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AI's invisible touch: how effortless browsing shapes customer perception, experience and engagement in online retail

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ABSTRACT

This study explores the influence of artificial intelligence (AI)-enabled ease of use on customer perception, experience, and engagement in online retail stores. Through a quantitative analysis of 1438 responses from Portuguese consumers, the research reveals that AI-enabled ease of use positively influences customers' perceived control, concentration, and cognitive enjoyment while browsing online stores. These perceptions, in turn, contribute to the elicitation of awe, which is found to be a crucial mediating factor in the relationship between customer perceptions and purchase intention. The study highlights the significant role of awe in strengthening the link between customer perceptions and purchase intent, rendering previously non-significant direct effects statistically significant. The findings offer valuable implications for online retailers seeking to leverage AI technologies to enhance customer experiences and drive sales. By prioritizing ease of use, cognitive enjoyment, and perceived control, and strategically leveraging the mediating role of awe, retailers can create engaging and memorable online shopping experiences that ultimately translate to increased customer satisfaction and purchase intention.

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1. Introduction

Artificial Intelligence (AI) has become a factor of change in the online retail sector (Guha et al., 2021). This change concerns the use of machines to perform tasks that normally require human intelligence, such as learning, problem-solving, and decision-making (Ma & Sun, 2020; Schweidel et al., 2023; Vincent, 2021). AI technologies are transforming the way online retail stores operate, allowing companies to recognize growth opportunities and improve their performance holistically (Oosthuizen et al., 2021). AI has the potential to revolutionize the online retail sector, providing customers with a more personalized and seamless shopping experience (Ameen et al., 2021).

One of the significant benefits of AI in online retail is its ability to personalize the customer experience (Haleem et al., 2022; Moreau et al., 2023). By using AI to analyze customer data and their purchase history, e-commerce companies can better understand customer demand and preferences (Ameen et al., 2021). This data can be used to provide personalized recommendations, promotions, and product suggestions to customers, making their shopping experience more pleasant and efficient (Hoyer et al., 2020). AI-based predictive analytics in e-commerce enables data-driven decision-making by analyzing customer behavior, sales patterns, and other key metrics (Chaudhuri et al., 2021).

AI-based functionalities in online retail stores are becoming increasingly popular (Hagberg et al., 2017). Retailers are using AI technologies and data-driven analytics to streamline processes, reduce costs, increase operational efficiency, and improve the overall shopping experience (Ameen et al., 2021).

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AI-powered personal shopping assistants are also becoming increasingly popular, offering features such as price monitoring and effective shopping list management. These features allow customers to have a more convenient and personalized shopping experience, leading to greater customer satisfaction and loyalty (Pillarisetty & Mishra, 2022).

The influence of AI-enabled ease of use on customer perception, experience, and engagement in online retail stores can be also considered in relation trust (Pelau et al., 2024), anthropomorphism (Pelau et al., 2021), to neuro management decision-making and cognitive algorithmic processes in the technological adoption of mobile commerce apps (Skare et al., 2021) and consumers' decision-making process on social commerce platforms in terms of online trust, perceived risk, and purchase intentions (Lăzăroiu et al., 2020).

According to Retail Economics (2019), 54% of retail marketers use AI-driven personalization across all channels to grow their business. By using AI, retailers can create a seamless and engaging shopping experience that increases customer satisfaction and loyalty. This approach has proven successful, with 51% of e-commerce companies using AI to deliver a seamless experience (Matzelle, 2024). The retail AI market is expected to reach 9.65 billion dollars by 2024 and grow at a CAGR of 32.17% to reach 38.92 billion dollars by 2029 (Mordor Intelligence, 2024). The use of AI in online retail stores in Portugal is growing rapidly, with more than 17% of companies already incorporating AI into their daily operations (Lopes, 2023). This statistic is more than double the European average, indicating a high level of adoption and interest in AI technology (Lopes, 2023). The Machine Learning market in Portugal is expected to grow by 18.14% between 2024 and 2030, resulting in a market volume of 2.23 billion dollars in 2030 (Statista, 2023). However, there is still some mistrust and hesitation among the Portuguese population when it comes to using retail stores that use AI (Ribeiro et al., 2022).

There is some literature on the impact of artificial intelligence on customer behavior in online shopping (Tulcanaza-Prieto et al., 2023). The studies carried out tend to show that AI-based personalization can positively influence customer perception, experience, and loyalty (Ifekanandu et al., 2023). However, there are still gaps in the literature regarding the influence of the ease of use of AI on these factors. For example, while some studies have examined the impact of AI on customer engagement, there is still a need for more research to fully understand the relationship between the ease of use of AI and customer engagement (Chen et al., 2022). Furthermore, while some studies have examined the impact of AI-based personalization, more research is needed on the impact of AI-based ease of use on customer trust and loyalty (Tulcanaza-Prieto et al., 2023). In addition, there is a need to address AI biases and how they can affect customer behavior (Dwivedi et al., 2023). Bridging these gaps and improving understanding of the topic could include analyzing the impact of the ease of use of AI on customer behavior in different industries and contexts (Haleem et al., 2022). In addition, the analysis could also focus on identifying the specific characteristics of AI that affect customer behavior (Bilal et al., 2024). There is a need to deepen the understanding of the effects of the ease of use of artificial intelligence on customer perception, experience, and interaction in the context of e-commerce (Ameen et al., 2021; Perez-Vega et al., 2021). So, two important questions can be raised: How does AI-enabled ease of use impact in customer perception and experience when browsing online shopping stores? How does AI-enabled ease of use influence customer engagement when browsing online shopping stores?

The aim of this study is to explore the influence of artificial intelligence-enabled ease of use on customer perception, customer experience, and customer engagement when browsing online stores with AI. To this end, 1438 responses were collected from the Portuguese population.

