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REVIEW

Literature Review on Immersive Effects in AR Advertising (2009-2024)

Revisión de la literatura sobre los efectos inmersivos en la publicidad de IA (2009-2024)

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ABSTRACT

Introduction: augmented Reality (AR) advertising has significantly influenced digital marketing by providing immersive and engaging consumer experiences. This article explores the evolution and implications of AR technology in advertising through a comprehensive literature review of publications from 2009 to 2024.
Method: the review categorizes various AR applications and investigates their theoretical foundations, methodologies, trends, and key findings related to immersive capabilities in advertising. Key aspects such as interactivity, personalization, and sensory engagement are examined to assess their influence on consumer interactions.
Results: the findings indicate that AR advertising has garnered substantial academic attention over the past decade and a half. It has been recognized for its transformative potential in consumer-brand interactions, particularly in sectors like retail, entertainment, and tourism, which have pioneered the use of AR to create impactful experiences. However, the review also highlights gaps in existing research regarding AR's immersive effects across different cultural contexts and the incorporation of cutting-edge technologies, including AI.
Conclusions: the synthesis of existing studies positions immersion as a critical factor in the evolution of AR advertising strategies. The article advances the discourse on AR in marketing and suggests pathways for future research to enhance understanding of AR's effects and capabilities in various contexts.

Keywords: Augmented Reality (AR) Advertising; Immersive Effects; Consumer Engagement; Personalisation; Interactivity; Digital Marketing Trends.

RESUMEN

Introducción: la publicidad de realidad aumentada (ra) ha influido significativamente en el marketing digital al proporcionar experiencias de inmersión y participación del consumidor. Este artículo explora la evolución e implicaciones de la tecnología de ia en la publicidad a través de una revisión bibliográfica exhaustiva de publicaciones entre 2009 y 2024.
Método: la revisión categoriza varias aplicaciones de ia e investiga sus fundamentos teóricos, metodologías, tendencias y hallazgos clave relacionados con las capacidades inmersivas en la publicidad. Se examinan aspectos clave como la interactividad, la personalización y el compromiso sensorial para entender su impacto en las experiencias del consumidor.
Resultados: los resultados indican que la publicidad de AR ha ganado la atención académica substancial en la última década y media. Ha sido reconocido por su potencial transformador en las interacciones entre consumidores y marcas, particularmente en sectores como el retail, el entretenimiento y el turismo,

que han sido pioneros en el uso de la ia para crear experiencias impactantes. Sin embargo, la revisión también destaca las brechas en la investigación existente con respecto a los efectos inmersivos de la ia en diferentes contextos culturales y la integración de tecnologías emergentes, como la ia.
Conclusiones: la síntesis de los estudios existentes posiciona a la inmersión como un factor crítico en la evolución de las estrategias publicitarias de ia. El artículo avanza el discurso sobre la ia en el marketing y sugiere vías para la investigación futura para mejorar la comprensión de los efectos y capacidades de la ia en varios contextos.

Palabras clave: Publicidad de Realidad Aumentada (AR); Efectos Inmersivos; Compromiso del Consumidor; Personalización; Interactividad; Tendencias de Marketing Digital.

INTRODUCTION

Augmented Reality (AR) is a ground-breaking tool that physically blends the current world with fundamental components, improving the user's awareness of their surroundings. Unlike Virtual Reality (VR), which generates a completely virtual world, AR envelops digital substances, sounds, and sensory signals into the actual world, delivering an interactive and engaging experience.[1] AR can be experienced through devices such as smart glasses, smartphones, headsets, and AR tablets. The importance of AR resides in its ability to convert how individuals engage with digital data and the natural environment. By connecting the gap between natural and digital domains, AR has become a powerful tool across industries such as healthcare, entertainment, learning, retail, and travel. In advertising and marketing, AR permits businesses to create engaging and memorable consumer experiences, driving brand awareness, loyalty, and purchase intent.[2] To create dazzling AR programs, marketers should think about experiences, target audience goals, enticing consumers, and other key factors entangling AR, which is represented in figure 1.

