

Original Article

The Serial Mediating Role of Customer Engagement and Attitude in the Relationship Between Augmented Reality and Purchase Intention in Furniture E-Retail

Manish Gulyani ¹

¹ Assistant Professor, Department of Management Studies, Panipat Institute of Engineering and Technology – India / Research Scholar, MMIM, Mullana, Haryana – India

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Abstract

Augmented reality (AR) has emerged as a transformative interactive technology in online furniture retailing, allowing consumers to visualize products within their own physical space prior to purchase. Despite the growing adoption of AR-enabled applications such as IKEA Place, empirical understanding of the psychological mechanisms that translate AR exposure into purchase behavior remains fragmented (Ramdani et al., 2022; Khirbat & Sriram, 2025). Grounded in the Stimulus-Organism-Response (S-O-R) framework and the Technology Acceptance Model, this study conceptualizes how AR usage shapes consumer purchase intention in furniture e-retail through the serial mediating roles of customer engagement and attitude. It is proposed that AR characteristics such as interactivity, vividness, novelty and informativeness act as external stimuli that first heighten consumer engagement, defined as cognitive, affective and behavioral absorption with the AR interface, which subsequently cultivates a favorable attitude toward the AR-enabled shopping experience, which in turn drives purchase intention (Lau & Tang, 2025; Yang & Lin, 2024). A quantitative, cross-sectional survey design is proposed, employing structured questionnaires administered to consumers who have used AR furniture applications, with data analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) and bootstrapped serial mediation analysis. The paper synthesizes more than thirty peer-reviewed studies published between 2020 and 2026 to build the conceptual model and hypotheses. Findings are expected to confirm that engagement and attitude sequentially and significantly mediate the AR-purchase intention relationship, extending prior single-mediator models. The study contributes theoretically and practically by guiding furniture retailers on designing AR features that engage consumers so as to convert virtual interaction into actual purchase. Limitations and directions for future research are discussed.

Introduction

The furniture e-retail sector has historically suffered from a distinctive form of purchase risk: consumers cannot physically inspect, touch, or spatially situate a product before buying it. Unlike apparel or electronics, furniture is bulky, expensive, difficult to return, and highly dependent on how it fits within an existing room, color scheme, and lifestyle. Static product photographs and even 360-degree videos have traditionally failed to resolve this uncertainty, leaving consumers to imagine how a sofa, dining table, or wardrobe will actually look and fit in their own homes. Augmented reality (AR) has emerged as a technological response to this long-standing gap, superimposing digital three-dimensional product models onto a consumer's real physical environment through a smartphone camera, thereby allowing a form of 'try-before-you-buy' visualization that was previously unavailable in digital commerce (Ozturkcan, 2021; Ramdani et al., 2022).

Major furniture retailers have accelerated their investment in AR as a strategic differentiator. IKEA's 'IKEA Place' application, launched in 2017, remains the most widely cited example of AR adoption in the furniture category, enabling shoppers to scale and place true-to-size three-dimensional furniture models within their own living spaces (Ozturkcan, 2021). Since then, competitors and marketplaces across developed and developing markets alike have integrated similar AR viewers into their mobile applications, particularly accelerated by the shift toward online shopping during and after the COVID-19 pandemic (Ramdani et al., 2022; Caboni & Pizzichini, 2022). This proliferation of AR tools has generated a parallel stream of academic enquiry into how such immersive technologies influence consumer psychology and, ultimately, purchase behavior (Khirbat and Sriram, 2025; Lau & Tang, 2025).

Address correspondence to Manish Gulyani, Assistant Professor, Department of Management Studies, Panipat Institute of Engineering and Technology, India
manishgulyani@gmail.com (Manish Gulyani).

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A recurring theme across this literature is that AR does not influence purchase intention directly and mechanically; rather, its persuasive power operates through intervening psychological states. Scholars have variously proposed that AR characteristics first generate heightened consumer engagement with the shopping interface, expressed through cognitive absorption, affective enjoyment, and behavioral interaction with the augmented product (Ramdani et al., 2022, using the Indonesian furniture retail context, found that engagement-related perceptions positively affect users' experience with AR applications, and that both engagement and experience subsequently affect purchase intention). Other studies foreground the mediating role of attitude, arguing that AR-enabled experiences cultivate a more favorable evaluative disposition toward the product or the shopping channel, which then translates into purchase intention (Khirbat & Sriram, 2025; Lau & Tang, 2025). Notably, Lau and Tang (2025), applying the Stimulus-Organism-Response framework to furniture e-commerce in Hong Kong, found that AR characteristics such as interactivity, informativeness, novelty and aesthetics enhance hedonic and utilitarian value, which in turn positively affects satisfaction and attitude, and that attitude strongly influences purchase intention.

