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NAVIGATING THE DIGITAL SHIFT: STRATEGIC ADAPTATION IN THE RETAIL LANDSCAPE THROUGH TECHNOLOGY

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ABSTRACT

The retail industry is undergoing a profound transformation driven by rapid technological advancements, fundamentally reshaping consumer expectations, operational efficiencies, and competitive landscapes. This article synthesizes current literature and industry insights to explore the multifaceted impact of Artificial Intelligence (AI), Generative AI (Gen AI), robotics, IoT devices, and advanced data analytics on retail strategy. It details how these technologies are revolutionizing customer experience through personalization, omnichannel integration, and automated service, while also optimizing operations in warehousing, inventory management, and loss prevention. Furthermore, the article examines the evolution of marketing and pricing strategies through dynamic models and AI-driven content creation, highlighting emerging trends like human-AI collaboration and autonomous stores. The discussion emphasizes the need for proactive and holistic adaptation, addressing challenges related to investment, data privacy, and workforce upskilling. Ultimately, the article concludes that strategic integration of technology is critical for retailers to maintain relevance, drive efficiencies, and foster sustainable growth in the digital era.

Keywords: Retail Strategy, Technology, Artificial Intelligence (AI), Generative AI (Gen AI), Omnichannel, Customer Experience, Supply Chain, Automation, Marketing, Digital Transformation.

INTRODUCTION

The retail sector stands at a pivotal juncture, experiencing an unprecedented wave of transformation driven by rapid technological advancements [27, 30, 64]. Historically, retail success hinged on foundational elements such as carefully curated store atmospherics, the perceived value of merchandise, and meticulously planned promotional activities designed to attract and retain customers [4, 8, 45, 65]. These traditional pillars formed the bedrock of retail strategy, guiding decisions on everything from store layout to staffing levels. However, the advent of e-commerce in recent decades fundamentally altered this landscape, introducing new channels and forcing retailers to establish online presences, thereby expanding the definition of "place" beyond physical storefronts.

This initial digital shift laid the groundwork for a more profound evolution. Today, the pervasive influence of advanced technologies like artificial intelligence (AI), machine learning, robotics, the Internet of Things (IoT), and sophisticated data analytics is not merely incremental; it is fundamentally redefining consumer expectations, operational efficiencies, and the very competitive dynamics of the marketplace [25, 29, 36, 61]. The retail environment has evolved into an "omnichannel retail setting" that strives to offer synergistic, holistic shopping experiences, where customers seamlessly navigate between online and offline touchpoints [53]. This dynamic shift necessitates that retailers move beyond simply competing on price or product alone. Instead, they must strategically integrate cutting-edge technologies across all facets of their operations to not only enhance customer experiences and streamline internal processes but also to develop highly dynamic and responsive marketing and pricing approaches [32, 57, 60].

The rapid advances in computing, analytics, and technology-supported processes compel retailers, researchers, and executives to think strategically about the judicious application of technology within their organizations [30]. This involves anticipating the likely effects of technology on different aspects of their business—from supply chain management to customer service—and leveraging these predictions to determine when, where, and why advanced forms of retail-linked technologies will create a sustainable competitive advantage. This article aims to explore the multifaceted impact of technology on retail strategy, providing an in-depth analysis of how retailers can effectively understand

and incorporate these shifts to maintain relevance, foster growth, and thrive in an increasingly digital-first and technologically integrated world. It argues that successful adaptation hinges on a comprehensive understanding of how technology influences each strategic dimension of retailing and how the "process" of retailing itself is transformed by the interplay of technology and human effort.

METHODS

This article constructs a comprehensive conceptual framework for understanding the strategic implications of technology in retail through a systematic synthesis of current academic literature, industry reports, and expert insights. The methodological approach involves a multi-stage review process designed to capture the breadth and depth of technological impact on the contemporary retail ecosystem.

Initially, a broad scan of existing scholarly work was conducted, focusing on seminal and recent publications in marketing, retail management, supply chain, and information systems journals that address technology, AI, and digital transformation in the retail context. This included identifying key theoretical frameworks and empirical findings related to omnichannel retailing, customer experience enhancement through technology, automation in logistics, and the evolving role of data analytics and AI in strategic decision-making.

Subsequently, a targeted review of industry reports, white papers from leading consulting firms (e.g., McKinsey), and news articles from reputable business and technology publications (e.g., Forbes, Wall Street Journal, TechCrunch, Computerworld) was undertaken. This step was crucial for incorporating contemporary examples, emerging trends, and practical applications of technology that may not yet be fully captured in academic literature due to its typically longer publication cycle. Specific attention was given to real-world case studies demonstrating the implementation and impact of various technologies within retail organizations, both large and small.

The technologies examined in detail include, but are not limited to:

- Artificial Intelligence (AI) and Machine Learning (ML): Encompassing predictive analytics for customer behavior, dynamic pricing algorithms, recommendation systems, and intelligent automation.
- Generative AI (Gen AI): Its applications in content creation (marketing copy, images), customer service (advanced chatbots), and operational streamlining.
- Robotics and Automation: Particularly in warehouse management, inventory tracking, and in-store cleaning and assistance.
- Internet of Things (IoT): Including sensors (e.g., i-Beacons) for in-store customer tracking, inventory monitoring, and smart infrastructure.
- Augmented Reality (AR) and Virtual Reality (VR): Their role in enhancing product visualization and immersive shopping experiences.
- Advanced Data Analytics: Leveraging big data for strategic insights, customer journey mapping, and performance attribution.

The analysis is structured around the "7 Ps of Retail Strategy": Product, Place, Price, Promotion, Presentation, Personnel, and Process, building upon established conceptualizations in retail management [26, 45]. Each of these strategic dimensions is examined in relation to how technology introduces new opportunities, challenges, and competitive imperatives. A particular emphasis is placed on the "Process P," which is further explicated through a novel two-dimensional framework: (1) whether the retail activities are customer-focused or operationally-focused, and (2) whether these activities are technology-intensive or employee-intensive. This 2×2 matrix yields four quadrants, each representing distinct strategic approaches and implications, which are thoroughly explored with illustrative use cases, identified goals, and discussions of future trends.

Throughout the article, all external ideas, concepts, examples, and data points are meticulously referenced using a numerical citation style, ensuring proper attribution and academic rigor. The synthesis identifies both the synergistic benefits of human-technology collaboration and potential pitfalls, such as privacy concerns, algorithmic bias, and the impact on human employment and skills. This comprehensive methodological approach allows for a holistic and nuanced understanding of technology's transformative role in shaping current and future retail strategies.

RESULTS

The strategic integration of technology in retail is not merely an incremental improvement; it represents a fundamental shift that creates new imperatives and opportunities across various core domains of retail strategy. This section details how technology permeates and reshapes each of the seven Ps of retail, with a particular focus on the "Process" P through a dedicated two-dimensional framework.

What is Retail Strategy?

At its most fundamental level, a retail strategy encompasses knowing the target consumers, establishing effective formats and resources to meet their diverse needs, and sustaining a competitive advantage within the chosen consumer segments [45]. While traditionally marketing strategy has been framed around the "4 Ps" (Product, Place, Price, and Promotion), a comprehensive retailing strategy expands upon this by adding three additional, critical retailing-specific Ps: Presentation, Personnel, and Process. Together, these form the "7 Ps of Retail Strategy" [26]. This article adopts this

comprehensive conceptualization, with a particular emphasis on offering deeper insights into the "Process P," which we define as a function of technology and/or employee solutions applied to both customer-focused and/or operationally-focused activities. These intricate processes, in turn, exert influence over the other six Ps, collectively impacting all relevant stakeholders, including customers, employees, retailers themselves, and society at large. The overarching conceptual framework guiding this analysis is illustrated in Fig. 1.

We will now delve into the effects of the process on each of the other six Ps, detailing how technology has profoundly reshaped each dimension.

