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Chapter 13

Augmented Reality in Interactive Marketing: The State-of-the-Art and Emerging Trends

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Abstract:

Recent years have seen a swift embracement of augmented reality (AR) as an interactive marketing tool, which has been accelerated even more rapidly by the COVID-19 pandemic. However, the general attitude towards the technology as well as the factors that inhibit or facilitate its adoption from both, the consumers, and practitioners, remain elusive. This prevents marketers from fully exploiting the potential related to AR marketing. This chapter (1) draws on current literature to conceptualize consumer experience in AR marketing and (2) complements these findings with a practitioner perspective by conducting interviews with small retailers. The results of the present chapter indicate that, from the consumer perspective, AR can give rise to diverse cognitive, affective, and social-psychological outcomes, which can translate into behavioral outcomes, including purchase intentions, word-of-mouth intentions, and brand engagement. From the practitioner's perspective, initial interview results reveal that advancements towards an easy integration of AR within existing IT infrastructures, as well as efficient ways to create virtual product replicas are crucial for the adoption of AR by small retailers. Based on the combined observations from literature and the conducted interviews, a

comprehensive framework of interactive AR marketing is provided, and a way forward is discussed by addressing the emergent trends of AR as an interactive marketing technology.

Keywords: Augmented reality; interactive marketing; shopping; retail; consumer experience

1. Introduction

With the development of virtual technologies and information systems such as mixed reality (MR), multisensory modalities, big data, cloud computing, robotics, and Internet of Things (IoT), the current marketing practices are facing various opportunities and challenges. Especially during the COVID-19 pandemic, increasing numbers of marketing activities relied on digital technologies to communicate with consumers remotely (Donthu and Gustafsson, 2020; Jiang and Stylos, 2021). On one hand, marketers have the opportunities to present more vivid, rich, and creative product, service, brand, and advertising information with the aid of digital platforms and tools (Sheng et al., 2021; Soto-Acosta, 2020) as well as to conduct customer management in a more efficient way (Barnes, 2020; Jiang and Stylos, 2021). On the other hand, due to the lack of guidance on designing and implementing virtual technologies in marketing practices, unpleasant user experience, low usability, information overload, privacy risk, and ethical concerns are becoming the hurdles to consumers' adoption and continued use of these virtual technologies.

One of the relatively mature virtual technologies that has been applied widely in current marketing practices is augmented reality (AR). The AR market was valued at USD 14.7 billion in 2020 and is expected to grow at a CAGR of 31.5% from 2021 to 2026[1]. AR technology allows to superimpose virtual content (e.g., objects, information, videos, sounds, etc.) into the physical environment (Azuma, 1997) with the aim to modify the perceived reality with virtual elements in an interactive manner (Xi and Hamari, 2021). The typical AR marketing practices include AR fitting rooms (Chiang et al., 2021), AR interactive advertisement (Feng and Xie, 2018), AR product presentation, and customization (e.g., IKEA catalog and Amazon AR view) as well as location-based AR shopping. These marketing information, that are being created and provided by AR, can modify consumers' multisensory experience (e.g. visual, sound, olfactory, and haptic) and have been believed to increase consumer engagement and loyalty as well as facilitate consumer decision making (Chiang et al., 2021). However, while the potential affordances of AR for interactive marketing have become more prominent (Carrozzi et al.,

[1] https://www.globenewswire.com/news-release/2021/10/06/2309582/28124/en/Global-Augmented-Reality-Market-Report-2021-Surging-Demand-for-AR-Devices-and-Applications-in-Healthcare-Forecast-to-2026.html

2019; Wang, 2021), a synthesized understanding of the effects of AR in marketing is still lacking. A few critical views have considered AR as a kind of marketing gimmick to attract consumers rather than an effective marketing tool for increased sales conversions. AR-mediated advertising, information presentation, promotion, and shopping have not replaced the traditional marketing techniques (Yaoyuneyong et al., 2016). In addition, the long-term effect of AR on marketing performance remains unknown. Due to the lack of understanding of the mechanisms and boundary conditions of how AR influences consumers' psychological and behavioral aspects, marketing practitioners rarely incorporate AR into their long-term marketing strategies (Tan et al., 2022).

Thus, a thorough and comprehensive understanding of interactive AR marketing can help understand a) what kind of psychological experience and behavioral outcomes AR marketing can evoke; b) what sorts of products and what marketing contexts AR has been applied to; c) what sort of different AR technologies have been implemented and d) what opportunities and challenges are perceived by practitioners in terms of using AR for marketing praxis. To address these questions, this chapter aims to develop a comprehensive understanding of the current state of the literature on interactive AR marketing and to expand this with the view of practitioners by conducting five interviews with small online shop providers. Based on the obtained results, a future outlook of trends for AR as an interactive marketing technology is presented.

2. Background and related work

2.1 AR and interchangeable terms

Since the presented information and content are both digital in AR and virtual reality (VR), in some of the early literature, AR was often treated as an interchangeable term with VR (Novak-Marcincin et al., 2014) or one branch of VR technology (Y. Huang et al., 2011). Xi and Hamari (2021) defined and clarified the difference between AR and VR from the perspective of applying technology: AR aims at modifying the perceived real world while VR aims at replacing reality with a virtual environment. VR is touted to block out the real world (Manis & Choi, 2019) and digitally duplicate or substitute the "real reality" (Kim et al., 2021; Xi and Hamari, 2021; Yim et al., 2017). VR can provide a highly immersive, natural, and realistic digital world for users and a sensation of "being there" (Hardiess et al., 2015; Kipper, 2013). In comparison, AR provides access to additional "augmenting" information (Pantano and Servidio, 2012; Rese et al., 2014) that can take any form and can be related to the stimulation of any senses (van Krevelen and Poelman, 2010) (e.g., scent, tactile sense, etc.) (Azuma, 1997; Lu and Smith, 2007). Most commonly, AR is employed to augment consumers' visual

experiences and to provide the possibility of interacting with visual virtual information. Especially, with the help of recognition and tracking techniques, the digitalized content (e.g., text, pictures, 3D models, audio, and video) can be triggered and displayed on the screen according to specific elements (e.g., images, objects, barcodes, QR codes, and location) in the current surroundings (Aggarwal and Singhal, 2019; Hilken et al., 2018).