What remains comparatively underexplored, however, is whether engagement and attitude operate independently as parallel mediators, or whether they form a sequential, serial psychological chain in which AR stimuli first activate engagement, which then shapes attitude, which in turn drives purchase intention. Existing furniture-retail AR studies have tended to examine either engagement as a mediator (Ramdani et al., 2022) or attitude as a mediator (Khirbat & Sriram, 2025) in isolation, without formally testing a serial mediation model that positions engagement as logically and temporally prior to attitude formation. This is a meaningful theoretical gap because consumer psychology research more broadly suggests that engagement, as an experiential and motivational state, typically precedes and feeds into evaluative attitude judgements, which then govern behavioral intentions (Hollebeek et al., 2020; Yang & Lin, 2024).

This paper addresses that gap by proposing and conceptually developing a serial mediation model in which customer engagement and consumer attitude sequentially mediate the relationship between AR usage in furniture e-retail and consumers' purchase intention. The study is guided by the Stimulus-Organism-Response (S-O-R) paradigm, in which AR characteristics represent the external stimulus, engagement and attitude represent successive internal organismic states, and purchase intention represents the behavioral response (Lau & Tang, 2025; Barta et al., 2023). This framework is complemented by the Technology Acceptance Model and flow/telepresence theory, which help explain why interactive, vivid, and spatially present AR experiences are capable of generating the engagement that seeds subsequent attitude change (Smink et al., 2020; Arghashi & Yuksel, 2022; Barhorst et al., 2021).

The remainder of the paper is organized as follows. Section 2 reviews the literature on AR in retail generally and furniture e-retail specifically, on customer engagement, on consumer attitude, and on purchase intention, before developing the serial mediation hypotheses. Section 3 outlines the proposed quantitative research methodology, including sampling, measurement, and analytical technique. Section 4 presents the anticipated analysis and discusses the findings in relation to prior literature. Section 5 concludes with a summary of theoretical and managerial contributions, limitations, and

directions for future research. By integrating engagement and attitude into a single sequential mechanism, this study aims to provide furniture e-retailers with a more precise understanding of how to design AR experiences that not only capture attention but also convert that attention into a durable, purchase-relevant attitude and, ultimately, into sales.

Article Highlights

- Develops a serial mediation model linking augmented reality (AR) usage to purchase intention in furniture e-retail.
- Examines customer engagement as a key psychological mechanism triggered by AR-enabled shopping experiences.
- Establishes consumer attitude as a sequential mediator between engagement and purchase intention.
- Integrates the Stimulus–Organism–Response (S-O-R) framework with TAM and flow/telepresence perspectives.
- Provides practical guidance for designing AR experiences that reduce purchase uncertainty and strengthen conversion.

Review of the Literature

❖ Augmented Reality in Retail and E-Commerce

Augmented reality is broadly defined as a technology that overlays computer-generated virtual elements onto a user's perception of the real, physical environment in real time, thereby blending digital and physical spaces rather than replacing the physical world as virtual reality does (Ozturkcan, 2021; Jafar et al., 2024). In retail, AR has moved rapidly from a novelty feature to a mainstream commerce tool, with applications spanning cosmetics try-on, apparel fitting, automotive configuration, and home furnishing visualisation (Rauschnabel et al., 2022; Khirbat & Sriram, 2025). The retail literature converges on several core AR characteristics that drive consumer response: interactivity, the extent to which users can manipulate and control the virtual object; vividness or informativeness, the richness and clarity of the sensory information conveyed; novelty, the perceived newness and surprise value of the technology; and spatial presence, the sense that the virtual object genuinely occupies the user's physical space (Smink et al., 2020; Lau & Tang, 2025; Lavoye et al., 2023).

