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Consumer Acceptance of AI in Retail: The Mediating Roles of Perceived Usefulness and Risk

Yuliani Nuril Khasanah [1]

[1] Sekolah Tinggi Ilmu Ekonomi Widya Wiwaha, Yogyakarta, Indonesia

Abstract

This study examines how artificial intelligence reshapes retail and how consumers ultimately accept or resist artificial intelligence enabled services. Using a systematic literature review of peer reviewed journal articles on retail, online shopping, and artificial intelligence based voice assistants and chatbots, the study synthesises evidence on benefit related and risk related pathways. The review confirms that perceived usefulness is a central mechanism through which automation, personalisation, and decision support translate into favourable attitudes, stronger purchase intentions, and even impulse buying in artificial intelligence mediated retail environments. At the same time, perceived privacy, performance, and security risks operate as countervailing forces that weaken trust and willingness to rely on artificial intelligence, even when functional benefits are salient. Across the literature, perceived usefulness and perceived risk are still modelled mainly as separate predictors rather than as integrated mediators. The study therefore proposes a dual pathway framework that explains consumer acceptance through simultaneous benefit and risk evaluations for more consumer centric retail strategies.

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*Corresponding author:
(Yuliani Nuril Khasanah)

1. Introduction

Artificial intelligence (AI) technologies are rapidly transforming retail by enabling highly data-driven, personalized, and automated customer journeys. Retailers increasingly deploy AI in the form of recommendation engines, dynamic pricing algorithms, cashierless stores, smart shelves, and conversational agents to process large volumes of transactional and behavioral data in real time, optimize assortments and promotions, and orchestrate seamless omnichannel experiences (Cao, 2021). Beyond back end optimization, AI reshapes frontline customer encounters in both online and physical stores, as consumers interact with chatbots and other AI interfaces that cocreate value and influence satisfaction and loyalty (Chen et al., 2021). These developments position AI not merely as a supporting technology, but as a core driver of new retail value-creation logics based on automation and hyper personalization.

However, consumer responses to AI enabled retail formats remain far from uniformly positive. Research on autonomous shopping systems shows that delegating decisions and tasks to AI can threaten fundamental psychological motives related to control, meaningful experiences, identity, and social connectedness, thereby creating powerful barriers to adoption even when functional benefits are salient (De Bellis & Johar, 2020). Similarly, studies of AI chatbots and AI mediated retail environments indicate that some consumers appreciate convenience and personalization, while others worry about depersonalized service, lack of human interaction, or opaque decision processes (Arachchi & Samarasinghe, 2023; Chen et al., 2021). These mixed reactions suggest that consumer acceptance of AI in retail

cannot be explained solely by technological sophistication; it also depends critically on how consumers weigh perceived benefits against perceived risks.

The technology acceptance model (TAM) provides a widely used framework for explaining adoption of digital services through the key beliefs of perceived usefulness and perceived ease of use. Recent extensions of TAM to AI contexts in online shopping demonstrate that perceived usefulness and trust are primary drivers of attitudes and behavioral intention toward AI powered webshops, often exerting stronger influence than perceived ease of use (Nagy & Hajdu, 2021). Evidence from AI-mediated retail environments further shows that when consumers perceive clear performance advantages such as time savings, decision support, and improved fit between products and needs AI can stimulate favorable attitudes and even impulse purchase intention (Arachchi & Samarasinghe, 2023). Taken together, these findings highlight perceived usefulness as a central psychological mechanism through which consumers translate their evaluations of AI's capabilities into acceptance.

At the same time, a growing body of work underscores the importance of perceived risk in shaping reactions to AI. In the context of voice controlled AI assistants, perceived privacy risk, performance risk, and security concerns have been shown to weaken trust and reduce willingness to rely on AI, despite the convenience and novelty of such systems (Hasan et al., 2021). De Bellis and Johar (2020) similarly argue that autonomous shopping systems can evoke concerns about loss of control and diminished meaningful experiences, which may outweigh functional benefits for many consumers. These insights imply that in AI-rich retail environments, perceived

risk operates as a countervailing force that can erode or neutralize the positive effects of perceived usefulness on acceptance.