In the existing literature, AR has been considered with three main attributes: vividness, novelty, and interactivity (Azuma, 1997; McLean and Wilson, 2019). The vividness of AR is the ability to produce a sensory-rich mediated environment (Steuer, 1992), and is usually related to the display quality and aesthetic aspect of information (Flavián et al., 2019; McLean and Wilson, 2019). The novelty of AR refers to the unique and personalized content experienced through the AR display, which can lead to consumers' curiosity and being engrossed (McLean and Wilson, 2019), while it can even act as a central cue that enhances consumers' understanding towards a brand's features (Feng and Xie, 2019). The third attribute, i.e., interactivity, is related to AR systems' capacity to allow consumers to modify (e.g., move, resize, reshape, etc.) the digitally overlaid virtual content (McLean and Wilson, 2019).

2.2 A theoretical framework for interactive AR marketing

In the realm of marketing, AR has been regarded as a strategic concept that incorporates digital content into users' perception to attain organizational goals and to present consumer benefits (Rauschnabel et al., 2019), such as extraordinary experiences, convenience, as well as personalized content (Wang, 2021). Understanding consumer behavior is one of the major themes in interactive marketing (Lim et al., 2022) and various theories have been employed to understand how AR technology influences consumers during shopping (Riar et al., 2022). One of the most relevant theoretical concepts in research on immersive technologies is grounded in the Stimulus-Organism-Response (S-O-R) model (Loureiro et al., 2019). The model specifies that different environmental conditions serve as stimuli (S) that affect the internal evaluation processes of consumers (O), leading to a response (R). Recently, the S-O-R model has also become a relevant theoretical basis for explaining consumer decision processes and behavior in the literature on interactive AR marketing (Nikhashemi et al., 2021; Qin et al., 2021). The main notion is that the technological characteristics of AR serve as stimuli to elicit cognitive and affective states in consumers which consequently lead to behavioral outcomes (see Figure 1). While recent studies have used this notion to empirically investigate the effects of AR on consumers, there is a lack of a synthesized overview of the diverse technological proficiencies

of AR and what psychological and behavioral responses these are capable to evoke. Therefore, guided by the S-O-R framework, the present study aims at closing this gap.

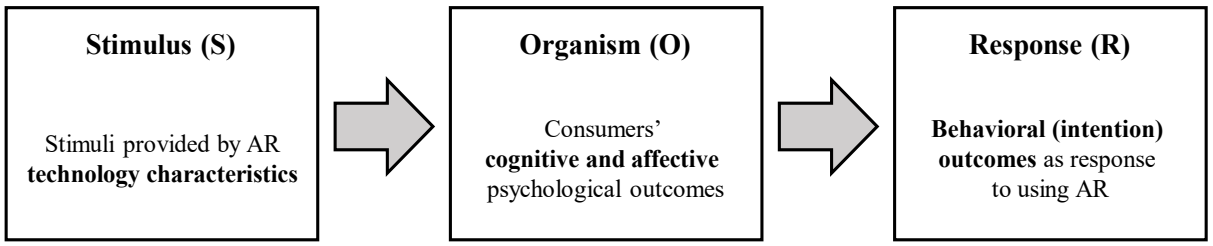

Figure 1. Framework for consumer response in interactive AR marketing based on S-O-R theory

3. Method

The methodology of this chapter is divided into two parts. First, a systematic review of the academic corpus of literature on the phenomenon of using AR for interactive marketing purposes is performed. Second, semi-structured interviews with small online shop providers are conducted to complement the findings from research with initial insights into the practitioners' perspectives on AR use in the marketing context.

3.1 Literature Review

Search strategy. The systematic literature review was performed by following the instructions of Brereton et al. (2007) and the search was conducted within the Web of Science database. This database was selected because it is indexing further bibliographic sources that, among other areas, provide access to relevant literature in the fields of information technology as well as marketing, retail, and shopping. The search string was constructed to include the relevant terms (i.e., "augmented reality" and "marketing") as well as the extended sphere of retail and shopping in order to ensure an exhaustive search. The final search string looks as follows and was performed to search the titles, abstracts, and keywords in the selected database: *("augmented reality" OR AR OR "virtual try-on") AND (marketing OR advertis* OR brand* OR shop* OR retail* OR commerce).* The search term "virtual try-on" was added because AR is sometimes used for self-representation in form of virtual mirrors by which consumers can superimpose virtual products on themselves, such as sunglasses, clothes, makeup, etc. On the other hand, terms related to "virtual reality / VR" were excluded from the search string because the present chapter focuses specifically on AR. In order to capture the most recent developments and trends, the search was conducted to cover the academic literature of the past 5 years (January 2016 - August 2021).

Study selection. The search returned an initial set of 889 studies. This initial set was pre-screened and duplicates, short papers, commentaries, non-peer-reviewed articles, studies that were written in languages other than English, studies on other technologies, such as VR, and non-empirical studies were excluded. The final pool consists of 43 studies. The included studies are highlighted with "*" in the references.

Data extraction. In accordance with recommendations by Brereton et al. (2007), a data extraction form was created to systematically obtain the relevant information from the screened literature. Specifically, this form was construed to obtain general information about the literature (e.g., authors, publication venue, etc.) and in line with the conceptualization based on the S-O-R theory presented in Figure 1, information related to the technological characteristics of AR as well as the psychological and behavioral responses of consumers were extracted. In addition, to provide further contextual information and to elucidate a more comprehensive picture of interactive AR marketing, information related to the use contexts of AR marketing, devices, and product types that have been investigated in the screened literature were extracted.

3.2 Practitioner interviews

Preparation. The first point of contact with the interviewees was established via E-Mail. Five respondents of small businesses (1 – 15 employees) agreed to take part in the interviews (see Table 1). Due to the request of the interview partners, their company names and details remain anonymous. A short summary of the research objectives was sent to the interviewees and interview dates were scheduled. An interview guideline containing 21 questions and 15 sub-questions was designed prior to conducting the interviews. The interview guideline was divided into six parts, each covering a specific topic: (1) the background and prior experiences with AR, (2) the perceived usefulness of AR for marketing, (3) the prerequisites that must be met in order to implement AR successfully in marketing, including potential barriers, risks, estimated costs, etc., (4) the usage of AR applications by their competitors and the suitability of AR within their branch, (5) the internal factors such as the employee structure and priorities within the business and (6) the general view of AR applications as a future trend in marketing.

