Toward Immersive Commerce: A Systematic Review of Augmented Reality Adoption in Retail

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Abstract

Augmented Reality (AR) has emerged as a prominent solution to address customer concerns in online shopping. This study aims to conduct a literature review on the factors influencing the adoption of AR in the retail industry. The reviewed literature spans the last five years, from 2020 to 2025, and was sourced from databases such as Scopus, Semantic Scholar, Web of Science, and Google Scholar. The PRISMA method was applied to facilitate the selection of relevant studies, resulting in a final dataset of 34 publications. The review identified 94 variables and 13 moderators commonly used in 11 prior studies. Among these, the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) were the most frequently applied frameworks. Research on AR adoption in retail has been conducted across various countries in Asia, Europe, and the Americas. This study is expected to provide insights beneficial for both researchers and retail practitioners in integrating AR technology into their business processes.

Keywords: Augmented Reality, Adoption, Intention to Use, Retail.

I. INTRODUCTION

When purchasing products online, customers often encounter a mismatch between their expectations and the actual products delivered. This discrepancy, stemming from the inability to physically examine or try products before purchase, has led to hesitation and mistrust among potential buyers. Such challenges are particularly pressing for businesses operating in the digital space, including proprietary websites, mobile applications, and official stores on e-commerce platforms. As consumer demands shift toward more immersive and personalized shopping experiences, online retailers are compelled to seek innovative solutions that can bridge the gap between virtual and physical retail environments.

One emerging and increasingly influential solution is the implementation of Augmented Reality (AR) technology. AR enables customers to visualize and interact with products virtually, often in real-time, through their smartphones or other digital devices prior to making a purchase [1], [2]. This not only provides a richer understanding of the product's appearance, scale, and functionality, but also enhances customer confidence by offering context-aware, detailed product information anytime and anywhere [3]. As a result, AR is positioned not only as a technological enhancement but also as a strategic tool for reducing return rates, increasing customer satisfaction, and driving purchase intention.

The concept of AR traces back to 1962, when Morton Heilig introduced the Sensorama, a multi-sensory simulator designed to immerse users in virtual experiences [4]. Sensorama is made by relying on many sensors from the body such as aroma, vibration, and wind. This aims so that Sensorama can provide a real experience to users [5], [6]. Building on this foundation, Caudell and Mizell formalized the term "Augmented Reality" in 1992, envisioning it as a system that overlays virtual information onto the physical environment [7]. AR technology can generally be classified into three main types: marker-based AR, location-based AR, and markerless AR [8]. Location-based AR relies on GPS to accurately place virtual objects in real-world settings [8], [9]. Pokemon Go is an example for location-based AR, it use the user's location while playing the game [8], [10], [11]. Marker-based AR uses pre-defined visual triggers, such as QR codes or images, to generate digital overlays. Meanwhile, markerless AR, which is increasingly dominant in commercial applications, leverages spatial recognition to anchor 3D models on flat surfaces without the need for specific visual cues [8].

In recent years, AR has seen notable adoption in the retail sector, offering brands a new medium to engage customers and differentiate their digital offerings. AR technology is used to

help businesses reach customers online [12]. For example, Shopee integrates AR into its "BeautyCam" feature, allowing users to virtually try on cosmetics and enhance their confidence before making a purchase [13]. Similarly, Warby Parker, a leading American eyewear brand, has implemented AR on its website and mobile platforms to enable customers to virtually try on glasses—anytime, anywhere [14]. These implementations signify a broader trend: retailers are leveraging AR not merely for novelty, but as a critical touchpoint in the consumer decision-making journey.

Beyond retail, AR adoption has been studied across various sectors. In tourism, researchers have investigated AR implementation among business leaders in Malaysia's small-to-medium tour enterprises [15]. In hospitality, studies have focused on customer acceptance of AR-enhanced experiences in luxury hotels [16]. The education sector, especially in medical and general instructional contexts, has similarly embraced AR as a transformative tool for interactive learning [17]. Within retail, specific domains such as cosmetics have received extensive scholarly attention through the analysis of virtual makeup try-on systems [4], [18], [19]. Likewise, furniture retail has been examined through case studies comparing AR experiences on IKEA's website and the IKEA Place app, which allows users to digitally visualize product placement within their home environments [3].