Despite these advances, much of the existing literature treats perceived usefulness and perceived risk as parallel, independent predictors of attitudes and behavioral intention. Studies on AI in online retail often focus on direct relationships between technological attributes, perceived usefulness, and intention (Cao, 2021; Nagy & Hajdu, 2021), while research on perceived risk tends to analyze its separate impact on trust and intention (Hasan et al., 2021). As a result, less is known about how higher order antecedents such as perceived service quality of AI agents, transparency of AI decision making, or consumers' prior experience with AI are transformed into behavioral intentions through benefit-oriented and risk-oriented paths. In particular, the mediating roles of perceived usefulness and perceived risk in the context of AI in retail have not yet been systematically integrated into a single explanatory model.

Against this backdrop, the present study seeks to develop and empirically test a framework that explains consumer acceptance of AI-enabled retail services by simultaneously considering benefit and risk perceptions as key mediating variables. Conceptually, the study extends TAM to an AI-intensive retail setting where perceived advantages and perceived threats are co-present and must be traded off. By modeling perceived usefulness and perceived risk as dual mediating mechanisms, the research aims to elucidate how upstream evaluations of AI-related factors ultimately shape consumers' intentions to engage with AI in retail. From a practical standpoint, the study offers guidance for retailers on how to design and

communicate AI-based services in ways that enhance perceived usefulness, mitigate perceived risk, and thereby foster stronger and more sustainable consumer acceptance.

2. Literature Review

The literature on artificial intelligence in retail shows that AI has become a core infrastructure for both back end operations and customer facing touchpoints. Systematic reviews document how retailers increasingly use AI for demand forecasting, assortment optimisation, dynamic pricing, chatbots, and personalised recommendation systems, which together enable highly data driven and individualised shopping journeys (Bawack et al., 2022). These applications shift retail value creation from human centric service encounters to hybrid or fully automated formats, where algorithms orchestrate interactions across online and physical channels (Pantano & Pizzi, 2020). As a result, AI is no longer a peripheral technology but a strategic element that shapes how consumers search, evaluate, and purchase in retail settings.

Emerging work also emphasises that AI reshapes the social fabric of shopping, not just its efficiency. Ethnographic research on AI "digital humans" in stores shows that these interfaces introduce new social possibilities and tensions, simultaneously entertaining customers, altering in-store roles, and provoking ambivalent reactions about the replacement or supplementation of human staff (Moore et al., 2022). While some shoppers experience AI as novel, helpful, and even "fun," others express unease about interacting with non-human agents or about how

these technologies may change norms of service and sociability in retail spaces. This highlights that consumer responses to AI depend not only on functional performance but also on how technologies align with deeper expectations about human contact and meaningful shopping experiences.

In explaining acceptance of AI enabled services, recent studies increasingly rely on extensions of the technology acceptance model that foreground perceived usefulness alongside other evaluative beliefs. In the retail and service context, reviews and empirical studies indicate that perceptions of AI's usefulness for saving time, simplifying decisions, and improving recommendation quality are central drivers of favourable attitudes and engagement, often outweighing concerns about ease of use once basic usability thresholds are met (Bawack et al., 2022). Research on AI powered voice assistants, which are often used for search and shopping tasks, shows that trust, perceived usefulness, and perceived ease of use jointly foster positive attitudes and willingness to provide personal information, thereby reinforcing ongoing engagement with AI interfaces (Acikgoz et al., 2023). These findings support the view that benefit oriented cognitions remain a key mechanism through which consumers translate their impressions of AI capabilities into acceptance.

At the same time, a growing stream of work highlights perceived risk as a critical countervailing force in AI adoption. Studies of interactive voice assistants demonstrate that privacy concerns and perceived surveillance can dampen perceived value and hinder usage intentions, even when the assistants are judged convenient and smart (Acikgoz et al., 2023). Jain et al. (2022) show that privacy risk perceptions

are significant barriers to adoption, and that only strong brand credibility can partially mitigate these concerns. Similarly, research on AI in physical retail reveals that consumers worry about loss of control, data misuse, and the erosion of authentic human interaction when AI systems become central to service delivery (Moore et al., 2022). Together, these studies indicate that perceived risk in forms such as privacy threats, opacity of decision processes, or social discomfort can erode or neutralise the positive influence of perceived usefulness on consumer responses to AI.