Interviews, data coding, and analysis: To establish a common understanding of the research scope, the participants were presented with a demo of an AR application at the beginning of the interviews. The interviews were conducted semi-structured (Helfferich, 2014) and therefore contained no standardized but open questions to encourage the interview partners to share their subjective opinion. The data derived from the interviews were analyzed following the guidelines of Mayring (i.e., Mayring, 2015, 2019). First, the interviews were transcribed to allow the coding and analysis of the data. The coding and analysis were conducted software-

supported relying on the software tool QCAmap[2]. Second, a category system was established consisting of (1) opportunities of AR in marketing, and (2) challenges of AR in marketing with the subcategories AR technology, customer outcome, and economic outcome. Finally, the data were qualitatively analyzed and interpreted (section 4.5).

Table 1. Overview of the conducted interviews

Interview	Industry / Branch	Position of Interviewee within Company	Interview Date	Interview Duration
IW1	Electronic cigarettes	Managing director	08.11.2021	24:59
IW2	Bedding	eCommerce & Marketing manager	11.11.2021	32:36
IW3	Water purification	IT & HR Manager	16.11.2021	32:54
IW4	Consumer electronics	Managing director	18.11.2021	38:28
IW5	Gift boxes	Managing director	19.11.2021	45:15

4. Conceptual overview of interactive AR marketing

In this section, a holistic framework of interactive AR marketing is incrementally derived from the combined results of the literature review (section 4.1 - 4.4) and the practitioner interviews (section 4.5). The unified results are illustrated in Figure 2.

4.1. Use scenarios and contexts

The screened literature reveals diverse use scenarios for employing AR technology for the purpose of interactive marketing that span across location-independent online situations as well as solutions for physical (brick-and-mortar) stores (see Figure 2: segment 4.1). Importantly, from a marketing perspective, sellers can attract consumers to a brand by providing AR functionality and giving them a new sense of experiencing products, both in-store and in online shopping scenarios. The advantages of AR in online shops involve that consumers can interact with virtual 3D representations of products in real-time, which unquestionably enhances the product experience beyond simply viewing non-interactive 2D pictures of products. Above all, consumers can often place virtual products in private environments, for example at home, where

[2] https://www.qcamap.org/ui/de/home

the product can be viewed and experienced within the environment it is intended for (Brengman et al., 2019; Fan et al., 2020; Haile and Kang, 2020; Kowalczuk et al., 2021; Pantano et al., 2017). Thereby, consumers can better assess the particular features of products, customize them and get a better idea of how these will fit into the intended surroundings, which can affect ownership perceptions (Brengman et al., 2019; Carrozzi et al., 2019) and enhance purchase decisions (Haile and Kang, 2020; Kowalczuk et al., 2021).

In addition to location-independent online solutions, AR can also provide unique consumer experiences in brick-and-mortar shopping environments. Specifically, marketers can make use of consumers' curiosity by offering virtual mirrors or interactive screens (Javornik et al., 2016; Javornik et al., 2021) within their stores or in shopping malls, thereby drawing the consumers' attention to stores and making the interaction with brands more enticing. Stores can also offer solutions by which consumers can use the AR capabilities of their own mobile devices. For example, AR can help shoppers navigate through supermarkets to find particular products (Chylinski et al., 2020) or superimpose additional virtual product cues to increase the consumers' informativeness (Qin et al., 2021; Rese et al., 2017; Smink et al., 2019) and support their purchase decisions. Overall, the interactive AR experiences can, among other factors, positively influence product (Xu et al., 2020) and brand attitudes (T.-L. Huang, 2019; Rauschnabel et al., 2019; Uribe et al., 2021; van Esch et al., 2019), which may directly translate into sales conversion. Hence, both in-store and online AR solutions provide appealing opportunities for marketers to advertise products, improve product management and consumer services, making AR technology a desirable instrument for marketing praxis.

4.2. Devices and technologies

The rapid technological development of the past decades has opened up various possibilities to enter the AR sphere (see Figure 2: segment 4.2). Desktop-PCs with external or built-in web cameras are an entry-level option by which users can, for instance, experience try-on products (e.g., sunglasses, clothes, makeup, etc.) as a sort of virtual mirror on themselves (T.-L. Huang, 2019; Smink et al., 2019). This concept has also been taken up in malls as well as brick-and-mortar stores via designated (mostly physically fixed) interactive screens that support so-called virtual or smart mirror functionalities by which users can virtually try on products. Thereby, these interactive screens provide personalized experiences, prompt playful interaction, and allow for self-referencing, which can in turn affect brand attitudes (T.-L. Huang, 2019).

Another frontier for creating AR experiences is the use of pseudo-holographic technology by which the users themselves do not use any technology to superimpose virtual content.

Instead, a visualization system generates a 3D illusion of content, for example, to create a virtual exhibition of products within a store (Morillo et al., 2019).

The rise of mobile devices has been one of the most prominent factors for the diffusion of AR technology. Present-day mobile devices are largely rolled out with AR capabilities which makes them a particularly interesting channel for marketers to connect with and bind consumers on a large scale. Besides having advantages in terms of diffusion, mobile devices also entail other important properties that enhance the experience with augmented content. Touch displays and the maneuverability of light-weight mobile devices, such as smartphones and tablets, enable users to effortlessly interact with augmented content (e.g., moving a virtually displayed and true to scale couch from one side of the room to the other, placing a virtually presented lamp on a physical desk, etc.). Therefore, it is unsurprising that the vast majority of the reviewed literature has relied on exploring the benefits of mobile AR marketing.

