

Understanding customer experience and engagement in digital assistant-based retail interactions

Abstract

Purpose – This study examines the impact of digital assistants' emotional stimuli (i.e., aesthetics and playfulness) on customer pleasurable experience (CPE) and purchase intentions within the boundary condition of customer engagement.

Design/methodology/approach – Partial least squares-based structural equation modelling was performed using SmartPLS 4.0 to confirm the reliability and validity of the measurement model and test hypotheses.

Findings – The findings highlight aesthetics and playfulness as key emotional stimuli driving CPE, which in turn enhances purchase intentions. Moreover, CPE serves as a full and partial mediator between emotional stimuli and purchase intention, while customer engagement negatively moderates the CPE-purchase intentions relationship.

Originality/value – Our study pioneers in establishing the mediating role of CPE in the relationship between emotional stimuli and purchase intentions. Furthermore, it offers fresh insights by introducing customer engagement as a moderating variable, revealing that higher engagement actually weakens the link between CPE and purchase intentions in DA-driven marketing.

Keywords: digital assistant, aesthetics, customer pleasurable experiences, customer engagement, playfulness.

Paper type: Research paper

1. Introduction

Artificial intelligence (AI) is transforming “how consumers eat, sleep, work, play, and even date” (Puntoni *et al.*, 2021, p. 1). This wind of change has reshaped the retail sector as modern consumers increasingly seek a seamless, integrated, and frictionless customer experience across physical and virtual environments (de Matos *et al.*, 2025; Miao *et al.*, 2022; Rahman *et al.*, 2024; Sharma *et al.*, 2024). Consequently, understanding customer experience, encompassing cognitive, emotional, and behavioural aspects, powered by AI-enabled digital assistants (DAs) is crucial for service organizations seeking to effectively co-create value with their customers (Huang and Rust, 2024; Sharma *et al.*, 2024). Despite the expansion of research in this field, in the recent past, customer pleasurable experience (CPE) in the diverse forms of affective (El Abed and Castro-Lopez, 2024), hedonic (Fan *et al.*, 2023), and smart experience (Gao *et al.*, 2022), has garnered heightened attention from marketing scholars in AI settings across countries. Positive and pleasurable experiences are a precondition to building an emotional connection with a good or service (Fiore *et al.*, 2000). When emotionally connected, customers feel a sense of uniqueness, intimacy, personalization, and closeness (Alalwan *et al.*, 2025; Huang and Rust, 2024), calling for a deeper understanding of CPE to effectively meet customers’ needs and wants in AI contexts.

Research has shown that the emotional attributes of DAs, such as playfulness, warmth, empathy, and supportiveness, are promising to nurture customers’ sense of connectedness, leading them to feel emotionally engaged (Gelbrich *et al.*, 2021; Noble and Mende, 2023; Puntoni *et al.*, 2021) and mitigate the monotony of one-way online interactions. DAs can provide emphatic, real-time, and personalized information about desired products, reflecting customer active engagement and satisfaction. In retail, many scholars (e.g., Affandi *et al.*, 2025; Fan *et al.*, 2023; Gao *et al.*, 2022; Miao *et al.*, 2022; Puntoni *et al.*, 2021; Rahman *et al.*, 2024) have argued that these attributional stimuli derived from AI agents have a great potential to shape CPE during the interactions. Highlighting the importance, Affandi *et al.* (2025) and El Abed and Castro-Lopez (2024) affirmed that retailers should better understand how to effectively and strategically utilize AI technologies to uplift customer experience and shopping performance. They argued that aesthetic, cognitive, and affective experiences contribute to evoking purchase intentions. This is critical as many recent studies have also emphasized that the emotional traits of DAs evoke customers’ positive emotions, which translates into favourable behavioural outcomes (Guo and Luo, 2023; Kim *et al.*, 2025; Sidaoui *et al.*, 2020).

Despite numerous studies (see the summary of selected literature in Supplementary_material) that have explored the association between AI stimuli and customer experiences, this research identifies three significant gaps. *First*, there is a lack of understanding regarding how emotional stimuli of AI technologies impact CPE and translate into favourable behavioural outcomes in retail. Precisely, no previous research has shown how the tangle of DAs’ aesthetics and playfulness influence purchase intentions through CPE within least-developed countries (LDCs), underscoring a process-based view of attributes-customer experience-purchase intentions. In a recent review, Rahman *et al.* (2024) opined that exploring customer behaviour with DAs in retailing is still in its early stage in LDCs and recommended further investigation of this process-based view from five value aspects. Consequently, understanding how to leverage DAs to effectively enhance CPE and purchase intentions in the retail industry remains a critical yet underexplored research area. *Second*, although previous

research has shown the mediation mechanism of customer experiences in diverse contexts (e.g., Fan *et al.*, 2023; Fiore *et al.*, 2000; Gao *et al.*, 2022), the extant body of knowledge is scattered and fragmented to understand how DAs' emotional stimuli are mediated by CPE to customer behavioural outcomes. Modern consumers, including those from developing countries, increasingly prioritize enjoyable shopping interactions over transactional efficiency (Taufique *et al.*, 2024). By understanding how DA design elements (aesthetics) and interactive features (playfulness) create pleasurable experiences to influence purchase intentions, retailers can optimize these touchpoints to boost conversion rates. *Third*, customer engagement, encompassing the cognitive, behavioural, and emotional investment in digital interactions (Rather *et al.*, 2022; Thakur, 2019), remains underexplored as a moderator between internal states (organisms) and behavioural outcomes (responses) (Rahman *et al.*, 2025). Accordingly, scholars (Blut *et al.*, 2023; Thakur, 2019) have urged to depict its moderating role to deepen insights regarding consumer behaviours in diversified contexts. Indeed, clarifying how engagement strength (high vs. low) alters the CPE–purchase intentions link would help marketers optimize behavioural outcomes.

To address the aforementioned research gaps, this study develops a conceptual model to present a process-based view of how DAs' aesthetics and playfulness translate into purchase intentions with the conduit of CPE, reflecting customer purchase behaviours from the LDC context through the lens of the Stimulus-Organism-Response (S-O-R) model (Mehrabian and Russell, 1974). The model is particularly intriguing for IS researchers, as DAs, being purposeful information technologies, provide diverse ways for users to respond to their design elements (Gao *et al.*, 2022). Unlike static interfaces (e.g., websites), they offer greater variety in their interaction styles with intriguing aesthetics and playfulness (emotional stimuli) that can influence customers' internal states (herein, CPE as an organism). The approach also allows us to investigate how the influence of the internal state of an organism subsequently impacts customer behavioural outcomes (i.e., purchase intentions). Additionally, this research is critical to addressing the moderating role of customer engagement, revealing when and how well CPE works, and explaining why its persuasive effect on buying decisions depends on how engaged customers are. Also, understanding whether CPE mediates the impact of DAs' emotional stimuli on purchase intentions is essential, as it elucidates the fundamental psychological process underlying this relationship, addressing a significant theoretical research gap. Specifically, building on the above research gaps, the research seeks to answer the following research questions:

- RQ1.** How do DA's aesthetics and playfulness enhance CPE and purchase intentions?
- RQ2.** What is the moderating role of customer engagement in the path between pleasurable experience and purchase intentions?
- RQ3.** How does CPE mediate between emotional stimuli and purchase intentions?

2. Literature review

2.1 The SOR model

The SOR model outlines the interaction between stimuli (S), organism (O), and response (R) (Mehrabian and Russell, 1974). Within this framework, stimuli refer to external factors that

affect the organism. The organism, functioning as an internal processing mechanism, mediates how individuals perceive and decode the stimuli, ultimately leading to a response representing the resulting behavioural outcomes (Mehrabian and Russell, 1974). Previous studies have utilized the SOR model across various DAs and retail contexts. For instance, Maduku *et al.* (2023) explored customer usage intentions of DAs, focusing on factors such as commitment and word-of-mouth intentions.

To expand the extant research on the intriguing role of attributes of cutting-edge technologies in consumer behaviour, existing theories and models need an extension or update to address the challenges posed by the rapidly evolving human-computer interaction dynamics (Miao *et al.*, 2022; Mishra *et al.*, 2022; Rahman *et al.*, 2024). To this end, underpinning the SOR model, this study provides a comprehensive framework for examining CPE's complex and conduit role concerning emotional stimuli and behavioural outcomes. Precisely, the model captures the dynamic process through which external stimuli (aesthetics and playfulness) influence internal states known as organisms (pleasurable experiences) and leads to behavioural responses (purchase intentions) within the boundary condition of customer engagement. Based on the SOR model, this paper develops a conceptual framework (refer to Figure 1) that facilitates a precise and deeper understanding of both the mechanisms (how) and motivations (why) underlying the impact of DAs on consumer behaviour.

2.2 Customer pleasurable experiences

Customer experience is conceptualized as “a customer's interactions with a firm's products, personnel, services, and/or shopping environment” (Fan *et al.*, 2023, p. 2). Extending customer experience research to emotional aspects, Fiore *et al.* (2000) defined pleasurable experience as sensory (positive stimulation of sensory receptors – such as the eyes, ears, nose, skin, muscles, and mouth), affective (emotional or feeling-based enjoyment), and cognitive pleasures (arising when information aligns with an individual's existing mental framework ‘schema’).