Figure 1. Entangling Augmented Reality

AR works by covering digital content in the natural environment using advanced software and hardware. Core components range from sensors to cameras, and processors are responsible for detecting and analyzing the surroundings. The rise of AR promotes robust emotional relationships and greater interaction, directly influencing user behavior. In education, AR helps students learn by providing collaborative models, while in marketing, AR allows virtual try-ons, improving participation and reducing hesitation during purchases.[3] Although AR holds important potential, further study is necessary in areas such as ease of access, cultural adaptability, and privacy issues. AR advertising creates immersive, interactive experiences by integrating digital elements into real-world environments, enhancing consumer engagement and brand connection.

Overview of AR

AR is a technology that transmits actual digital content, containing sounds, images, and other systems of sensory input, onto the actual world in real time. When compared with VR, AR improves consumers' actual world involvements by covering physical and digital components. It can be experienced through AR headsets, which use sensors, cameras, and software to identify and map environments.[4] The application of AR includes trade, entertainment, education, and healthcare productions, providing a collaborative and immersive experience. AR carries on to advancements with Artificial intelligence (AI), Fifth Generation (5G), and Machine Learning (ML), further identifying and attracting consumer understanding. Its perspective for transforming Digital Marketing (DM) and user interactions is extensive, producing new opportunities for businesses.

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Advertising Strategies in AR

Advertising approaches through AR exploit its involvement and communication to engage customers in ways different from other advertisements. Several brands use AR technology for engaging advertisement (ad) understandings that combine digital content with the current world, thrusting users to dynamically participate. For instance, virtual simulations allow consumers to try on clothes or makeup items in real-time through these AR devices. Location-oriented AR ads allow users to engage with the AR content through the activation of a separate location, thus improving significance and engagement.[5] Individual AR involvements play an important part by customizing the content to consumer's favorites or past preferences, improving emotional attachment and brand loyalty. AR game mechanics have emerged as another effective strategy, where users interact with branded AR games, providing exciting rewards and further enhancing brand recall.[6] These approaches utilize the potential of AR to produce unforgettable, shareable experiences, thus growing consumer interaction, brand awareness, and sales.

AR Advertising

AR combines virtual objects, such as images and videos in real-time, making the consumer experience more vibrant. The technology is defined by the overlay of virtual elements on top of reality.[7] There are three types of AR apps: those augment surroundings, products, and self-augmentation, each providing distinct user experiences through digital augmentation. The following are the specific applications of AR.

AR apps overlay the surroundings

The AR apps superimpose virtual objects, such as furniture, in a real environment through a smart device. It enables users to view how things will look in the real world before buying them.

AR apps enhance the products

These apps enhance customer experiences by providing additional digital content like videos or reviews when users scan an image or a product with the app. It allows deeper insights and enrichment while interacting with the products.

AR apps for self-augmentation

These apps will take an impression of a body part or a reflection and overlay virtual objects such as makeup products, glasses, or clothes. They will enable users to try on products before buying them in a virtual setting.[8]

Absolut AR Campaign

Absolut leveraged AR technology to improve user interaction by enabling consumers to scan their bottles or visit the Absolut website. This provides access to a communicating 3D tour of Ahus, the birthplace of their vodka, along with a creation guide and free drink recipes, producing an individual and immersive brand experience.[9]

Pepsi Co.UK AR Campaign

The company created live-streamed over-the-top events, such as meteor crashes and alien attacks on a glass bus stop wall, for its Pepsi Max campaign in London. This caught people off guard, captivating their attention as they unexpectedly encountered Pepsi Max's ad in an engaging way.[10]

The Lynx Excite (AXE) campaign at Victoria Railway Station utilized AR technology to deliver an immersive and captivating experience. Travelers on designated spots saw their photographs and virtual angels on a video monitor. As the travelers moved about, the angels fell and responded to them as if to explain the great attraction of the product. In the 2015 NCAA Men's Final Four, Coca-Cola's "Drinkable" campaign used AR as part of its multichannel efforts. Fans could get samples or coupons, and AR elements included interactive billboards, kiosks, and vending machines, which further enhanced engagement with the Coke Zero campaign.[11]

Characteristics of ar technology

AR technology in advertising is defined by characteristics such as novelty, entertainment, complexity, informativeness, vividness, aesthetics, and augmentation, which shape consumer engagement and influence perceptions of AR experiences. Table 1 presents the characteristics of AR advertisement campaigns.