The contributions of this article are manifold. First, it bridges the gaps identified in previous research by providing empirical evidence on the influence of AI-enabled ease of use on customer engagement and the mediating role of awe in the context of online retail. Second, it deepens our understanding of how AI shapes consumer perceptions, experiences, and intentions in e-commerce settings, offering valuable insights for retailers seeking to leverage AI technologies to enhance customer engagement and drive sales. Third, the study highlights the importance of designing AI-powered online stores that prioritize ease of use, cognitive enjoyment, and perceived control to foster positive customer perceptions and heighten the sense of awe, ultimately increasing purchase intentions. Fourth, it establishes the crucial role of awe as a mediating mechanism channeling consumer behavior and driving purchase intentions in AI-enabled online retail.

The remaining part of this article is structured as follows: the next section provides a review of articles on the topic and formulation of hypotheses and research and presents the research model; in section three, the methods are presented, namely sample collection, measurement of the constructs and data analysis; in [Section 4](#), the results of the statistical description of the sociodemographic characteristics of the participants and the items that measure the constructs, the evaluation of the model obtained after applying the PLS method and the estimation of the research model are presented; [Section 6](#) contains a discussion of the results and presentation of theoretical and practical implications. The article concludes with synthesizing results and articulating possible limitations with future research directions.

2. Literature review

2.1. Artificial intelligence-enabled ease of use in online retail stores

AI has reshaped the retail industry, enhancing interaction between customers and companies via interactive digital platforms (Kaplan & Haenlein, 2020). Easy to use technology is appealing to customers as it requires minimal effort (Alalwan, 2020), making it a key factor inducing technology acceptance (Carter et al., 2020). The extent to which a potential user perceives a technology as being straightforward to use and comprehend translates to the enabled perceived ease of use of the technology (Davis, 1989; Davis et al., 1989; Liu et al., 2009; Venkatesh & Davis, 2000). It is viewed as a significant factor affecting people's behaviour intent (Yang et al., 2017), and associated with how individuals assess the level of effort required when utilizing the technology (Oly Ndubisi & Jantan, 2003). Commonly, the ease of use mirrors the anticipations that users hold for applications based on technology (Flavián et al., 2006), and influences their inclinations and motivations to accept and engage with technology (Chen et al., 2021). The ease of use exerts a noteworthy influence on consumers intentions to engage in transactions (Bayır & Akel, 2023; Pavlou, 2003). The variable of ease of use is identified as a significant determinant in the process of individuals adapting their perception of a system's usability with accrued direct experience (Venkatesh & Davis, 2000). This implies a positive relation between increased familiarity with the internet among consumers and their heightened favourable appraisal of it as a shopping intermediate (Monsuwé et al., 2004). Additionally, users prioritize perceived ease of use when selecting and integrating advanced technologies for a specific purpose (Bayır & Akel, 2023).

2.2. Customer perception in online retail navigation

E-commerce faces unique challenges in comparison to traditional retail, including potential undesirable customer perceptions because of the absence of direct interaction, the incapacity to physically examine items prior to purchase, geographical distance, and concerns about retailer reliability (Davari et al., 2016; Faqih, 2016). Therefore, online retail is challenged by a multitude of new complexities (Mou et al., 2018), emphasizing the crucial role of moulding customer perceptions (Vargo & Lusch, 2004; Zehir et al., 2014). Various factors heavily influence customer perceptions of the value of online channels (Carlson et al., 2015). Within the realm of online commerce, academics often make use of flow dimensions, such as perceived control, concentration, and cognitive enjoyment. Perceived control entails the degree of influence an individual believes they have over environmental stimulus and their resulting behaviour (Kautish & Khare, 2022). It stems from the perception of manipulating environmental factors, eliciting a sense of mastery (Csikszentmihalyi, 1975). Concentration is crucial for online shoppers, fostering focused attention, emotional attachment to AI interfaces, and efficient task completion throughout the shopping journey, as these interfaces progress to multi-agents that interpret particular circumstances (Kautish & Khare, 2022). Cognitive enjoyment, as people enter a flow state, is marked by intrinsic pleasure, manifested through a diminished self-awareness and a distorted perception of time (Csikszentmihalyi, 1975). The perception of computer-related activities as enjoyable in themselves, regardless of anticipated performance outcomes, defines online cognitive enjoyment (Kautish & Khare, 2022).

2.3. Artificial intelligence-enabled ease of use and customer perception, experience and engagement

The inclination to control AI machines is closely linked with individuals' intentions to utilize them (Compeau & Higgins, 1995). Previous studies have confirmed a favorable relation between perceived ease

of use and the adoption of technology by consumers (Liang et al., 2020). Thus, ease of use significantly shapes individuals' perceived control, reflecting their confidence in effectively utilizing AI systems (Mohr & Kuhl, 2021). Moreover, studies suggest that when consumers feel their decision-making is constrained, they tend to harbor consistently negative attitudes towards service providers (Yan et al., 2022). The absence of such restrictions, originating from ease of use, has the potential to positively influence perceived control. As a result of these reasoning, the following hypothesis was presented:

H1a: The artificial intelligence-enabled ease of use positively influences customers' perceived control.

Concentration entails individuals directing their attention to activities, filtering out irrelevant thoughts, resulting in absorption and heightened awareness of mental processes (Moon & Kim, 2001). It is crucial for online shoppers to efficiently accomplish tasks (Kautish & Khare, 2022). Being essential for achieving the flow state; users unable to focus on a specific field amidst multitasking will not experience it (Lu et al., 2009). In the realm of novel technologies, perceived ease of use has been recognized as having a significant positive influence on concentration (Akbari et al., 2020). AI's provision of up-to-date information and flexible services supports customers' decision-making, leading to a flow state where customers concentrate more (Nguyen et al., 2022). In light of this, the following hypothesis was suggested:

H1b: The artificial intelligence-enabled ease of use positively influences customers' concentration.

AI-driven technology has been observed to significantly contribute to enhancing customer enjoyment throughout the shopping experience, a phenomenon corroborated by numerous studies (Brill et al., 2022; Kreuger, 2018). Moreover, research suggests that people are more likely to invest additional effort in a given process when they derive satisfaction or enjoyment from it (Humida et al., 2022; Rodrigues et al., 2016). Additionally, consumers' perception of ease of use has been found to be positively associated with their perceived enjoyment (Humida et al., 2022). The ease of use has been found to have considerable impacts on intrinsic motivations, particularly in enhancing the enjoyment experienced by users (Kim et al., 2016). Thus, the following hypothesis was formulated:

H1c: The artificial intelligence-enabled ease of use positively influences customers' cognitive enjoyment.