In retail settings, researchers have contended that AI agents can offer pleasurable experiences through flexible and personalized service interactions that evoke enjoyment and pleasure (Fan *et al.*, 2023; Grewal and Roggeveen, 2020; Huang and Rust, 2024; Kim *et al.*, 2025). The conversational interfaces of AI agents add a touch of interactivity and fun, creating hedonic pleasure and making interactions more pleasurable and memorable (Lee *et al.*, 2022; Liu-Thompkins *et al.*, 2022; Sidaoui *et al.*, 2020).

Despite having theoretical and managerial significance, CPE remains under-explored in the extant literature. Although hedonic experiences in IS settings have gained heightened attention due to the widespread adoption of innovative technologies, including Big data, smartphone applications, and augmented/virtual reality systems (Fan *et al.*, 2023; Gao *et al.*, 2022; Huang and Rust, 2024; Liu-Thompkins *et al.*, 2022; Puntoni *et al.*, 2021), so far no previous study has explored how the emotional stimuli (aesthetics and playfulness) tangle with CPE, and in return, such experiences shape purchase intentions. Thus, a deeper understanding of how DAs' emotional stimuli influence customer pleasure is crucial for strategic decisions in tech-heavy customer service interactions.

2.3 Customer engagement

Customer engagement is conceptualized as a psychological state that drives frequent, non-transactional interactions with a focal object (e.g., brands, organizations, or media), motivated by utilitarian (e.g., seeking product information) or hedonic (e.g., entertainment) goals (Brodie *et al.*, 2011; Nunes *et al.*, 2024; Thakur, 2019). It is widely regarded as a multidimensional construct comprising cognitive, emotional, and behavioural dimensions (Anubha and Shome, 2021; Thakur, 2019).

Most of the former research extensively relied on exploring the direct or mediating effects of customer engagement in diverse consumer behavioural settings, including value co-creation, brand loyalty, and experience in contexts like social media and online communities (Gao *et al.*, 2023; Islam and Rahman, 2017; Rather *et al.*, 2022). However, its moderating role remains comparatively less explored (Rather *et al.*, 2022; Thakur, 2019). In IS and human-computer interaction domains, scholars (e.g., Anubha and Shome, 2021; Lee *et al.*, 2024; Nunes *et al.*, 2024) have highlighted further exploration of high vs. low customer engagement's impact considering that the cutting-edge technologies possess multidimensional engaging stimuli that may have differential effects at diverse levels of engagement.

2.4 Hypothesis development

2.4.1 Aesthetics

Aesthetic refers to a distinctive design that is creatively conceived and embodies innovation and sophistication (El Abed and Castro-Lopez, 2024). Thüring and Mahlke (2007, p. 257) conceptualized aesthetics as “the sensual experience a product entails, and to the extent to which this experience fits individual goals and preferences.” They confirmed that products' aesthetics (e.g., innovative and futuristic design) make users surprised, curious, or pleased. In IS settings, aesthetics is deemed an emotional cue highly relevant to evoke pleasurable experiences, such as enjoyment, happiness, fun, and excitement (El Abed and Castro-Lopez, 2024; Tractinsky, 2015; Wang *et al.*, 2011). Fiore *et al.* (2000) affirmed that these pleasurable experiences are the fundamental motivators of consumer behaviour.

In DA settings, for example, asking Siri to write a funny story prompts humorous animation alongside the punchline, like a laughing emoji or comic-style graphics. Such visual cues derived from cutting-edge technologies enhance consumer experiences, making them more engaging and enjoyable (Laroche *et al.*, 2022; Wang *et al.*, 2011). Thus, Kumar *et al.* (2021) opined that aesthetic appeal, closely tied to pleasure and arousal, is vital in driving word-of-mouth and encouraging revisit intentions. Taufique *et al.* (2024) reported that aesthetics, an essential hedonic component, substantially enhances web-based retail shopping. Connecting aesthetics and experiences, Thüring and Mahlke (2007) found a strong association between aesthetics and user emotional experience for technical products in human-computer interactions. Building on these findings, we posit that innovative AI technologies incorporating diverse aesthetic stimuli – including visual elements (e.g., emojis) and nonvisual features (e.g., gendered voice modulation) – can enhance users' emotional interactions. This enriched interaction is theorized to amplify CPE, consequently exerting a stronger positive effect on purchase intentions (El Abed and Castro-Lopez, 2024). Therefore, this study proposes that:

H1a. DAs' aesthetics positively and significantly increase CPE.

H1b. DAs' aesthetics positively and significantly increase purchase intentions.

2.4.2 Playfulness

Playfulness refers to “a degree of cognitive spontaneity in human-computer interactions” (Mishra *et al.*, 2022, p. 4). It echoes pleasure and enjoyment derived from engaging in activities and can vary throughout interactions with a person or object (Moon and Kim, 2001). For example, when online video gamers engage in gaming, they dedicate a long time to experiencing the exhilarating excitement of completing missions, yielding mental peace. In a similar vein, Holbrook and Hirschman (1982) emphasized the “consumption experience,” arguing that the emotional aspects of products, such as a sense of comfort, can play a crucial role in creating pleasurable experiences. While interacting with DAs, consumers find an element of playfulness – an emotional dimension, such as posing funny questions (e.g., whether they are vegetarian or have boyfriends/girlfriends).

Researchers have contended that humorous DA replies make interactions more pleasing and enjoyable (Fan *et al.*, 2023; Gao *et al.*, 2022; Puntoni *et al.*, 2021). Such pleasing interactions, in turn, are expected to significantly impact users' hedonic or emotional experiences (Puntoni *et al.*, 2021) and drag toward positive behavioural outcomes (Ben-Saad and Choura, 2024; Bonfanti *et al.*, 2023; Gao *et al.*, 2022). Building on these insights, we believe from a psychological stance that the playful features of DAs have a high potential to enhance customers' pleasurable experiences by reducing cognitive stress and stimulating enjoyment, relaxation, and satisfaction (Lee *et al.*, 2022; Yang and Lin, 2017). Similarly, the playful and engaging interactions between customers and DAs are expected to uplift customer purchase intentions. Thus, we posit the following hypotheses.

H2a. DAs' playfulness positively and substantially increases CPE.

H2b. DAs' playfulness positively and substantially increases purchase intentions.

2.4.3 Customer pleasurable experience to purchase intentions

Purchase intentions refer to a customer's likelihood or willingness to buy a specific good or service in the future. In smart retailing, emotional support from DAs can help consumers feel more comfortable and connected and effectively boost their desire to avail of goods or services. For instance, DAs' gentle voice alerts or empathetic responses create a friendly atmosphere and enhance users' mental gratification. Scholars have affirmed that AI-enabled agents' empathetic, supportive, and personalized interaction enhances users' affective pleasures (Gao *et al.*, 2022; Gelbrich *et al.*, 2021). Pleasant interactions, in turn, reduce stress and promote relaxation, positively impacting mental health and substantially stimulating customers' willingness to purchase (Gao *et al.*, 2022; Guo and Luo, 2023). Thus, this study proposes that pleasurable experiences derived from DAs denote an organism likely to influence customer purchase intentions (response) positively. Supporting this proposition, El Abed and Castro-Lopez (2024) found that affective experiences drive purchase intentions in AI-connected stores. Aligning with this insight, we propose:

H3. CPE positively and substantially increases purchase intentions.

2.4.4 Moderation of customer engagement

In human-DA interaction, customer level of engagement with AI agents varies due to their ability to create a sense of emotional bonding through humanlike attributes (e.g., empathy and attentiveness) (Anubha and Shome, 2021; Lee *et al.*, 2024). Due to the Uncanny-Valley effects (experiencing discomfort or eeriness when a humanoid object appears almost, but not entirely human), engagement nature changes (Sharma *et al.*, 2022).

Several researchers have emphasized the positive outcomes of engagement, noting that high engagement with DAs can enhance the pleasurable experience, improving the sense of belonging and pacifying feelings of loneliness (Lee *et al.*, 2024; Liu *et al.*, 2020). For example, Pansari and Kumar (2017) argued that highly engaged customers are more likely to exhibit trust and satisfaction in the products or services they buy or intend to buy. Conversely, Blut *et al.* (2023) identified that higher customer engagement in digital or rich platforms might weaken behavioural intentions due to diverse informational cues, especially when the engagement's nature is emotional. It is also contended that high anthropomorphic augmentation of DAs causes uncanniness (Anubha and Shome, 2021; Lee *et al.*, 2024; Pandey *et al.*, 2024), which may turn customer experiences negative, impacting their behavioural decisions (Lee *et al.*, 2024; Nunes *et al.*, 2024). Such ambiguous findings of customer engagement literature drive this study to examine how customer engagement changes the relationship weights between perceived emotional values and purchase intentions within an LDC, where such scholarly investigation is critical and unique. Thus, we can posit:

H4. Customer engagement moderates the relationship between CPE and purchase intentions.