Smink et al. (2020) demonstrated that spatial presence and perceived personalization positively influence app and brand responses, while perceived intrusiveness undermines both brand attitude and purchase intention, a finding of particular relevance to furniture retail, where spatial presence allows a consumer to evaluate a product's fit, scale, and style within an actual room. Barta et al. (2023) extended this line of enquiry by showing that AR reduces post-decision cognitive dissonance and thereby increases purchase intention, because the pre-purchase visualization lowers the perceived risk associated with an incorrect buying decision. Similarly, Trivedi et al. (2022) found that AR in mobile shopping applications increases consumers' online impulse purchase intention through the mediating role of perceived value, underlining that AR's persuasive effect is rarely direct but is instead channeled through intervening psychological constructs.

A growing body of meta-analytic and systematic work has sought to consolidate these fragmented findings. Riar et al. (2023) conducted a meta-analytic review of AR marketing outcomes and concluded that AR's effects on behavioral intentions are substantially explained by hedonic and utilitarian value as first-order mediators and by attitude

and satisfaction as second-order mediators, offering early empirical support for multi-step mediation chains of the kind proposed in the present study. Likewise, Rauschnabel et al. (2022) called for greater theoretical precision in defining what AR marketing actually is and how its distinct affordances (versus generic digital media) generate unique consumer psychological responses.

❖ AR Applications in Furniture E-Retail

Furniture is frequently cited as one of the product categories best suited to AR because of the category's high dependence on spatial and aesthetic fit (Ramdani et al., 2022; Ozturkan, 2021). IKEA's Place app remains the benchmark case, using true-to-scale three-dimensional rendering accurate to within a small margin of error, enabling shoppers to assess how light, shadow, and proportion interact with a piece of furniture inside their own homes, a feature credited with reducing product returns and increasing user engagement with the retailer's mobile channel (Ozturkan, 2021). Ramdani et al. (2022), studying Indonesian consumers during the COVID-19 pandemic, found that AR characteristics significantly shape consumer perception, and that perceived functional benefit and trust in AR directly relate to attitude toward AR, which subsequently affects behavioral intention to adopt the technology, providing an early empirical precedent for an engagement-perception-attitude-intention pathway in furniture retail specifically.

More recent furniture-focused studies have refined this picture. Khirbat and Sriram (2025), applying the UTAUT model to home décor and furnishings, found that performance expectancy and effort expectancy exert the strongest influence on consumer attitude, which subsequently shapes purchase intention, while social and peer-related factors were comparatively negligible. Lau and Tang (2025) surveyed furniture e-commerce consumers in Hong Kong and found that AR interactivity and informativeness enhance both hedonic and utilitarian value, and that these value dimensions positively affect satisfaction and attitude, which in turn strongly predict purchase intention; interestingly, novelty and aesthetics enhanced hedonic value but not utilitarian value, suggesting that furniture consumers evaluate AR through both emotional and functional lenses simultaneously. A related study on virtual furniture shopping similarly found that perceived usefulness is the dominant driver of purchase intention for first-time AR users, while novelty and 'wow-factor' effects, if excessive, can paradoxically distract from rather than support engagement, pointing to the importance of a balanced AR interface design (Lokesh et al., 2025).

❖ Customer Engagement with Augmented Reality

Customer engagement is conceptualized as a psychological state arising from interactive, co-creative experiences with a focal object such as a brand, product, or technology interface, encompassing cognitive, emotional, and behavioural dimensions of involvement (Hollebeek et al., 2020; Yang & Lin, 2024). Within AR shopping contexts, engagement has been operationalized as the degree of absorption, enjoyment, and active interaction a consumer experiences while manipulating a virtual product overlay. Ramdani et al. (2022) reported that high levels of engagement positively affect users' overall experience with AR applications, and that both engagement and experience independently affect purchase intention in the furniture retail mobile-application context. Yang and Lin (2024) similarly demonstrated that the vividness of AR content drives purchase intention through the mediating pathway of media enjoyment, an affective dimension closely related to engagement.

The concept of flow has been used extensively to theorize how AR generates engagement. Flow, defined as a state of deep cognitive absorption in an activity, has been shown to mediate the effects of AR interactivity, telepresence, and vividness on consumer attitudes and purchase intentions (Arghashi & Yuksel, 2022; Barhorst et al., 2021). Barhorst et al. (2021) found that flow experiences generated by blending real and virtual worlds in AR significantly enhance positive consumer responses, while Arghashi and Yuksel (2022) showed that interactivity and inspiration jointly heighten perceived usefulness and purchase intention in mobile AR retail settings. Complementing this, research on telepresence, the sense of 'being there' within a mediated environment, has repeatedly identified it as a proximate driver of engagement and a mediator of downstream purchase outcomes (Lavoye et al., 2023; Jafar et al., 2024; Ying et al., 2022).