Recent studies have explored technological progress in research related to awe (Hinsch et al., 2020). Awe experience is a powerful emotional reaction triggered by stimuli that surpass one's typical frame of reference, compelling an adjustment to existing psychological frameworks (Chirico et al., 2017). Awe enriches environmental processing, extends present focus to expand perception of time, shifts attention from self to universal connectedness (Drinkwater et al., 2022). AI-enabled services provide the chance to undergo emotional experiences (Kautish & Khare, 2022). These reasoning, support the argument that the ease of use of AI-enabled retail stores has the potential to influence the awe experience, as it offers seamless and intuitive interactions, thereby fostering a sense of wonder and amazement among consumers as they explore innovative technologies and services. Therefore, the following hypothesis was proposed:

H1d: The artificial intelligence-enabled ease of use positively influences customers' awe experience while navigating through online retail stores.

The evaluation of customer engagement is conducted by assessing their purchase intention in online retail stores. Online purchase intention is indicative of customers' inclination or desire to conduct buying activities over the internet (Moslehpour et al., 2018). The perceived ease of use associated with AI and individuals' attitudes toward technology have a notable and positive effect on their intention to make purchases (Arachchi & Samarasinghe, 2023). Moreover, several research investigations have explored and established the relation between perceived ease of use and its association with purchase intention (Ghosh, 2024; Manis & Choi, 2019). Moreover, the perceived ease of use of a technology can significantly influence consumer purchase intention, particularly through AI-based applications in the retail sector (Arachchi & Samarasinghe, 2023). It also influences online purchase intentions when utilizing AI assistants (Hsieh & Lee, 2021). Consequently, the following hypothesis was posited:

H1e: The artificial intelligence-enabled ease of use positively influences consumers' purchase intention in online retail stores that utilize AI.

2.4. Customer perception and customer experience

The shopping platform should offer product details and interactive features that stimulate social, emotional, and cognitive engagement (Kautish & Khare, 2022). AI-driven technology in e-commerce is transforming the dynamics of customer experience (Ameen et al., 2021). Retailers have adopted the idea of managing customer experience, integrating it on the fabric of their corporate mission declarations (Foroudi et al., 2018).

The temporary loss of perceived control significantly impacts an individual's consumption habits, as evidenced by their preferences for orderly environments, brands with distinct boundaries, and choices to maintain a sense of control rather than prioritize uniqueness (Zhang et al., 2023). Additionally, the perception of control associated with AI-enabled services contributes positively to the awe experience (Kautish & Khare, 2022). Furthermore, contemplations on potential future scenarios, guided by the perception of control, are centered on the exploration of awe-inspiring possibilities (Mueller et al., 2023). Henceforth, the following hypothesis was postulated:

H2a: The perceived control of customers while navigating through online retail stores positively influences their awe experience.

Academics have identified substantial connections between concentration and favourable emotional states (Pilgrim et al., 2017). Concentration denotes the degree of focused attention, particularly evident when individuals are in a state of flow, where they typically engage in activities with heightened concentration, playing a pivotal role in aiding online customers in efficiently and effectively completing shopping tasks (Kautish & Khare, 2022). Moreover, a heightened level of concentration facilitated by AI-enabled service technology leads to various positive outcomes, including the elicitation of awe experiences (Kautish & Khare, 2022). Thus, the following hypothesis was asserted:

H2b: The concentration of customers while navigating through online retail stores positively influences their awe experience.

The functionalities embedded within the website serve to actively involve customers in a spectrum of activities associated with exploring novel incitements, experimenting with applications, and acquiring knowledge about emerging dimensions of technological applications, ultimately evoking a sense of awe (Kautish & Khare, 2022). When fashion consumers utilize virtual assistant technology as a driver for enjoyment, they are prone to encountering feelings of awe (Kautish et al., 2023). The perception of enjoyment has a significant influence on the experience of awe within the demographic of retail consumers belonging to Generation Z (Ng et al., 2021). Subsequently, the following was hypothesized:

H2c: The cognitive enjoyment of customers while navigating through online retail stores positively influences their awe experience.

2.5. Customer perception, customer experience and purchase intention

In the case of multichannel consumers, perceived control is positively associated with purchase intention (Rippé et al., 2016). Granting users' greater control within virtual try-on applications may result in more favourable app perceptions and heightened intentions to make purchases (Feng & Xie, 2019). The perception of control, resulting from image interaction, boosts consumers' perception of the richness of information provided regarding their intention to make online purchases. Furthermore, perceived control is linked to multiple consumer answers, such as purchase intention, and the perception of the online retail (Hu & Wise, 2020). Accordingly, the following hypothesis was stated:

H3a: The perceived control of customers positively influences the purchase intention in online retail stores that utilize AI.

Flow was employed to examine how the concentration of users affects task engagement (Liu et al., 2009). Concentration is of utmost importance, acting as a pivotal factor in facilitating the experience of flow, aiding in the efficient accomplishment of purchasing objectives, thereby serving to assist customers

in realizing their intentions to make purchases online (Koufaris, 2002). Concentration plays a critical role in enabling online information systems to offer consumer-friendly interfaces, while also impacting E-commerce vendors' ability to improve consumer focus by minimizing irrelevant content, thereby shaping online consumer behaviour (Lee & Chen, 2010). Enhanced concentration throughout the online shopping experience can bolster confidence in purchasing decisions, thereby underscoring the substantial positive influence of concentration on online purchase intention (Ozkara et al., 2017). In consequence, the following hypothesis was advanced:

H3b: The concentration of customers positively influences the purchase intention in online retail stores that utilize AI.