2.4.5 Mediation of customer pleasurable experience

Customer experiences can play a pivotal mediating role in the relationship between technologies' attributional stimuli and behavioural outcomes (Fan *et al.*, 2023; Gao *et al.*, 2022; Sidaoui *et al.*, 2020). In particular, Fiore *et al.* (2000) found that CPE significantly mediates the relationship between atmospheric effects and approach responses toward a product, including overall attitude, purchase intentions, estimated price, and the price customers are willing to pay. Indeed, leveraging aesthetic design and playful interactions, DAs create emotionally engaging experiences (Huang and Rust, 2024; Puntoni *et al.*, 2021). We consider that these emotionally stimulating features foster a sense of pleasing experiences (e.g., comfort, happiness, and belonging), making consumers more receptive to purchasing decisions. Lee *et al.* (2022) further support this logic, demonstrating that AI chatbots providing emotional support through voice, text, and visuals significantly boost purchase intentions by creating enjoyable and satisfying interactions. Drawing on the SOR model, Gao *et al.* (2022) found AI emotional stimuli (i.e., passion) significantly evoke customers' smart experiences in an AI-mediated context and subsequently influence word-of-mouth (WOM) intentions. Aligning with these findings, we assume that the aesthetic and playful elements of DAs enhance positive and pleasant experiences and translate into higher purchase intentions, indicating a potential mediation role of CPE. Therefore, we posit that:

H5. CPE mediates the relationship between emotional stimuli (i.e., aesthetics and playfulness) and purchase intentions.

[Please insert Figure 1 here]

3. Methods

3.1 Sampling and data collection

Bangladesh, as an LDC, presents a compelling research context due to its rapid digital transformation (Rahman *et al.*, 2024). With over 130.94 million internet users, it ranks 9th globally in mobile and internet usage (BIDA, 2024); the country is experiencing a remarkable technological transformation (Supplementary_material provides an overview of DA proliferation in Bangladesh). Consequently, customers with sufficient knowledge and experience using AI agents were considered this study's target respondents. Conducting empirical research with this large segment is noteworthy, as the AI market in Bangladesh is projected to expand from USD 1145 million in 2025 to USD 3906 million by 2030, reflecting a viable market with a CAGR of 27.82% (Statista, 2024). These trends highlight Bangladesh's potential as an ideal setting for exploring interactions and consumer behaviours.

The data collection involved two phases. We started with the pilot test of 30 respondents, required finetuning of the questionnaire was done, and then the main survey was performed. We used both purposive and snowball sampling techniques to gather participants. Given the undefined population of DA users in Bangladesh, these sampling methods are validated. We administered a survey, utilizing both personal and online methods, with a Google Form link distributed via Facebook, WhatsApp, and LinkedIn. To ensure the selection of appropriate respondents, we set a 'yes/no' question to confirm their knowledge of DAs and ask them to identify the DA they used most frequently. After removing incomplete responses, 549 were retained, exceeding the recommended threshold (Kline, 2023). Supplementary file reports respondents' demographic details.

3.2 Survey instruments

All measurement items used in this study were adapted from prior research (the complete list is provided in Supplementary_material). These items were anchored on a five-point Likert scale, ranging from strongly agree (5) to strongly disagree (1) (Atulkar and Singh, 2021; Lavuri *et al.*, 2022; Taufique *et al.*, 2024).

4. Data analysis and results

We employed two data analysis approaches. For descriptive statistical analysis, SPSS version 23.0 was used. Then, partial least squares structural equation modelling (PLS-SEM) was performed with SmartPLS 4.0 to confirm the reliability and validity of the measurement and structural models. Before proceeding with PLS-SEM, data normality and common method bias were examined (details are available in Supplementary_material).

4.1 Measurement model

The convergent and discriminant validity was assessed at this stage. For the convergent validity (refer to supplementary material), the results found that the minimum loading is 0.672, and the maximum loading is 0.902. On the other hand, Cronbach's alpha (0.752 to 0.881) and composite reliability (0.842 to 0.912) for each construct exceed the threshold of 0.70 (Fornell and Larcker, 1981; Guo and Luo, 2023). Similarly, average variance extracted values indicate that the model is reliable, exceeding the threshold for all constructs (0.573 to 0.776), suggesting solid convergent validity (Hair Jr *et al.*, 2021).

Subsequently, discriminant validity was assessed by applying the Fornell-Larcker criterion (Fornell and Larcker, 1981) and the Heterotrait–Monotrait Ratio (HTMT). Our analysis revealed that each construct’s square root of the AVE surpasses the correlation with other constructs (see supplementary material). Additionally, the HTMT values are below 0.85. These outcomes of our study substantiate discriminant validity (Fornell and Larcker, 1981; Guo and Luo, 2023).

4.2 Structural model

The analysis showed that the standardized root mean square residual value for the estimated model was 0.077, which is below the recommended threshold of 0.08, confirming good model fitness. Additionally, the model explained 51% of CPE and 40% of purchase intentions, exceeding the 10% benchmark (Hair Jr *et al.*, 2021) and further supporting its robustness and adequacy.

4.2.1 Path coefficient estimation

As shown in Table 1, the results indicate that hypotheses H1a and H2a should be accepted as emotional stimuli, including aesthetics ($\beta = 0.450$, $t = 11.896$, $p < 0.001$) and playfulness ($\beta = 0.348$, $t = 8.441$, $p < 0.001$) demonstrated a positive influence on CPE. Yet, the direct impact of aesthetics on purchase intentions was insignificant ($\beta = -0.080$, $t = 1.749$, $p > 0.05$), indicating the rejection of H1b. Whereas playfulness positively and significantly impacted purchase intentions ($\beta = 0.143$, $t = 2.575$, $p < 0.05$), indicating the acceptance of H2b. Besides, the findings show that CPE had a strong positive and statistically significant effect on purchase intentions ($\beta = 0.439$, $t = 7.942$, $p < 0.001$), supporting H3.

Regarding the moderation effects, the results found that customer engagement negatively moderated the relationship between pleasurable experience and purchase intentions ($\beta = -0.077$, $t = 2.224$, $p < 0.05$), confirming that H4 should be accepted. This suggests that engagement with DAs weakens the relationship and decreases customer buying intentions.

[Please insert Table 1 here]

4.2.2 Mediation effects

As of Table 1, both the indirect relationships are positive and significant, indicating the strong mediation mechanism of CPE, supporting H5. Regarding aesthetics, the direct impact on purchase intentions is insignificant, while the indirect effect is positively significant, identifying that CPE fully mediates the connection between aesthetics and purchase intentions. Meanwhile, for playfulness, direct and indirect effects are significant and positive, indicating complementary or partial mediation.

5. Discussion and implications

The study aimed to address three key research questions. Hereby, we discuss the findings, framing them within these research questions to provide meaningful insights.

RQ1. How do DA’s aesthetics and playfulness enhance CPE and purchase intentions?

The results identified that DAs’ emotional stimuli – aesthetics and playfulness – are the salient explanatory variables of CPE (i.e., 51%) in customer-DA interactions. Such noteworthy

impacts underscore the prominence of emotional stimuli in shaping customers' internal organism for cutting-edge technologies. The findings are consistent with past studies (e.g., El Abed and Castro-Lopez, 2024; Gao *et al.*, 2022). However, the findings on the role of DAs' aesthetics and playfulness in evoking pleasurable experiences are unique, offering new theoretical insights. Notably, DAs' attractiveness and aesthetic appeal strongly translate into pleasurable experiences in the DA-mediated context, reconfirming the findings of El Abed and Castro-Lopez (2024). Moreover, emotional touches – characterized by personalized, effective, and playful responses – generate effective warmth, comfort, and reassurance, contributing to a trusting and safe environment that bolsters customers' purchase intentions. That is, the more customers feel pleasurable experiences, the more they will be emotionally engaged with DAs during their shopping journey. Our study confirms this positive and impactful relationship and adds notable contribution by expanding existing literature (El Abed and Castro-Lopez, 2024; Fan *et al.*, 2023; Gao *et al.*, 2022; Guo and Luo, 2023).

RQ2. What is the moderating role of customer engagement in the path between pleasurable experience and purchase intentions?

The results found that the level of engagement (high vs. low) strongly changes the relationship between CPE and purchase intentions. It reveals that higher customer engagement with DAs cultivates adverse effects and weakens the relationship weight, aligning with past studies (e.g., Lee *et al.*, 2024; Nunes *et al.*, 2024). Indeed, prior studies (e.g., Lee *et al.*, 2024; Liu-Thompkins *et al.*, 2022) show that customers react less favourably to AI sales agents than to human counterparts, especially in the buying context. In fact, their heavy engagement makes them aware that they interact with a bot, a lifeless machine. Inadequate emotional responses, as they do not expect, result in empathy gaps that negatively impact their behavioural outcomes. The Uncanny Valley effects may cause such feelings of discomfort or eeriness in consumers. This psychological response can profoundly influence how individuals engage with such entities, potentially reducing trust, emotional connection, and overall user interaction (see Sharma *et al.*, 2022). Supporting this, Blut *et al.* (2023) conferred that higher engagement in digitally rich platforms reduces purchase intentions, as users may perceive automated interactions as more superficial and complex than human exchanges. In other words, highly engaged users may seek meaningful, human-like interactions. When DAs fall short, cognitive dissonance arises, weakening the CPE–purchase intentions link. As DAs are new and evolving in LDCs like Bangladesh, people tend to treat new technologies as complex due to potential technology anxiety and perceived risk. Thus, discomfort and insecurity while using new technologies like DAs may weaken behavioural intentions.

