mobile AR applications for navigation, information retrieval and content creation on the go (Muskan, 2021). In addition, the advent of wearables such as AR glasses provides visitors with hands-free, convenient access to navigation and information, making exploration and discovery seamless and intuitive. Most likely, mass adoption of such wearables might lift AR experiences to a new level. However, wearable AR *per se* is not better. For instance, stationary AR installations can draw visitors' attention. Smartphones allow users to augment themselves (e.g. with face filters) using the front camera (Flavián *et al.*, 2019), for instance, allowing the user to experience themselves wearing virtual depictions of ancient headwear or different types of cultural adornment in a museum.

The following example can serve as an illustration: The German restaurant and bar chain "Sausalitos" offers an AR-enhanced menu. Guests of their restaurants (consumers) can use their smartphones (computing device) to project 3D versions of their food (content; many of their servings are Tex-Mex/Mexican and therefore certainly difficult for some guests to imagine) onto their tables in their restaurants (context) via WebAR that they activate with a QR code placed on printed menus. The 4Cs are well aligned here: Guests in the restaurants want to order food. They have their smartphones at hand (and there is no need for more sophisticated hardware given the simplicity of the content) and may need guidance to better understand what certain food items might look like (e.g. in terms of size). Creating such 3D scans of products and integrating them into a WebAR platform is not that costly but the potential value to guests is there.

In summary, hospitality and tourism professionals should consider all 4C categories when evaluating, researching and managing AR. More formally, it is as follows:

Fundamental Premise 3: Effective AR results from an alignment of the 4C factors: the content, context, consumer (in this case, visitors) and computing device, while keeping the environmental and macro factors in mind.

5. Discussion and conclusions

5.1 Conclusion

Tourism and hospitality managers have recognized the significant potential of AR to enhance marketing efforts in recent years. This has been echoed by the academic community, resulting in an increased volume of scholarly publications aimed at understanding the opportunities and challenges associated with these technological advances. However, the current research landscape is characterized by a considerable degree of fragmentation. In light of this, this article calls for a more strategic and holistic approach to the integration of AR into marketing practices specific to the tourism and hospitality industry.

Therefore, this paper presents an overall framework supported by three fundamental premises that cover AR's unique characteristics, its role in the visitor journey and the 4C factors that are important in driving AR marketing success. More specifically, our work challenges the current practice in academic research of treating AR and VR as similar tools; given the unique strengths of each approach, both have their place in organizations' marketing activities, but the use cases, success factors and underlying principles are different. Therefore, this paper calls for a stricter separation of AR and VR in tourism and hospitality marketing, as reflected in fundamental premise 1. Next, it is argued that AR is most beneficial for the on-trip experience (Fundamental Premise 2). A key rationale for this is AR's ability to contextually embed digital content, resulting in a hybrid (phygital) experience. Finally, Fundamental Premise 3 is proposed, which states that effective AR use

cases align four broad factors: consumers (here: tourists or visitors), content, their context and the computing device used. These factors should also be considered in academic endeavors.

5.2 Theoretical contributions

This study contributes to the literature in two important ways. First, and most importantly, we synthesize basic AR concepts, discuss them through the lens of marketing and propose new theoretical lenses. For example, while the term “marketing” has been associated with promoting or selling services in hospitality and tourism (typically before a trip), this study conceptualizes the central role of AR as an additional tool or experience during the trip. Such a view has been established in the marketing discipline (Rauschnabel *et al.*, 2022a; Flaviàn *et al.*, 2019), but is new in the domain of the current work. Nevertheless, we conclude that a more holistic “marketing lens” could stimulate academic work in the field. Thus, an umbrella definition of AR marketing in hospitality and tourism could serve as a starting point for positioning further research:

AR marketing for hospitality and tourism can be defined as the strategic integration of AR experiences across multiple touch points within the visitor journey to achieve overarching marketing goals by creating value for visitors, tourism and hospitality businesses, its stakeholders, and destinations.

Second, this study contributes to the literature by providing a comprehensive framework based on the three fundamental premises. Our framework suggests areas and factors that scholars and managers should consider when working with AR. For example, our framework places users and the core characteristics of AR – in particular, contextual embedding – at the center of consideration. Previous research has often applied more “technological” lenses by combining different AR formats. Our framework distinguishes AR (where context is part of the experience) from technologically similar approaches (e.g. VR) where context is less critical. Based on this, the framework calls for considering AR primarily as a tool for on-trip experiences, rather than as a sales tool at the beginning of a visitor's journey (where, for example, VR may be superior). When designing and exploring AR use cases, the framework suggests applying the 4C's: Each of these factors must be refined and all must be aligned to deliver effective experiences (Figure 3).

5.3 Practical implications

AR can be an effective tool for hospitality and tourism brand's marketing. The current article provides guidance to managers who are interested in assessing and eventually implementing AR. First, it is observed that AR and VR are often discussed interchangeably in hospitality and tourism; most likely, because of their technological similarities; we have observed similarities in the practice of hospitality and tourism. However, AR and VR differ fundamentally based on their key characteristics from a user perspective (c.f., Table 1 for a brief summary). For instance, one strength of AR is that it can be run on standard smartphones that tourists and visitors already own (whereas VR requires specific headsets that most people do not have). Hence, as a starting point and rooted in Fundamental Premise 1, managers should familiarize themselves with AR (and VR) first before moving on. Fortunately, a variety of toolboxes exist nowadays that allow brands to create simple AR experiences on their own without any coding or agency support. Results of such free-to-use or inexpensive platforms might not meet a brand's standards to launch them publicly; however, they can offer an effective learning environment for hospitality and tourism brands to familiarize themselves with AR, to generate ideas, and to receive initial feedback from potential users.