Engagement in AR furniture contexts is also shaped by app-level design features. Kumar and Srivastava (2022) found that AR's role in online impulse behavior depends on the degree to which the technology sustains user interactivity across the shopping journey, while Qin et al. (2021) used qualitative methods to show that mobile AR applications affect shopping decisions by altering the sensory and exploratory richness of the browsing experience, both of which are constitutive of engagement. Collectively, this literature establishes engagement as a well-evidenced, proximate psychological consequence of AR exposure, but one whose downstream link to purchase intention is not always direct, motivating investigation of subsequent mediators such as attitude.

❖ Consumer Attitude Toward AR-Enabled Shopping

Attitude, defined as a consumer's overall favorable or unfavorable evaluation of an object, technology, or behavior, is one of the most robust and consistently supported predictors of purchase intention across the marketing literature, consistent with long-standing theories of planned behavior and reasoned action (Ramdani et al., 2022; Alimamy & Al-Imamy, 2022). In AR contexts specifically, attitude has been modelled both as an outcome of AR characteristics and as a mediator between AR-generated value perceptions and purchase intention. Alimamy and Al-Imamy (2022) found that customer perceived value derived from high-quality AR experiences in retail operates through customer attitude to shape downstream behavioral outcomes, confirming attitude's mediating function. Khirbat and Sriram (2025) similarly positioned attitude as the central mediating mechanism between technology acceptance constructs and purchase intention in the home décor and furnishings category.

Lau and Tang (2025) provided some of the most direct evidence within furniture e-commerce, showing that both hedonic and utilitarian value positively influence attitude, and that attitude, alongside satisfaction, strongly determines purchase intention. Complementary evidence from mobile shopping and impulse-purchase research shows that AR-generated perceived value and enjoyment cultivate favorable attitudes that subsequently drive both planned and impulsive purchase behavior (Trivedi et al., 2022; Barta et al., 2023). Beyond furniture, cross-category studies of AR in retail stores confirm that brand attitude functions as a partial mediator between AR-enabled stimuli, such as immersive virtual try-on and personalized recommendation, and purchase intention, with personalization showing the strongest association with brand attitude among the stimulus dimensions tested (Lau & Tang, 2025; Riar et al., 2023).

Importantly, several studies suggest that attitude formation in AR contexts is itself downstream of engagement-related constructs such as enjoyment, flow, and telepresence, rather than being formed

directly from technical AR features. Ying et al. (2022) and Jafar et al. (2024) both found that telepresence and flow-related engagement states precede and predict attitudinal and behavioral outcomes in immersive shopping environments, lending theoretical support to a sequential rather than parallel mediation structure. This body of evidence directly informs the serial mediation logic advanced in the present study: AR stimuli generate engagement first, and engagement subsequently crystallizes into a stable evaluative attitude that then governs purchase intention.

❖ Purchase Intention as the Behavioural Outcome

Purchase intention represents a consumer's self-reported likelihood or willingness to buy a product, and is widely used in marketing research as a proximal proxy for actual purchase behavior (Khirbat & Sriram, 2025; Lokesh et al., 2025). Within the AR retail literature, purchase intention has been consistently found to be a downstream consequence of a chain of psychological antecedents rather than a direct function of AR exposure itself. Studies converge on the view that perceived value, enjoyment, trust, satisfaction, and attitude all sit between AR stimuli and purchase intention, though the precise ordering and relative strength of these mediators vary by study and product category (Riar et al., 2023; Ramdani et al., 2022; Trivedi et al., 2022).

For furniture specifically, purchase intention appears particularly sensitive to the reduction of two categories of risk: functional risk (will the product fit and perform as expected) and financial or post-purchase risk (will the product need to be returned) (Barta et al., 2023; Ozturkcan, 2021). AR's capacity to reduce both forms of risk through realistic, true-to-scale visualization is repeatedly cited as the mechanism through which engagement and attitude ultimately translate into purchase intention (Ramdani et al., 2022; Lau & Tang, 2025).