RQ3. How does CPE mediate between emotional stimuli and purchase intentions?

The findings confirm that aesthetic appeals and playful interactions derived from DAs play a robust role in uplifting purchase intentions mediated by distinct psychological mechanisms (pleasurable experiences), supplementing previous findings (Fan *et al.*, 2023; Gao *et al.*, 2022). While aesthetic elements alone do not directly drive purchase decisions, they serve as crucial emotional primers that must first evoke CPE to impact consumer behaviour. This supports the notion that design attractiveness requires emotional resonance to be effective. In contrast,

playful interactions exhibit a dual influence, both directly increasing purchase intentions through immediate enjoyment and indirectly through enhanced CPE. Specifically, we show that aesthetics operates through full mediation (requiring CPE to affect purchases), while playfulness functions through partial mediation (having both direct and indirect effects). These findings are unique and offer an original contribution by advancing our theoretical understanding of affective priming in AI-driven commerce. In doing so, the study highlights the need to strategically design DAs that balance visual appeal with emotionally engaging playful elements while ensuring these features create genuine pleasurable experiences rather than superficial attractiveness.

5.1 Academic implications

The current research contributes multiple fresh insights into the literature on DAs. First, mirroring the SOR model, this research advances the attribute-value-outcome framework coined by Rahman *et al.* (2024). They argued that DAs' attributional stimuli related to appearance and behaviour, such as tone, cuteness, empathy, playfulness, greatly evoke customers' internal values to form positive behavioural outcomes (e.g., satisfaction, purchase intentions, and patronage decisions). Integrating two well-established emotional stimuli of DAs with CPE and purchase intentions, this study offers a fresh theoretical lens from marketing aspects, a potential blueprint for future research in the human-computer interaction domain.

Second, this study introduces customer engagement as a moderating factor, demonstrating that it significantly weakens the relationship between CPE and purchase intentions. To the best of our knowledge, this research pioneers in offering insights into the moderating role of customer engagement in the pleasurable experience-purchase intentions relationship. Hence, it contributes to the existing customer engagement literature by extending past findings (e.g., Blut *et al.*, 2023; Rather *et al.*, 2022; Thakur, 2019). This result enhances scholars' understanding of how elevated engagement with DAs as alternative service agents may decline customers' pleasurable experiences in sophisticated emotional interactions, especially in the areas where DAs are still early in their adoption phase in replacing human agents. Thus, it provides a new perspective by challenging former findings (Lee *et al.*, 2024; Liu *et al.*, 2020), which suggest that customer engagement positively drives purchase intentions.

Third, although CPE has been studied as a mediator in retail (Fiore *et al.*, 2000), this study is the first to link DAs' aesthetics and playfulness to purchase intentions using the SOR model. Unlike prior research, our findings unify DAs' emotional attributes, pleasurable experiences, and purchase intentions, reinforcing the significance of emotional support in shopping (Gelbrich *et al.*, 2021; Guo and Luo, 2023). In the process, our study extends current theoretical understanding by incorporating aesthetics and playfulness as key attributional variables and highlighting CPE's mediating role in technology-mediated interactions.

5.2 Practical implications

This research has found that enhancing DAs' emotional traits, including aesthetics and playfulness, is essential for triggering purchase intentions through CPE. Commercially, these findings refine strategies: brands must prioritize emotionally calibrated DAs over purely functional ones, with playfulness serving as a differentiator. The full mediation for aesthetics implies that visual appeal alone is insufficient, so retailers must pair it with experiential triggers

(e.g., personalized rewards) to convert engagement. Conversely, playfulness's dual impact offers a scalable tool for impulse-driven sectors (e.g., fashion). Accordingly, DA developers and marketing practitioners should focus on embedding high emotional intelligence within DAs, enabling them to communicate with empathy and create a warm, positive atmosphere. These favourable outcomes can be achieved by developing advanced facial, vocal, and text-based recognition algorithms that allow DAs to accurately identify, analyse, and respond to users' emotions. This approach may enable DAs to foster an emotional connection with consumers, contributing to a more enjoyable and relaxed shopping experience.

Based on the customer engagement findings of this study, DA designers should prioritize developing visually appealing interfaces that incorporate culturally relevant themes and designs to resonate strongly with local consumers and enhance trustworthy user engagement. Additionally, integrating gamification elements, such as quizzes, reward systems, and interactive storytelling, can further stimulate and sustain consumer engagement with DAs (Disse and Olsson, 2023). Overall, the designers must ensure that engagement with DAs' is more authentic, lively, and interactive to minimise empathy gaps. However, our findings carry significant ethical implications for AI-driven retailing. Since high engagement with DAs weakens purchase intentions – likely due to heightened awareness of artificiality – brands must ethically balance anthropomorphic design with clear disclosures about privacy, data security, and AI capabilities to avoid deceptive practices (Barari *et al.*, 2024). Socially, the results highlight a paradox: while playful DAs enhance shopping experiences, over-reliance on gamification risks trivializing consumer autonomy, especially among vulnerable groups (e.g., older adults or low-digital-literacy populations).

Given that CPE, directly and indirectly, predicts purchase intentions in DA interactions, developers should prioritize features that amplify pleasure – such as enjoyment, happiness, and relaxation – while reducing cognitive demands. This optimization is especially crucial in LDCs, where DA adoption remains nascent. To foster trust and ease anxiety during high-stakes decisions, DAs should deliver empathetic, affirming responses. Such emotional design not only enhances pleasurable experiences but also mitigates perceived risks (e.g., eeriness or discomfort) by building familiarity (El Abed and Castro-Lopez, 2024; Fan *et al.*, 2023).

6. Limitations and future research directions

This study, however, includes several limitations. First, since the study was conducted exclusively on Bangladeshi customers, focusing on LDCs, its generalizability is limited to other LDCs or similar regional contexts. Future studies should test and validate the proposed model across diverse cultural and regional settings. Second, the study primarily explored two emotional attributes of DAs. Expanding the scope to include other attributes—such as empathy, cuteness, politeness, and supportiveness—could provide a more comprehensive understanding of their diverse effectiveness. Also, future research could investigate the functional and social aspects of DAs to evaluate their influence on customer diverse experiences (e.g., cognitive experiences) and purchase intentions. Finally, incorporating the moderating role of categorical variables like age, gender, and usage status while adopting a longitudinal research design could offer deeper insights into the strength and dynamics of the relationships between DA attributes, customer experiences, and behavioural outcomes.

References

- Affandi, S., Ishaq, M. I., Raza, A. and Ahmad, R. (2025), "AI assistant is my new best friend! Role of emotional disclosure, performance expectations and intention to reuse", *Journal of Retailing and Consumer Services*, Vol. 82.
- Alalwan, A. A., Algharabat, R., Abu El Samen, A., Albanna, H. and Al-Okaily, M. (2025), "Examining the impact of anthropomorphism and AI-chatbots service quality on online customer flow experience—exploring the moderating role of telepresence", *Journal of Consumer Marketing*, Vol. 42 No. 4, pp.448-471.
- Anubha and Shome, S. (2021), "Customer Engagement and Advertising Effectiveness: A Moderated Mediating Analysis", *Journal of Internet Commerce*, Vol. 20 No. 4, pp.409-449.
- Atulkar, S. and Singh, A. K. (2021), "Role of Psychological and Technological Attributes on Customer Conversion to Use Food Ordering Apps", *International Journal of Retail & Distribution Management*, Vol. 49 No. 10, pp.1430-1446.
- Barari, M., Casper Ferm, L.E., Quach, S., Thaichon, P. and Ngo, L. (2024), "The dark side of artificial intelligence in marketing: meta-analytics review", *Marketing Intelligence and Planning*, Vol. 42 No. 7, pp.1234–1256.
- Ben-Saad, S. and Choura, F. (2024), "Avatars' Impacts in Retail: A Study within Regulatory Engagement Theory", *International Journal of Retail & Distribution Management*, Vol. 52 No. 6, pp.689-705.
- BIDA. (2024), "*Bangladesh It & Ites Industry*". <https://bida.gov.bd/information-technology>
- Blut, M., Kulikovskaja, V., Hubert, M., Brock, C. and Grewal, D. (2023), "Effectiveness of Engagement Initiatives across Engagement Platforms: A Meta-Analysis", *Journal of the Academy of Marketing Science*, Vol. 51 No. 5, pp.941-965.
- Blut, M., Wunderlich, N. V. and Brock, C. (2024), "Facilitating retail customers' use of AI-based virtual assistants: A meta-analysis", *Journal of Retailing*, Vol. 100 No. 2, pp.293-315.
- Bonfanti, A., Vigolo, V., Vannucci, V. and Brunetti, F. (2023), "Creating Memorable Shopping Experiences to Meet Phygital Customers' Needs: Evidence from Sporting Goods Stores", *International Journal of Retail & Distribution Management*, Vol. 51 No. 13, pp.81-100.
- Brodie, R. J., Hollebeck, L. D., Jurić, B. and Ilić, A. (2011), "Customer Engagement: Conceptual Domain, Fundamental Propositions, and Implications for Research", *Journal of Service Research*, Vol. 14 No. 3, pp.252-271.
- Calvo, A.V., Franco, A.D. and Frassetto, M. (2023), "The role of artificial intelligence in improving the omnichannel customer experience", *International Journal of Retail & Distribution Management*, Vol. 51 No. 9/10, pp.1174-1194.
- Chen, J.S., Tran-Thien-Y, L. and Florence, D. (2021), "Usability and responsiveness of artificial intelligence chatbot on online customer experience in e-retailing", *International Journal of Retail & Distribution Management*, Vol. 49 No. 11, pp.1512-1531.
- de Matos, C. A., Laurentino, R. and Veiga, R. T. (2025), "Understanding customer collaboration with virtual agents: service task as a moderator", *International Journal of Retail & Distribution Management*, pp.1-15.
- Disse, I. K. and Olsson, M. (2023), "Uncovering the Gamified Customer Experience in the Retail Environment", *International Journal of Retail & Distribution Management*, Vol. 51 No. 7, pp.955-971.
- El Abed, M. and Castro-Lopez, A. (2024), "The Impact of Ai-Powered Technologies on Aesthetic, Cognitive and Affective Experience Dimensions: A Connected Store