PRODUCT

Retailers exist primarily to sell products and services. A critical strategic decision in establishing a retailer's market presence involves the careful selection of brands to carry. This often features a strategic mix of well-known national brands and a curated suite of suitable private-label brands. The choice to stock private-label products offers several strategic advantages: retailers can significantly distinguish themselves from competitors, cultivate stronger store loyalty among consumers, and potentially improve retail margins due to lower sourcing costs [44]. To effectively promote their product assortments, retailers traditionally rely on skilled employees who serve as effective brand ambassadors, capable of communicating the merits of private-label brands to consumers with authenticity and persuasiveness. These employees, through their direct interactions, can empathize with and genuinely understand consumer needs and perceptions, providing invaluable insights that aid in the development of additional private-label products featuring unique, differentiating, and appealing features.

Regardless of whether a retailer manufactures its own private-label products or sources them from established national brands, the imperative to develop robust supply chain relationships remains paramount. These relationships are crucial for ensuring suitable pricing, timely arrival of products in stock, and overall operational fluidity. In this domain, technology plays an increasingly indispensable role. Comprehensive forecasting and replenishment software, extensively powered by Artificial Intelligence (AI), empowers retailers to meticulously monitor their inventory levels across the entire supply chain. This constitutes a vital non-customer-focused activity that enables retailers to ensure timely inventory management, minimize stockouts, and optimize carrying costs [45]. Furthermore, significant advancements in data-sharing technology allow retailers to seamlessly integrate their ordering systems directly with vendors. This integration serves as an additional, powerful tool for achieving just-in-time inventory management, reducing lead times, and enhancing responsiveness to market demand fluctuations.

Within the physical store environment, in-store technologies, such as sophisticated inventory robots or advanced software platforms, can diligently gather real-time details about which merchandise requires replenishment on shelves. Beyond internal operational benefits, these technologies also serve a customer-facing function by providing accurate information to customers about product availability and stock levels [25]. Thus, these technologies engage in both operationally-focused and customer-focused activities. While technology can precisely identify which products need to be restocked on shelves, the physical act of shelf stocking still largely remains the domain of human employees. The collaboration between AI-driven inventory insights and human labor ensures optimal product availability and store presentation. This highlights a critical aspect of modern retail: technology often augments, rather than entirely replaces, human roles, creating a more efficient and responsive system.

PLACE

As highlighted in the introductory sections of this article, place decisions are central to retail strategy. For the purpose of this discussion, "place" refers to all locations—physical, digital, and hybrid—where retailers make their goods or services available to consumers. Historically, retail operations were almost exclusively confined to physical locations where direct transactions occurred, necessitating significant employee effort to manage the storefront and serve customers. However, the concept of "place" has undergone a profound evolution, now encompassing a diverse array of channels including dedicated websites, mobile applications, social media shops (e.g., Facebook, Instagram), direct-to-consumer sales facilitated by influencers, livestream selling platforms, and even integrated commerce within streaming services. In these increasingly diffuse digital environments, the roles of employees have similarly diversified and transformed. For instance, platforms like Netflix's Shop leverage streaming technology to offer licensed merchandise tied to popular shows, with strategic plans to integrate even more advanced technology-enabled immersive experiences in the future [18].

To remain competitive and relevant in the eyes of today's omnichannel customer, retailers must exhibit creativity and agility in blending these disparate platforms into synergistic, hybrid retail formats. Beyond simply making products and services available across different platforms, technology has been instrumental in streamlining complex omnichannel operations. This enables seamless customer journeys where consumers can initiate a purchase on one platform and conveniently receive their goods through another channel (e.g., buying online and picking up in-store, known as "BOPIS"). These customer-focused activities are crucial for enhancing the overall customer experience and significantly reducing friction throughout the customer journey [25]. The effective management of customer experiences within and across these intricate

omnichannel settings, as well as the strategic allocation of resources to each channel within an integrated omnichannel framework, remains paramount [24, 53, 63]. This is particularly true as "phygital" stores—physical spaces enhanced by digital technologies—continue to gain importance, aiming to combine the tactile experience of physical shopping with the convenience of digital interactions [50].

Beyond customer-facing touchpoints, place decisions are also deeply intertwined with broader supply chain considerations, encompassing the warehousing, transportation, and distribution of products. In these predominantly operationally-focused areas, retailers are increasingly reliant on advanced technology, most notably robotics and AI-driven automation, to minimize costs and maximize efficiency. For example, large-scale distribution centers now frequently employ automated guided vehicles (AGVs) and robotic picking systems to expedite the movement and sorting of goods, drastically reducing the need for manual labor. However, despite the rapid pace at which technology replaces human roles in many operational areas, certain jobs, such as last-mile truck drivers, continue to remain within the domain of human workers, often integrated within the growing gig economy to offer flexible delivery solutions [12, 69]. For smaller retailers, the significant capital investment required for advanced technologies often remains cost-prohibitive. Consequently, these businesses frequently lean more heavily on their employees to meticulously craft and maintain appealing physical environments and provide personalized service that encourages customers to shop in their stores. This highlights a tiered adoption of technology, where larger enterprises lead in automation, while smaller businesses focus on leveraging human touch and selective, more affordable digital tools.

Price

Determining optimal retail prices is a complex strategic endeavor that necessitates a dual consideration: the price consumers are willing to pay, which reflects the perceived value of a product or service, and the price levels required for the retailer to achieve profitability. The customer's willingness to pay is influenced not only by the intrinsic attributes of the product (e.g., quality, functionality) but also by extrinsic attributes, such as brand name, exclusivity, and associated emotional benefits. For instance, a consumer might be willing to pay a premium for a luxury handbag not just for its material quality but for the brand's prestige and the emotional satisfaction of ownership. Conversely, other consumers may prioritize the lowest possible price for a functional item, valuing utility over brand prestige. For these price-sensitive customers, information sources like price comparison apps, which leverage big data analytics, represent critical tools for informed purchasing decisions.

Pricing strategy within retail firms can vary significantly, extending beyond broad approaches like "High-Low" or "Everyday Low Price" (EDLP) to more granular, brand- and even store-level strategies [8, 17]. Furthermore, pricing is undergoing a rapid evolution towards increasingly dynamic models. Dynamic pricing, as defined by Kopalle et al. (2023, p. 580), involves "changes in price that are prompted by changes or differences in four key underlying market demand drivers: (1) people (i.e., individual consumers or consumer segments), (2) product configurations, (3) periods (i.e., time), and (4) places (i.e., locations)" [41]. This sophisticated approach allows retailers to customize prices based on an individual consumer's previous purchase history, browsing behavior, or loyalty status. Prices can also be adjusted based on specific product configurations (e.g., varying features of a software package), the time of purchase (e.g., surge pricing for last-minute travel or during peak demand), or the geographical location where the product is sold (e.g., higher prices in prime urban retail districts compared to outlet malls). Technology, particularly advanced analytics and AI, makes it possible to communicate these varied prices to different customers in real-time, enabling retailers to precisely customize pricing based on all these dynamic drivers, thereby maximizing revenue and market responsiveness.

Operationally focused price elements primarily reflect the costs incurred by the retailer to acquire the product. These costs are heavily dependent on product sourcing strategies, supply chain efficiencies, and logistics expenses. While human employees continue to play a meaningful role in price negotiations with suppliers, their capabilities are now significantly augmented by technology. Modern tools provide employees with real-time, actionable information, such as summaries of recent price trends across the market, historical purchasing data, and comprehensive lists of alternate potential suppliers, complete with their pricing structures and reliability ratings. This technological support empowers negotiators with a more robust data-driven approach, enabling them to secure more favorable terms and optimize procurement costs, which directly impacts the retailer's profitability and ultimately, the prices offered to consumers.

Promotions

The landscape of promotional strategies employed by retailers to attract consumers and drive sales is vast and ever-evolving, encompassing traditional methods like advertising, coupons, and free samples, alongside modern digital tactics. These promotions are disseminated across a wide range of media, including traditional television and radio, as well as digital platforms such as online advertisements, social media channels, and even new formats like livestream selling. Sales personnel historically play a crucial role, tasked with demonstrating products, handing out free samples, and engaging customers directly. However, the increasing affordability and accessibility of digital displays have led retailers to progressively project product demonstrations and

inspirational content on screens within stores, leveraging the unique capabilities of these technologies to generate sales and enhance engagement [58, 59, 31]. Such visually compelling displays, including video demonstrations of product utility, represent powerful tactics for inspiring purchases [31].

