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The Role of AI in Omnichannel Retail: Coordinating Online and Offline Customer Experiences

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Abstract

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This article examines how artificial intelligence (AI) contributes to coordinating online and offline customer experiences in omnichannel retail. It addresses the question of whether and how AI enabled tools help retailers deliver seamless journeys across physical and digital touchpoints. Using a systematic literature review of peer reviewed studies published between 2017 and 2022, the study synthesizes evidence on AI applications that support personalization, context aware interaction, and data driven decision making in omnichannel settings. The results show that AI primarily operates through two layers: front stage applications that tailor content and service across channels, and back stage analytics that integrate data to support forecasting, inventory, and logistics decisions. The article discusses these findings by organizing the literature into themes of omnichannel integration, technology enabled in store experiences, AI driven personalization, and data and governance capabilities. It concludes that AI has significant potential to strengthen omnichannel coordination, but its benefits are contingent on integration quality, strategic alignment with customer centric goals, and robust data governance.

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1. Introduction

The rapid diffusion of digital technologies has transformed retail business models, pushing firms to integrate physical stores, websites, mobile apps, social media, and emerging touchpoints into coherent omnichannel systems. Rather than treating channels as separate pipelines, omnichannel retailing aims to provide customers with a seamless journey in which information, pricing, and service are consistent as they switch between online and offline environments (Cai & Lo, 2020; Asmare & Zewdie, 2022). Prior research highlights how integrated promotions, assortment visibility, and logistics coordination across channels can shape purchase behavior, satisfaction, and brand image (Blom et al., 2017; Mishra et al., 2021). Recent work has also begun to conceptualize and measure omnichannel customer experience, capturing how customers evaluate retailers across multiple touchpoints and journey stages (Rahman et al., 2022; Riaz et al., 2022).

At the same time, artificial intelligence has become a critical enabler of data driven retailing. AI applications such as recommendation engines, dynamic pricing, demand forecasting, computer vision, and conversational agents allow retailers to process large volumes of behavioral and contextual data in order to personalize offers, automate service, and optimize operations. By learning from cross channel data, AI can infer preferences, predict churn, and tailor content at scale, with reported effects on satisfaction and loyalty in retail contexts (Ameen et al., 2021a; Guha et al., 2021). These developments suggest that AI is not only a back end analytics tool but also a front stage technology that shapes how customers experience brands across devices and store formats (Moore et al., 2022).

The intersection between AI and omnichannel retail raises important questions about how intelligent systems help coordinate online and offline customer experiences. Conceptual work on omnichannel strategy emphasizes seamlessness, integration quality, and consistent value propositions across touchpoints (Cai & Lo, 2020; Mishra et al., 2021; Asmare & Zewdie, 2022), while AI research stresses personalized, context aware interactions and new forms of human technology service encounters (Ameen et al., 2021a; Moore et al., 2022). Rahman et al. (2022) show that perceived omnichannel customer experience strongly predicts satisfaction and loyalty, yet their measurement model is largely technology agnostic. Similarly, studies on AI in retail often focus on single channel contexts, such as online shopping or in store digital humans, rather than the coordinated journeys that span both physical and digital spaces (Guha et al., 2021; Moore et al., 2022). As a result, it remains unclear through which mechanisms AI contributes to the orchestration of channel roles, the synchronization of information and service levels, and the reduction of friction as customers move between online and offline environments.

This article addresses this gap by examining the role of AI in omnichannel retail, with a specific focus on how AI enabled tools support the coordination of online and offline customer experiences. Using a systematic literature review of peer reviewed studies published between 2017 and 2022, the study synthesizes evidence on AI applications that link digital and physical touchpoints, the customer and managerial outcomes associated with these applications, and the contingencies that condition their effectiveness. By integrating insights from omnichannel management and AI driven customer experience research, the review aims to develop a

conceptual understanding of AI supported omnichannel coordination and to identify avenues for future empirical work on the design, governance, and ethical implications of AI in omnichannel retail settings.

2. Literature Review

The literature on omnichannel retail and customer experience has expanded rapidly in recent years, but often treats AI only indirectly. Foundational reviews of omnichannel strategy emphasize channel integration, assortment visibility, and logistics coordination as key levers for creating seamless journeys and consistent value propositions across touchpoints (Cai & Lo, 2020; Mishra et al., 2021; Asmare & Zewdie, 2022). Omnichannel customer experience is typically conceptualized as a holistic evaluation of interactions across channels and journey stages, with perceived integration quality and consistency as central drivers of satisfaction and loyalty (Rahman et al., 2022; Riaz et al., 2022). Gerea et al. (2021) synthesize this work into an integrative framework, underscoring the importance of organizational capabilities for monitoring journeys end to end and orchestrating touchpoints rather than optimizing channels in isolation.