❖ Theoretical Foundations: S-O-R, TAM/UTAUT, and Flow-Telepresence Theory

The Stimulus-Organism-Response (S-O-R) framework, originally rooted in environmental psychology, has become the dominant theoretical lens for modelling AR's effects on consumer behavior, treating AR characteristics as external stimuli (S), engagement, value, satisfaction, and attitude as internal organismic states (O), and purchase intention or other behavioral outcomes as the response (R) (Lau & Tang, 2025; Barta et al., 2023). This framework naturally accommodates multi-step or serial mediation, since the 'organism' component can itself be decomposed into successive internal states, such as engagement followed by attitude, rather than a single undifferentiated construct.

The Technology Acceptance Model (TAM) and its extension, the Unified Theory of Acceptance and Use of Technology (UTAUT), have also been widely applied, particularly to explain how perceived usefulness and perceived ease of use of AR interfaces shape attitude and behavioral intention (Khirbat & Sriram, 2025; Ramdani et al., 2022). Khirbat and Sriram (2025) found performance expectancy and effort expectancy, both UTAUT constructs analogous to TAM's usefulness and ease-of-use dimensions, to be the strongest predictors of attitude in the home furnishings category. Flow theory and telepresence theory supplement these acceptance-based models by explaining the experiential, affective route through which AR generates engagement: flow captures the cognitive absorption users experience while manipulating AR content, while telepresence

captures the felt sense of the virtual product's physical presence in the user's environment (Arghashi & Yuksel, 2022; Barhorst et al., 2021; Lavoye et al., 2023; Ying et al., 2022).

❖ Engagement and Attitude as Serial Mediators

While single-mediator models involving either engagement or attitude are well established in the AR literature, direct empirical tests of a serial engagement-then-attitude mediation chain remain scarce, particularly within the furniture e-retail category. Several strands of indirect evidence nonetheless support such a sequence. First, engagement, as an experiential and motivational construct, is theorized to precede and causally inform evaluative judgements such as attitude, consistent with hierarchy-of-effects models in which cognitive and affective engagement with a stimulus feeds into an overall evaluative response before that response translates into behavioral intention (Hollebeek et al., 2020; Yang & Lin, 2024). Second, empirical studies that have modelled multiple sequential mediators in adjacent AR contexts, such as hedonic/utilitarian value followed by attitude/satisfaction (Riar et al., 2023; Lau & Tang, 2025), or telepresence followed by trust (Ying et al., 2022), have found that serial or multi-step mediation models fit AR consumer behavior data better than single-mediator alternatives, reinforcing the plausibility of an engagement-to-attitude sequence.

Third, studies of AR advertising content have found that intervening variables can serially mediate the relationship between AR content characteristics and consumer responses, with perceived value and believability sequentially transmitting the effects of AR features on attitude, offering a structurally analogous precedent for the engagement-attitude chain proposed here. Building on this cumulative evidence, the present study advances the following hypotheses: H1: AR usage in furniture e-retail positively influences customer engagement. H2: Customer engagement positively influences consumer attitude toward AR-enabled furniture shopping. H3: Consumer attitude positively influences purchase intention. H4: Customer engagement positively influences purchase intention. H5: Customer engagement and consumer attitude serially and significantly mediate the relationship between AR usage and purchase intention in furniture e-retail.

❖ Research Gap

In summary, the reviewed literature confirms that AR characteristics reliably predict both engagement and attitude, and that both constructs individually predict purchase intention, across furniture and adjacent retail categories (Ramdani et al., 2022; Khirbat & Sriram, 2025; Lau & Tang, 2025; Yang & Lin, 2024; Trivedi et al., 2022). However, most existing furniture-focused studies model engagement and attitude as parallel or single mediators rather than testing whether engagement functions as an antecedent organismic state that feeds sequentially into attitude before jointly producing purchase intention. Moreover, much of the furniture-specific AR literature originates from single-country contexts such as Indonesia, Hong Kong, and India (Ramdani et al., 2022; Lau & Tang, 2025; Khirbat & Sriram, 2025; Lokesh et al., 2025), leaving open questions about the generalizability of a serial engagement-attitude mediation model across markets. This study addresses both gaps by formally proposing and operationalizing a serial mediation model tailored to furniture e-retail.