Despite the growing body of literature, the rapid expansion of AR applications in retail calls for a comprehensive synthesis of current research. This article addresses this need by conducting a five-year systematic review of scholarly studies related to AR adoption in the retail sector. Specifically, it aims to answer the following research questions:

RQ1: What variables have been studied in research related to customers' intention to use AR in retail?
RQ2: Which countries are most active in conducting research on customers' intention to use AR in retail?
RQ3: Which academic journals have published articles on the intention to use AR in retail?
RQ4: How many studies use moderator variables, and what types of moderators are employed?

By synthesizing existing findings, this study seeks to map key trends, highlight research gaps, and offer actionable insights for both scholars and practitioners. For researchers, it provides a curated foundation for future investigations into AR-related consumer behavior. For retail decision-makers, it offers strategic guidance on integrating AR to enhance customer experience, drive engagement, and remain competitive in an increasingly digital marketplace.

II. RESEARCH METHODOLOGY

This study aims to conduct a comprehensive review of the existing literature on the adoption of AR technology in both online and offline retail contexts. As outlined in the previous section, the review is structured to address specific research questions. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was utilized to guide the literature search and selection process. PRISMA comprises four main stages: identification, screening, eligibility, and inclusion [20]. Following this process, a total of 34 relevant publications were selected for in-depth analysis. The detailed steps of the PRISMA process applied in this study are illustrated in Figure 1.

A. Identification

In the identification process, the first step was to determine the keywords that would be used for the literature search. The keywords in this study were derived from previous literature reviews, supplemented by additional terms considered relevant by the author during the search process. Keywords adopted from prior research include "augmented reality," "store," "e-commerce," and "retail*" [21]. The author also added supporting keywords deemed relevant to the topic, such as "mobile augmented reality," "AR-based application," "behavioral intention to use," "acceptance," "adoption," "intention to*," "smart retail," and "online retail*." These keywords were then combined into search queries using logical operators "AND" and "OR." To facilitate the literature search, the tool Publish or Perish was used. The databases consulted included Scopus, Web of Science, Google Scholar, and Semantic Scholar. The literature search was conducted on March 19, 2025, yielding a total of 1,205 records published between 2020 and 2025. Duplicate entries were consolidated, and only empirical research articles were retained; literature identified as systematic literature reviews in their titles was excluded. Additionally, books, conference proceedings, and opinion pieces were not included. This step resulted in the identification of 368 duplicate entries and 94 non-empirical studies. Ultimately, the identification process yielded 743 articles to be carried forward to the screening stage.

B. Screening

The screening process was conducted on 743 articles by reviewing their titles and abstracts. The abstracts were used to determine whether each article met the predefined inclusion criteria. In addition to title and abstract content, another criterion was the indexing status of the article. Selected articles had to be indexed in Scopus or, for those originating from Indonesia, at least classified as SINTA 3 or higher. Furthermore, the articles had to be available in either English or Indonesian; publications in other languages were excluded. During this screening stage, two articles were found to be published outside the 2020–2025 range and were thus excluded. A more detailed breakdown of the exclusion criteria and the number of articles removed for each reason is presented in Figure 1. After applying all screening criteria, 54 articles remained. However, six of these could not be accessed in full, leaving 48 articles to proceed to the eligibility assessment stage.

C. Eligibility

In the eligibility stage, the 48 selected articles were further reviewed by reading key sections, specifically the abstract,

introduction, and conclusion, to ensure compliance with the inclusion criteria. This step was essential to capture critical information that may not have been evident during the abstract-only review in the screening phase. As a result of this in-depth evaluation, 14 articles were found to be non-compliant with the study criteria and were excluded. Details of these exclusions are illustrated in Figure 1. Ultimately, the eligibility phase finalized 34 articles for inclusion in the study.

D. Inclusion

The final phase, inclusion, involved a comprehensive reading of the 34 eligible articles to extract relevant research data. During this process, an Excel spreadsheet was used to systematically document findings from each article. The recorded information included: author names, journal and publisher names, year of publication, study location, investigated variables, statistical analysis methods, population, research methodology, and study outcomes. This data formed the basis for the subsequent synthesis and analysis of the selected literature.