A more focused stream examines how technology enabled touchpoints in physical stores contribute to omnichannel experiences. Studies on promotions and cross-channel campaigns show that omnichannel promotions can strengthen purchase behavior and brand image when they are perceived as coherent across online and offline environments (Blom et al., 2017). Alexander and Kent (2022) track changes in technology enabled omnichannel customer experiences in fashion stores

between 2014 and 2019, highlighting how mobile devices, interactive displays, and in store digital services reshape expectations of seamlessness and control. Complementing this, Chung et al. (2022) demonstrate that perceived cross channel integration influences retail brand experience, which in turn affects service convenience, satisfaction, and patronage intentions. Arora and Sahney (2018) add a behavioral perspective by showing how consumers strategically combine online search and offline purchase, suggesting that omnichannel strategies must account for deliberate role allocations across channels rather than assuming linear journeys.

Research explicitly combining AI with omnichannel retail remains more fragmented. Work on AI enabled personalization and decision support shows that AI can enhance retail performance by processing large scale behavioral data and supporting granular targeting, forecasting, and assortment decisions (Ameen et al., 2021a; Guha et al., 2021). However, much of this literature focuses on single channel contexts or back end analytics rather than explicit coordination of online and offline experiences. Studies of data and analytics capabilities in retail, such as Aktas and Meng (2017), emphasize that leveraging big data for retail operations requires integration of information flows across supply chain and customer facing processes, but typically stop short of examining omnichannel journeys or customer experience outcomes. As a result, there is still limited systematic evidence on how specific AI applications, such as recommendation systems, dynamic pricing engines, or AI powered in store services, contribute to the design of coherent omnichannel journeys and to the alignment of channel roles from the perspective of both customers and managers.

3. Methods

This study used a systematic literature review design to synthesize current knowledge on the role of AI in coordinating online and offline customer experiences in omnichannel retail. Searches were conducted in major academic databases, including Scopus, Web of Science, ScienceDirect, and Google Scholar, using combinations of keywords related to artificial intelligence, AI, machine learning, omnichannel, multichannel, retail, online and offline channels, and customer experience. The search was restricted to peer-reviewed journal articles published in English between 2017 and 2022. Conference papers, books, non-scholarly reports, purely technical AI papers without a retail or customer experience focus, and studies that did not address both AI and retail channel issues were excluded. Titles and abstracts were screened for relevance, followed by full-text assessment based on predefined inclusion and exclusion criteria, resulting in a final set of eligible studies.

For each included article, data were extracted using a structured template capturing basic bibliographic information, research context, methodological approach, type of AI application, channels and touchpoints covered, and key outcomes related to customer experience, operational performance, or strategic implications. A qualitative content analysis was then conducted to identify patterns across the studies. Codes and categories were developed iteratively to capture how AI is used to link online and offline touchpoints, what roles it plays in omnichannel coordination, and which contingencies influence its effectiveness. The findings were synthesized narratively, with themes organized around omnichannel integration, technology-enabled store experiences, AI-driven personalization and decision

support, and emerging challenges related to implementation, governance, and customer perceptions.

4. Results and Discussion

The review shows that research at the intersection of AI and omnichannel retail is emerging but remains dispersed across several partially connected streams. One group of studies focuses on omnichannel integration and customer experience, highlighting the importance of consistent pricing, information, and service quality as customers move between online and offline touchpoints (Cai & Lo, 2020; Mishra et al., 2021; Asmare & Zewdie, 2022). These works conceptualize omnichannel customer experience as a holistic evaluation of interactions across channels and stages of the journey, and they demonstrate robust links between perceived integration quality, satisfaction, and loyalty (Rahman et al., 2022; Riaz et al., 2022). Another group examines technology enabled store environments and documents how mobile devices, interactive displays, and digital services in physical stores reshape expectations of seamlessness and control in omnichannel settings (Alexander & Kent, 2022; Moore et al., 2022). Only a subset of these studies explicitly foreground AI, but collectively they provide the baseline against which the added value of AI enabled coordination must be understood.

Within this landscape, AI is most often framed as a driver of personalization and data driven interaction that cuts across channels. Studies on customer experience in the age of AI show that intelligent systems can leverage behavioral and contextual data to tailor recommendations, content, and service interactions, thereby enriching

perceived relevance and engagement (Ameen et al., 2021a; Guha et al., 2021). In an omnichannel retail context, personalization becomes a key mechanism through which AI can link online and offline experiences, for example when browsing and purchase histories collected online inform in store recommendations or promotions, and the reverse. Tyrväinen et al. (2020) provide strong empirical evidence that personalization and hedonic motivation improve customer experience and loyalty in omnichannel retail, suggesting that AI driven personalization is likely to have strategic implications beyond short term conversion metrics. However, the majority of AI focused studies still analyze isolated touchpoints or single channels rather than end to end journeys, which limits our ability to assess how well AI actually coordinates experiences across the online-offline boundary.