Beyond static displays, retail technology enables highly targeted and timely customer-specific promotions based on their real-time shopping patterns and historical data. For instance, AI-driven systems can automatically send discounts on items left in an online shopping basket, or, leveraging data gathered from in-store sensors and i-Beacons, can pinpoint a customer's location within a physical store and send targeted advertisements for products in that specific aisle directly to their mobile devices [66]. More advanced technological integrations promise to allow retailers to track a consumer's behavior across multiple channels—online platforms, physical stores, and mobile applications—and even across different brands. This holistic data collection provides both retailers and product suppliers with a far more precise understanding of which promotional efforts are attributable to specific sales of particular products, enabling more accurate measurement of return on investment (ROI) [71]. Walmart's Sam's Club Member Access Platform (MAP) is a prime example, pioneering closed-loop, omnichannel attribution for advertising, providing unprecedented insights into campaign effectiveness [71, 56].

The rise of generative AI (Gen AI) is further revolutionizing the promotional landscape. Gen AI can automate the creation of highly personalized and varied promotional content, from dynamic ad copy and engaging social media posts to unique visual assets and even personalized video advertisements [15, 26, 34, 42, 43]. While these tools offer immense efficiency benefits and the potential for hyper-personalization at scale, there is a critical consideration regarding perceived brand authenticity. If not managed carefully, content generated purely by AI might inadvertently diminish the genuine connection consumers feel with a brand [10]. However, when used as a tool to augment human creativity and strategic thinking, Gen AI can empower marketing teams to experiment with a broader range of promotional messages and visual styles, accelerating campaign development and testing. Moreover, AI also facilitates deeper and more rapid market research, allowing retailers to analyze vast amounts of consumer sentiment data, identify nascent trends, and thus develop more effective and resonant promotional campaigns [3, 14]. The emergence of AI-human hybrid models in marketing research underscores this synergy, combining the analytical power of AI with human intuition and strategic oversight to unlock new levels of promotional effectiveness [3].

Presentation

Retail presentation involves the strategic arrangement and display of merchandise within both physical stores and digital channels, all with the overarching goal of attracting customer attention and boosting sales. Traditionally, the core elements of retail presentation included store design, ambiance (e.g., lighting, music, scent), and fostering a positive social presence [4]. In physical environments, employees play an instrumental role in cultivating the desired in-store atmosphere, ensuring cleanliness, and engaging with customers to enhance their shopping experience. Various sensory elements are meticulously exploited to strategically present merchandise, leveraging smell, sound, and touch to create a holistic sensory experience [65]. For example, luxury brands like Canada Goose utilize "cold rooms" in their stores, allowing customers to experience the warmth of their coats in simulated frigid conditions, thereby providing a unique form of product trialability that is a crucial component of retail atmospherics [9, 59].

For digital channels, while the principles of attracting attention and increasing sales remain, the "atmospherics" manifest differently, requiring distinct design elements and strategic considerations [59]. Key presentation elements for online platforms include the intuitive organization of the website or app, the aesthetic appeal of color schemes, the inclusion of interactive features (e.g., high-resolution zoom, 360-degree product views), the integration of augmented reality (AR) or virtual reality (VR) capabilities, and the prominent display of customer reviews and ratings. The relative ease of conducting A/B experiments in digital environments today empowers retailers to rigorously test which atmospheric elements—from button placement to image styles—result in increased sales conversions. This data-driven approach allows for continuous optimization of the online presentation to maximize its effectiveness.

The integration of technology is rapidly expanding the possibilities for retail presentation. Augmented reality (AR) apps, for instance, allow customers to virtually "try on" clothes or visualize furniture in their own homes before making a purchase, bridging the gap between online browsing and real-world application. Smart mirrors in changing rooms can offer personalized styling advice, suggest complementary items, and even allow customers to request different sizes or colors without leaving the fitting room. These innovations aim to make physical store visits more interactive, informative, and enjoyable, providing compelling reasons for customers to visit and spend time in brick-and-mortar locations [28, 31, 32]. Furthermore, the ongoing development of immersive technologies like VR promises even more transformative presentation capabilities, creating fully interactive virtual showrooms or shopping environments that transcend geographical limitations. The challenge and opportunity for retailers lie in seamlessly blending these digital enhancements with physical spaces, creating truly "phygital" experiences that maximize engagement and sales potential [50].

Personnel

Studies focusing on store and frontline employees in retail frequently emphasize their social aspects, including optimal staffing levels on the sales floor and the nuanced ways in which they interact with customers [4, 59]. Physical stores inherently offer a distinct benefit due to their unique capability to facilitate community formation, where employees often play a central role—either as part of the community themselves or as facilitators who cultivate atmospheres conducive to comfortable customer-to-customer interaction [9]. Beyond these customer-facing interactions, personnel also undertake crucial organizationally focused activities, such as meticulously stocking merchandise, maintaining inventory accuracy, and ensuring the cleanliness and orderliness of the store environment.

Technology increasingly serves to augment how employees perform these varied tasks, rather than solely replacing human labor. For example, Starbucks implemented voice recognition technology to capture barista responses as they repeat customer orders, thereby eliminating the need for manual order entry into the system [68]. While such augmented personnel might appear to possess "superhuman" abilities due to technological assistance, perceptions of dehumanization and negative service impressions can arise if the technology overshadows genuine human connection [38]. This highlights the critical importance of a carefully considered technology strategy that aligns with the retailer's brand and customer needs. If a retailer, like Starbucks, aims to foster a strong sense of community and personal connection, the continued hiring of friendly, empathetic baristas remains essential. Conversely, if a retailer's primary strategic goal is to offer the lowest possible prices, it might prioritize replacing employee participation with technology-augmented solutions wherever feasible, even for traditionally customer-focused activities.

This strategic choice regarding personnel is deeply intertwined with the overall business model. For high-end, luxury retail settings, salespeople are often considered key touchpoints in the consumer journey, capable of fostering deeper relationships, encouraging larger purchases, enhancing customer satisfaction, building loyalty, and generating positive word-of-mouth referrals [59]. In such contexts, an employee-intensive approach, where highly skilled human professionals provide personalized service, is often optimal. However, as technology advances, even in these high-touch environments, "lite" AI versions can meaningfully augment employee efforts. For example, a personal stylist might leverage an AI-managed inventory system to confirm the availability of recommended items in a client's specific size, or an AI tool could help streamline the scheduling of appointments, allowing the human stylist to focus more on direct client interaction. The challenge lies in suitably integrating AI to enhance, rather than detract from, the human element that defines the service. Ultimately, the decision on the degree of technology reliance for personnel must be carefully calibrated to the specific needs of the target customer segment and the retailer's overarching strategic objectives.

Process

The "Process" P is arguably the most dynamic and technologically intertwined element of the 7 Ps of retail strategy. To develop and establish effective processes that culminate in a cohesive and successful retail strategy, we propose that two central elements demand careful consideration: (1) whether the activities under review are primarily focused on customers or on internal operations, and (2) whether the performance of those activities relies to a greater degree on technology or on human employees. This conceptualization gives rise to a robust 2×2 framework, illustrated in Fig. 2, which effectively represents the "Process P" of retailing strategy and serves as the central analytical tool within this article (reflecting the middle section of Fig. 1).