- Experiment", *Asia Pacific Journal of Marketing and Logistics*, Vol. 36 No. 3, pp.715-735.
- Fan, H., Gao, W. and Han, B. (2023), "Are Ai Chatbots a Cure-All? The Relative Effectiveness of Chatbot Ambidexterity in Crafting Hedonic and Cognitive Smart Experiences", *Journal of Business Research*, Vol. 156, pp.113526.
- Fiore, A. M., Yah, X. and Yoh, E. (2000), "Effects of a Product Display and Environmental FrAGRancing on Approach Responses and Pleasurable Experiences", *Psychology & Marketing*, Vol. 17 No. 1, pp.27-54.
- Fornell, C. and Larcker, D. F. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error", *Journal of Marketing Research*, Vol. 18 No. 1, pp.39-50.
- Gao, J., Ren, L., Yang, Y., Zhang, D. and Li, L. (2022), "The Impact of Artificial Intelligence Technology Stimuli on Smart Customer Experience and the Moderating Effect of Technology Readiness", *International Journal of Emerging Markets*, Vol. 17 No. 4, pp.1123-1142.
- Gao, L., Li, G., Tsai, F., Gao, C., Zhu, M. and Qu, X. (2023), "The Impact of Artificial Intelligence Stimuli on Customer Engagement and Value Co-Creation: The Moderating Role of Customer Ability Readiness", *Journal of Research in Interactive Marketing*, Vol. 17 No. 2, pp.317-333.
- Gelbrich, K., Hagel, J. and Orsingher, C. (2021), "Emotional Support from a Digital Assistant in Technology-Mediated Services: Effects on Customer Satisfaction and Behavioral Persistence", *International Journal of Research in Marketing*, Vol. 38 No. 1, pp.176-193.
- Grewal, D. and Roggeveen, A. L. (2020), "Understanding Retail Experiences and Customer Journey Management", *Journal of Retailing*, Vol. 96 No. 1, pp.3-8.
- Guha, A., Grewal, D., Kopalle, P.K., Haenlein, M., Schneider, M.J., Jung, H., Moustafa, R., Hegde, D.R. and Hawkins, G. (2021), "How artificial intelligence will affect the future of retailing", *Journal of Retailing*, Vol. 97 No. 1, pp.28-41.
- Guo, W. and Luo, Q. (2023), "Investigating the Impact of Intelligent Personal Assistants on the Purchase Intentions of Generation Z Consumers: The Moderating Role of Brand Credibility", *Journal of Retailing and Consumer Services*, Vol. 73.
- Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., Ray, S., Hair, J. F., Hult, G. T. M., Ringle, C. M. and Sarstedt, M. (2021), "An Introduction to Structural Equation Modeling", *Partial least squares structural equation modeling (PLS-SEM) using R: a workbook*, pp.1-29.
- Holbrook, M. B. and Hirschman, E. C. (1982), "The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun", *Journal of Consumer Research*, Vol. 9 No. 2, pp.132-140.
- Huang, M.-H. and Rust, R. T. (2024), "The Caring Machine: Feeling Ai for Customer Care", *Journal of Marketing*, Vol. 88 No. 5, pp.1-23.
- Islam, J. U. and Rahman, Z. (2017), "The Impact of Online Brand Community Characteristics on Customer Engagement: An Application of Stimulus-Organism-Response Paradigm", *Telematics and Informatics*, Vol. 34 No. 4, pp.96-109.
- Kim, H. J., Ahn, S. and Ye, S. (2025), "Exploring AI assistant in luxury brands: How social presence and emotional appeal drive technology adoption", *Journal of Retailing and Consumer Services*, Vol. 87.
- Kline, R. B. (2023), *Principles and Practice of Structural Equation Modeling*. Guilford publications.

- Kumar, S., Jain, A. and Hsieh, J. K. (2021), "Impact of apps aesthetics on revisit intentions of food delivery apps: The mediating role of pleasure and arousal", *Journal of Retailing and Consumer Services*, Vol. 63.
- Laroche, M., Li, R., Richard, M. O. and Zhou, M. (2022), "An investigation into online atmospherics: The effect of animated images on emotions, cognition, and purchase intentions", *Journal of Retailing and Consumer Services*, Vol. 64.
- Lavuri, R., Jaiswal, D. and Thaichon, P. (2022), "Extrinsic and Intrinsic Motives: Panic Buying and Impulsive Buying During a Pandemic", *International Journal of Retail & Distribution Management*, Vol. 51 No. 2, pp.190-204.
- Lee, C. T., Pan, L.-Y. and Hsieh, S. H. (2022), "Artificial Intelligent Chatbots as Brand Promoters: A Two-Stage Structural Equation Modeling-Artificial Neural Network Approach", *Internet Research*, Vol. 32 No. 4, pp.1329-1356.
- Lee, W. H. H., Chan, S. H. G. and Tang, B. M. (2024), "Paradigm of Symbiosis as a Mechanism of Artificial Intelligence and Customers' Patronage Decision in the Hospitality Sector: The Moderating Role of Customer Engagement", *Asia Pacific Journal of Tourism Research*, pp.1-21.
- Liu-Thompkins, Y., Okazaki, S. and Li, H. (2022), "Artificial Empathy in Marketing Interactions: Bridging the Human-Ai Gap in Affective and Social Customer Experience", *Journal of the Academy of Marketing Science*, Vol. 50 No. 6, pp.1198-1218.
- Liu, F., Lim, E. T., Li, H., Tan, C.-W. and Cyr, D. (2020), "Disentangling Utilitarian and Hedonic Consumption Behavior in Online Shopping: An Expectation Disconfirmation Perspective", *Information & Management*, Vol. 57 No. 3, 103199.
- Maduku, D. K., Mpinganjira, M., Rana, N. P., Thusi, P., Ledikwe, A. and Mkhize, N. H.-b. (2023), "Assessing Customer Passion, Commitment, and Word-of-Mouth Intentions in Digital Assistant Usage: The Moderating Role of Technology Anxiety", *Journal of Retailing and Consumer Services*, Vol. 71, 103208.
- Mehrabian, A. and Russell, J. A. (1974), *An Approach to Environmental Psychology*. The MIT Press.
- Miao, F., Kozlenkova, I. V., Wang, H., Xie, T. and Palmatier, R. W. (2022), "An Emerging Theory of Avatar Marketing", *Journal of Marketing*, Vol. 86 No. 1, pp.67-90.
- Mishra, A., Shukla, A. and Sharma, S. K. (2022), "Psychological Determinants of Users' Adoption and Word-of-Mouth Recommendations of Smart Voice Assistants", *International Journal of Information Management*, Vol. 67, pp.102413.
- Moon, J.-W. and Kim, Y.-G. (2001), "Extending the Tam for a World-Wide-Web Context", *Information & Management*, Vol. 38 No. 4, pp.217-230.
- Noble, S. M. and Mende, M. (2023), "The Future of Artificial Intelligence and Robotics in the Retail and Service Sector: Sketching the Field of Consumer-Robot-Experiences", *Journal of the Academy of Marketing Science*, Vol. 51 No. 4, pp.747-756.
- Nunes, D. C., Schmidt, S., Crespo, C. F. and Eberle, L. (2024), "Moderation and/or Mediation? The Role of Engagement in Relationship Quality and Customer Loyalty", *Journal of Relationship Marketing*, pp.1-25.
- Pansari, A. and Kumar, V. (2017), "Customer engagement: the construct, antecedents, and consequences", *Journal of the Academy of Marketing Science*, Vol. 45 No. 3, pp.294-311.
- Pandey, P. K., Dhaliwal, A. and Pandey, P. K. (2024), "Convergence of Online Flow and Ai-Enabled Services: The Impact on Awe Experience in E-Tail Customer Journeys", *The International Review of Retail, Distribution and Consumer Research*, pp.1-28.