Another prominent theme concerns technology enabled omnichannel experiences in physical environments and the ways AI can augment them. Research on smart shopping malls and fashion retail shows that digital in store touchpoints, such as interactive displays, mobile integration, and smart services, can create a sense of flow and continuity between digital and physical encounters (Ameen et al., 2021b; Alexander & Kent, 2022). Gerea et al. (2021) and Chung et al. (2022) argue that effective omnichannel customer experience management requires retailers to orchestrate these touchpoints around customer goals, not around internal channel silos. AI capabilities, such as real time analytics, computer vision, and context aware recommendation engines, are beginning to be embedded into these touchpoints, allowing retailers to adapt content and service in response to customer behavior across locations. Yet detailed empirical accounts of how AI supported in store

technologies are integrated with online platforms, loyalty systems, and logistics processes are still scarce, and most studies rely on cross sectional survey data or qualitative interviews rather than longitudinal or experimental designs.

The review also highlights the centrality of data and analytics infrastructures for AI supported omnichannel coordination. Holmlund et al. (2020) develop a strategic framework for customer experience management in the age of big data analytics and emphasize that unlocking value from AI requires integrated data architectures, appropriate analytics capabilities, and alignment with customer centric objectives. In retail, studies on big data and analytics point out that integrating customer, product, and operational data across systems is a prerequisite for consistent experiences across channels and for effective AI based decision support in assortment planning, pricing, and logistics (Aktas & Meng, 2017; Guha et al., 2021). However, only a limited number of studies explicitly link these back end capabilities to observable changes in omnichannel customer experience indicators. Governance issues, such as data quality, privacy, and algorithmic transparency, are often acknowledged conceptually but remain underexplored empirically in the specific context of coordinating online and offline retail journeys.

Taken together, the reviewed literature suggests that the role of AI in omnichannel retail is best understood as layered and contingent rather than uniform. At the front stage, AI primarily contributes through personalization and context aware interaction, which strengthen perceived relevance and continuity of experiences across channels when well executed (Tyrväinen et al., 2020; Ameen et al., 2021a). At the back stage, AI and analytics support demand forecasting, inventory

management, and logistics coordination that underpin reliable service and product availability in omnichannel settings (Aktas & Meng, 2017; Holmlund et al., 2020). Where retailers combine these layers with strong integration capabilities, customers report more seamless journeys, greater perceived control, and higher satisfaction (Rahman et al., 2022; Riaz et al., 2022). At the same time, important gaps remain regarding causal evidence, cross channel tracking, and the potential unintended consequences of AI, such as overpersonalization, perceived intrusiveness, or fairness concerns. This review therefore points to a need for future research that investigates AI supported omnichannel coordination in real organizational settings, compares different integration architectures and governance arrangements, and develops metrics that capture both the experiential and operational dimensions of AI enabled omnichannel retail.

5. Conclusion

This systematic literature review examined how AI contributes to coordinating online and offline customer experiences in omnichannel retail. The findings indicate that AI is increasingly embedded along both front stage and back stage processes, supporting personalization, context aware interaction, and data driven decision making while resting on integrated data and analytics infrastructures. When combined with strong omnichannel integration capabilities, AI helps retailers deliver more seamless journeys, with consistent information, service quality, and perceived control as customers move across channels.

At the same time, the review shows that current research is fragmented and often limited to single channels, isolated touchpoints, or high level conceptual discussions. Detailed empirical evidence on how specific AI applications connect online and offline touchpoints, how they are embedded in organizational routines, and how they shape customer perceptions over time remains scarce. Issues related to data governance, privacy, and transparency are widely acknowledged but seldom operationalized in studies that explicitly measure omnichannel customer experience or behavioral outcomes.

Overall, the role of AI in omnichannel retail emerges as layered and contingent rather than uniform. AI has clear potential to strengthen omnichannel coordination, but its impact depends on the quality of integration across systems and touchpoints, the strategic alignment of AI use with customer centric goals, and the presence of robust governance mechanisms. Future research should investigate AI supported omnichannel coordination in real organizational settings, employ longitudinal and experimental designs to establish causal effects, and develop metrics that jointly capture experiential, operational, and ethical dimensions of AI enabled omnichannel retailing.

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