The cognitive enjoyment of shoppers, buying from online retail platforms, significantly e positively influenced the online purchasing intention (Nguyen et al., 2023). Among the flow dimensions, perceived control exerts the most significant influence on the intention to engage in online purchasing (Ozkara et al., 2017). In AI-powered automated stores, the cognitive enjoyment experienced by consumers is a notable predictor of their intention to shop (Pillai et al., 2020). Furthermore, in the realm of AI-driven intelligent products, enjoyment plays a pivotal role in shaping the intention to make a purchase (Sohn & Kwon, 2020). Therefore, the following hypothesis was projected:

H3c: The cognitive enjoyment of customers positively influences the purchase intention in online retail stores that utilize AI.

Acquaintance to aesthetically pleasing objects, that defy pre-existing cognitive frameworks, within customers can lead to a sense of awe (Hinsch et al., 2020) that stimulate the desire to buy goods (Guo et al., 2018). Furthermore, interacting with AI-enabled technologies demands customers to adapt their pre-existing mental models, eliciting awe and prompting particular behavioural consequences (Hinsch et al., 2020) including but not limited to intentions to make purchases (Guo et al., 2018). The feeling of awe, sparked by the aesthetic appeal of a product showcased in an promotional material, has the capacity to counteract the impact of negative reviews while also prompting curiosity and fostering a desire to learn among customers, increasing their inclination to experiment with a product (Septianto et al., 2020). In accordance, the following hypothesis was proposed:

H4: Customers' awe experience while navigating through online retail stores positively affects their purchase intention in online retail stores that utilize AI.

2.6. Customer perception and purchase intention, mediating by customer experience

The enhanced level of perceived control explains the advantages of using interactive images in online publicity (Hu & Wise, 2020). Awe, frequently ignited by encounters with grand landscapes, striking images or visuals, possesses the capacity to evoke significant shifts in consumer behaviour, potentially leading to changes in their purchasing decisions and preferences. Moreover, the motivations underlying the use of interactive AI-enabled technology, including functional, hedonic, social, and cognitive factors, may evoke an awe experience among consumers, thereby influencing purchase intentions (Koufaris, 2002). Furthermore, consumer behaviour is not solely determined by stimuli; instead, it is channelled through a mediation mechanism (Sharma et al., 2021; Sharma, Fadahunsi et al., 2022). Consequently, the following was hypothesized:

H5a: The perceived control of customers, while navigating through online retail stores, positively influences their purchase intention in online stores that utilize AI, when mediated by their awe experience.

Based on the premise that, consumer behaviour is not exclusively influenced by stimuli, but rather directed through a mediation mechanism (Sharma et al., 2021; Sharma, Fadahunsi et al., 2022), the role of concentration in purchase intentions, with the mediation part of awe, can be examined. Concentration refers to the degree of an individual's absorption in an activity, to the extent that nothing else holds significance. Social media users, engage with a dashboard filled with various interactive elements, necessitating deep concentration due to the multitude of information presented, ultimately leading to

heightened enjoyment (Pelet et al., 2017). Awe not only increases product memorability but also positively influences consumers' purchase intentions (Guo et al., 2018). As a result, the following hypothesis was formulated:

H5b: The concentration of customers, while navigating through online retail stores, positively influences their purchase intention in online stores that utilize AI, when mediated by their awe experience.

The rationale for this final hypothesis aligns with the reasoning behind the two previous ones, namely, that consumer behaviour isn't solely dictated by stimuli but is rather channelled through a mediation mechanism (Sharma et al., 2021; Sharma, Fadahunsi et al., 2022). The influence of cognitive enjoyment on purchase intentions, particularly when mediated by the experience of awe, warrants examination. Highlighting the connection between enjoyment and purchase intention, businesses can alleviate advertising irritation by engaging customers through enjoyable online platforms, providing desired information, integrating artworks to deepen connections, ultimately increasing effectiveness and benefiting businesses (Sharma, Dwivedi et al., 2022). Consumers' enjoyment of voice assistants can drive their motivation to utilize them for shopping, suggesting that hedonic motivations are poised to boost purchase intentions by evoking enjoyment feelings (Kautish et al., 2023). Therefore, the following hypothesis was proposed:

H5c: The cognitive enjoyment of customers, while navigating through online retail stores, positively influences their purchase intention in online stores that utilize AI, when mediated by their awe experience.

Figure 1 illustrates the research model and the hypotheses formulated in this study.

3. Methods

3.1. Research design

This exploratory study investigates the influence of AI-enabled ease of use on customer perception, experience, and engagement in online retail stores. This approach is appropriate since the aim is to test the relationships established in the research model.

3.2. Sample collection

The sample for this study was collected through an online questionnaire, the link to which was shared with the authors' contact networks and the LinkedIn social network. This is a non-probabilistic sample collected for convenience. The target audience was consumers over 18 years old, residing in Portugal, who had, in the last 12 months, made at least one purchase in an online store (in any sector of activity) that uses artificial intelligence tools. Therefore, the questionnaire contained two questions to validate participation: (i) "I confirm that I am over 18 years old and a resident of Portugal" and (ii) "In the last 12 months, I have made at least one purchase in an online store (in any sector) that had artificial intelligence tools". A negative answer to the questions led to the end of the questionnaire. If so, participants had access to the remaining questions. The choice of Portuguese consumers as the target audience was

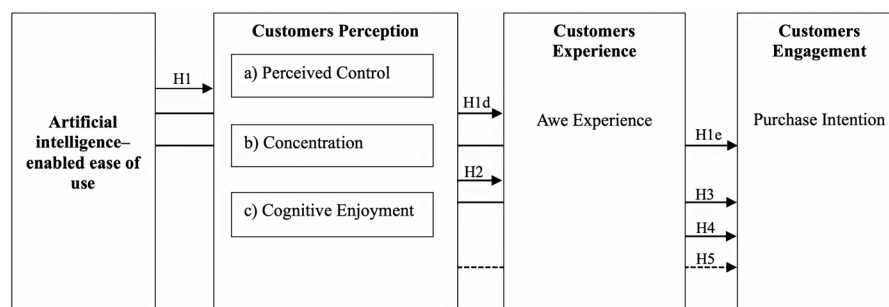


Figure 1. Research model and the hypotheses formulated.