Designated AR devices, such as AR glasses (Heller et al., 2019b) offer an even more immersive experience by providing hands-free interaction and by overlaying augmented information directly in the users' field of view. While examples of AR glasses in research and practice are still relatively limited compared to the use of mobile devices, it is foreseeable that these will become more prevalent in the future as more affordable and technologically mature devices emerge. Therefore, marketers should keep an eye on these developments and appropriate themselves with the necessary knowledge to exploit the future potentials of contemporary AR technology.

4.3. Virtual product types

Creating personalized product experiences is one of the essential marketing strategies to generate brand engagement. Current literature on AR marketing is in accord with this because studies are largely focusing on how AR can create personalized consumer experiences. This becomes especially evident in terms of the product types that are offered to consumers via AR technology. Most prominently, these involve wearables such as accessories, eyewear, cosmetics, fashion, and clothing. Usually, these products are presented via try-on proficiencies by which AR operates as a virtual mirror. From a marketing perspective, this is a highly relevant feature of AR because it can connect consumers directly with products by letting them experience these wearables on themselves, thereby inducing self-brand connections (Baek et al., 2018), brand awareness, and shaping brand attitudes (T.-L. Huang, 2019).

Another popular trend has evolved around letting consumers place virtual furniture and decorations directly into their homes. In the past, consumers relied on the impressions and information that they could gather by visiting furniture stores and afterwards used this

information to map out or mentally picture and measure whether or not these items fit size-wise or in terms of the existing décor and interior design. Today, consumers can utilize AR technology to display virtual furniture and decorations true-to-scale directly in their intended environments. Thereby, AR technology supports the mental imagery of consumers and provides the necessary information to support purchase decisions (Heller et al., 2019a, 2019b).

While wearables and furniture or decorations currently seem to be the main two product categories of AR solutions, there are numerous other product categories that marketers can consider in order to offer unique product experiences to consumers and to draw them to a brand (see Figure 2: segment 4.3 for selected further examples).

4.4. Consumer response to AR marketing

The use of AR has been argued to increase store attractiveness (Bonnin, 2020) by addressing different consumer needs, both of pragmatic and hedonic nature (Javornik et al., 2016; Qin et al., 2021; Rauschnabel et al., 2019; Rauschnabel, 2021; Riar et al., 2021). The extant literature on AR in marketing contexts largely explores how AR can address pragmatic and hedonic consumer needs by investigating how the specific technological features of AR affect psychological outcomes, which ultimately transcend into behavioral outcomes (see Figure 2: segment 4.4.). Some of the most explored AR attributes are interactivity and vividness. interactivity refers to the technological ability to perform modifications with virtual content in real-time, whereas vividness refers to the representational richness of a medium. Both technological attributes are highly relevant to generating immersive experiences (Steuer, 1992). Further important characteristics to attain desired consumer responses in marketing practice are the informativeness of the AR application (e.g., the quality and degree of provided information, product contextuality, information sharing capabilities, etc.) (Heller et al., 2019a; Hilken et al., 2020; Kowalczuk et al., 2021; Pantano et al., 2017) as well as aspects pertaining to the quality or performance of the AR solution (e.g., the visual quality, mapping quality, responsiveness of the AR app, etc.) (Kowalczuk et al., 2021; Pantano et al., 2017; Park and Yoo, 2020).

In terms of the psychological outcomes, AR can give rise to diverse cognitive responses, such as usefulness perceptions (Pantano et al., 2017; Rese et al., 2017; Zhang et al., 2019), perceived informativeness (Feng and Xie, 2018; Qin et al., 2021; Rese et al., 2017; Smink et al., 2019), curiosity (Beck and Crié, 2018; Yang et al., 2020), brand awareness (Feng and Xie, 2019), creativity (Jessen et al., 2020) as well as self-referencing (T.-L. Huang, 2019), which is decisive in creating a personalized experience with products, forging ownership perceptions (Song et al., 2020), and attachment with a brand (Yuan et al., 2021).

Marketers may also take a special interest in the ability of AR to produce affective consumer responses. The reviewed literature suggests that consumers can perceive nostalgia (Hinsch et al., 2020) and higher sensations of enjoyment when interacting with AR-mediated product presentations. The hedonic value can create intrinsically fulfilling experiences, such as immersion (Hilken et al., 2020; Kowalczuk et al., 2021; Smink et al., 2020), brand love (T.-L. Huang, 2019), desire for products (Hilken et al., 2017) and consumer satisfaction (Jessen et al., 2020; McLean and Wilson, 2019; Moriuchi et al., 2021; Poushneh and Vasquez-Parraga, 2017). These are all aptitudes that set AR as an interactive marketing technology apart from more conventional non-interactive technologies.

In addition to the cognitive and affective responses that have been encountered, the analyzed body of literature also indicates that it can be imperative to cultivate social dynamics between consumers. Albeit considered only to a marginal extent, the reviewed studies indicate that AR can be combined with social media features (Zhang et al., 2019) and other social constituents, such as point-of-view sharing (Hilken et al., 2020) or further communicative acts. It is assumed, that social experiences can be facilitated via AR, which can result in viral marketing behavior and unpaid brand endorsements (Sung, 2021). Groundwork on interactive marketing indicates that the proliferation of social media, content-sharing, brand, and fandom communities is becoming increasingly relevant for marketers and users to share brand and product-related information (Wang, 2021). Accordingly, marketers should consider today's participatory culture where subjective norms (McLean and Wilson, 2019) are shaped through online communities, customer recommendations, (internet) celebrities as well as significant others such as family and friends, which ultimately influences consumers' attitudes towards companies, brands, and products. Thus, in order to transform AR into an effective marketing tool, it seems relevant to consider functionalities that can satisfy the need of consumers to socialize and communicate about products and brands.

In a similar vein, when turning the attention to the encountered behavioral outcomes in Figure 2, consumers have also been found to breed word-of-mouth intentions (Heller et al., 2019a; Mishra et al., 2021; Park and Yoo, 2020) when engaging with AR technology because it is largely regarded as fun and interesting, thus prompting consumers to share their experience with others. Willingness to share personal data is another outcome addressed in the reviewed literature (Smink et al., 2019). AR often requires users to reveal their current surroundings, or their own face, body, hands, etc., and its use may thus result in privacy concerns or perceived intrusiveness. However, it has also been argued that the perceived informativeness as a result of using AR can encourage users to share their personal information (Smink et al., 2019).