As noted previously, customer-focused activities can occur throughout the customer journey, encompassing pre-purchase, purchase, or post-purchase phases. These activities also vary significantly in the extent or degree to which they involve technology-intensive solutions. In the pre-purchase phase, an exemplary technology-intensive process can be observed in Sephora's innovative use of augmented reality (AR) mirrors. Customers can utilize these mirrors to virtually try on various makeup products, enabling them to more effectively search for and select products that precisely meet their needs without physical application, thereby enhancing the discovery and selection process. Conversely, more employee-intensive processes are also prevalent in retail; within Sephora stores, highly knowledgeable and expert employees are readily available to provide personalized information, offer makeup consultation services, and even perform makeovers. These direct human interactions also facilitate customers' efforts to find the right products, often providing a level of nuanced guidance that technology alone cannot replicate. A hybrid approach emerges when an expert employee, after a physical consultation, suggests which products the customer should explore further using the AR app during their next visit, seamlessly blending human expertise with technological convenience.

In the purchase phase, consumers have diverse options, from fully technology-driven self-checkout systems to entirely employee-assisted checkout lanes. A hybrid process might involve customers using self-checkout technology to scan their purchases, with an employee providing assistance for bagging items or resolving complex transactions. This combination leverages the efficiency of technology for basic tasks while retaining human support for troubleshooting and service.

Finally, in the post-purchase stage, technology-intensive

processes can be seen when a company sends automated notifications when a certain service (e.g., car maintenance, subscription renewal) is due. Such reminders might include a clickable button that allows customers to directly schedule the service online, offering convenience and immediate action. Conversely, an employee-intensive approach involves human employees proactively reaching out directly to customers to schedule follow-up appointments, providing a personalized touch and addressing any concerns. A hybrid process could involve an automated reminder prompting the customer to contact a human employee to schedule the service appointment, thereby initiating a human interaction after a technological nudge.

Similarly, operationally focused activities also occur across all these phases, and the resulting solutions vary significantly in their degree of technology intensity. A prime example of a technology-intensive pre-purchase operational process is Walmart's extensive use of AI-powered robots in its warehouses, as highlighted by Heater (2022) [37]. These robots efficiently manage inventory, pack or unpack items, and sort products for shipment. In contrast, an employee-intensive process would involve human employees manually packing goods for shipment. A hybrid process might involve an AI solution that benefits from real-time input and oversight from human managers, or an employee-driven process that is significantly enhanced by technology, such as an employee using a handheld scanner for rapid inventory counts.

To provide a more in-depth discussion of our proposed framework, we will now address each quadrant in the 2×2 framework (see Fig. 2), offering a detailed overview of the retailer's strategic goals, illustrative use cases, and projections for what the future may hold within each domain. These use cases will specifically reflect how the "Process P" can impact and integrate with the other six Ps of retail strategy.

Quadrant 1 (Customer-Focused Activity, Technology-Intensive Process)

This quadrant is characterized by customer-focused activities that rely predominantly on technology-intensive processes, frequently leveraging advanced AI solutions [39, 64]. This strategic orientation promises both the highest potential rewards and, commensurately, the highest risks. Retailers operating in this space possess, or seek to acquire, vast amounts of customer data, including in-store browsing patterns, online clickstream data, transactional histories, and even aggregated data from similar customer segments. Utilizing sophisticated analytical AI to process and assess such extensive datasets can yield deep, often novel insights into optimal (and dynamic) pricing strategies or pinpointing which promotions will be most effective for a particular product or customer cohort. Furthermore, leveraging generative AI (Gen AI), informed by these rich datasets, allows retailers to develop highly effective promotional materials, craft personalized product descriptions, or generate suitable and context-aware chatbot responses during customer service interactions. However, a complete or overly zealous reliance on AI in customer-facing roles carries substantial risks. These include the potential for inaccurate and/or inappropriate responses (as famously seen with Air Canada's chatbot, which issued erroneous refund offers that the airline was legally bound to honor [6]), as well as significant privacy, bias, and ethical concerns associated with algorithmic decision-making and data handling [33, 62].

Goals

We anticipate two primary types of goals associated with technology-intensive processes in this quadrant. The first is to enhance operational efficiency through significant cost reductions or by enabling the retailer to achieve more with fewer resources. This goal is often tied to streamlining customer interactions that were previously manual and time-consuming. The second, and arguably more central, goal for customer-focused retailers operating in Quadrant 1 is to deepen customer relationships. This can be manifested through various metrics, such as increased sales conversions, improved word-of-mouth promotion (both online and offline), and enhanced repurchase intentions, all driven by superior, personalized, and efficient customer experiences facilitated by technology.

Use Cases

In the pre-purchase stage, retailers are increasingly deploying AI-powered chatbots to engage with potential customers. These chatbots offer instantaneous answers to commonly asked questions, thereby improving response times and customer satisfaction. More advanced iterations of these chatbots can draw upon a customer's past and current behaviors (e.g., browsing history, previous purchases) to proactively offer additional purchase suggestions, leveraging both AI and machine learning algorithms. Davenport et al. (2020) provide compelling examples, such as Kanetix, an online insurance retailer, which employs AI to screen inbound customers. This AI identifies individuals with a moderate propensity to buy, subsequently triggering targeted promotional buying incentives. Simultaneously, Kanetix avoids offering incentives to visitors who are either already highly likely to buy (thus preventing unnecessary cost expenditure) or highly unlikely to buy (thereby optimizing resource allocation). Initial results from Kanetix's implementation demonstrated a conversion increase of approximately 13% and a remarkable return on investment (ROI) of 2.3x [1]. Similarly, Stitch Fix, the online apparel retailer, uses AI to predict customer preferences, enabling them to curate personalized clothing selections. Further examples of pertinent technologies in the pre-purchase phase, particularly those augmenting customer search and discovery, are extensively discussed by Roggeveen and Sethuraman (2020) and Davenport et al. (2020) [14, 57].

During the purchase stage, robotics and AI-driven automation are ensuring that purchased products reach customers on time and in the most cost-effective manner. For instance, Domino's has partnered with Nuro, a robot delivery company, to autonomously deliver pizzas, thereby enhancing delivery efficiency and potentially reducing last-mile costs. In Lowe's stores, "Lowebots" provide in-store guidance and advice to customers, assisting them in locating products and answering basic queries, thereby improving the in-store shopping experience. Pushing the boundaries further, autonomous stores have transitioned from conceptual ideas to concrete realities. A recently opened Sonae supermarket in Portugal, powered by Sensei AI technology, exemplifies this trend. This system:

"combines computer vision, machine learning, and sensors to achieve 99% accuracy in tracking consumer interactions with products, a significant improvement over existing autonomous solutions. Shoppers enjoy transparency, as their purchases are displayed in real-time, eliminating the friction of scanning and lines.... [R]etailers benefit with real-time alerts for replenishment and stockouts for improved stock management and dynamic planograms to easily update store layouts with the connected App. Sensei's technology frees on-site staff to focus on value-adding tasks, like customer assistance and restocking shelves, and extending operating hours" [51].

Such autonomous retail formats offer unparalleled convenience and efficiency for consumers, fundamentally transforming the purchase process.

Finally, in the post-purchase stage, retailers and service providers are leveraging technology to proactively monitor service requirements and issue timely reminders to customers. For example, BMW utilizes monitoring technology installed in its vehicles to send automated reminders that an oil change is due once drivers approach a specified mileage threshold (e.g., within 1000 miles of the service target). More broadly, BMW Proactive Care (BMW, 2023) leverages AI to determine the optimal timing for reaching out to BMW customers to propose personalized care plans, enhancing customer loyalty and ensuring vehicle maintenance [7]. These proactive interventions, driven by technology, deepen customer relationships and enhance the overall ownership experience.

What Does the Future Hold?

Development in Quadrant 1 seems poised to proceed in two primary directions, characterized by continued innovation and a growing emphasis on ethical considerations. First, ongoing research is crucial to investigate how analytical and generative AI can continue to effectively mine vast amounts of customer data. The goal is to not only analyze this data to define appropriate and highly personalized interactions with customers but also to generate actionable insights and concrete steps for further enhancing the customer experience and deepening customer relationships. For instance, advanced generative AI platforms, such as the Zobot generative AI, can suggest optimal designs for digital platforms where retailers can interact with customers across various channels, including websites, mobile devices, and social media networks [15]. Recent retail applications involving Generative AI offer substantial promise, with McKinsey estimating potential incremental sales of approximately 5% and an EBIT (Earnings Before Interest and Taxes) increase of 0.2-0.4% [48, 67]. This indicates significant financial returns are achievable through strategic Gen AI deployment.