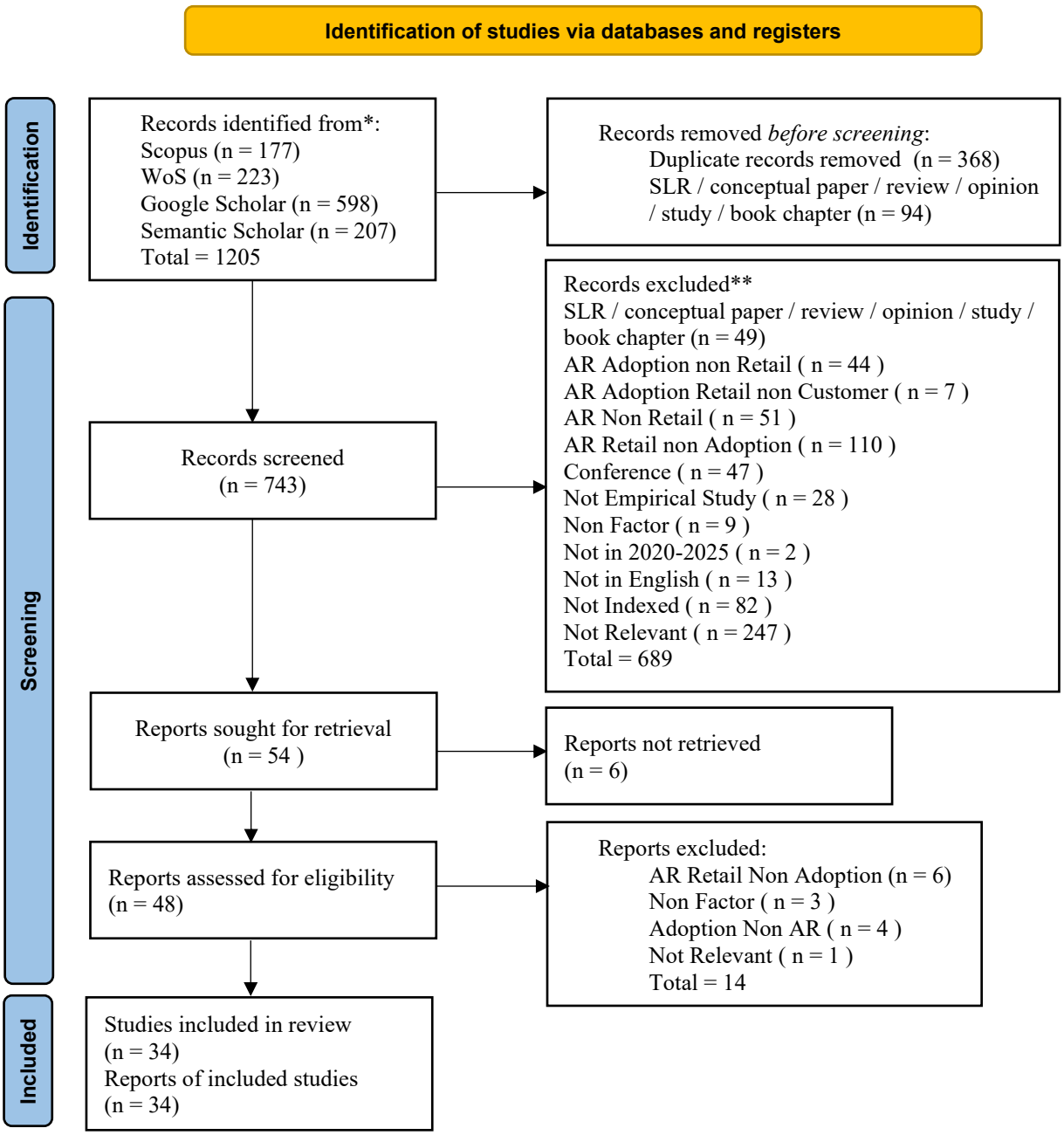

Figure 1. PRISMA Flow Diagram

III. RESULT AND DISCUSSION

From the collected literature, various variables used in studies on the intention to use AR in retail were identified. The list of variables and their frequencies is presented in Table 1. In total, 94 variables were extracted from 34 studies. The most frequently discussed variable is intention to use, which appeared 21 times, highlighting its central role in consumer behavior research. Other commonly appearing variables include perceived usefulness, perceived ease of use, and perceived enjoyment, indicating that many studies focus on the usability, convenience, and perceived benefits of AR technology. Variables such as attitude and purchase intention after experiencing AR also received considerable attention. In addition, information quality and interactivity provided by AR systems are frequently explored. Some studies addressed individual factors, such as personal innovativeness, the tendency to try new technologies, and social influence, which may affect one's decision to adopt AR. Further variables like effort expectancy, performance expectancy, vividness, and telepresence also emerged as important, focusing on the visual experience and sense of presence when using AR. The wide variety of variables reflects that consumer behavior toward AR technology adoption is shaped by a combination of psychological, social, technical, and emotional factors.

Table 1. Key Variables Used In AR Adoption Research Retail

Variable	Total	Reference
Intention to Use	21	[4], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41]
Perceived Usefulness	13	[4], [18], [28], [29], [31], [35], [39], [40], [41], [42], [43], [44], [45]
Perceived Ease of Use	12	[4], [28], [31], [35], [37], [39], [40], [41], [42], [45], [46], [47]
Attitude	11	[28], [30], [31], [32], [35], [37], [42], [45], [46], [48], [49]
Perceived Enjoyment	10	[3], [4], [18], [28], [31], [34], [38], [40], [44], [46]
Purchase Intention	10	[3], [18], [19], [43], [44], [45], [46], [47], [50], [51]
Information Quality	9	[3], [4], [18], [29], [32], [41], [43], [44], [47]
Interactivity	9	[3], [19], [25], [30], [32], [33], [44], [49], [50]
Personal Innovativeness	7	[22], [28], [36], [38], [39], [44], [46]