❖ Cross-Category and Cross-Cultural Evidence

Evidence supporting the engagement-attitude-purchase intention sequence is not confined to furniture retail. In cosmetics and fashion, AR try-on features have been shown to generate engagement through novelty and personalization, which subsequently shapes brand attitude and repurchase intention, mirroring the structural logic proposed for furniture (Anand et al., 2023; Uribe et al., 2021). In tourism and hospitality, Anand et al. (2023) found that the quality dimensions of AR-based mobile apps influence customer satisfaction and reuse intention through engagement-related quality perceptions, while Daassi and Debbabi (2021) showed that the sense of immersion, product presence, and perceived realism jointly determine consumers' intention to reuse AR-based applications, again implicating an engagement-like immersive state as an antecedent of intention-relevant attitudes. Khashan et al. (2023) extended this evidence to mobile commerce more broadly, demonstrating that AR features shape purchase intention partly through socially mediated engagement mechanisms, underscoring that the engagement-attitude sequence identified in furniture-specific studies is likely to generalize across product categories, even if the relative strength of hedonic versus utilitarian value differs by category (Lau & Tang, 2025).

Cross-cultural comparisons remain limited but instructive. Ramdani et al. (2022) examined Indonesian consumers during the COVID-19 pandemic and emphasized trust and functional benefit as salient drivers of attitude in an emerging-market, pandemic-disrupted retail context. Khirbat and Sriram (2025) examined Indian consumers and found technology-related expectancy factors, rather than social or peer influence, to dominate attitude formation, while Lau and Tang (2025) examined Hong Kong consumers and found hedonic and utilitarian value to jointly and almost equally shape satisfaction and attitude. Enyejo et al. (2024) similarly reported that AR-enabled mobile commerce shapes purchase decision-making in emerging African markets primarily through perceived usefulness and trust rather than hedonic engagement alone. Taken together, these studies suggest that while the general engagement-attitude-purchase intention sequence appears robust, the specific weighting of hedonic (engagement-driven) versus utilitarian (functional, trust-driven) pathways to attitude may vary meaningfully across markets, income levels, and stages of e-commerce maturity, an important boundary condition for the model proposed in this paper.

Additional support for the sequencing logic comes from research on AR advertising rather than shopping applications per se. Studies of AR-enabled advertisements have found that content characteristics such as novelty, entertainment, and informativeness shape consumer engagement with the advertisement, which subsequently shapes attitude toward the advertisement and, ultimately, toward the advertised brand and product (Uribe et al., 2021; Khan, 2019). Poushneh (2021) similarly found that spatial presence, an engagement-proximate construct, shapes consumer responses to augmented retail interfaces in a manner consistent with an engagement-first, attitude-second causal ordering. Kang et al. (2023), reviewing managerial practice across major AR-adopting retailers including IKEA, Sephora, and Nike, concluded that firms achieving the strongest conversion outcomes from AR investment are those that explicitly design for a two-stage consumer journey: first capturing engagement through highly interactive, novel AR features, and only then reinforcing that engagement with informative, trust-building content intended to consolidate a favorable attitude before the point of purchase. This managerial pattern lends applied, practice-based corroboration to the academically derived serial mediation hypotheses advanced in Section 2.7.

Methodology

This study adopts a quantitative, cross-sectional survey research design, consistent with the majority of empirical studies examining AR's effects on consumer behavior in retail settings (Ramdani et al., 2022; Khirbat & Sriram, 2025; Lau & Tang, 2025). A quantitative approach is appropriate because the study's objective is to test a set of directional hypotheses concerning the sequential mediating roles of engagement and attitude between AR usage and purchase intention, which requires the estimation of path coefficients and indirect effects rather than exploratory qualitative interpretation.

Population and sampling: The target population comprises adult consumers (18 years and above) who have used at least one AR-enabled furniture shopping application or web-based AR viewer, such as IKEA Place or comparable AR features embedded within furniture and home-décor e-retail platforms, within the preceding six months. A non-probability purposive and convenience sampling technique is proposed, screening respondents at the outset of the questionnaire to confirm prior AR usage experience, consistent with the sampling approach used by Ramdani et al. (2022), who similarly screened for AR familiarity before administering their instrument. Following established PLS-SEM sample-size guidelines and comparable prior studies, which employed samples ranging from approximately 200 to 490 respondents (Lau & Tang, 2025; Ramdani et al., 2022), a minimum target sample of 350 to 400 valid, fully completed responses is set, to be collected via an online, self-administered structured questionnaire distributed through social media, furniture-retailer customer panels, and university/consumer research participant pools.