due to the authors' proximity to these participants. Thus, the study sample consists of 1,438 participants who cumulatively met the two participation conditions. Informed consent was obtained in written form from all participants prior to their inclusion in the study. Participants provided their consent electronically through the online questionnaire platform. They were presented with detailed information about the study's purpose, procedures, potential risks, and their rights, and they indicated their agreement by selecting the appropriate option before proceeding to the questionnaire. This study was approved by the Ethics Committee at Instituto Superior Miguel Torga, under approval number CE-P22-23. All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments. The questionnaire was anonymous, the objective of the study was explained, and artificial intelligence tools available in online stores were exemplified (e.g., chatbots, voice assistants, augmented reality, smart technology, adaptation to each customer with customization, smart clothing, among others). A pre-test was carried out with 20 participants with different sociodemographic characteristics in order to assess their understanding of the questions and response time. The results of the pre-test reveal that participants had no difficulty understanding the questions, and the average response time was 6 min.

3.3. Measurement of the constructs

The questionnaire applied consisted of five sections (details in [Appendix A.1.](#)). The first section related to the participation issues described previously, and the second section related to the collection of the sociodemographic characteristics of the participants. The third section was adapted from Bhagat et al. (2023), relating to the applicability of artificial intelligence tools in online stores. This section was composed of two constructs: (i) AI-enable ease of use with three items and (ii) purchase intention in online stores with AI tools with three items. The fourth section was related to consumers' perceptions when using online stores with AI tools, having been measured by three constructs: (i) perceived control with three items, (ii) concentration with three items, and (iii) cognitive enjoyment also with three items. The fifth section was related to consumers' awe experience when using this type of service and was measured by twelve items. Sections four and five were adapted from Kautish and Khare (2022). All questions were measured on a 7-point Likert agreement scale, ranging from 1 – Strongly disagree to 7 – Strongly agree.

3.4. Data analysis

This study uses a quantitative methodology, and the data analysis comprised five phases. In the first phase, a statistical analysis of the sociodemographic characteristics of the participants and the items that measure each construct was carried out using the SPSS software (V.25). In the second phase, a factor analysis was carried out, with an exploratory factor analysis (EFA) being implemented with a varimax-rotated matrix with the aim of dividing the items into factors and evaluating the communalities and confirmatory factor analysis (CFA) with the aim of evaluating the confirmatory factor loads (reference value > 0.70) and the reflective nature of the research model. In the third phase, the Partial Least Square (PLS) method was applied to the research model using the SMART PLS software (v. 4.0) (Ringle et al., 2020). The PLS method combines factor analysis with the estimation of relationships between constructs using the Ordinary Least Square method. It does not require data normality. The data for our study were collected by questionnaire, and we carried out normality tests. According to the statistics obtained from the Kolmogorov–Smirnov test and the Shapiro–Wilk tests, the data does not have a normal distribution. The PLS method has already been applied in other similar studies (e.g. Bharti et al., 2023; Kautish & Khare, 2022; Aw et al., 2022). In the fourth phase, the model obtained after applying the PLS method was evaluated according to the indicators proposed by Hair et al. (2022). Therefore, to evaluate convergence and reliability, we use the Cronbach alpha ($\alpha > 0.70$), Composite Reliability (CR > 0.70), and Average Variance Extracted (AVE > 0.50) coefficients. To assess discriminant validity, we used the heterotrait-monotrait ratio of correlations (HTMT). We also evaluate the model fit, the existence of collinearity problems through the variance inflation factor (VIF) statistic, the significance and relevance of path coefficients through R^2 , and the predictive and explanatory capacity of the model through the

Stone-Geisser measure (Q^2). Finally, in the fifth phase, we estimated the relationships established between constructs in the research model, and a bootstrap analysis was implemented in Smart PLS (v. 4.0).

4. Results

4.1. Statistical description of participants' sociodemographic characteristics

The sample consists of 1,438 participants, of which 55.5% are female, 43.5% male, and 1% other. The average age is 27.7 years old, with the minimum age being 18 years old and the maximum age being 79 years old. In terms of education, 45.4% have completed secondary education at most, 44.5% have a bachelor's degree, 8% have a master's degree, and 2.1% have a doctorate. 47.1% are students, 39.6% are dependent workers, 7.9% are self-employed, 2.1% are retired and 3.3% are unemployed. In terms of net monthly income, 36.2% have no monthly income, and 38.6% have a monthly income of less than 1000 euros. Regarding previous experience with AI-based online shopping, 39.6% have experience of less than six months, 32.9% between 6 months and one year, and 27.5% more than one year.

4.2. Statistical description of the items that measure the constructs

Table 1 contains the mean and standard deviation of the items that measure the constructs. In general terms, participants agreed with the questions ($M > 3.50$). Specifically, on average, the questions relating to AI-enable ease of use generated moderate agreement ($M = 4.52$). Regarding the items referring to customer perception, the ones that generated the greatest agreement were concentration ($M = 4.29$), followed by cognitive enjoyment ($M = 4.23$) and perception control ($M = 4.11$). The items that measured the awe experience obtained an average agreement of 3.96, and those for decision purchase were 3.82.

4.3. Factor analysis

In Appendix A.2. The results of the implementation of the EFA and CFA are included. The EFA results demonstrate that the items were divided into six factors corresponding to each of the constructs included in the research model. No items were eliminated and all items have high communalities (> 0.70). The accumulated variance of the factors was 61.6%, with no single factor explaining more than 50% of the total variance. The CFA results demonstrate that the items have high confirmatory factor loadings (> 0.70) and the reflective nature of the model was confirmed.

4.4. Model evaluation after applying the logarithm of the PLS method

After applying the logarithm of the PLS method, the model obtained was evaluated in terms of convergence, reliability, and discriminant validity. To evaluate convergence and reliability, results from the Cronbach alpha ($C\alpha > 0.70$), Composite Reliability ($CR > 0.70$), and Average Variance Extracted ($AVE > 0.50$) coefficients are used, as suggested by Hair et al. (2022). According to the results in Table 2, as the values for these coefficients are higher than the reference values, the model obtained is convergent and reliable. Table 2 also contains the results of the HTMT criterion, highlighting that the model has discriminant validity.