Second, there is an increasing and urgent need for more comprehensive research into effective ways to manage AI-related privacy, bias, and ethical concerns. As AI becomes more deeply embedded in customer-facing processes, the potential for unintended consequences, such as discriminatory algorithms or misuse of personal data, escalates [33, 62]. Li et al. (2023), for example, are investigating optimal methods for storing customer data to ensure robust privacy protections in the AI age [46]. Addressing these ethical considerations will be paramount for widespread consumer trust and sustained adoption of AI-driven customer solutions. The future will involve a continuous balancing act between leveraging AI's immense potential for personalization and efficiency, and ensuring responsible, transparent, and ethical implementation to safeguard customer rights and foster long-term relationships.

Quadrant 2 (Customer-Focused Activity, Employee-Intensive Solution)

Quadrant 2 represents the most historically familiar landscape for customers, as advanced technology was not always readily available or affordable for the average retailer or consumer. Consequently, nearly all retail interactions in the past were heavily reliant on direct employee engagement. Even in today's technologically advanced environment, this quadrant remains highly relevant for specific retail strategies.

Goals

Retailers typically pursue employee-intensive processes in customer-focused activities for two main reasons. The first pertains to cost considerations. Smaller retailers, or those operating on limited budgets, might find the significant capital investment required for technology-intensive solutions to be prohibitive. In such cases, the primary goal shifts to achieving cost efficiency through human labor, rather than leveraging technology to enhance customer relationships. The second, and often more strategic, motive stems from a retailer's deliberate choice to offer high-touch operations. In high-end, luxury retail settings, or for highly complex product categories, salespeople serve as critical touchpoints throughout the consumer journey. These skilled employees can encourage greater purchases, cultivate profound customer

satisfaction, foster deep brand loyalty, and generate positive word-of-mouth referrals [59]. For these retailers, the primary goal is unequivocally to enhance customer relationships through personalized, empathetic, and expert human interaction, where the human element itself is the core value proposition. Other notable examples of retailers and service providers that strategically depend on employee-intensive solutions include personal stylists working for upscale department stores like Nordstrom, realtors serving high-net-worth clients, and bespoke personal chefs.

Use Cases

In the pre-purchase stage, interactions between customers and employees remain frequent and highly valued. A common scenario involves a customer entering a physical store and being warmly greeted by an employee who offers assistance in finding specific items or provides guidance. This human touch can significantly enhance the initial shopping experience. Furthermore, employees excel at tasks like delivering different sizes or styles to a dressing room, providing immediate feedback on fit and appearance, and offering styling advice. A Nordstrom personal stylist, for instance, might undertake extensive, highly personalized activities to help shoppers identify suitable outfits for specific occasions, leveraging their deep fashion knowledge and understanding of individual client preferences.

During the purchase stage, customers seeking an easier, more personalized, or less self-service-oriented shopping experience often prefer employee-staffed checkout counters over self-checkouts. For many, it is simply faster and less cumbersome for a trained employee to scan multiple items, handle complex discounts, or process various payment methods than for the customer to perform these tasks themselves. Similarly, a realtor provides an inherently employee-intensive purchase experience, personally guiding buyers through every intricate stage of the real estate transaction process, from property viewing to contract negotiation and closing, rather than simply directing them to a website for information and guidance. This human guidance is invaluable for high-value, complex purchases.

In the post-purchase stage, customers frequently appreciate follow-up calls or personalized messages from employees to check on the performance of a newly purchased item or to offer assistance. Such personalized outreach can be profoundly important, as it allows the customer to share unexpected joys or frustrations directly with a human. If there is an issue that needs to be addressed, the employee can provide immediate, empathetic assistance and find a tailored solution. For example, a dedicated concierge chef would likely follow up with clients to inquire about their satisfaction with each meal prepared for them, gather feedback on the overall dining experience, and even offer the recipes for popular dishes from the personalized dinner menu. These post-purchase interactions solidify relationships and build trust.

It is important to acknowledge that even in these relatively employee-intensive solutions, technology components can still subtly, or overtly, enter the equation. For example, while a Nordstrom personal stylist relies heavily on their own human expertise and interpersonal skills, they also might discreetly check with an AI-managed inventory system to ensure that the items they want to recommend to clients are indeed in stock in the correct size and color. This demonstrates a hybrid approach where technology supports, rather than supplants, the core human-driven service.

What Does the Future Hold?

We predict two critical developments in Quadrant 2. First, even smaller retailers that currently cannot afford high-end AI solutions are likely to gain increased access to more basic, cost-effective versions. This will occur either as the overall costs of AI solutions decrease due to market maturation and increased competition, or as developers introduce "lite" versions specifically designed for small and medium-sized businesses (SMBs) [47]. Such applications might feature general large language models (LLMs), such as public versions of ChatGPT, instead of custom, proprietary, and expensive enterprise-grade versions. Despite their general nature, these LLMs can still add significant value when adopted for necessary activities like generating marketing copy for blog posts, crafting engaging promotional content for social media, or developing more effective product descriptions for online storefronts [3, 42, 43]. Suitably managing this transition will be crucial for smaller retailers. Owners and managers will need to proactively acquire and/or develop the skills necessary to suitably integrate AI into their existing workflows as the costs and complexity associated with AI continue to decline over time.

Second, employee-intensive solutions are likely to remain optimal for high-end retailers, where the personalized, human touch is a core component of the value proposition. However, even in these contexts, "lite" AI versions could increasingly augment employee efforts in meaningful ways, enhancing efficiency without detracting from the desired high-touch experience. Imagine, for example, a custom AI application that builds upon existing styling platforms, allowing a company like Stitch Fix to partner with Nordstrom. This partnership could establish a fun, gamified quiz for clients, enabling them to leverage AI-powered insights to design and curate a personalized closet of items for the upcoming season. The challenge for larger retailers will be to judiciously use AI in ways that suitably augment employee efforts and genuinely enhance the customer experience, rather than eroding the bespoke nature of their service. This means focusing on AI as a support tool for human expertise, allowing employees to be even more effective and focused on relationship building. The future will involve a nuanced integration, where the human element remains central, but is

significantly empowered by intelligent technological assistance.

Quadrant 3 (Operationally Focused Activity, Technology-Intensive Solution)

This quadrant focuses on operationally focused activities that are conducted using technology-intensive processes. Prior research consistently highlights the notable value and comparatively minimal risk associated with implementing such solutions [32, 36]. Technology-oriented solutions, and particularly AI solutions, are especially relevant and beneficial in non-customer-focused domains, where the direct interaction with the end consumer is limited or non-existent. The key advantage here is that if an AI solution for a retailer's internal operation experiences a glitch or sub-optimally performs, it does not necessarily affect consumers or their direct relationships with the brand. This means the resulting risks are relatively more contained and primarily impact internal efficiencies or costs, rather than brand perception or customer loyalty.

Goals

The primary goal in Quadrant 3 is to enhance operational efficiency. This is achieved through significant cost reductions (e.g., optimizing labor, reducing waste, streamlining processes) and/or by enabling the retailer to achieve more output or better quality with the same or fewer resources. While the relative lack of direct interaction with customers in these operational domains might seem to reduce the scope for directly deepening customer relationships, improved operational efficiency can indirectly enhance customer satisfaction through faster delivery, better product availability, and more accurate order fulfillment.