- Puntoni, S., Reczek, R. W., Giesler, M. and Botti, S. (2021), "Consumers and Artificial Intelligence: An Experiential Perspective", *Journal of Marketing*, Vol. 85 No. 1, pp.131-151.
- Rahman, M. S., Sabbir, M. M., Zhang, J. and Zhang, L. (2025), "I sense my digital assistants! Assessing the impact of customers' immersive experience and perceived social presence on purchase intention", *Behaviour & Information Technology*, pp.1-19.
- Rahman, M. S., Sabbir, M. M., Zhang, J., Taufique, K. M. R. and Rahman, M. M. (2024), "Navigating Avatar-Based Marketing from Value Aspects: A Systematic Literature Review and Forward-Looking Research Agenda", *International Journal of Consumer Studies*, Vol. 48 No. 6.
- Rather, R. A., Hollebeek, L. D., Vo-Thanh, T., Ramkissoon, H., Leppiman, A. and Smith, D. (2022), "Shaping Customer Brand Loyalty During the Pandemic: The Role of Brand Credibility, Value Congruence, Experience, Identification, and Engagement", *Journal of Consumer Behaviour*, Vol. 21 No. 5, pp.1175-1189.
- Sharma, A., Johar, V. and Bhatt, K. (2024), "Technology in Fashion Retail: Exploring the Nexus of in-Store Technology, Customer Experience, and Store Image", *The International Review of Retail, Distribution and Consumer Research*, pp.1-21.
- Sharma, M., Joshi, S., Luthra, S. and Kumar, A. (2024), "Impact of Digital Assistant Attributes on Millennials' Purchasing Intentions: A Multi-Group Analysis Using Pls-Sem, Artificial Neural Network and Fsqca", *Information Systems Frontiers*, Vol. 26 No. 3, pp.943-966.
- Sidaoui, K., Jaakkola, M. and Burton, J. (2020), "Ai Feel You: Customer Experience Assessment Via Chatbot Interviews", *Journal of Service Management*, Vol. 31 No. 4, pp.745-766.
- Statista. (2024), "Artificial Intelligence - Bangladesh".
<https://www.statista.com/outlook/tmo/artificial-intelligence/bangladesh>
- Taufique, K. M. R., Sabbir, M. M., Quinton, S. and Andaleeb, S. S. (2024), "The Different Impact of Utilitarian and Hedonic Attributes on Web-Based Retail Shopping Behaviour through the Lens of Extended Technology Acceptance Model", *International Journal of Retail & Distribution Management*, Vol. 52 No. 4, pp.443-460.
- Thakur, R. (2019), "The Moderating Role of Customer Engagement Experiences in Customer Satisfaction–Loyalty Relationship", *European Journal of Marketing*, Vol. 53 No. 7, pp.1278-1310.
- Thüring, M. and Mahlke, S. (2007), "Usability, Aesthetics and Emotions in Human–Technology Interaction", *International Journal of Psychology*, Vol. 42 No. 4, pp.253-264.
- Tractinsky, N. (2015), "Aesthetics in Information Technology: Motivation and Future Research Directions". In *Human-Computer Interaction and Management Information Systems: Foundations* (pp.344-361). Routledge.
- Wang, Y. J., Minor, M. S. and Wei, J. (2011), "Aesthetics and the Online Shopping Environment: Understanding Consumer Responses", *Journal of Retailing*, Vol. 87 No. 1, pp.46-58.
- Yang, H.-L. and Lin, R.-X. (2017), "Determinants of the Intention to Continue Use of Solomo Services: Consumption Values and the Moderating Effects of Overloads", *Computers in Human Behavior*, Vol. 73 No., pp.583-595.

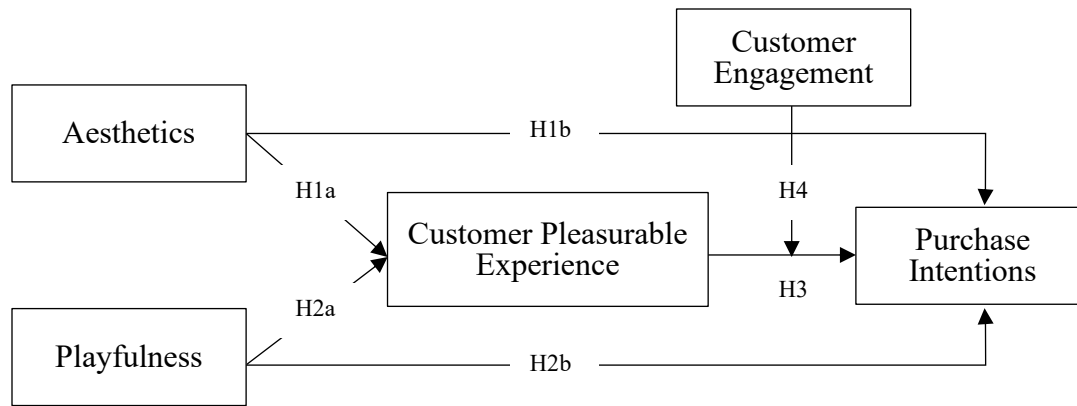


Figure 1. Proposed conceptual framework
Source (s): Authors' own work

Table 1. Path coefficient values

Relationships	Hypothesis	Path coefficients	<i>t</i> statistics	<i>p</i> values	Result
Direct Effects					
Aesthetics → CPE	H1a	0.450	11.896	0.000	Supported
Aesthetics → Purchase Intentions	H1b	-0.080	1.749	0.080	Not Supported
Playfulness → CPE	H2a	0.348	8.441	0.000	Supported
Playfulness → Purchase Intentions	H2b	0.143	2.575	0.010	Supported
CPE → Purchase Intentions	H3	0.439	7.942	0.000	Supported
Moderating Effects					
Customer Engagement*CPE → Purchase Intentions	H4	-0.077	2.224	0.026	Supported
Mediation Effects					
Aesthetics → CPE → Purchase Intentions	H5	0.198	6.341	0.000	Full mediation
Playfulness → CPE → Purchase Intentions		0.153	5.569	0.000	Partial mediation
Note (s): Statistically significant (p < 0.001; p < 0.01; p < 0.05) and insignificant (p > 0.05)					

Source (s): Authors' own work

Supplementary materials

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1. Summary of selected recent literature on the role of DA in AI-driven retailing

Authors	Scope	Label	Theory	Highlighted attributes/elements	Mediation mechanism	Moderating variable	Key Findings
Rahman <i>et al.</i> (2025)	Retail and e-commerce	Digital Assistant	Theory of Consumption Values; Stimuli-Organism-Response (SOR) Model	Social attributes (i.e., form and behavioural realism)	Perceived social values (i.e., immersive experience and perceived social presence)	Customer engagement	• Behavioural realism and form realism significantly increase immersive experience and perceived social presence, and both these social values strongly influence purchase intentions. • High customer engagement with DAs significantly enhances purchase intention.
Kim <i>et al.</i> (2025)	Retail and e-commerce	AI-Assistant	Unified Theory of Acceptance and Use of Technology (UTAUT)	Emotional and social attributes	No	Cognitive and affective trust	• Emotional appeal positively impacted all four UTAUT dimensions, while social presence influenced all but effort expectancy.
de Matos <i>et al.</i> (2025)	Retail and e-commerce	Virtual Agents	Technology Acceptance Model (TAM)	Functional attributes (i.e., usefulness and ease of use)	Attitude	Service task	• Perceived usefulness, compared to ease of use, is a stronger antecedent of attitude. • Attitude significantly influences intention to use and willingness to collaborate with virtual agents. • Attitude functions as a significant mediator between perceived usefulness and intention to use. • Service task type – support, purchase, or complaint – acts as a significant moderating factor.
Affandi <i>et al.</i> (2025)	Retail and e-commerce	AI-Assistant	Dual Process Theory	n.a.	No	Performance expectation	• The findings show that AI assistant advantages positively impact user engagement, and user emotional disclosure increases the intention to reuse AI assistants. The impact of user engagement and user emotional disclosure, along with performance expectations, maximizes the reuse intention of AI.
Alalwan <i>et al.</i> (2025)	Customer Service and Support	Chatbots	Flow Experience Model	Anthropomorphism	Online customers' flow experience	Telepresence	• The results show a strong and significant impact of AISAQUAL and anthropomorphism on online customer flow experience, which in turn significantly predicted both emotional brand attachment and brand loyalty.
Mpinganjira <i>et al.</i> (2024)	Retail and e-commerce	Chatbots	SOR Model	Humanistic elements (i.e., anthropomorphism and intelligence)	No	No	• Continued chatbot use intentions (CUIs) are increased by perceived hedonic and utilitarian experiential value. • Perceived social experiential value negatively impacts shoppers' continued intention to use the chatbot. • Both perceived chatbot anthropomorphism and perceived chatbot intelligence positively and significantly affect shoppers' experiential value, while perceived chatbot risk yields a significantly negative effect.
Osakwe <i>et al.</i> (2024)	Customer Service and Support	Customer-Service Robots	Cognitive-Affective-Normative Model	n.a.	No	No	• The results from structural equation modeling (SEM) highlight that cognitive, normative, and affective factors significantly increase the intention of Gen Z shoppers to interact with a customer-service robot.
Fan <i>et al.</i> (2023)	Customer Service and Support	Chatbots	Dual Process Theory	Chatbot ambidexterity	Hedonic and cognitive smart experiences	No	• The relative effectiveness of distinct AI chatbot ambidexterity positively and strongly crafts consumers' hedonic and cognitive smart experiences.