Second, when realizing that AR is the format of choice, starting with on-trip experiences might be effective, as highlighted in the second fundamental premise. The current article provides several example use cases and we recommend managers to monitor the market. Successful apps in the discipline and beyond can serve as a source of inspiration. As discussed in our definition of AR marketing for hospitality and tourism, managers are encouraged to align any AR marketing activities to overarching strategies. Here, they need to identify the benefits they want to achieve. The importance and prioritization of such objectives differ between brands. However, potential benefits AR can provide can range from improving one's branding to generating revenues to fostering loyalty (by providing better experiences). Or simply by reducing costs since marketers could render other expensive marketing materials obsolete.

In this vein, it is important to note that AR marketing's broad scope. AR marketing can promote existing services (e.g. as discussed in the Sausalitos example in Section 4.3). However, it can also play an important role in other fields of the marketing mix. For example, when tourists point a smartphone at historic buildings, they can see facts, historical data or even animated reconstructions of past events to better understand the site (this example could be positioned as part of the "product mix"). Likewise, a historical virtual night watchman could guide tourists through a city as a nonplayable character, whereas a restaurant could have AR games to entertain their guests. In addition, AR can be used to train staff more effectively by showing them real-time information during training sessions. For example, AR could provide cleaning staff with immediate instructions on how to prepare a room or use specific cleaning equipment. Bartenders could have cocktail information displayed in their field of view and new bartenders could use such solutions as training apps. Effective trainings are essential to improve one's services and customers experiences and thus, represent a core issue of hospitality and tourism marketing. In short, the possibilities beyond product promotion are almost endless, leading to the need for brands to identify, evaluate and prioritize use cases that help them achieve their overarching (marketing) goals.

Third, designing and implementing AR use cases is a complex endeavor. As discussed in Fundamental Premise 3, the effectiveness of an AR experience is the result of the alignment of the 4Cs – consumer, content, context and computing device. Throughout the development process, managers and developers should critically evaluate these factors and their interrelationships. For example, "Who is the target audience?" (consumer) and "What kind of devices do they own or want to use?" (link with computing device). Likewise, "Is such a device appropriate for the intended content?" and "Is the device appropriate for use in a particular context?" (e.g. rain, dust, etc.); and finally, "What kind of content is most appropriate?"

However, it is important to note that the 4C framework should not be used in isolation. It should be used as a complementary tool with other concepts (e.g. design thinking or scrum). Furthermore, as discussed in the 4C literature (Rauschnabel *et al.*, 2024a), brands should always have an eye on the macro environment, including legal issues or technological developments.

5.4 Future research directions

Biding on our three fundamental premises, we propose three broad areas for future research in AR marketing in hospitality and tourism research: use case development, complexity theory and AR's role in combination with other technological approaches.

5.4.1 Understanding augmented reality in the context of other technological developments. In the Fundamental Premise 1, we call for a strict separation of AR and VR. Strategically, however, AR and VR can be combined. For example, visitors could plan a trip in VR and then experience it at the destination with AR. In consumer marketing, Hilken *et al.* (2022) have made an initial attempt to explore how brands should strategically combine AR and VR. Such efforts could be tailored to the specific characteristics of the hospitality and tourism industry.

Given the increasing prevalence of generative AI, we propose to explore personalization and consumer preferences of AI-based recommendation systems in AR. AR solutions could, for example, offer a virtual travel guide displayed via AR headsets. This guide could be controlled by AI and answer tourists' questions in the same way a human guide would – but in all languages and probably with access to far more information than a human brain could ever store and recall. This may sound intriguing at first, but one might also question this in terms of authenticity and perhaps even have ethical concerns – which are potential research topics.

5.4.2 Use case development. In the Fundamental Premise 2, we concluded that AR is best suited for the on-trip experience due to the unique characteristics of AR – especially contextual embedding. However, as shown in [Table 3](#), there are also some use cases for the other stages of the visitor journey (e.g. measuring the dimensions of suitcases before check-in). Although these observations do not contradict our second fundamental premise, they do show that further research and use case development are needed to better understand where and how AR can add further value to visitors and tourists outside of the actual trip. Case study analysis and design science approaches in interdisciplinary research teams could be promising methodological approaches.

5.4.3 Applying configurational theory to understand augmented reality in hospitality and tourism. Most behavioral research in this area is based on the “linear paradigm”, which states that certain factors (e.g. hedonic or utilitarian benefits) independently determine the success of a use case (e.g. overall visitor ratings). In contrast, configurational theory states that different configurations of factors, defined as “any multidimensional constellation of conceptually distinct characteristics that commonly occur together” ([Meyer et al., 1993](#), p. 1175), of factors determine a desired outcome. Put simply, a practical app may be beneficial in some situations, whereas an entertaining app may be more appropriate in another situation. Early research has been published in related fields. For instance, [Orús et al. \(2021\)](#) focused on content and device type and [von der Au et al. \(2023\)](#) on content and context. Here, in particular in Fundamental Premise 3, we suggest that future research should holistically incorporate all 4C dimensions for optimal AR visitor engagement. As configurational theory is the theoretical root of the 4C framework, future research can build on these assumptions. Methods such as fsQCA are suitable for applying such a complexity view to the field. We also call for consideration of different target variables (e.g. user evaluations or actual user behavior) and study objects (e.g. tourists versus tourism companies) – and using data from qualitative and quantitative, as well as primary and secondary, sources.

Note

1. The authors acknowledge that these terms are inconsistently used and defined. For simplicity, the authors use “AR” in this manuscript.

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