Therefore, it seems that the positive aspects of AR can overcome potential hesitancies of consumers when it comes to sharing personal information. Besides word-of-mouth intentions and willingness to share personal data, the reviewed literature chiefly agrees that AR can induce intentions to revisit stores (Javornik, 2016; Park and Yoo, 2020) that support AR functionality as well as increase purchase intentions (Beck and Crié, 2018; Brengman et al., 2019; Moriuchi et al., 2021; Zhang et al., 2019). This is important for marketers, as it pinpoints AR technology as a medium with the potential not only to increase sales conversion but also to maintain customer relations.

4.5. Small retailers' perspective

Opportunities for adopting AR in marketing. Pertaining to the practitioner perspectives on AR marketing in the domain of small shop owners, all interviewees showed a positive attitude towards AR, considering it as a relevant application "in the near future" (IW3) and stated several advantages that they expect from the technology. In the experience of the retailers, the description of the products in online shops is the most important criterion for the consumers' purchase decision ("the better the description on the website, the better the sales" (IW2)) while the product pictures are vital since they "are what haptics are for stationary retail" (IW2). Therefore, an advanced visualization of the products is of great importance to the online retailers and considered by the interviewees as the most prominent benefit of AR applications (IW1, IW2, IW3, IW4, IW5). The enhanced visual and spatial impression allows the consumers to get more detailed information about the product (IW2, IW3) and assess the size of the products which is still an issue in E-commerce (IW3, IW5). Consumers often order a product twice due to the limited size evaluation possibilities (IW5). Compared to product pictures, 3D visualizations have the advantage that the users can evaluate the entire product with a simple click rather than go through the entire photo gallery (IW2) while the product itself comes "within reach" (IW3). Specifically, the opportunity to interact with and evaluate specific components of a complex product, to experience the product from the in- and outside, and to customize several parts of the product simultaneously is stressed by the interviewees as a great advantage (IW2, IW4, IW5). In addition, the integration of the products in their spatial contexts can solve the challenge of product installation issues (IW3) which also affects stationary retail. In the case of IW2, the product portfolio differs online and offline since some of their products are only sold in the stationary store. AR is considered as a great complement to allow the consumers to experience the products from the stationary store beforehand at home in their spatial context (IW2, IW3). The stationary retail can additionally benefit from AR by using the application to provide the consumers with online information about the product in the stationary

environment (e.g., product reviews) (IW5). Furthermore, offline retailers might use the AR application to let the users experience or see products that are not exhibited on the shop floor based on a catalog with products, QR codes, and AR functionality (IW5). Hence, the shop owners expect from the integration of the AR functionalities a reduction of user complaints and product returns (IW1, IW4), higher sustainability (IW5) and a higher purchase intention (IW2) as well as a reduction of customer support due to the higher informativeness (IW5). Overall, AR is regarded as a technology that can generate positive marketing effects due to its newness and the curiosity towards the technology that increases the interest in the products. Consumers are predicted to "stay longer with the product" (IW2), leading to increasing sales (IW2).

The early adoption of the technology provides an additional marketing advantage since the shops can advertise themselves as "the only store where you can assess the products in AR that fits you" (IW5). AR can also be included in traditional marketing approaches such as newsletters to allow the consumers to get a teaser of new products (IW3). In addition, IW5 would welcome the integration of the AR functionality in social media stores, such as the Instagram shop, to facilitate the interaction with the consumer base (IW5). Therefore, social media is not only a platform to enhance the marketing capabilities via AR but a medium to foster AR adoption from the interviewee's perspective: Advertising AR over influencers and social media may shift attention to the benefits of the technology (IW1, IW2).

Challenges for adopting AR in marketing. Apart from the expected benefits from the inclusion of AR in marketing, the interviewees emphasize challenges concerning the integration of the technology and virtual product replica, i.e., 3D models of the products (Korbel, 2021). The integrational challenges mainly stem from the consumer devices in use as well as the integration in the IT infrastructure and existing shop systems. The interviewees state that a multitude of consumers may not possess smartphones that allow the usage of AR applications (IW4, IW5). If users see the AR feature but are not able to use it or have problems using the AR application, they could get frustrated and even tend to leave the website (IW5). The same applies to the computational requirements of AR applications. The computational requirements might be too high (IW5), leading, in the worst case, to a limited functionality or even a crash of the website. If the AR application impairs the functionality of the website, it can lead to customer churn (IW4) and negatively influence SEO (IW5). Therefore, the IT infrastructure and servers must be migrated to enable the AR functionalities (IW1) and short loading times (IW5). In addition, settings should be available and editable so that website owners can adjust the resource insensitivity of the AR application (IW5). Furthermore, the interviewees stress that the integration of the AR functionalities should be a one-time IT effort (IW4), feasible "with a

few clicks" (IW4), and compatible with existing shop systems (IW2). The provision of AR as a plugin for existing shop systems would tremendously decrease the integrational challenges (IW3). If an easy integration of the AR functionalities is not possible, shop owners tend to think about adopting and investing in AR twice (IW4).

The challenges regarding the virtual product replicas mainly derive from the creation, provisioning, and quality of the 3D models that are mandatory to use the AR application at all. How the models are created or provided depends on the firm's access to supplier and manufacturing media data. While the firm in the case of IW5 creates product pictures themselves (also in 360 degrees) and would require a software tool or pipeline to convert their product pictures to 3D models, the firms of IW1 and IW4 rely entirely on pictures from the suppliers or manufacturers based on partnerships and do not even have the products at hand (IW1). Hence, the virtual product replicas must be provided by the manufacturer, supplier, or the vendor of the AR environment in the opinion of the interviewees (IW1, IW2, IW3, IW4), otherwise the added value is not comparable with the efforts and investments in the AR environment (IW4). Therefore, the providers of AR applications should coordinate and arrange terms with suppliers and manufacturers to integrate the virtual product replicas in the supplier or manufacturer API where firms can access all the other information about the products (IW1, IW4). Apart from the provisioning of the 3D models, the interviewees raise concerns about their quality. The quality of the 3D models in the AR application must be comparable to the high-quality pictures on the websites (IW3, IW5). The visualization of the products may differ from the actual products, especially in terms of colors (IW2). However, inaccurate visualizations of product characteristics are a general problem in E-Commerce (IW2) and may be resolved by technology development (IW3).