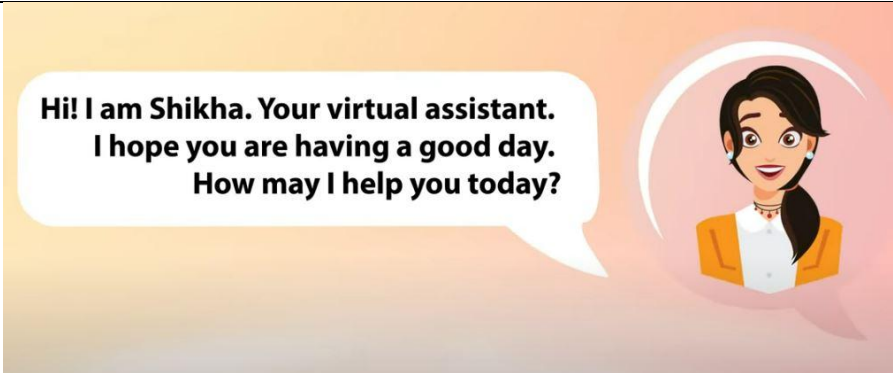
Chen <i>et al.</i> (2023)	Customer Service and Support	Chatbots	Not Specified	n.a.	processing fluency and perceived service quality	Consumer demand certainty	The match between customer service type and product type positively influences purchase intentions, mediated by processing fluency and perceived service quality, and is effective only under low demand certainty.
Guo and Luo (2023)	Retail and e-commerce	Intelligent Personal Assistant	CASA Framework	Personalization and conversational tone	No	Brand credibility	- Personalization and conversational tone enhance informational and emotional support, and autonomy and responsiveness boost informational support. - Both support positively influence purchase intentions, and brand credibility strengthens the impact of informational and emotional support on purchase intentions.
Maduku <i>et al.</i> (2023)	Customer Service and Support	Digital Assistant	SOR Model; TAM	Functional attributes (i.e., •usefulness, ease of use, privacy concerns, and localization)	Passion	Technology anxiety	Usefulness, ease of use, privacy concerns, and localization drive consumers' passion for digital assistants (DAs), which in turn fosters WOM intentions and commitment, though technology anxiety weakens passion's influence on these outcomes.
Sharma <i>et al.</i> (2024)	Retail and e-commerce	Digital Assistant	Uncanny Valley Theory; Social Presence; Theory of Planned Behaviour (TPB)	Interactivity, social presence, and anthropomorphism	No	No	DA attributes may amplify purchasing intention among millennials, especially through perceived interactivity and anthropomorphism.
Chen <i>et al.</i> (2021)	Retail and e-commerce	Chatbots	TAM; Information System Success (ISS) Model	Functional attributes (i.e., chatbot's usability and responsiveness)	No	Personality	- The chatbot's usability positively influenced the extrinsic values of customer experience, while its responsiveness enhanced the intrinsic values. - Online customer experience influenced customer satisfaction, and personality moderated the relationship between usability and the extrinsic values.
Fernandes and Oliveira (2021)	Technology and Software	Voice Assistant	Service Robot Acceptance Model	Functional, social, and relational elements	No	Experience and need for human interaction	Findings show that functional, social, and relational elements drive adoption, untangle crossover effects between them, and reveal the moderating role of experience and the need for human interaction.
This study	Retail and e-commerce	Digital Assistant	SOR Model	Emotional attributes (i.e., aesthetics and playfulness)	Yes: Customer pleasurable experience (CPE)	Yes: Customer engagement	Aesthetics and playfulness act as key emotional stimuli driving CPE, which in turn enhances purchase intentions. CPE serves as a full and partial mediator between emotional stimuli and purchase intention, while customer engagement negatively moderates the CPE-purchase intentions relationship.

Note(s): n.a. = not applicable

2. Digital assistants in Bangladesh

In Bangladesh, firms increasingly leverage digital assistants (DAs) across critical sectors to enhance accessibility, efficiency, and engagement. For example, Banglalink, with 37.95 million subscribers in the telecommunication sector, recently launched an AI-powered chatbot named ‘MyBL’. Another telecommunication firm, Robi, with over 50 million subscribers, has also introduced AI-enabled DA to accelerate 24/7 online customer services. In finance, LankaBangla Finance has launched its virtual assistant ‘Shikha’ to offer faster, improved, and more convenient services to its valued customers. Even during COVID-19, chatbots like ‘Mita Chatbot’, ‘Corona Bot’, and ‘Bloodman’, using both in Bengali and English, offered COVID-19-related information, advice on mental health, doctor consultation, and access to emergency services, among others (Islam and Islam, 2020). Such an uprising growth of DAs is also evident, as 6Wresearch (2025) has reported that the Bangladesh chatbot market is projected to grow at a significant CAGR of 7.3% during 2025–2031. Collectively, in the near future, a growing number of customer-centric companies are expected to adopt AI agents to drive sustainable customer relationship management, streamline finance and bookkeeping, optimize human resource management and payroll, enhance sales engagement, and advance revenue intelligence, among other business functions.

Instances of firms using AI-enabled DAs in Bangladesh

Firm	Sector	AI agent	Agent’s aesthetic view
LankaBangla	CRM	Shikha	 Source: https://www.lankabangla.com/shikha-chatbot/

Banglalink	CRM	MyBL	BL AI assistant  Good Evening How can I help you today? Type your message BL AI Assistant is still in learning phase. For any extended help please take agent support. Source: https://banglalink.net/en
bKash	CRM	bKash Chatbot	 bKash Limited Welcome to bKash Customer Service 10:51 pm বিকাশ সার্ভিসের জন্য এখন অন্যান্য চ্যানেলের পাশাপাশি WhatsApp থেকেও সহজে যেকোনো সময় লাইভ চ্যাট করতে যোগাযোগ করুন এই 01844116247 নাম্বারে। Please select your preferred language অনুগ্রহ করে আপনার পছন্দের ভাষা নির্বাচন করুন English বাংলা 10:51 pm Type your message and press enter Source: http://bkash.com/help/livechat

3. Demographic details

Variables	Frequency (N)	Percent
Gender		
Male	332	60.47%
Female	217	39.53%
Age (years)		
18-25	295	53.73%
26-35	172	31.33%
36-45	48	8.74%
46-55	32	5.83%
56 or above	2	0.36%
Education		
High School/College	21	3.83%
Graduation	267	48.63%
Post-Graduation	212	38.62%
Others	49	8.93%
Digital Assistant Usage Experience (Years)		
< 2	410	74.68%
2 – 4	101	18.40%
5 – 7	21	3.83%
8 or above	17	3.10%
Total	549	100.00%

Source (s): Authors' own work

4. Items, constructs, and their convergent validity

Code	Item	FL	Mean	SD	α , CR, and AVE	Source
AST1	I think my interacted digital assistant is attractive	0.902	3.56	1.080	Aesthetics $\alpha = 0.855$ CR = 0.912 AVE = 0.776	Parra <i>et al.</i> (2012)
AST2	I think my interacted digital assistant is appealing	0.891	3.60	1.039		
AST3	I think my interacted digital assistant is professionally designed	0.848	3.56	1.012		
PL1	I do not realize the time elapsed when interacting with the digital assistants	0.743	3.42	0.904	Playfulness $\alpha = 0.752$ CR = 0.842 AVE = 0.573	Moon and Kim (2001); Ruangkanjanases and Wutthisith (2018)
PL2	When interacting with the digital assistants, I often forget my task	0.672	3.31	1.034		
PL3	Interacting with digital assistants gives me enjoyment in my tasks	0.824	3.78	0.832		
PL4	Interacting with digital assistants makes my tasks fun	0.779	3.77	0.846		
CPE1	After interacting with the digital assistants, I feel satisfied.	0.690	3.56	0.856	Customer Pleasurable Experience $\alpha = 0.881$ CR = 0.907 AVE = 0.584	Ruan and Mezei (2022); Yang and Lin (2017)
CPE2	After interacting with the digital assistants, I feel happy	0.706	3.74	0.809		