The model fit was also evaluated with the indicators suggested by Hair et al. (2022): Chi-Square ($p = 0.093$), Goodness-of-Fit (0.96; reference > 0.90), the Comparative Fit Index (0.95; reference value > 0.90) and Standard Root Mean Square Residual (0.072; reference value < 0.08). As the values obtained are higher than the reference values, we can conclude that the model presents a good fit. In order to evaluate potential collinearity problems, the variance inflation factor (VIF) coefficients were calculated in Smart PLS (V.4.0). The largest VIF is 2.876 for item AE7, and as such, there are no collinearity issues. Finally, the significance and relevance of path coefficients were assessed using R^2 , and the predictive and explanatory capacity of the model using the Stone-Geisser measure (Q^2). Table 3 presents the significance and relevance of path coefficients (R-square) and predictive and explanatory capacity of the model

(Q^2). The results demonstrate that, according to Cohen (2013) criterion, all dependent variables have a strong effect size (> 0.26). Furthermore, the estimated model has cross-validated predictive relevance since the Q^2 coefficient obtained for the dependent variables is greater than zero.

4.5. Estimations of relationships between constructs

Table 4 contains the results of applying bootstrap analysis to estimate the direct relationships between constructs established in the research model.

The results reveal that AI enables ease of use positively and significantly influences customer perceptions when browsing online shopping stores in terms of perceived control ($\beta=0.548$), concentration ($\beta=0.534$), and cognitive enjoyment ($\beta=0.478$). In this way, hypotheses H1a to H1c are confirmed. Although the influence is smaller, AI's enabling ease of use positively influences the customer's awe experience when browsing online shopping stores ($\beta=0.121$) and the customer's purchase intention in stores that use AI ($\beta=0.316$), confirming hypotheses H1d and H1e. Customer perceptions when browsing online shopping stores positively influence the awe experience, with the greatest influence being cognitive enjoyment ($\beta=0.366$), followed by perceived control ($\beta=0.192$) and finally, concentration ($\beta=0.171$), confirming hypotheses H2a to H2c. However, the positive relationship between customer perceptions when browsing online shopping stores and purchase intention in online stores that use AI was only found for perceived control ($\beta=0.181$) and cognitive enjoyment ($\beta=0.202$), not being significant to support the relationship between concentration and purchase intention. Therefore, hypotheses H3a and H3c are accepted, and hypothesis H3b is rejected. Finally, there is a positive influence of the customer's awe experience when browsing online shopping stores on the intention to purchase in online stores with AI ($\beta=0.307$), confirming hypothesis H4.

Table 5 contains the results of mediating effects between constructs established in the research model.

Table 1. Mean and standard deviation of items.

	Mean	Std. Deviation
Artificial Intelligence-enable ease of use (AI)	4.52	1.561
A1	4.55	1.569
A2	4.55	1.56
A3	4.47	1.554
Perceived Control (PC)	4.11	1.555
PC1	4.34	1.520
PC2	4.24	1.578
PC3	3.75	1.568
Concentration (CO)	4.29	1.515
CO1	4.28	1.518
CO2	4.32	1.520
CO3	4.27	1.507
Cognitive Enjoyment (CE)	4.23	1.633
CE1	4.33	1.644
CE2	4.21	1.611
CE3	4.16	1.644
Awe Experience (AE)	3.96	1.640
AE1	4.34	1.552
AE2	4.11	1.543
AE3	4.09	1.501
AE4	4.08	1.591
AE5	4.06	1.628
AE6	4.19	1.604
AE7	3.60	1.817
AE8	3.49	1.842
AE9	3.71	1.705
AE10	3.86	1.626
AE11	3.94	1.648
AE12	4.05	1.624
Purchase Intention (PI)	3.82	1.691
PI1	3.89	1.690
PI2	3.99	1.634
PI3	3.59	1.749

Table 2. Convergence and reliability of model.

	Ca	CR	AVE	AI	PC	CO	AE	PI
Artificial Intelligence-enabled ease of use (AI)	0.840	0.903	0.757					
Perceived Control (PC)	0.875	0.780	0.549	0.761		0.771		
Concentration (CO)	0.747	0.855	0.663	0.669				
Cognitive Enjoyment (CE)	0.878	0.925	0.804	0.557	0.675	0.801	0.685	0.623
Awe Experience (AE)	0.934	0.943	0.581	0.544	0.733	0.690		
Purchase Intention (PI)	0.808	0.886	0.722	0.741	0.828	0.662	0.708	

Table 3. Significance and relevance of path coefficients (R-square) and predictive and explanatory capacity of the model (Q²).

	R Square	R Square Adjusted	Q ²
Perceived Control (PC)	0.301	0.300	0.163
Concentration (CO)	0.285	0.285	0.185
Cognitive Enjoyment (CE)	0.269	0.268	0.183
Awe Experience (AE)	0.494	0.492	0.279
Purchase Intention (PI)	0.535	0.533	0.382

Table 4. Direct effects.

Effects on Endogenous Variable	Path (β)	t Value (Bootstrap)	p-value	Confidence Interval		Hypothesis support
				2.5%	97.5%	
H1a: AI > PC	0.548	22.823	0.000	0.499	0.593	Yes
H1b: AI > CO	0.534	22.349	0.000	0.487	0.578	Yes
H1c: AI > CE	0.478	20.000	0.000	0.431	0.524	Yes
H1d: AI > AE	0.121	4.372	0.000	0.070	0.173	Yes
H1e: AI > PI	0.316	11.154	0.000	0.256	0.367	Yes
H2a: PC > AE	0.192	6.419	0.000	0.134	0.251	Yes
H2b: CO > AE	0.171	5.383	0.000	0.115	0.233	Yes
H2c: CE > AE	0.366	12.149	0.000	0.298	0.418	Yes
H3a: PC > PI	0.181	6.428	0.000	0.128	0.235	Yes
H3b: CO > PI	0.004	0.114	0.910	-0.060	0.066	No
H3c: CE > PI	0.202	6.437	0.000	0.137	0.266	Yes
H4: AE > PI	0.307	9.920	0.000	0.244	0.371	Yes

Note: Artificial Intelligence-enabled ease of use (AI); Perceived Control (PC); Concentration (CO); Cognitive Enjoyment (CE); Awe Experience (AE) and Purchase Intention (PI).