The challenges have a direct effect on the investments, expenses, and efforts of small retailers. The interviewees agree that additional personnel is required to adopt AR for their shop systems, either to implement and integrate the AR environment (IW1, IW5), to conduct market analyses on whether AR is desired by the consumers (IW3), or to create the virtual product replicas (IW3, IW2, IW4, IW5) while the latter is considered as mandatory to use AR at all, especially if new products are added to the portfolio (IW4, IW5).

Implications of adopting AR in marketing. The opportunities and challenges are summarized in Figure 2 (segment 4.5). In addition, three main implications can be derived from the interviews: First, manufacturers and suppliers as well as the shop owners must be provided with evidence that the technology is well received by consumers and that it has positive effects on, e.g., brand awareness, purchase intention, etc. Otherwise, they seem reluctant to create 3D

models at extra expenses, and in turn the technology will not be adopted by small shop owners since the effort to provide their own virtual 3D models is considered too high for a currently not quantifiable benefit. Second, the software tools to create virtual product replicas need to advance to allow shop owners to quickly generate 3D models of their products, preferably based on already existing data such as product pictures. Third, an easy integration of AR functionalities (e.g., via plugin) within the existing IT infrastructure and shop systems is pivotal for the diffusion of AR as a marketing tool and to keep the expenses for additional personnel and resources low.

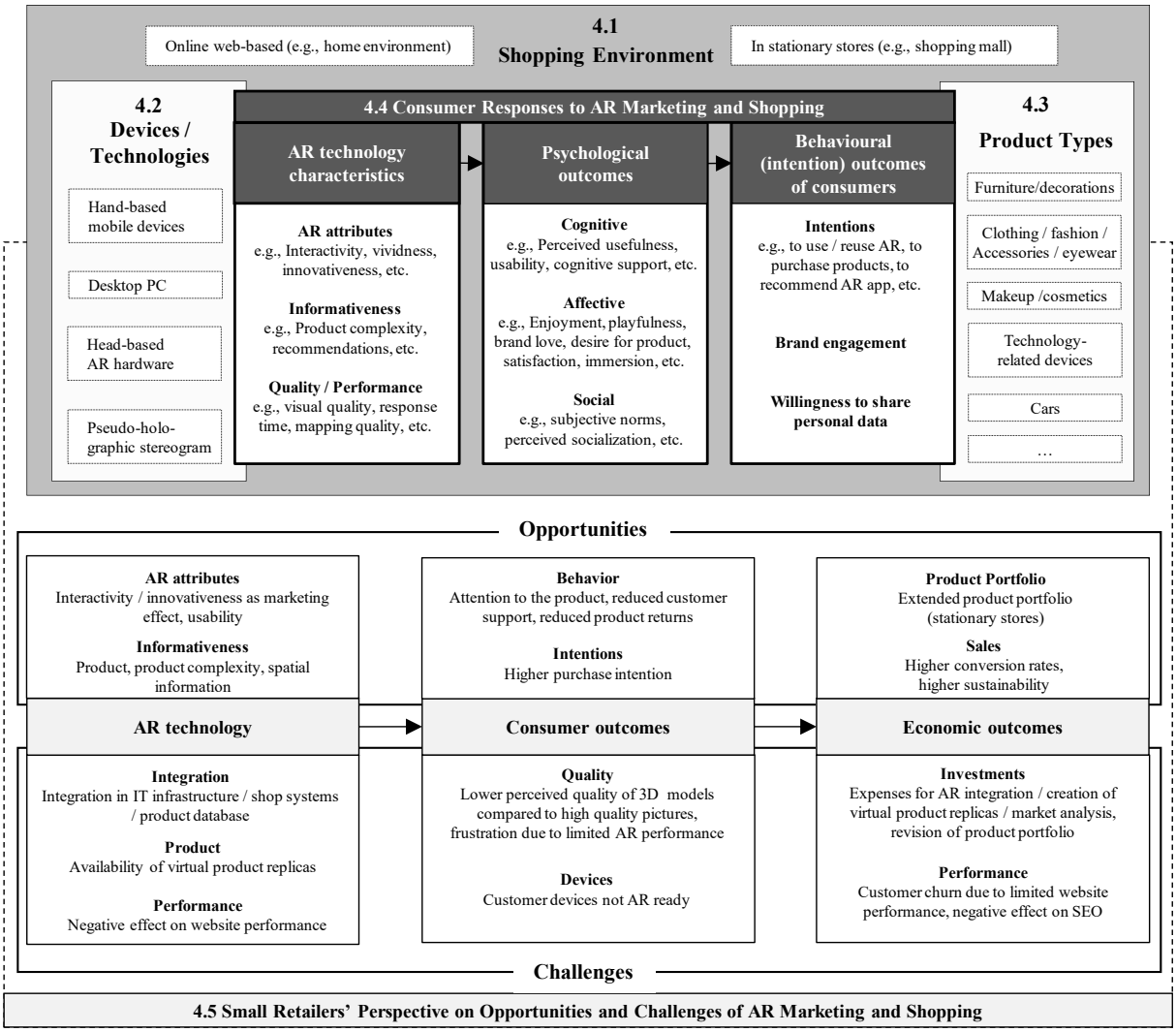

Figure 2. Unified overview of interactive AR marketing

5. Discussion

In the present chapter, the academic literature of the past five years was explored to conceptualize a holistic picture of the use of AR as an interactive marketing technology and

five interviews with small online retailers were conducted to complement the findings with an initial practitioners' perspective (see Figure 2). Specifically, in the literature review part, focus was set on the use scenarios of AR in marketing, the virtual product types that are most commonly investigated, and importantly, in line with the S-O-R framework, the technological characteristics of AR were explored and the psychological as well as behavioral outcomes that AR is capable of evoking was reported on. The interviews revealed that small online shop owners see several opportunities and challenges for introducing AR as part of their marketing strategy, which are also reflected in Figure 2 and from which three practical implications were derived in section 4.5. In the following, as part of the interpretation of the combined results from the interviews and observations in the literature, several future trends for using AR in marketing are discussed.