CPE3	After interacting with the digital assistant, I feel pleasant	0.768	3.80	0.879		
CPE4	After interacting with the digital assistant, I feel close	0.782	3.76	0.883		
CPE5	Interaction with the digital assistants allows me to spend time	0.804	3.91	0.810		
CPE6	The interaction with the digital assistants gives mental peace	0.813	3.82	0.835		
CPE7	After interacting with the digital assistants, I feel relaxed.	0.778	3.83	0.790		
CE1	I am passionate about taking service from digital assistants	0.799	3.68	0.957	Customer Engagement $\alpha = 0.813$ CR = 0.877 AVE = 0.642	Islam and Rahman (2017)
CE2	I can continue using digital assistants for very long periods	0.827	3.64	1.033		
CE3	I feel enthusiastic when interacting with the digital assistants	0.864	3.63	0.997		
CE4	I get absorbed when I interact with my digital assistants	0.707	3.46	1.015		
PI1	I will consider the assistance of digital assistants when I want to purchase in the near future	0.848	3.95	0.880	Purchase Intention $\alpha = 0.870$ CR = 0.911 AVE = 0.720	Guo and Luo (2023); Sharma <i>et al.</i> (2024)
PI2	I am willing to buy the products or brands recommended by the digital assistants in the near future	0.855	4.09	0.797		
PI3	I will ask my digital assistants to provide me with brand suggestions before I go shopping in the near future	0.873	4.13	0.826		
PI4	I expect to continue using my digital assistants in the future	0.818	4.19	0.821		

Note(s): Factor Loading (FL); Standard Deviation (SD); Cronbach's Alpha (α); Composite Reliability (CR); Average Variance Extracted (AVE)
Source (s): Authors' own work

5. Data normality and common method bias

The data normality was examined based on the benchmark of Pearson's skewness and kurtosis values. Evidence shows skewness values between -2 and +2, and kurtosis values between -7 and +7 indicate data normality (Hair *et al.*, 2021; Kline, 2023). The findings show that all the values (skewness ranged between -0.954 to -0.079 and kurtosis ranged between -0.827 to 1.054) are within the thresholds; this confirms data is normally distributed. On the other hand, common method variance (CMV) introduces survey response bias because each respondent answers both the predictor and dependent variables simultaneously. This potentially leads to skewed results (Podsakoff *et al.*, 2012). Hence, several steps (e.g., respondents' information anonymity and confidentiality) were implemented during the survey design and administration. The authors also used Harman's single-factor evaluation of the common method bias (CMB) (Harman, 1976) and found that a single component explained 41.40% of the overall variation, which falls below the recommended criterion of 50%.

6. Discriminant validity and correlations of the latent variables

	HTMT Criterion					Fornell-Larcker Criterion				
	AST	CE	CPE	PL	PI	AST	CE	CPE	PL	PI
AST						0.881				
CE	0.576					0.479	0.801			
CPE	0.751	0.735				0.653	0.626	0.764		
PL	0.713	0.620	0.737			0.581	0.488	0.610	0.757	
PI	0.436	0.577	0.676	0.562		0.378	0.487	0.599	0.463	0.849

Note(s): Aesthetics (AST); Playfulness (PL); Customer Pleasurable Experience (CPE); Customer Engagement (CE); Purchase Intention (PI)

Source (s): Authors' own work

7. References

- 6Wresearch (2025), *Bangladesh Chatbot Market (2025–2031): Industry, Companies, Outlook, Revenue, Analysis, Growth, Share, Size, Trends, Forecast and Value*, available at: <https://www.6wresearch.com/industry-report/bangladesh-chatbot-market> (accessed 18 August 2025).
- Affandi, S., Ishaq, M. I., Raza, A. and Ahmad, R. (2025), “AI assistant is my new best friend! Role of emotional disclosure, performance expectations and intention to reuse”, *Journal of Retailing and Consumer Services*, Vol. 82.
- Alalwan, A. A., Algharabat, R., Abu El Samen, A., Albanna, H. and Al-Okaily, M. (2025), “Examining the impact of anthropomorphism and AI-chatbots service quality on online customer flow experience—exploring the moderating role of telepresence”, *Journal of Consumer Marketing*, Vol. 42 No. 4, pp.448-471.
- Chen, J.-S., Le, T.-T.-Y. and Florence, D. (2021), “Usability and Responsiveness of Artificial Intelligence Chatbot on Online Customer Experience in E-Retailing”, *International Journal of Retail & Distribution Management*, Vol. 49 No. 11, pp.1512-1531.
- Chen, S., Li, X., Liu, K. and Wang, X. (2023), “Chatbot or Human? The Impact of Online Customer Service on Consumers’ Purchase Intentions”, *Psychology & Marketing*, Vol. 40 No. 11, pp.2186-2200.
- de Matos, C. A., Laurentino, R. and Veiga, R. T. (2025), “Understanding customer collaboration with virtual agents: service task as a moderator”, *International Journal of Retail & Distribution Management*, pp.1-15.
- Fernandes, T. and Oliveira, E. (2021), “Understanding Consumers’ Acceptance of Automated Technologies in Service Encounters: Drivers of Digital Voice Assistants Adoption”, *Journal of Business Research*, Vol. 122, pp.180-191.
- Guo, W. and Luo, Q. (2023), “Investigating the Impact of Intelligent Personal Assistants on the Purchase Intentions of Generation Z Consumers: The Moderating Role of Brand Credibility”, *Journal of Retailing and Consumer Services*, Vol. 73.
- Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P. and Ray, S. (2021), “An Introduction to Structural Equation Modeling”, *Partial least squares structural equation modeling (PLS-SEM) using R: a workbook*. Springer Cham.
- Harman, H. H. (1976), *Modern Factor Analysis*. University of Chicago Press.
- Islam, J. U. and Rahman, Z. (2017), “The Impact of Online Brand Community Characteristics on Customer Engagement: An Application of Stimulus-Organism-Response Paradigm”, *Telematics and Informatics*, Vol. 34 No. 4, pp.96-109.
- Islam, M. N. and Islam, A. N. (2020), “A systematic review of the digital interventions for fighting COVID-19: the Bangladesh perspective”, *IEEE Access*, Vol. 8, pp.114078-114087.
- Kim, H. J., Ahn, S. and Ye, S. (2025), “Exploring AI assistant in luxury brands: How social presence and emotional appeal drive technology adoption”, *Journal of Retailing and Consumer Services*, Vol. 87.
- Kline, R. B. (2023), *Principles and Practice of Structural Equation Modeling*. Guilford Publications. New York.
- Maduku, D. K., Mpinganjira, M., Rana, N. P., Thusi, P., Ledikwe, A. and Mkhize, N. H.-b. (2023), “Assessing Customer Passion, Commitment, and Word-of-Mouth Intentions in Digital Assistant Usage: The Moderating Role of Technology Anxiety”, *Journal of Retailing and Consumer Services*, Vol. 71.

- Mpinganjira, M., Dlodlo, N. and Idemudia, E. C. (2024), "Perceived Experiential Value and Continued Use Intention of E-Retail Chatbots", *International Journal of Retail & Distribution Management*, Vol. 52 No. 13, pp.121-135.
- Moon, J.-W. and Kim, Y.-G. (2001), "Extending the TAM for a World-Wide-Web Context", *Information & Management*, Vol. 38 No. 4, pp.217-230.
- Osakwe, C. N., Říha, D., Elgammal, I. M. Y. and Ramayah, T. (2024), "Understanding Gen Z Shoppers' Interaction with Customer-Service Robots: A Cognitive-Affective-Normative Perspective", *International Journal of Retail & Distribution Management*, Vol. 52 No. 13, pp.103-120.
- Parra, F., Abdelfattah, B. and Bagchi, K. (2012), "Aesthetics in the Adoption of Information and Communication Technology", *Proceedings of the Eighteenth Americas Conference on Information Systems*, pp.1-13
- Podsakoff, P. M., MacKenzie, S. B. and Podsakoff, N. P. (2012), "Sources of Method Bias in Social Science Research and Recommendations on How to Control It", *Annual Review of Psychology*, Vol. 63, pp.539-569.
- Rahman, M. S., Sabbir, M. M., Zhang, J. and Zhang, L. (2025), "I Sense My Digital Assistants! Assessing the Impact of Customers' Immersive Experience and Perceived Social Presence on Purchase Intention", *Behaviour & Information Technology*, pp.1-19.
- Ruan, Y. and Mezei, J. (2022), "When Do AI Chatbots Lead to Higher Customer Satisfaction Than Human Frontline Employees in Online Shopping Assistance? Considering Product Attribute Type", *Journal of Retailing and Consumer Services*, Vol. 68, 103059.
- Ruangkanjanases, A. and Wutthisith, M. (2018), "Predicting Intention to Purchase Digital Stickers in an Application for Instant Communications on Mobile Devices: A Comparative Study", *Journal of Telecommunication, Electronic and Computer Engineering*, Vol. 10 No. 1-10, pp.75-80.
- Sharma, M., Joshi, S., Luthra, S. and Kumar, A. (2024), "Impact of Digital Assistant Attributes on Millennials' Purchasing Intentions: A Multi-Group Analysis Using Pls-Sem, Artificial Neural Network and Fsqca", *Information Systems Frontiers*, Vol. 26 No. 3, pp.943-966.
- Yang, H.-L. and Lin, R.-X. (2017), "Determinants of the Intention to Continue Use of Solomo Services: Consumption Values and the Moderating Effects of Overloads", *Computers in Human Behavior*, Vol. 73, pp.583-595.