Novelty

AR advertising refers how much the ad deviates from consumer expectations, incorporating surprising or unusual design elements.[12] It incorporates concepts such as freshness, uniqueness, and divergence, shaping how audiences perceive the ad as innovative and distinct from conventional approaches.

Entertainment

AR advertising provides a fun experience, satisfying consumers' desires for hedonic pleasure, aesthetic

enjoyment, and escapism.[13] It offers intrinsic enjoyment, motivating viewers to seek entertainment value, especially in engaging AR campaigns, such as those on YouTube.

Complexity

In AR marketing, complexity refers to how easily consumers can engage with AR technology, particularly in online shopping.[14] Studies have explored whether complicated or frustrating website designs with AR features influence consumer experiences and participation on the platform.

Informativeness

Informativeness in AR advertising involves delivering relevant, context-sensitive information while maintaining an engaging and interactive experience.[15] This is crucial for how well the ad conveys helpful content, which influences consumers' attitudes and evaluations.

Vividness

Vividness in AR refers to the sharpness with which AR technology generates realistic images, combining sensory experiences from real-world objects with digital, imaginary elements to enrich consumer perception.[16]

Aesthetics

Aesthetics in AR focuses on the visual appeal of augmented objects and environments. It emphasizes how attractive and engaging the design and appearance of AR-enhanced visuals are to consumers.[17]

Augmentation

Augmentation refers to the range of digital objects. They are seamlessly incorporated with current environments, enabling consumers to interact with and manipulate these digital objects in a manner that is quite natural with their surroundings.[18]

Table 1. Characteristics of Augmented Reality Ad Campaigns

AR Context	Variables
Mobile applications[19]	Accessibility and satisfaction
Virtual shopping[20]	Service quality, Aesthetics, spirit, and user return on savings
Points of sale[21]	Perceived ease of use and enjoyment
Travel[22]	Mobile applications Aesthetics and enjoyment
Design advertising[23]	Novelty
Brand promotion[24]	Entertaining, advertisement value, Informativeness, user irritation, convenience, and novelty.

Theoretical framework in AR

Table 2. Theoretical lenses

Theory	Explanations
Technology Acceptance Model (TAM)[25]	A unique observation of how easy and useful a technology is will determine their approach to using it and their behavioral purpose to use it.
Stimulus Organism Response (SOR)[26]	According to this theory, all elements of the environment, or the stimulus, are liable to influence consumers' cognitive and affective states, which then cause a response to it.
Uses and Gratification Theory (UGT)[27]	Media effectiveness is a form of intellectual satisfaction that inspires media practice intentions.
Theory of Reasoned Action (TRA)[28]	People's behavior could be anticipated if their purposes are known. Their targets are motivated by their approach toward the performance.
Unified Theory of Acceptance and Use of Technology (UTAUT)[29]	This philosophy states that 4 factors presentation expectancy, effort expectation, social impact, and assisting conditions directly determine behavioral purpose.
Self-Referencing Theory[30]	Self-referencing increases retention of advertisement statistics and improves product and brand estimates.
Equity Theory[31]	Unique DM of using tools based on their association with the effort.
Flow Theory [32]	Achieve the course knowledge by applying the project features that assist the optimum positions of flow. The flow involvement would improve other user involvement results.

Existing AR advertising utilizes an extensive range of theoretical frameworks. Table 2 presents the frequently used theoretical lenses. The Technology Acceptance Model (TAM) is the most commonly applied, which is featured in several studies. The Stimulus Organism Response (SOR) structure is another broadly applied theory. Moreover, other prominent theories are also recognized in the academic community.