5.1. Future trends in research and practice

Layered augmented product information. A crucial challenge for marketers consists in effectively communicating product and brand-related information to consumers. Specifically, this entails providing the right amount of information so that consumers can make informed decisions while not being overwhelmed with too much information that would be too strenuous to mentally process (B.-K. Lee and Lee, 2004). What makes this even more challenging, recent research indicates that engagement with AR technology itself can increase the mental workload of users due to the task of cognitively processing the virtually overlayed content within the physical surrounding (Xi et al., 2022) which induces even more challenges in terms of information load. Marketers need to be aware of these challenges in order to mitigate negative consumer experiences, such as irritation or less satisfied consumers in general (B.-K. Lee and Lee, 2004). Some of the recommendations to deal with this is to consider dynamically embedded information that users themselves display or hide via the interactive proficiencies of AR technology (Riar et al., 2022). For example, AR solutions may be designed in a way to empower users to interact with the different features of a product, by which information related to the particular features is being dynamically displayed. This way, consumers can learn about the product features and gather relevant pre-purchase information in snippets to support learning processes and avoid information overload as well as unsatisfying consumer experiences.

Integrating interactive marketing practice with gamification and location-based services. One of the rising trends in recent years that has also penetrated into the marketing literature is gamification, i.e., the employment of principles through which a system or service becomes more gameful. From a marketing perspective, the goal of gamification is to afford

services in a way to enhance consumers' experienced value of the core service (Huotari and Hamari, 2017). Previous studies have indicated that gamification possesses the ability to increase brand engagement (Xi and Hamari, 2020), brand experience (Sung, 2021), and consumer-brand satisfaction (J.-Y. Lee and Jin, 2019). Thus, it should be recognized as a desirable approach for marketers to connect consumers to a brand. More importantly, gamification can be combined with AR and location-based services to unleash even greater potential for marketing praxis. One of many examples exists in notifying consumers via push notifications of place-dependent special offers. These offers may entail virtual coupons that are overlaid via AR technology into the real world and that can be collected and redeemed at a nearby store. Thereby, AR and gamification can be used in combination with the navigational aspects of location-based services and draw consumers to stores. In addition, AR has been used to provide added value to consumers via in-store navigation functionalities (Jayagoda et al., 2021). There seems to be much potential in creating in-store marketing solutions via combining AR with gamification and location-based services because they may be perceived as both useful and fun. Important implications can also be drawn from full-fledged location-based AR games (Laato et al., 2021; Morschheuser et al., 2017), which have lately been investigated for their potential to attract consumers to points of interest and for increasing place attachment (Oleksy and Wnuk, 2017), as well as general number of customers (Pamuru et al., 2021) via increased foot traffic in and around neighborhoods and stores. These potentials should not go unnoticed by marketers because harnessing the power of location-based AR games and gamification solutions may hold important economic implications for competitive advantage. Accordingly, in addition to looking into options for adding a gameful AR layer to their existing mobile apps to increase the experienced value of their core services, marketers may find it profitable to look into partnerships with suppliers of location-based AR games to establish unique marketing strategies and campaigns.

Social Capabilities. Another intriguing direction for interactive marketing praxis is to utilize the potential social capabilities of AR technology to connect consumers with each other and to create shared social experiences (Sung, 2021). The influence of significant others to shape brand attitudes or induce the purchase of products has become an exceedingly vital phenomenon among marketers. Thus, it seems important to scrutinize whether and how AR may be used to support connectedness and socialization between consumers. The reviewed literature supports the notion that AR can have unique potentials to connect users with each other, such as via sharing, social media, recommender, and perspective-taking functionalities. Specifically, AR may introduce novel ways for consumers to share content and information,

such as point-of-view sharing (Hilken et al., 2020) through which a user can select products and modify their features (e.g., color) in the AR view and share the augmented content with the exact modifications with significant others. Through such functionality, AR enables two or more individuals to mutually participate in shopping-related decision processes. Besides asynchronous point-of-view sharing, the technological leaps in the AR realm may also allow users to synchronously participate in co-shopping activities where two or more individuals simultaneously interact (e.g., reshape, resize, move, change color or other features) with virtual content, thereby enhancing collective decision processes. So far, the potential socializing features of AR seem underrepresented in industry contexts as well as not sufficiently addressed in academia. Due to the benefits of social features to induce, for example, co-shopping or word-of-mouth, these potentials should be regarded as a worthwhile and intriguing future waypoint for both researchers and marketing practitioners.

Augmentation of other sensory information besides visual. The present literature review on interactive AR marketing made it evident that current investigations are chiefly limited to exploring the effects of augmented visual content, whereas investigations into other sensory experiences (i.e., touch, smell, sound, taste) largely remain uncharted territory. This is striking because essentially any human sense can in some way be augmented and utilized for marketing purposes. Sensory marketing is the discipline of involving the human senses for shaping consumers' perceptions towards firms, brands, and products (Hultén et al., 2009). Specifically, marketers can consider involving touch and movement-based features (e.g., via haptic gloves) as well as smell (e.g., via scent masks), or audio information to provide an even richer and more immersive experience when consumers engage with products or brands via AR technology. Marketing literature suggests that involving the human senses for branding purposes can have many merits. For example, sound has been suggested to express brand identity (Hultén et al., 2009), while smell can trigger memories (Goldkuhl and Styvén, 2007), positive emotional and cognitive responses (Rimkute et al., 2016), both consciously and unconsciously, thus making sensory information an efficacious instrument for marketing. However, so far, there is little knowledge on the effectiveness of AR technology that utilizes the human senses beyond the visual. Due to the above-mentioned possible merits for marketing, it seems important to investigate how involving other sensory information in AR beyond the visual can affect consumer responses.