Measurement instrument: The questionnaire will comprise five sections. Section one captures demographic and screening information (age, gender, prior AR furniture-app usage, device type). Sections two to five operationalize the study's four core constructs using multi-item, previously validated scales adapted to the furniture e-retail AR context: (a) AR usage/characteristics, capturing interactivity, vividness, informativeness, and spatial presence, adapted from Smink et al. (2020) and Lau and Tang (2025); (b) customer engagement, capturing cognitive, affective, and behavioral absorption, adapted from Hollebeck et al. (2020) and Ramdani et al. (2022); (c) consumer attitude toward AR-enabled shopping, adapted from Khirbat and Sriram (2025) and Alimamy and Al-Imamy (2022); and (d) purchase intention, adapted from Lau and Tang (2025) and Trivedi et al. (2022). All items will be measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A pilot test with 30 to 40 respondents is recommended prior to full deployment to refine item wording and assess preliminary reliability.

Data analysis technique: Given the study's predictive, theory-extension orientation and the need to estimate a multi-step mediation model, Partial Least Squares Structural Equation Modelling (PLS-SEM) is proposed as the primary analytical technique, consistent with its widespread use in the AR-retail literature (Ramdani et al., 2022; Lau & Tang, 2025). Analysis will proceed in two stages: first, assessment of the measurement model through indicator reliability, internal consistency reliability (Cronbach's alpha and composite reliability, both recommended to exceed 0.70), convergent validity (average variance extracted, AVE, recommended to exceed 0.50), and discriminant validity (Fornell-Larcker criterion and the Heterotrait-Monotrait ratio); second, assessment of the structural model through path coefficients, coefficients of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2). The serial mediation hypothesis (H5) will be tested using bootstrapping procedures (5,000 resamples) to generate bias-corrected confidence intervals for the specific indirect effect running from AR usage through engagement and then through

attitude to purchase intention, following procedures analogous to Hayes' serial multiple mediation approach. Ethical considerations, including informed consent, voluntary participation, and anonymity of responses, will be observed throughout data collection.

Analysis and Discussion

Because this paper is conceptual and methodological in nature, the analysis presented here synthesizes expected patterns based on the structural relationships consistently reported across the reviewed empirical AR-furniture and AR-retail studies, rather than reporting primary survey data. This synthesis serves to illustrate how the proposed serial mediation model (AR usage → engagement → attitude → purchase intention) is likely to perform once empirically tested, and to situate anticipated results within the existing evidence base.

Direct effects. Consistent with Ramdani et al. (2022) and Khirbat and Sriram (2025), AR usage is expected to exert a significant, moderate-to-strong positive effect on customer engagement (H1), reflecting the consistent finding that interactivity, informativeness, and spatial presence are the AR characteristics most strongly associated with heightened user absorption and enjoyment. In turn, engagement is expected to exert a significant positive effect on attitude (H2), mirroring findings that flow and telepresence, both engagement-adjacent constructs, positively shape evaluative judgements of AR-enabled shopping channels (Arghashi & Yuksel, 2022; Ying et al., 2022). Attitude is, in turn, expected to exert the strongest direct effect on purchase intention among the model's proximal predictors (H3), consistent with Lau and Tang's (2025) finding that attitude strongly influences purchase intention in furniture e-commerce, and with the broader marketing literature's long-standing attitude-intention linkage.

Direct engagement-to-purchase-intention effect. Based on Ramdani et al. (2022), who found that engagement independently affects purchase intention alongside experience, a modest but significant direct path from engagement to purchase intention (H4) is also anticipated, even after accounting for attitude, suggesting that attitude offers partial rather than full mediation of the engagement-purchase intention relationship.

Serial indirect effect. The central hypothesis of this study (H5) proposes that the indirect path from AR usage through engagement and then through attitude to purchase intention will be positive and statistically significant, and will represent a meaningful share of AR usage's total effect on purchase intention. This expectation draws direct support from analogous multi-step mediation findings in the wider literature: Riar et al. (2023) found that hedonic/utilitarian value and subsequently attitude/satisfaction serially transmit AR's effect on behavioral intention; Lau and Tang (2025) found a comparable value-then-attitude sequence in furniture e-commerce; and Ying et al. (2022) demonstrated that telepresence sequentially predicts trust, which then predicts purchase intention. Collectively, these precedents suggest that a serial rather than purely parallel mediation structure is likely to provide superior model fit for furniture-AR purchase intention data, because engagement functions as a proximal, experiential precursor that must first be established before a stable attitudinal evaluation, and hence purchase intention, can form.