Augmentation/Augmenter Reality	6	[4], [18], [19], [33], [49], [51]
Social Influence	6	[22], [23], [26], [36], [38], [40]
Effort Expectancy	5	[22], [23], [24], [26], [38]
Performance Expectancy	5	[22], [23], [24], [26], [38]
Vividness	5	[3], [19], [31], [49], [50]
Telepresence	5	[19], [25], [33], [41], [47]
Trust	5	[18], [32], [34], [38], [51]
Hedonic Motivation	4	[22], [24], [26], [47]
Utilitarian	4	[25], [30], [33], [50]
Navigation	3	[41], [42], [43]
Facilitation Condition	3	[22], [26], [34]
Relative Advantage	3	[37], [45], [51]
Hedonic Value	3	[25], [33], [50]
System Quality	3	[18], [29], [32]
Novelty	3	[3], [31], [50]
Perceived Risk	3	[22], [26], [32]
Perceived Compatibility	3	[34], [37], [45]
Perceived Value	3	[37], [39], [44]
Self-efficacy	2	[40], [42]
Perceived Functional Benefit	2	[32], [34]
Aesthetics	2	[19], [42]
Intrusiveness	2	[3], [44]
Playfulness	2	[19], [48]
Task-Technology Fit	2	[22], [26]
Perceived Trialability, Perceived Observability	2	[37], [45]
Customer Engagement	2	[39], [49]
Continuance Intention	2	[50], [51]
Satisfaction	2	[18], [29]

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Variable	Total	Reference
Technology Readiness, Need for Personal Interaction	1	[42]
Consumer Resource Affluence, Technostress, Security Concern	1	[36]
Complexity, Fit Confidence, Body Esteem	1	[45]
Service Quality	1	[29]
Anticipated Emotions	1	[30]
Reality Congruence	1	[32]
Media Richness	1	[25]
Consumer Novelty Seeking, Technology Anxiety	1	[4]
Privacy Concern	1	[44]
Fit Concern, Pandemic Fear	1	[35]
Privacy Risk	1	[26]
Self-Identity, Social-Identity	1	[28]
Concentration, Exploratory Behavior, Decision Comfort	1	[19]
Task Characteristics, Technology Characteristics	1	[22]
Perceived Service Value	1	[34]
Pleasure, Arousal	1	[23]
Habit of Using AR	1	[24]
Brand Loyalty	1	[38]
Perceived Sacrifice, Personalization	1	[39]
Visual Appeal, Entertainment, Hedonic Component	1	[43]
Rewards	1	[40]
Responsiveness, Controllability, Elaboration, Quality	1	[48]
User Experience	1	[3]
Functional Value, Experiential Value, Social Value, Environmental Value, Performance Risk, Privacy Risk, Psychological Risk, Time Risk	1	[27]
Information Format, Information Currency, Information Accuracy, Information Completeness, AR Attractiveness, AR Popularity, Trust in Product Information	1	[51]