Types of AR

AR applications used by consumers involve various devices, such as stationary devices, mobile devices, wearable devices, and sensory input devices. AR applications in advertising have evolved into various forms, as highlighted in journals from 2009 to 2024, such as web-based, wearable, mixed, mobile, image recognition, and on-site AR. Early AR applications were web-based, in which individuals could virtually try on a pair of sunglasses, watches, makeup, or furniture on their computer.[33] Figure 2 presents the distribution of journal publications from 2009 to 2024, categorizing various types of AR advertising.

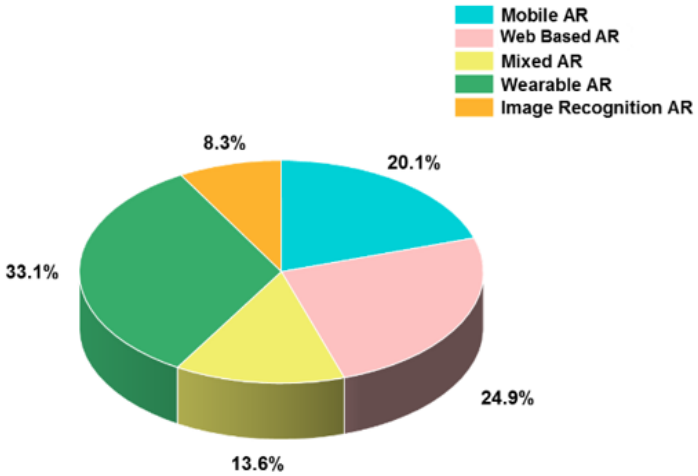

Figure 2. Types of Augmented Reality

The data presented indicates the distribution of AR types in journal publications from 2009 to 2024. Wearable AR, accounting for 33,1 %, emerges as the most utilized format, followed by web-based AR (24,9 %) and mobile AR (20,1 %). Mixed AR (13,6 %) and image recognition AR (8,3 %) are relatively less explored.

Immersive Engagement in AR Advertising

Flow, or deep involvement in an activity, has been used extensively in many fields of study, including marketing, education, and media use. For AR advertising, flow experiences are defined as total sensory immersion that is provided by AR, especially by interaction and navigating virtual environments. Such engaging features enhance consumer involvement because the person is completely engaged in the task or activity being performed, such as interacting with AR ads. The studies have shown that flow experiences in AR advertising result in positive outcomes, including greater consumer learning, higher engagement, and a higher intention to adopt new technologies. It was therefore previously used to analyze consumer behavior in several other areas, including online shopping and media consumption.

Flow experiences would positively affect consumer learning. Subsequently, various analysis confirmed the connection between flow and positive behavioral effects, such as raised purchase intentions and favorable brand attitudes. Although the relationship of flow with the effectiveness of advertisements has been widely studied, it is still unclear how AR advertising contributes specifically to flow experiences. Further investigation into how AR technology can provide greater immersion and generate flow experiences compared to more traditional forms of advertising, therefore, necessary to increase understanding of the impact on consumer responses.[34]

Designing AR campaign

Designing effective AR campaigns includes an organized method to ensure arrangement with advertising objectives and consumer engagement. The first step is describing the goal audience and campaign objectives. Dealers are required to identify their audience and inaugurate pure purposes, such as increasing awareness, conveying product awareness, generating emotional relations, or structuring brand groups.[35] Primary adopters of technology are ideal goals for AR campaigns necessitating app downloads, while limited innovative-driven audiences may take advantage of simpler formats like open AR fittings. The second step is shaping the trigger.