Discussion. These anticipated results, if confirmed, would extend the furniture-AR literature in two important ways. First, they would clarify that engagement and attitude are not competing, redundant explanations of the AR-purchase intention link but are sequentially

and functionally distinct: engagement captures the immediate, experiential reaction to the AR interface itself, while attitude captures a more stable, cumulative evaluation of the shopping experience that draws on that engagement. This distinction has practical implications, discussed further below, for how furniture retailers should sequence their AR design priorities. Second, the anticipated partial mediation pattern (a significant direct engagement-purchase intention path alongside the significant serial indirect path) would suggest that some furniture shoppers act on engagement-driven impulse even before a fully formed attitude crystallizes, aligning with evidence that AR reduces impulse-purchase barriers (Trivedi et al., 2022; Barta et al., 2023), while other shoppers rely more heavily on the deliberative, attitude-mediated route, consistent with the higher financial stakes and functional-risk considerations typical of furniture purchases (Barta et al., 2023; Ozturkcan, 2021). Retailers should therefore design AR experiences that are simultaneously engaging in the moment (through high interactivity, novelty, and spatial realism) and capable of sustaining a positive post-interaction attitude (through informativeness, personalization, and risk-reducing accuracy), in order to capture both impulse-driven and deliberation-driven purchase pathways identified in the literature (Smink et al., 2020; Lau & Tang, 2025).

The anticipated effect sizes also carry segmentation implications. Drawing on Khirbat and Sriram's (2025) finding that performance and effort expectancy dominate attitude formation while social/peer factors are negligible, and on Lau and Tang's (2025) finding that novelty and aesthetics enhance hedonic but not utilitarian value, it is reasonable to expect that the strength of the engagement-to-attitude path will vary by consumer segment: functionally oriented shoppers (for example, those replacing a specific worn-out item) may weight informativeness and accuracy more heavily in forming attitude, whereas hedonically oriented shoppers (for example, those redecorating for aesthetic reasons) may weight novelty and enjoyment more heavily. A single aggregate serial mediation coefficient would therefore likely mask meaningful heterogeneity, and multi-group PLS-SEM analysis across such segments is recommended as a natural extension once primary data are collected. Furthermore, consistent with Riar et al.'s (2023) meta-analytic observation that interactivity alone does not reliably predict behavioral intention without an intervening value or attitude construct, the model predicts that AR characteristics with weak or no direct path to purchase intention will nonetheless show a significant total effect once the engagement-attitude chain is accounted for, reinforcing the practical importance of measuring indirect rather than only direct effects when retailers evaluate the return on their AR investment.

Findings and Conclusion

This paper conceptually developed and grounded, in more than thirty peer-reviewed studies published between 2020 and 2026, a serial mediation model in which customer engagement and consumer attitude sequentially transmit the effect of augmented reality usage on purchase intention within furniture e-retail. The review consistently indicates that AR characteristics such as interactivity, informativeness, novelty, and spatial presence generate engagement, that engagement feeds into a favorable attitude toward the AR-enabled shopping experience, and that attitude, alongside a residual direct effect of engagement, drives purchase intention (Ramdani et al., 2022; Khirbat & Sriram, 2025; Lau & Tang, 2025; Yang & Lin, 2024).

Theoretically, the study contributes by integrating engagement and attitude into a single serial mediation chain within the S-O-R framework, addressing a gap left by prior furniture-AR studies that examined these constructs as parallel or single mediators (Ramdani et al., 2022; Lau & Tang, 2025). Managerially, the findings imply that furniture e-retailers should not treat AR merely as an engagement or 'wow-factor' tool, nor merely as an attitude-shaping informational tool, but should deliberately design AR features that first capture experiential engagement and then reinforce that engagement with accurate, informative, and personalized content capable of consolidating a durable positive attitude, thereby maximizing downstream purchase intention (Lau & Tang, 2025; Barta et al., 2023). Limitations of this conceptual paper include its reliance on secondary literature rather than primary data, and the cross-sectional, single-market bias of much of the underlying evidence base. Future research should empirically validate the proposed model using primary survey data across multiple furniture-retail markets, test for boundary conditions such as product price tier and consumer AR familiarity and consider longitudinal designs to capture how the engagement-attitude-purchase intention sequence evolves with repeated AR usage over time.

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- Conceptualization, data collection, interpretation, drafting of the manuscript and intellectual revisions
- The author agrees to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed

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