The analysis of moderators revealed 13 distinct variables used across studies, with gender appearing in two separate articles, making it the most frequently examined moderator. Other moderators include demographic factors such as age and generational differences, which were considered to assess how technology adoption or trust may vary across different population segments. Psychological variables, including technology anxiety, self-efficacy, and consumer self-confidence, were also explored to understand the internal cognitive or emotional states that might influence individuals' behavioral intentions. Additionally, personality-related factors, such as consumer innovativeness and product involvement, were investigated to determine how inherent traits or personal engagement with products affect users' responses. These moderators provide valuable insights into the boundary conditions under which certain effects hold true, highlighting the importance of considering individual differences when evaluating user behavior in digital contexts. The diversity of these moderating variables reflects a growing recognition of the complex interplay between user characteristics and technology interaction, and suggests that future studies may benefit from integrating multidimensional moderator frameworks to enrich theoretical explanations and practical implications. A detailed summary of these moderators and their respective studies can be seen in Table 2.

Table 2. Moderators Identified and Their Occurrence

Moderator	Total	Reference
Gender	2	[22], [23]
Age	1	[22]
Generational Difference	1	[24]
Task Complexity	1	[25]
Technology Anxiety	1	[26]
Trust	1	[43]
Product Involvement	1	[48]
Consumer Innovativeness, Consumer Self-confidence	1	[27]
Self-efficacy	1	[28]
Individualism, Fashion Innovativeness	1	[19]
Trade-off price and Value	1	[18]

Next, the literature search revealed a list of countries actively conducting research on the intention to use AR in retail over the past five years, as shown in Table 3. In total, research was conducted in 17 countries during this period. The top five most active countries are Indonesia with six publications, the United States with five, India with four, followed by Malaysia and South Korea with three each. Several other countries contributed with one publication each, including Turkey, Tunisia, Taiwan, Spain, Nicaragua, Croatia, Germany, Iran, and Austria. Overall, the literature is fairly distributed across various regions of the world, Asia, Europe, the Americas, and the Middle East, encompassing both developing and developed countries.

Most research was conducted in Indonesia. As Indonesia is a developing country, it is not surprising that many studies on AR adoption have been conducted in Indonesia. Another influencing factor is the number of smartphone users in Indonesia, which reached 209.3 million in 2023 [52]. This could be a driving force for the development and use of mobile new technologies like AR in Indonesia, leading to a significant amount of research being conducted there.

Table 3. Country Distribution

Country	Total
Indonesia	6
USA	5
India	4
Malaysia	3
South Korea	3
China	2
Pakistan	2
Egypt	2
Turkey	1
Tunisia	1
Taiwan	1
Spain	1
Nicaragua	1
Croatia	1
Germany	1
Austria	1
Iran	1

Based on Figure 2, the number of articles shows a consistent increase from year to year since 2020. In 2020, there were two publications, followed by four in 2021. The number rose to seven in 2022, then slightly decreased to six in 2023. In 2024, the number increased again to eight. For 2025, as of early in the year, seven publications have been recorded. Overall, the total of 34 articles reflects a growing research interest in the intention to use AR in retail over the past five years.