This includes crucial how the AR coating would be stimulated. User-driven triggers, like scanning a QR code or interrelating with an app, deliver control and improve commitment. Alternatively, marketer-driven triggers, such as mall-oriented AR presentations, decrease consumer effort and good health for awareness campaigns. The third step is preparation of content support, which regulates who generates or adds content to the AR structure. Advertiser-directed content certifies reliability, while user-created content encourages creativity and brand support.[36] The last step is incorporating context, certifying the AR understanding aligns with its physical and social environment. Thoughtful context incorporation improves engagement and reduces disruptions. By following these steps, vendors could generate attractive AR campaigns that resonate with users and exploit brand influence. Figure 3 shows the ingredients and design decisions in AR.

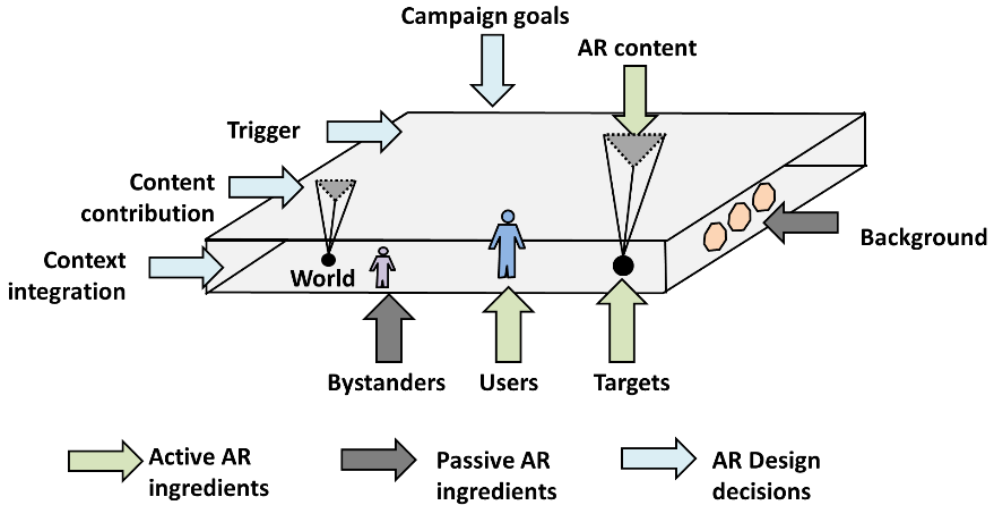

Figure 3. Augmented Reality Ingredients and Design Decisions

Utilizing AR to Increase Consumer Participation

To increase consumer participation, AR is leveraged to generate significant connections that improve consumer associations. By incorporating exclusive content into consumers' physical and social surroundings, AR suggests a vibrant way to involve consumers. Dealers could optimize AR creativities by regulating the dynamics between passive and active AR features to promote three types of interactions: consumer-brand, consumer-consumer, and consumer-bystander.[37] Slight design variations and engagement strategies could improve interaction, enhancing consumer knowledge and the return on outlay for AR campaigns.

Consumer Collaboration

User-user engagement in AR campaigns enhances consumer interactions by embedding branded content into social exchanges. This engagement occurs when users' actions toward AR content influence and are perceivable by others, enabling reciprocal interactions. For example, a Greek chocolate brand allows users to personalize chocolate wrappers with messages for loved ones, fostering private sociability. South African iced tea brand BOS encourages public sociability by enabling users to plant virtual trees via an AR app, visible to all.[38] By integrating sociability, AR campaigns strengthen brand communities and interpersonal connections, deepening consumer relationships and embedding the brand into conversations, fostering loyalty and return engagements.

Bibliometric analysis

A bibliometric is a matrix or table used in bibliometric analysis, summarizing various aspects of academic literature, such as publications, citations, and trends in research fields. It can provide insights into the influence, collaboration, and evolution of study topics. In this review, journal papers published between 2009 and 2024 are analyzed, and displayed in figure 4.

Currently, the analysis emphasizes the transformative role of AR in various domains, highlighting its widespread adoption and impact. Years from 2009 to 2024, study was explored and it was found that investigation on AR in advertising has reached a peak in the years 2010, 2014 to 2018, and 2021. Further investigation is reduced in recent days. Looking ahead, the integration of AR in advertising, is expected to gain prominence in the future, offering even more immersive and engaging experiences.