Table 5. Mediating effects.

Effects on Endogenous Variable	Path (β)	t value (Bootstrap)	p-value	Confidence interval		Hypothesis support
				2.5%	97.5%	
H5a: PC $\rightarrow$ AE $\rightarrow$ PI	0.259	5.506	0.000	0.039	0.280	Yes
H5b: CO $\rightarrow$ AE $\rightarrow$ PI	0.112	4.549	0.000	0.032	0.175	Yes
H5c: CE $\rightarrow$ AE $\rightarrow$ PI	0.312	7.798	0.000	0.083	0.340	Yes

Note: Perceived Control (PC); Concentration (CO); Cognitive Enjoyment (CE); Awe Experience (AE) and Purchase Intention (PI).

The results reveal a positive influence between customers' perceptions when browsing online shopping stores and their purchase intention in online stores that use AI when mediated by their awe experience, with this mediation strengthening this relationship. Furthermore, the concentration that was not directly statistically significant in influencing purchase intention now has a positive influence ($\beta=0.112$). Hypotheses H5a to H5c are confirmed.

5. Discussion

The influence of artificial intelligence-enabled ease of use on customer perception, experience, and engagement when browsing online stores with AI is a topic of great significance. Our findings indicate that AI-enabled ease of use positively influences customer perceptions, specifically through enhanced perceived control, concentration, and cognitive enjoyment. These improved perceptions contribute to a heightened awe experience when customers navigate online stores utilizing AI technologies. Interestingly, while perceived control and cognitive enjoyment directly impact purchase intention, concentration does not have a direct effect. However, when the awe experience mediates the relationship, concentration

positively influences purchase intention. This shows the important role of emotional experiences in converting cognitive perceptions into actual purchasing behavior.

Our findings link to existing theories in the field, such as the Technology Acceptance Model (Davis, 1989; Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2012), which emphasize ease of use as a fundamental determinant of technology adoption. Moreover, by linking the psychological state of flow with the emotional experience of awe, we underline the importance of flow dimensions—perceived control, concentration, and cognitive enjoyment—and thereby flow theory (Csikszentmihalyi, 1975; Kautish & Khare, 2022) in understanding consumer engagement with AI technologies. We also contribute to the growing body of research discussing the influence of AI on creating engaging and immersive customer experiences (McLeay et al., 2021). The seamless and intuitive interactions facilitated by AI foster a sense of control, heightened focus, and intrinsic enjoyment among consumers exploring innovative technologies and services (Akbari et al., 2020; Kim et al., 2016; Mohr & Kühl, 2021). This enhancement of the overall customer experience leads to increased satisfaction and loyalty.

A particularly noteworthy aspect of our findings is the significant role of the awe experience as a mediating factor. The sense of awe, evoked by innovative and user-friendly AI features, enriches customer perceptions as well as significantly influences purchase intentions. This aligns with previous research suggesting that awe can stimulate curiosity, counteract negative perceptions, and increase consumers' willingness to engage with products (Guo et al., 2018; Septianto et al., 2020). The mediating effect of awe transforms the previously non-significant direct effect of concentration on purchase intention into a significant indirect effect, stressing the importance of emotional experiences in driving consumer behavior (Sharma et al., 2021; Sharma, Fadahunsi et al. 2022). However, the observation that concentration does not directly influence purchase intention suggests that cognitive engagement alone may not suffice to drive purchasing behavior without the accompanying emotional resonance provided by the awe experience. This invites further exploration into the association between cognitive states and emotional responses in shaping consumer decisions (Lee & Chen, 2010; Ozkara et al., 2017).

5.1 Academic implications for future research

We consider that integrating the emotional dimension of awe into established models may enrich existing frameworks by highlighting the role of emotions in technology adoption. Beyond cognitive evaluations of ease of use and usefulness, emotional responses elicited by AI technologies seem to significantly shape consumer behavior. Future models of technology acceptance could benefit from incorporating emotional constructs to predict consumer intentions. Also, the prominent impact of cognitive enjoyment on both the awe experience and purchase intention directs to the importance of hedonic motivations in adopting AI technologies, aligning with prior research emphasizing intrinsic enjoyment as a key driver of user engagement with new technologies (Humida et al., 2022; Kim et al., 2016). Subsequent studies could explore how specific features of AI interactions—such as personalization, interactivity, and gamification—enhance cognitive enjoyment and, consequently, influence consumer engagement and loyalty.

While focused attention is necessary, the emotional amplification provided by awe appears to translate cognitive engagement into purchasing behavior. This insight invites further exploration into how cognitive states like concentration convert into actionable intentions and how emotions mediate this process. Traditionally associated with extraordinary or sublime events (Chirico et al., 2017; Guo et al., 2018), awe's role in everyday interactions with AI technologies presents a novel area of inquiry. Future research might examine how other emotions elicited by AI—such as trust, surprise, or curiosity—influence consumer behavior, and how these emotional responses can be intentionally designed into AI interactions to enhance user experience and engagement.

We acknowledge that the focus on Portuguese consumers underlines potential cultural factors impacting the observed relationships. Cultural differences may moderate how consumers perceive and react to AI-enabled ease of use, suggesting that cross-cultural comparisons would enhance the generalizability of the findings. Moreover, the implications of AI-enabled ease of use for consumer empowerment and autonomy warrant deeper exploration. Enhanced perceived control indicates that AI technologies could redefine power dynamics between consumers and retailers, potentially leading to increased consumer

empowerment. Investigating how AI influences perceptions of agency and control could provide valuable insights into consumer trust and loyalty in digital marketplaces.