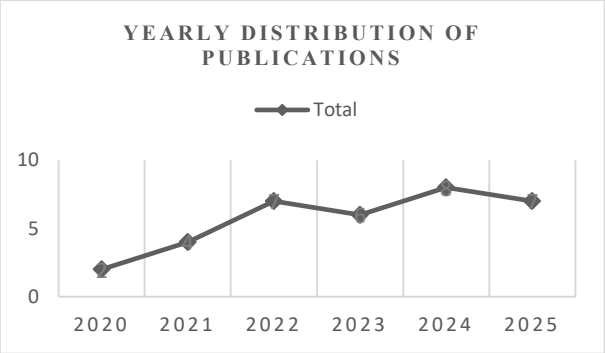

Figure 2. Yearly Distribution of Publications

Among the 34 identified studies, the literature is distributed across various academic journals, as shown in Table 4. The journals that published the most research on intention to use AR in retail over the past five years are the Journal of Retailing and Consumer Services and the Journal of Fashion Marketing and Management: An International Journal, each with three articles. These are followed by several other journals, including Young Consumers, Marketing Intelligence & Planning, Journal of Theoretical and Applied Information Technology, and Asia Pacific Journal of Marketing and Logistics, each publishing two articles.

Table 4. Distribution of Journal Source

Journal	Total
Journal of Retailing and Consumer Services	3
Journal of Fashion Marketing and Management: An International Journal	3
Young Consumers	2
Marketing Intelligence & Planning	2

Journal	Total
Journal of Theoretical and Applied Information Technology	2
Asia Pacific Journal of Marketing and Logistics	2
The International Review of Retail, Distribution and Consumer Research	1
Telematics and Informatics Reports	1
Technological Forecasting & Social Change	1
Jurnal Sistem Informasi	1
Jurnal Nusantara Aplikasi Manajemen Bisnis	1
Journal of Tourism Futures	1
Journal of Service Marketing	1
Journal of Research in Interactive Marketing	1
Journal of Product & Brand Management	1
Journal of Internet Commerce	1
Journal of Global Marketing	1
Internet Research	1
International Social Science Journal	1
International Journal of Retail & Distribution Management	1
International Journal of E-Services and Mobile Applications	1
Heliyon	1
European Journal of Innovation Management	1
EuroMed Journal of Business	1
Computers in Human Behavior	1
Binus Business Review	1

From the list of journals, the corresponding publishers were also identified, as shown in Table 5. Emerald is the leading publisher in terms of the number of publications related to intention to use AR in retail, with a total of 17 articles. Elsevier ranks second with seven articles, followed by Taylor & Francis with three articles, and the Journal of Theoretical and Applied Information Technology with two. Other publishers contributed one article each over the past five years.

Table 5. Publication Country by Publisher

Publisher	Total
Emerald	17
Elsevier	7
Taylor & Francis	3
Journal of Theoretical and Applied Information Technology	2
Jurnal Sistem Informasi (Journal of Information System), Universitas Indonesia	1
Jurnal Nusantara Aplikasi Manajemen Bisnis	1
John Wiley & Sons Ltd	1
IGI Global	1
Binus Business Review	1

IV. CONCLUSION

Based on the analysis of 34 selected studies, it can be concluded that research on the intention to use AR in retail has shown a growing trend over the past five years. This is evident from the increasing number of publications between 2020 and 2025, peaking in 2024. The literature covers a wide range of variables related to the intention to adopt AR in retail settings. Among these, many studies still rely heavily on established theoretical frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). This is because both models include factors related to the adoption of technology and the main purpose of UTAUT model was originally developed to provide a unified and comprehensive framework for explaining technology adoption behavior, and later UTAUT was further extended into UTAUT2 [26].

While some studies have begun to explore emotionally and sensorily driven variables such as hedonic motivation, interactivity, and augmented reality experience, these remain underrepresented in the existing literature. In addition to core variables, a variety of moderators have been examined. Gender appears as the most commonly used moderator, but psychological and individual characteristics such as self-efficacy, consumer innovativeness, product involvement, consumer self-confidence, and technology anxiety have also been investigated.

Overall, these findings indicate that the topic of AR adoption intention in retail is evolving and continues to attract scholarly interest. Future research could benefit from exploring a broader set of variables and expanding the current focus. Cultural variables, social values, and local identities remain underutilized as moderators. Cross-cultural studies or research centered on indigenous populations and local communities may offer fresh insights into AR adoption in retail contexts. Beyond functional aspects, future studies should delve deeper into the emotional, aesthetic, and symbolic dimensions of AR. Most existing research has yet to place AR itself at the center, particularly in understanding how user experience (UX) with AR can influence adoption and usage behavior.

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