Marketplace for virtual products. Lastly, the diffusion of AR in retail and interactive marketing strongly depends on the availability of virtual product replicas that are the basis for

the product visualization regardless of whether the aim is to sell (virtual) products or to use the objects as virtual assets for interactive marketing campaigns. Although manufacturers and suppliers possess 3D models of their products, these models cannot be directly transferred to AR environments due to their complexity and concerns regarding intellectual property (Korbel and Zarnekow, 2021). Thus, online trading platforms emerged that allow the trade of 3D models which are sufficient for AR environments (e.g., Sketchfab). However, these platforms comprise a variety of 3D models for identical physical products while most of the models are neither approved by the manufacturers or suppliers nor are they even aware of their existence. Therefore, the currently existing virtual assets can only be used in AR environments to a limited extent. Furthermore, the search for and integration of the models remains in the hands of the retailers, which induces additional expenses that especially small online retailers might not be willing to invest in (see section 4.5 Small retailers' perspective). Consequently, there is a need for new virtual asset online platforms that incorporate 3D models of physical products with explicit identifiers (e.g., European Article Number (EAN) or Universal Product Code (UPC)) and provide interfaces that allow an automatic search and assignment of the virtual objects to the real products in online stores and on websites. Alternatively, software architectures and programming interfaces must be created that allow manufacturers and suppliers to include 3D models in databases that can be accessed by the consumers, i.e., online shop providers, and directly assigned to the products in their AR applications. Without the availability of virtual product replicas and sufficient processes to include these models in virtual environments, firms will neither be able to use AR applications to their full extent nor participate in the realm of virtual shopping and marketing.

5.2. Limitations

The search of the literature in the present chapter has been limited to the Web of Science database and even though it is one of the most recognized proprietary databases for peer-reviewed and high-quality publications, there is still a chance that some publications have been missed. Therefore, future studies may consider using additional and multiple databases such as JSTOR, Scopus, Google Scholar, EBSCO, etc.

Furthermore, only literature written in English was reviewed. Undeniably, important AR marketing-related studies which were written in languages other than English are excluded from this study. Especially, the application of AR in marketing practice is in full swing in Asia, such as China, Japan, and South Korea. Thus, other search languages can also be considered in future studies.

Even though the interviews turned out to be very informative pertaining to the perceived opportunities and challenges of using AR in marketing, a limitation may exist in the small sample size of five interviewees to capture the practitioner stance as well as in the selected business domain (small retailers), thus the generalizability of these perceptions cannot be ensured. It is also worth noticing that none of the interviewees already use AR as part of their marketing strategies. Consequently, the results obtained from the interviews are based on pre-adoption perceptions of the opportunities and challenges of utilizing AR in marketing and can be understood as initial findings from a small retailer perspective. While this is highly relevant for understanding the stance of practitioners that have not yet integrated AR technology within their marketing campaigns, insights on post-adoption perceptions of integrating AR as an interactive marketing tool from practitioners are missing from this study.

Despite these limitations, the present study contains vital contributions by (1) providing a synopsis of the results from interactive AR marketing research, by (2) revealing the standpoint of five practitioners in terms of the perceived opportunities and challenges of integrating AR as a marketing instrument, and by (3) spotlighting several waypoints for interactive AR marketing in future research and practice endeavors.

6. Conclusion

In the present chapter, a comprehensive framework (see Figure 2) of interactive AR marketing was presented by combining results from a review of academic literature and initial findings of using AR in interactive marketing from a practitioner perspective based on interviews with small retailers that operate online shops.

Based on the theoretical premise of the S-O-R model (see Figure 1), the results of this chapter contribute to understanding the dynamics of interactive AR marketing by showing how AR evokes diverse psychological outcomes, which essentially translate into behavioral outcomes of consumers. Specifically, the obtained results in this chapter indicate that the technological characteristics of AR (e.g., interactivity, vividness, informativeness, quality and performance, etc.) can give rise to several cognitive, affective and social-psychological outcomes, which can positively impact consumers' brand engagement and willingness to share personal data, as well as behavioral intentions to purchase products, use AR applications, or to recommend it to others. Moreover, the environments (i.e., online and stationary), the technologies and devices, as well as the product types that have been subject to interactive AR marketing in the current scientific literature were outlined.

To provide an even more comprehensive overview, the present chapter supplemented the consumer view with a practitioner's view. For this purpose, five interviews with online shop providers were conducted to understand the perceived opportunities and challenges of integrating AR in praxis from a small retailer perspective. From the interviews, three implications could be derived, including that awareness and confidence of the benefits of integrating AR needs to be proliferated more widely among practitioners, and that an easy integration of AR within existing IT infrastructures as well as efficient ways to create virtual product replicas are necessary before small retailers see a tangible pay off in entering the AR sphere for their business and marketing strategies.

In retrospect of the combined observations from the literature review and the conducted interviews, this chapter paves a way forward via a discussion of several emergent trends of applying AR in interactive marketing. In particular, the present chapter exposes the need to further investigate (1) how virtual information should be presented to users (e.g., layered, interactive, embedded); (2) what needs to be considered in terms of the amount of presented information, and the trade-off between informativeness and information overload; (3) how gamification and location-based services can be utilized to produce better marketing campaigns via AR; (4) how to create social experiences or make use of other sensory information (e.g., touch, smell, sound) to generate even more immersive consumer experiences; and (5) how the diffusion of AR in interactive marketing can be fostered by establishing marketplaces and IT architectures for the provisioning of virtual product replicas.

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Glossary

Augmented reality: Enhancement or modification of the perceived (i.e., physical) world via technologically mediated sensory stimuli and information (i.e., visual, touch, scent, sound, smell).

Gamification: The use of principles by which a system or service becomes more gameful. From a marketing perspective, the goal of gamification is to afford services in a way to enhance consumers' experienced value of the core service.

Interactive AR marketing: A strategic concept that incorporates digital content into users' perception to attain organizational goals and consumer benefits.

Interactivity: The technological ability of performing modifications with virtual content in real-time.

Stimulus-Organism-Response (S-O-R): A theoretical model that specifies that different environmental conditions serve as stimuli (S) that affect the internal evaluation processes of consumers (O), leading to a response (R).

Virtual reality: Artificial environment which digitally duplicates or substitutes the perceived (physical) reality via technology.

Vividness: The representational (i.e., visual) richness of a medium.

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