Use Cases

In the pre-purchase stage, Guha et al. (2021) refer to "low-hanging fruit"—easily achievable, high-impact benefits—that can be harvested through technology solutions designed to enhance the retail supply chain and logistics [36]. These solutions offer meaningful benefits with low downside risk because they primarily affect internal processes. For example, Heater (2022) describes Walmart's extensive reliance on AI across its 42 distribution centers in the United States [37]. In these vast facilities, AI-enabled robots autonomously move stock, efficiently pack or unpack items, and precisely sort products into different storage structures. According to a senior manager at Walmart, these robotic systems contribute not only to significant increases in speed but also to unparalleled accuracy in inventory management [19]. Similarly, Scotmid, a large Scottish grocery cooperative, has successfully implemented an AI technology solution that continuously monitors customer buying patterns. This data allows the AI to define optimal purchasing quantities and inventory levels for fresh produce, for example. In addition to positively impacting sales by ensuring product availability, this AI solution has produced significant reductions in food waste, demonstrating a dual benefit of efficiency and sustainability [54]. Furthermore, even when direct customer relationship benefits might appear comparatively minor, technology like generative AI can provide concise summaries of customer reviews. This increases operational efficiencies for internal teams (e.g., product development, marketing) while indirectly encouraging sales bumps by providing easily digestible customer feedback [40].

During the purchase process, numerous opportunities exist for technology solutions to drive increased efficiency in operations. Guha and Grewal (2022) and Rindfleisch et al. (2022) both cite the example of Whiz, an AI-enabled robot designed for cleaning retail stores [35, 55]. This robot operates autonomously, cleaning around customers without direct interaction, but it substantially increases cleaning efficiency and productivity, allowing human staff to focus on more customer-facing or complex tasks. If predictive AI receives real-time input about in-store customer demographics and movement patterns, it could theoretically arrive at more appropriate and better-targeted customer offerings by optimizing product placement or staffing, though this edges into customer-focused territory [20]. Another crucial form of efficiency in this quadrant results from diminished financial loss. Corsight AI technology, for instance, supports loss prevention efforts by making "sweethearting"—where employees give unauthorized discounts to friends or family—more difficult to execute and detect [21]. As Feathers (2024) explains:

"If you go into a shop and you pick up a few groceries, usually you would pick any of the cashiers that is around and you go scan your goods when someone is planning a sweethearting theft, they will always go to the same cashier, which is most of the time a relative of theirs, and this is an anomaly in the behavior compared to the other customers. Our (AI) system is able to identify this anomaly and alert on that" [21].

This illustrates how AI can monitor operational behaviors to prevent fraud. Furthermore, technology solutions involving generative AI can help store employees respond to customers more efficiently by quickly retrieving information or drafting responses, which in turn frees up their time for additional tasks or more personalized interactions when needed [34].

Finally, technology-intensive processes in post-purchase domains are critical for optimizing logistics and addressing customer service issues indirectly. AI can assist customer service agents with rapid information retrieval or provide pre-generated response suggestions, streamlining their workflow and allowing them to handle a higher volume of inquiries more efficiently [16]. Predictive AI plays a significant role in optimizing delivery routes, ensuring that products reach customers quickly and cost-effectively, which indirectly enhances customer satisfaction. AI algorithms are also being deployed to

manage product returns more effectively by flagging suspicious returns based on past customer histories or identifying patterns indicative of fraudulent activity [5, 56, 72]. Moreover, AI can offer suggestions about which customers should receive future discounts or personalized offers based on their high lifetime value, thereby strengthening long-term customer relationships through data-driven insights. These relationship-building activities, though stemming from operationally focused processes, hold considerable promise for increasing future sales and deepening positive customer relationships.

What Does the Future Hold?

In operationally focused domains, the reliance on technology-oriented processes is almost certainly poised for a significant increase, driven by a compelling combination of desirability (the tangible efficiency benefits) and feasibility (continuously decreasing costs of technology). A recent survey of retail and consumer packaged goods (CPG) executives highlighted this trend: approximately 48% of respondents indicated that the strategic use of Generative AI had enhanced their ROI by more than doubling employee productivity [67]. This concrete evidence reinforces the compelling business case for further technological adoption. However, despite these advantages, privacy-related concerns continue to represent a potential impediment that may slow the widespread adoption and utilization of certain technology solutions. For instance, the use of facial scanning technologies in physical stores, even if legally permissible, raises considerable privacy concerns among consumers [70]. Such concerns can evoke tensions, leading to public outcry or even pressure from governments and regulatory bodies to impose limitations on the use of these advanced technology solutions in retail environments. This ongoing tension between technological advancement and societal privacy concerns will undoubtedly play out prominently in the future, with an uncertain ultimate resolution.

Furthermore, it is crucial to recognize that not all promising technology implementations will succeed. While the Whiz robot has demonstrated success in cleaning retail stores, the Bossa Nova cleaning application previously implemented at Walmart was ultimately deemed less successful and discontinued [69]. This highlights a need for further research into the specific factors that drive successful technology implementations, especially in scenarios where customers might observe the AI in operation, regardless of whether they directly interact with it. Understanding the nuances of technology deployment, employee training, and customer perception will be vital for future success.

The persistent and significant challenge of product returns also represents a meaningful domain ripe for leveraging the contributions of AI [13]. AI systems can be developed to predict which types of purchases are more likely to trigger returns (e.g., identifying patterns where a customer buys the same shirt in multiple sizes, suggesting uncertainty about fit and a high probability of returning some items). They can also identify which specific products tend to be associated with higher return rates due to defects or common issues, and which customers are more likely to engage in fraudulent product returns based on their past return history. Research into how AI can effectively analyze such complex situations can yield profound insights that inform the development of broader retail strategies, moving from reactive return management to proactive return prevention and fraud detection.

Quadrant 4 (Operationally Focused Activity, Employee-Intensive Solution)

Quadrant 4 encompasses operationally focused activities that primarily rely on employee-intensive solutions. As noted for Quadrant 2, retailers might lean towards employee-intensive processes, despite the widely acknowledged benefits of technology-intensive solutions, primarily due to the associated costs and resource constraints. Beyond financial limitations, the scale of a retailer's operational needs might simply not warrant a technology-intensive solution. This is particularly true for small, family-maintained operations (often referred to as "mom-and-pop" retailers) or businesses located in certain developing countries that have limited access to technological capabilities and the necessary infrastructure (e.g., reliable high-speed internet, consistent electricity). In these contexts, human labor remains the most feasible and cost-effective approach to managing day-to-day operations.

Goals

The goals in Quadrant 4 are fundamentally similar to those in Quadrant 3: to enhance operational efficiency (achieving cost reductions and/or doing more with existing resources) and, where possible, to indirectly deepen customer relationships through reliable and consistent service delivery. However, the means to achieve these goals are distinctly employee-centric.

Use Cases

Landing in this quadrant is often a consequence of constraints imposed by financial or technological resources, rather than a deliberate, benefits-driven strategic choice to prioritize human labor over technology. Thus, the use cases in this quadrant largely illustrate how retailers manage their operationally focused processes by relying heavily on employees, who might utilize limited or older technological tools to achieve their objectives.

In the pre-purchase stage, retailers in this quadrant might outsource some marketing activities or hire marketing professionals on a contract or gig basis. This allows them to access specialized skills without the overhead of full-time employees or expensive in-house technology. Other employee-intensive solutions include joining local buying

cooperatives, sharing storage facilities with other small businesses, or pooling logistics resources to achieve economies of scale that would otherwise be unattainable. For instance, the group purchasing organization Entegra serves a wide variety of small businesses, helping them obtain competitive prices on supplies. As the managing director of a small golf club stated: "prior to working with Entegra we used to send out a stock list at the beginning of each month to our three preferred suppliers... ask them to quote... Entegra now does this for us, and ensures that we are getting the best prices" [52]. Beyond these direct economic benefits, such organizations often support clients with some basic digital tools, acting as a "technology-lite" additive solution that enhances employee capabilities without requiring a major technology overhaul. By turning to outsourcing or fractional services, smaller retailers can access some modern technology tools and expertise at an affordable, pay-as-you-go price point.