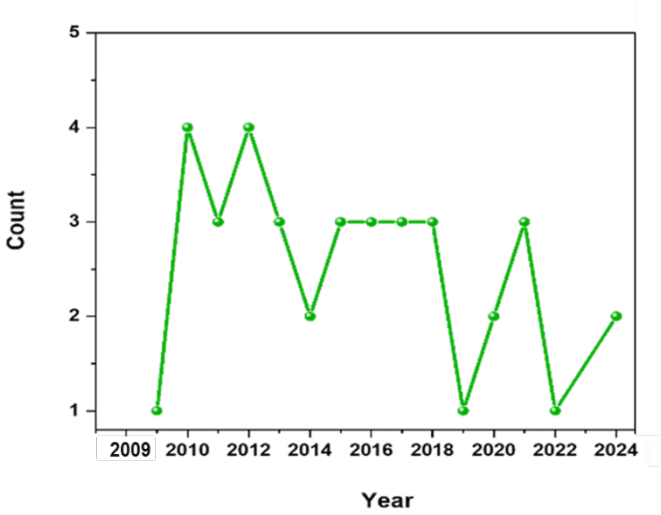

Figure 4. Bibliometric Analysis on AR Advertising Journals (2009–2024)

Challenges

Some challenges that AR advertising produces are technical disputes, such as alignment with various strategies and the requirement for high-performance software and hardware, which could limit its widespread adoption. Consumer acceptance remains a hurdle, as many users still find AR technology intimidating or too complex. Privacy concerns are also significant, as AR apps often collect personal data. Additionally, cultural differences present challenges, as certain AR experiences may not resonate universally due to content differences across markets. Lastly, the cost of developing and integrating AR into marketing strategies makes it difficult for small businesses to access.

Limitations

AR in advertising presents some limitations, which are as follows:

- Device Adaptability issues restrict extensive accessibility to AR involvements.
- User recognition is limited due to strangeness or trouble in using AR technology.
- Isolation and data security concerns emerge, affecting consumer trust in AR frameworks.
- Traditional variations may limit the efficiency of AR content across areas.
- High progress and execution costs pose commercial challenges for brands.

CONCLUSIONS

AR advertising is transforming consumer-brand relationships by enabling highly immersive and interactive experiences across industries like retail, entertainment, and tourism. By focusing on key aspects such as consumer collaboration, increasing participation through AR, and creating effective campaigns, this review highlights the strategic importance of AR in modern advertising. Notably, mobile AR, wearable AR, mixed AR, web-based AR, and image recognition AR are the key formats, with wearable AR emerging as the most widely adopted due to its hands-free capabilities, real-time interactivity, and growing consumer accessibility. Wearable AR devices, in retail, healthcare, and tourism, offer personalized content and enhance user interaction. Year-wise bibliometric analysis was done, representing that future study might focus more on investigating AR in advertising. Furthermore, the challenges of implementing AR in advertising are also portrayed along with the limitations of existing study. The review emphasizes that future study should explore the theoretical foundations of AR, its technological characteristics, and its integration with AI, while also addressing cultural adaptability. As AR evolves, it will be a cornerstone for innovative, consumer-centric advertising strategies.

Future study area

AR is an area of significant possibility across different domains. It can transform education by offering highly engaging knowledge experiences and redefining healthcare through current surgical support and diagnostics. AR permits virtual simulations and improves shopping involvement. The gaming and entertainment sectors will develop with communication and interactive understandings. Urban planning and structure will benefit from accurate visualizations. Furthermore, developments in AR spectacles and devices are estimated to incorporate AR into routine life seamlessly. Continued study into optimizing AR hardware, improving user interfaces, and exploring novel applications will unlock new opportunities and further solidify AR's place in the everyday lives. Study into improving the comfort, accessibility, and affordability of AR devices will be critical in making AR ubiquitous.

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