Despite these advances, the existing literature often models perceived usefulness and perceived risk as separate, parallel predictors of attitudes or behavioural intention rather than as interrelated mediating mechanisms. Reviews of AI in retail primarily catalogue technological applications and surface-level drivers of adoption without fully unpacking how upstream perceptions of AI service quality, transparency, or brand credibility translate into behavioural intentions through benefit oriented and risk oriented pathways (Pantano & Pizzi, 2020; Bawack et al., 2022). Likewise, studies of voice assistants and AI interfaces frequently estimate the direct effects of privacy risk or trust on intention, while treating perceived usefulness as an additional control or predictor rather than a mediating construct (Jain et al., 2022; Acikgoz et al., 2023). This suggests a gap for integrative models that explicitly conceptualise perceived usefulness and perceived risk as dual mediators through which consumers reconcile the advantages and threats of AI in retail, ultimately determining their acceptance of AI enabled retail services.

3. Methods

This study adopts a systematic literature review (SLR) approach to synthesise existing evidence on consumer acceptance of AI in retail, with a particular focus on the mediating roles of perceived usefulness and perceived risk. The review follows a structured, transparent protocol inspired by established SLR and reporting guidelines. First, a review protocol was defined that specified the research questions, key constructs (AI in retail, consumer acceptance, perceived usefulness, perceived risk), and eligibility criteria. Academic databases such as Scopus, Web of Science, ScienceDirect, and Google Scholar were searched using combinations of keywords including "artificial intelligence", "retail", "consumer acceptance", "adoption", "perceived usefulness", "perceived risk", "trust", and "technology acceptance model". Only peer-reviewed journal articles written in English and focusing on AI applications in retail or closely related consumer-facing contexts (e.g., e-commerce, automated stores, AI-based service interfaces) were included, while conference papers, dissertations, book chapters, conceptual essays without empirical grounding, and non AI specific technology studies were excluded. The selection process consisted of several stages: removal of duplicates, title and abstract screening against the inclusion criteria, and full-text assessment to ensure that studies explicitly examined consumer behavioural responses to AI and reported constructs relevant to usefulness, risk, trust, and acceptance.

For each included article, a data extraction form was used to capture bibliographic information, theoretical frameworks, methodological characteristics, operationalisation of key variables, and main findings related to AI in retail and the

roles of perceived usefulness and perceived risk. A quality appraisal step was conducted to assess the methodological rigour and clarity of measurement and analysis, and low quality studies were either excluded or treated cautiously in the synthesis. Finally, the extracted data were subjected to thematic and conceptual coding, grouping studies according to their theoretical lens (e.g., TAM based models, trust and risk frameworks), type of AI application, and treatment of perceived usefulness and perceived risk (as predictors, mediators, or moderators). This analytical procedure enabled the identification of patterns, consistencies, and gaps in how prior research conceptualises and empirically tests the benefit and risk related pathways through which AI in retail influences consumer acceptance.

4. Results and Discussion

4.1 Perceived Usefulness as a Mediating Mechanism in AI Retail Acceptance

Across the reviewed studies, perceived usefulness emerges as the most consistent benefit oriented explanation of why consumers accept AI enabled retail services. Evidence repeatedly indicates that consumers develop favourable attitudes and intentions when AI demonstrably improves shopping effectiveness, for example by saving time, simplifying search and evaluation, reducing decision effort, and increasing the fit between products and individual needs through better recommendations (Bawack et al., 2022). In extended TAM applications to AI contexts, usefulness related beliefs appear more decisive than perceived ease of use once basic usability expectations are met, reinforcing the view that performance gains are central drivers of acceptance in AI rich environments (Nagy & Hajdu,

2021). This pattern is also visible in AI mediated retail encounters such as chatbots and digital agents, where responsiveness and problem-solving capacity enhance satisfaction and perceived value, strengthening consumers' willingness to engage with AI interfaces (Chen et al., 2021). Moreover, when AI is experienced as highly beneficial during real time shopping interactions, usefulness perceptions can intensify engagement outcomes, including impulse-oriented responses (Arachchi & Samarasinghe, 2023). Overall, the synthesis suggests that perceived usefulness often acts as an evaluative channel through which AI capability cues and service performance are translated into favourable consumer responses in retail settings.