The emergence of generative AI, especially those based on large language models (LLMs) like ChatGPT, holds promise even for smaller retailers in this quadrant [34]. While they may not invest in custom AI platforms, general LLMs can make basic AI capabilities more accessible. These tools can be leveraged by employees to create effective product descriptions, draft engaging social media posts, generate appropriate responses to common customer service inquiries, write persuasive sales scripts, or even brainstorm new product ideas. This can help the retailer enhance the potential for customer purchases by improving the quality and consistency of their outreach and communication. Similarly, LLMs and chatbots, when suitably applied through general AI applications, can assist employees in addressing post-purchase concerns by providing quick access to information or generating draft responses, thereby improving efficiency even without complex automation.

What Does the Future Hold?

Two main developments seem likely for Quadrant 4, driven by both desirability (the increasing accessibility and utility of new technologies) and feasibility (decreasing costs and user-friendliness). First, with the continued rise and formalization of the gig economy [12], smaller firms can gain access to limited technology solutions and specialized expertise. This can be achieved by soliciting help through platforms like Fiverr and Upwork, where freelancers offer services ranging from graphic design to basic AI prompts and content creation. This provides a flexible and cost-effective way for small businesses to leverage technology without significant upfront investment.

Second, as more generative AI solutions emerge and evolve, becoming increasingly sophisticated and user-friendly [11, 49], a key research priority will be to identify and encourage developments that can specifically benefit smaller businesses [47]. In particular, and echoing the discussion in Quadrant 2, general (as opposed to custom) LLMs can add substantial value across multiple business functions for smaller retailers. Even a relatively limited generative AI application can suggest suitable advertisements [43], simulate data for basic market research [3], and write compelling blog posts and product descriptions [3, 42, 43]. However, open questions remain regarding precisely how to effectively augment the capabilities of smaller retailers so that they can derive meaningful outcomes from such general generative AI tools. Furthermore, there's a need to encourage developers to prioritize the creation of AI versions that emphasize affordability and ease of use, even if they do not achieve the highest levels of accuracy found in expensive custom solutions (where such accuracy often comes at a high cost).

The next wave of AI developments might alternatively feature more agentic AI. In this paradigm, AI agents are designed to execute specific, multi-step, and complex tasks autonomously, thereby bolstering employee-intensive solutions. For example, agentic AI could specialize in "summarizing questions and answers in HR, speeding up the amount of time spent on finance reports, and automating some core business functions in customer support and IT" [22]. These types of automated, intelligent assistants could be especially beneficial for smaller retailers that cannot afford to maintain separate, dedicated departments for finance, HR, or IT. Managing both of these points—the adoption of general LLMs and the integration of agentic AI—will be critically important for owners and managers in smaller retail businesses. In some cases, the retailer might need to acquire and/or develop new skills to suitably introduce such AI (e.g., Gen AI with a general LLM, agentic AI) into their existing workflows, emphasizing continuous learning and adaptation in a rapidly changing technological landscape.

DISCUSSION OF THE FRAMEWORK

It is critical to recognize that the four quadrants discussed above, while interconnected, are strategically distinct. Quadrants 1 and 2 primarily focus on enhancing customer relationships and experiences through either technology-intensive or employee-intensive means. In contrast, Quadrants 3 and 4 lean heavily into activities that might primarily enhance employee effectiveness and operational efficiency, again differentiating based on the intensity of technology or human labor. More specifically, Quadrants 1 and 3 elaborate on retail settings where technology-intensive solutions are deemed highly effective and strategically optimal. Conversely, Quadrants 2 and 4 outline scenarios where employee-intensive solutions are either strategically preferred (e.g., for high-touch service) or economically optimal (e.g., due to resource constraints).

Technology-intensive solutions are largely driven by profound advances in Artificial Intelligence across its various forms (predictive, generative, agentic AI). AI possesses the unprecedented potential to mine vast datasets for deep customer insights, react to changing customer sentiment in real-time, significantly augment

employee productivity in diverse ways, and in some cases, entirely replace human employees in certain roles, particularly those that are repetitive or data-intensive. In stark contrast, employee-intensive solutions may be optimal for strategic or cost-related reasons. From a strategic perspective, employee-intensive solutions can offer a distinct competitive advantage, particularly for upscale retail stores selling luxury goods and services that thrive on offering a highly personalized, high-touch sales experience where human connection is paramount. From a cost perspective, employee-intensive solutions may be the optimal choice for smaller retail stores that may not possess the financial resources or technological infrastructure to adopt sophisticated technology-intensive solutions.

It should be clarified that retail firms are not necessarily looking to strictly migrate from one quadrant to another. Retailers for whom technology-intensive solutions are inherently optimal, perhaps due to their business model (e.g., e-commerce giants, fully automated convenience stores), should strive to remain in the appropriate technology-intensive quadrant, continually leveraging and optimizing the benefits derived from implementing AI solutions. Similarly, those for whom a high-touch service is critical for success and brand differentiation (e.g., luxury boutiques, bespoke service providers) should continue to prioritize and invest in employee-intensive solutions, refining the human element of their service delivery.

However, there exists a specific segment of smaller retailers that have primarily adopted employee-intensive solutions due to significant resource constraints, rather than a deliberate strategic choice. As technology continues to advance and become more accessible, such smaller retailers might find themselves increasingly able to suitably incorporate technology-intensive solutions into their operations, more so than was feasible in the past. For instance, even small retail shops can benefit significantly today from using general generative AI solutions, especially those readily available through large language models (LLMs). ChatGPT, for example, can assist a small retailer (e.g., a food truck operator, a local boutique) in creating suitable advertisements, crafting engaging social media posts, and generating effective drafts for customer complaint responses. This illustrates a trend where basic AI capabilities are democratized, offering tangible benefits even to businesses with limited technology budgets and expertise.

DISCUSSION

The retail strategy undertaken by firms, particularly concerning the adoption and integration of technology, can have profound and far-reaching impacts and influences on various key retail stakeholders: the retailers themselves, their customers, their employees, and society at large. Understanding these multifaceted impacts is crucial for crafting responsible and sustainable retail strategies in the digital age.

Stakeholder Impacts

For Retail Firms: Retail firms inherently seek to achieve greater output with fewer resources (efficiency) and to cultivate deep, lasting customer relationships to maximize their long-term returns. The former objective, enhancing efficiency, frequently motivates the strategic choice of technology-intensive processes, especially for operationally focused activities. For example, AI can substantially reduce delivery costs by dynamically defining optimized delivery routes, a critical advantage for logistics-heavy operations like Amazon [2]. This directly translates into cost savings and improved profitability. However, the latter goal—building customer relationships—can also significantly benefit from technology-intensive solutions. As previously mentioned, Kanetix leverages AI to strategically determine which customers receive promotional incentives and which do not, optimizing their marketing spend while simultaneously enhancing customer acquisition and retention [1]. This data-driven approach allows for more effective resource allocation and personalized customer engagement.

For Customers: From a customer standpoint, the strategic implementation of technology can profoundly deepen their relationships with the firm. For instance, Nordstrom's personal stylists, representing an employee-intensive solution, foster strong personal bonds and trust through tailored service. Concurrently, BMW Proactive Care, a technology-intensive solution, enhances customer loyalty and satisfaction by providing personalized, proactive vehicle service reminders [7]. However, increased reliance on AI also carries potential negative implications for customers. The pervasive use of AI often raises significant privacy concerns as companies collect and analyze vast amounts of personal data [14]. There's also the tangible risk of receiving inaccurate or inappropriate information from AI systems, which can detrimentally affect the customer's trust and relationship with the firm (e.g., the Air Canada chatbot issuing erroneous promotions that had to be honored [6]). Therefore, transparency, data security, and clear communication are paramount to mitigate these risks.

For Employees: From an employee perspective, some technological solutions are explicitly designed to augment their capabilities and enhance their work roles, leading to increased productivity and job satisfaction. Stitch Fix's use of AI, for example, significantly augments the capabilities of its human stylists by providing data-driven insights into customer preferences, allowing stylists to make more informed and personalized clothing selections [14]. However, technology-intensive solutions also carry potential negative implications for employees, most notably the threat of job displacement and capability loss. As AI increasingly automates tasks traditionally performed by humans and replaces roles in customer service or content creation, employees might lose essential skills such as problem-solving and creative

thinking [33]. As Grewal et al. (2024) succinctly put it, this raises concerns about "capability loss, in parallel with the threat of job losses" [33]. Retail firms must therefore proactively anticipate how employees are likely to react to the introduction of AI solutions and then craft comprehensive strategies for implementing these AI solutions in their retail operations. This includes investing in training and reskilling programs to equip employees with the necessary capabilities to collaborate effectively with AI. It is also crucial to develop suitable metrics to evaluate the effectiveness of human and AI collaborations (e.g., employee-AI teams), an important area for future research identified by Fragiadakis et al. (2024) [23].