5.2 Managerial implications for organizations

The findings of this study may offer valuable insights for online retailers aiming to leverage AI technologies to enhance customer experiences and drive sales, as emphasizing AI-enabled ease of use seems to be of great importance (Ameen et al., 2021). By developing intuitive and user-friendly AI interfaces, retailers can significantly improve customers' perceived control, concentration, and cognitive enjoyment—factors that positively influence purchase intentions. Simplifying navigation and interaction, and ensuring that features like chatbots, virtual assistants, and recommendation systems are seamlessly integrated (Hoyer et al., 2020), can foster positive customer perceptions and increase satisfaction.

To elevate cognitive enjoyment, retailers may consider incorporating interactive and engaging elements into their online platforms. Implementing features such as gamification, personalized content, and immersive technologies like virtual or augmented reality can make the shopping experience more enjoyable and mentally stimulating (Brill et al., 2022). This strategy not only deepens customer engagement but also encourages repeat visits and fosters brand loyalty (Kautish et al., 2023). Also, creating awe-inspiring experiences through innovative AI applications can strengthen the emotional connection with customers (Hinsch et al., 2020). Retailers can achieve this by introducing cutting-edge technologies that exceed customer expectations. For instance, AI-powered virtual try-on features, highly personalized product recommendations using advanced algorithms, or visually stunning virtual showrooms can generate moments of wonder and amazement (Septianto et al., 2020).

The indirect influence of concentration on purchase intention, mediated by the awe experience, suggests that retailers need to design online environments that capture and maintain customer attention without causing cognitive overload. Achieving a balance between engaging content and ease of navigation is therefore fundamental (Pelet et al., 2017). Seamlessly integrating AI technologies across various touchpoints—from product discovery and personalized recommendations to customer support and post-purchase engagement—can optimize the customer journey on multiple levels (Oosthuizen et al., 2021). Such balance elicits not only experience optimization but also dynamic responsiveness. Retailers should engage in continuous evaluation and refinement of AI-powered features by gathering feedback, analyzing behavioral data, and conducting user testing (Chen et al., 2022). By sustaining customer focus and enhancing the overall shopping experience, retailers can convert cognitive engagement into actual purchasing behavior (Lee & Chen, 2010).

5.3 Limitations and future research perspectives

This study has some limitations. Firstly, despite the large number of participants that comprise the sample, it is non-probabilistic and collected for convenience, and the results cannot be generalized. Therefore, it would be interesting to collect a probabilistic sample of Portuguese consumers in future studies to generalize the results. Second, consumer perception of online shopping stores that use AI was assessed, but information was not collected about the features and tools that customers used in these stores in terms of AI. A more intense use of AI in online stores, such as product personalization, product recommendation based on the customer profile, personalized storefronts, anthropomorphized chatbots, and voice searches, among others, can influence the customer experience when browsing this type of store and intensify your engagement. Therefore, it would be important in a future study to diagnose AI features and tools that the online store uses and evaluate how they affect customer perception, the awe experience, and their purchase intention. The sociodemographic characteristics of the sample participants were not used as constructs in the research model. In future lines of research, we could use gender, age, education, and net income as moderating variables for customer perceptions and the awe experience. This will allow us to infer important implications for marketing managers to promote practices focused on different consumer profiles to improve customer engagement in online AI stores.

6. Conclusion

The increasing dissemination and use of AI has driven the transformation of traditional marketing practices, given its impact on consumer perceptions, preferences, attitudes, and behaviors. This study aims to explore the role of AI-enabled ease of use in customers' perceptions and experience of admiration when browsing online stores and in their engagement through their purchase intention in online stores that use AI.

The results reveal that AI-enabled ease of use positively influences customer perceptions measured by perceived control, concentration, and cognitive enjoyment, as well as the awe experience obtained when browsing online stores and purchase intention in online stores that use AI. Furthermore, customer perceptions of perceived control, cognitive enjoyment, and awe experience positively affect customer engagement in online stores. However, the perception of AI-driven concentration in customers when they browse online stores is not statistically significant in influencing their purchase intention. But, when the relationship between customers' perceptions when browsing online stores and purchase intention is mediated by the awe experience, there is a positive and significant influence. Therefore, it is not enough for the ease of use of AI to positively influence customers' perceptions when they browse online stores with AI; they must have an awe experience that motivates them to buy in these types of online stores with AI.

Authors' Contributions

João M. Lopes: study conception, study design, questionnaire development, and manuscript preparation. Tiago Trancoso: literature review, study design, discussion of results, and manuscript preparation. Sofia Gomes: data collection, data curation, and data analysis. Elisabete Nogueira: literature review, data collection, and editing. All authors have approved the final manuscript.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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Appendix

A.1. Questionnaire available at: https://drive.google.com/file/d/1PEIsXwq5SkFyqYG_bthvVdWJzOlOgAJQ/view?usp=sharing

A.2. EFA and CFA results

Table A.2. EFA and CFA results.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalities	Confirmatory Factor Loads
Artificial Intelligence-enable ease of use (AI)								
A1	0.766						0.768	0.874
A2	0.769						0.766	0.877
A3	0.722						0.719	0.859
Perceived Control (PC)								
PC1		0.778					0.705	0.829
PC2		0.788					0.795	0.814
PC3		0.777					0.749	0.745
Concentration (CO)								
CO1			0.764				0.791	0.815
CO2			0.758				0.738	0.807
CO3			0.706				0.701	0.821
Cognitive Enjoyment (CE)								
CE1				0.767			0.702	0.892
CE2				0.755			0.711	0.902
CE3				0.726			0.701	0.896
Awe Experience (AE)								
AE1					0.725		0.717	0.707
AE2					0.757		0.764	0.756
AE3					0.792		0.778	0.779
AE4					0.704		0.781	0.754
AE5					0.731		0.706	0.798
AE6					0.703		0.738	0.804
AE7					0.702		0.727	0.809
AE8					0.754		0.717	0.825
AE9					0.732		0.745	0.763
AE10					0.71		0.716	0.746
AE11					0.735		0.747	0.721
AE12					0.718		0.784	0.775
Purchase Intention (PI)								
PI1						0.737	0.758	0.867
PI2						0.757	0.759	0.852
PI3						0.794	0.757	0.829