4.2 Perceived Risk as a Mediating Mechanism and Its Interaction with Usefulness

While usefulness supports acceptance, the reviewed literature shows that perceived risk consistently constrains consumer willingness to rely on AI, mainly by weakening trust and increasing psychological and ethical costs. Studies on AI assistants and interactive voice interfaces demonstrate that privacy risk, perceived surveillance, security concerns, and performance uncertainty reduce reliance and intention even when consumers recognise convenience and novelty (Hasan et al., 2021; Acikgoz et al., 2023). In addition, research on autonomous and AI mediated retail contexts indicates that consumers can experience discomfort related to loss of control, opaque decision processes, and reduced meaningful human interaction, which can neutralise or in some cases override perceived functional benefits for certain segments (De Bellis & Johar, 2020; Moore et al., 2022). Several studies further

indicate that brand credibility can partially buffer these anxieties, but risk perceptions often remain salient unless retailers actively address them (Jain et al., 2022).

Taken together, the evidence supports a dual pathway interpretation of consumer acceptance in AI retail settings. Perceived usefulness tends to lift behavioural intention by highlighting functional value, whereas perceived risk pulls intention downward by elevating perceived costs and undermining trust (Hasan et al., 2021; Bawack et al., 2022). Importantly, the review indicates that risk perceptions do not merely add a separate negative effect; they can dampen or neutralise the influence of usefulness on intention when consumers feel surveilled, insecure, or socially uncomfortable in AI mediated retail environments (De Bellis & Johar, 2020; Moore et al., 2022). At the same time, the synthesis reveals a limitation in the current empirical landscape: many studies still treat usefulness and risk mainly as parallel predictors of attitudes or behavioural intention, rather than explicitly testing them as integrated mediating mechanisms that transmit upstream evaluations into acceptance outcomes (Pantano & Pizzi, 2020; Bawack et al., 2022). Consequently, prior research provides strong conceptual and thematic support for benefit risk mediation, but direct and consistent mediation testing remains uneven across AI retail contexts.

This pattern suggests a clear agenda for both scholarship and retail strategy. Future research would benefit from unified models in which perceived usefulness and perceived risk jointly mediate the effects of antecedents such as AI service quality, transparency of AI decision making, prior AI experience, and brand credibility on consumer intention (Pantano & Pizzi, 2020; Jain et al., 2022). From a

practical perspective, the reviewed evidence implies that retailers are unlikely to secure sustainable acceptance by emphasising performance advantages alone. Acceptance is more plausible when retailers strengthen perceived usefulness through clear, demonstrated value while simultaneously reducing perceived risk through privacy and security assurances, transparency cues, and the thoughtful preservation of meaningful human contact where it matters most (Moore et al., 2022).

5. Conclusion

This study concludes that artificial intelligence has become a strategic infrastructure in contemporary retail, reshaping both operational processes and consumer-facing experiences. Across the reviewed literature, AI is consistently shown to enable data driven, personalised, and automated customer journeys through applications such as recommendation engines, dynamic pricing, chatbots, and "digital humans." At the same time, consumer responses remain ambivalent: while many shoppers value the convenience, efficiency, and decision support that AI offers, others experience concerns related to loss of control, reduced human contact, privacy risks, and opaque algorithmic decisions. Synthesising these findings within the technology acceptance model highlights perceived usefulness as a central benefit-oriented pathway that translates AI capabilities into favourable attitudes and behavioural intentions. Yet, perceived risk emerges as an equally important, countervailing mechanism that can undermine or neutralise the positive influence of usefulness, especially when consumers feel surveilled, insecure, or socially uncomfortable in AI mediated retail environments.

Theoretically, the review points to a clear gap in existing empirical models, which predominantly treat perceived usefulness and perceived risk as separate, parallel predictors rather than as interconnected mediating mechanisms. An integrated framework that models perceived usefulness and perceived risk as dual mediators can better capture how upstream factors such as service quality of AI agents, transparency of decision making, brand credibility, and prior experience with AI are transformed into acceptance or resistance. Practically, the findings imply that retailers cannot secure sustainable consumer acceptance by emphasising functional superiority alone. Effective AI enabled retail strategies must simultaneously enhance perceived usefulness and actively mitigate perceived risk through transparent communication, robust privacy and security practices, and the thoughtful preservation of meaningful human interaction where it adds value. Future research should therefore develop and test models that explicitly incorporate these dual pathways, offering more precise guidance on how to balance automation and assurance in AI rich retail settings.

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