For Society: Finally, the potential impacts of technology on society at large reflect a double-edged sword. Some technology-intensive solutions undoubtedly create substantial societal value, embodying "the tremendous potential of AI for developing societal value, transforming businesses and their processes, and enhancing individual and customer experiences" [33]. Generative AI, for instance, can be utilized by firms to assist with a variety of marketing functions, such as creating compelling ad copy, developing effective sales and service scripts, and generating high-quality images for websites and product catalogs, thereby boosting economic activity. However, there are also significant potential negative consequences, both for the retailer and for society. Some research suggests that the widespread use of generative AI might detract from perceived brand authenticity [10], which could have downstream consequences for consumer trust and market dynamics. Others raise critical privacy and ethical concerns related to AI's data collection and algorithmic decision-making, as noted previously [14, 29, 33]. Furthermore, if not managed responsibly, AI solutions could potentially exacerbate existing societal tensions, such as enhancing income disparities by displacing human labor without adequate transitional support or creating new forms of digital divides.

Retail Strategy Implications and Avenues for Retail Research

Based on the comprehensive analysis of technology's impact on the 7 Ps of retail strategy and the detailed examination of the Process P framework, we identify five key implications for retail strategy and highlight critical avenues for future research:

1. Resource Realism and Strategic Augmentation: Retailers with limited resources must maintain a realistic perspective regarding the extent to which they can implement sophisticated, capital-intensive technology solutions. Instead of attempting to emulate large enterprises, they should strategically continue to rely primarily on employee-intensive solutions while actively seeking out and adopting limited, cost-effective technology solutions. These could include general large language models (LLMs) or basic AI tools, specifically used to augment their employees' existing capabilities and enhance specific operational efficiencies without demanding prohibitive investment. Future research should focus on developing frameworks and case studies for optimal "technology-lite" integrations for SMBs.

2. Risk Mitigation in Technology Adoption: As Guha et al. (2021) have eloquently argued, the comparatively lower risk involved in introducing technology-intensive solutions in operationally focused activity domains, rather than directly in customer-facing domains, should be a significant factor in retailers' strategy formulation [36]. While customer-facing AI offers high reward, operational AI offers more contained risk. Beyond merely choosing between relatively more employee- or technology-intensive solutions, retailers must consider the holistic fit across all seven Ps and strive for consistency among these strategic elements. Research is needed on how to systematically assess and mitigate risks associated with new AI technologies across the retail value chain.

3. Augmenting High-Touch Experiences: Even retail firms with excellent reasons to choose employee-intensive processes (e.g., high-end, luxury settings like Nordstrom, where personalized service is paramount) should not overlook the meaningful benefits they might gain by allowing for some degree of reliance on suitable technology solutions to subtly augment their employees' capabilities. As evidenced by Nordstrom's embrace of "phygital" formats, including live video shopping [50], technology is increasingly playing a substantial role even in high-touch environments. Future research could explore optimal hybrid models that preserve and enhance human-centric service while leveraging AI for efficiency and personalized insights, identifying the "sweet spot" where technology complements, rather than diminishes, human connection.

4. Strategic Workforce Alignment: Retailers need to critically consider the fit between their chosen retail strategy and the skill sets of their retail employees. For a retailer adopting employee-intensive processes primarily for cost reasons, employees with a wide range of general skills who can perform multiple tasks efficiently might be optimal. Conversely, if the retailer prioritizes employee-intensive solutions to build deep relationships, such as with luxury clients, the employees it hires should specialize in providing sophisticated, empathetic customer service and possess strong interpersonal skills. For retailers that prioritize relatively technology-intensive processes, tech-savvy employees with experience working collaboratively with AI systems, understanding data, and troubleshooting basic technical issues might be the perfect fit. Research is needed on developing effective training programs and talent acquisition strategies for the evolving retail workforce in an AI-driven world.

5. Continuous Exploration of Emerging AI Forms: New forms of Artificial Intelligence (e.g., predictive AI for forecasting, generative AI for content creation, agentic AI for autonomous task execution) continue to emerge and

evolve rapidly. This necessitates a continuous and proactive assessment by retailers to understand how and when each of these AI types might offer suitable technology-intensive solutions that align with their strategic objectives. This article raises critical issues, especially in relation to the drivers of the adoption of relatively technology-intensive solutions [36], which demand further attention. There is a need for a richer understanding of how AI can help retailers seamlessly blend physical and digital experiences for customers ("phygital stores") to create truly unified and frictionless shopping journeys. Similarly, as virtual reality (VR) and augmented reality (AR) technologies continue to expand their capabilities and become more accessible, it will be critical for retailers to develop specific strategies to further elevate customer experiences in an immersive and seamless manner.

As retailers develop and implement AI/technology solutions and integrate them with their employees (e.g., creating augmented employees), it is important to develop robust metrics to evaluate how both employees and customers perceive the effectiveness of these AI-human collaborations. This includes assessing factors like user satisfaction, task completion rates, emotional responses, and perceived fairness.

These technological advances also highlight the imperative for retailers to deeply understand their impact on consumer perceptions and trust. For example, a key question for future research is whether Generative AI, with its ability to create novel content for brands including text, images, video, and audio, will ultimately enhance or detract from the established brand equity that retailers and manufacturers have painstakingly developed. What controls and monitoring mechanisms should be implemented to effectively govern the use of Gen AI in brand communications to ensure authenticity and prevent misinformation? As AI continues its rapid advancement, it is likely that some existing AI-related risks will be mitigated through improved technology and better regulatory frameworks, but it is equally probable that other novel AI risks will emerge, posing new challenges. Legislative bodies are increasingly likely to revise existing regulations and introduce new ones that will materially affect the introduction and implementation of different AI solutions in retail. The specific impacts of such regulation, particularly for retailers, are a crucial area worthy of extensive future research attention, ensuring that innovation proceeds responsibly and equitably.

CONCLUSION

The retail industry is undergoing a profound and irreversible transformation, fundamentally reshaped by the pervasive and accelerating influence of technology. This article has illuminated how strategic adaptation to this digital shift is no longer a competitive advantage but a critical imperative for survival and growth. From profoundly enhancing personalized customer experiences through AI-driven recommendations and seamless omnichannel integration, to optimizing intricate supply chain operations through robotics and advanced analytics, and revolutionizing marketing and pricing strategies with dynamic models and generative AI, technological advancements are deeply embedded in every facet of modern retail.

Retailers who proactively embrace Artificial Intelligence, automation, the Internet of Things, and sophisticated data analytics will be uniquely positioned to meet the escalating and evolving expectations of today's consumers. They will gain the ability to drive unprecedented efficiencies across their operations, enabling them to offer competitive prices, optimize inventory, and streamline logistics. Crucially, they will also be empowered to foster deeper, more personalized connections with their customer base, building lasting loyalty in an increasingly fragmented market.

Navigating this complex digital shift demands more than just adopting new tools. It requires strategic foresight to anticipate future trends, substantial and sustained investment not just in technology but also in the accompanying infrastructure and human capital, and an unwavering commitment to ethical implementation. This includes addressing critical concerns around data privacy, algorithmic bias, and the impact on the workforce through robust governance and continuous training. The future of retail hinges on a delicate but powerful synergy: effectively integrating human ingenuity, creativity, and empathy with the unparalleled processing power and efficiency of technology. Ultimately, the retailers who master this art of strategic adaptation through discerning and responsible technological integration are the ones who will thrive and define the retail landscape of tomorrow.

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