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Impact of using Agentic AI in Retail industry

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Abstract - Retail has always chased any technology that promised an advantage. Agentic AI feels different from all the technology that came before. These are systems that do not simply answer questions or suggest a product. They can plan a series of actions carry them out and change the plan as needed while receiving very little human input. A chatbot tells a customer where an order's an agentic AI system notices that a delivery is running late reroutes it and sends a message to the customer before anyone asks. That difference. It is the starting point for this paper. Of conducting new fieldwork, we assemble what has already been written about agentic AI in retail. Some of this writing is peer-reviewed some is fresh from arXiv. Some comes from industry research by firms such as Bain and Strategy&. We try to build a picture that fits together. The paper uses four lenses that are normally used separately—the Technology Acceptance Model, Diffusion of Innovation, Agency Theory and the Resource-Based View—and brings them together into one framework. This framework follows a path from readiness to adoption then through mediating mechanisms such as personalization and adaptive pricing and finally to outcomes like loyalty and operational efficiency. Ten recent studies support the review. We also spend time on what could go wrong: trust, transparency, job displacement and unclear accountability. The literature shows that these issues are not footnotes; they will decide whether agentic AI creates real value or simply shifts problems around. In short, our conclusion is that the technology has upside but it appears only when retailers combine autonomy, with genuine oversight.

Keywords: Agentic AI, Retailing, Autonomous Agents AI Adoption, Customer Experience, Conceptual Framework, Retail Technology

1. INTRODUCTION

Retail has always chased whatever technology promised an edge. Agentic AI feels different from what came before it. Retails relationship with technology has gone through distinct phases—point-of-sale systems, then ERP, then e-commerce then the big-data-and-analytics push and more recently generative AI chatbots bolted onto customer service desks. Agentic AI is being talked about as the phase and its worth pausing on why its treated as a break from what came before rather than just another upgrade. The systems in question can set their sub-goals, string together multi-step plans call on external tools when needed and revise their approach based on what happens next—all without a human clicking 'approve' at every step. That's a jump from a system that predicts demand or drafts a product description.

You can already see this playing out. Some retailers are testing shopping agents that research options and complete a purchase on a customer's behalf; others have inventory agents quietly reordering stock before a human even notices it's low; still others route a growing share of customer service through agents that resolve the issue end to end. Analysts have thrown around eye-catching figures—hundreds of billions of dollars in transaction value over the several years is one estimate doing the rounds—and whatever one makes of the precision of that number the direction of travel seems clear enough. What's less clear and what the academic literature hasn't caught up with yet is how this gets adopted in practice what it does to the retail value chain once its embedded and what risks come along for the ride.

This paper doesn't try to close that gap with data. Instead, it tries to organize what's already there, into something more coherent—clarifying terms pulling together theory that's usually applied separately and proposing relationships that a future empirical study could actually go and test.

2. PROBLEM STATEMENT

Retail has always been handled separately. Proposing relationships that a future. The enthusiasm around AI in retail is running well ahead of the research base. Most of what's published far is descriptive a white paper here a technical prototype there and it doesn't add up to a coherent picture yet. Three gaps stand out. The first is definitional: 'agentic AI' gets used loosely interchangeably with generative AI or basic

automation which blurs the one thing that actually sets it apart the capacity to act autonomously across multiple steps toward a goal. The second is fragmentation: studies tend to look at one slice of retail at a time customer experience inventory there pricing somewhere else without anything tying the pieces together into a single model that connects what driv es adoption to what results from it. The third and probably the most consequential is that the risk side of the story is under-theorized. Consumer trust, transparency who's accountable when an autonomous agent gets it wrong what happens to the people whose jobs the agents absorb these show up in the literature as concerns but rarely as part of a structured explanation of when agentic AI creates value and when it erodes it. This paper works from those three gaps, toward a conceptual framework, built on adoption and organizational theory that already has a track record elsewhere.

3 OBJECTIVES OF THE STUDY

1. Retail must define AI clearly enough to separate it from generative AI and assistive AI as they are used in retail.

2. literature, about where agentic AI is actually being applied in retail customer experience, inventory and supply chain, pricing and marketing.

3. Pull together the grounding that helps explain why and how agentic AI gets adopted and what it changes.

4. Build a framework connecting antecedents, adoption mechanisms and outcomes.

5. Outline the benefits, the risks and where research still needs to go.

4 REVIEW OF LITERATURE

1. Hosseini and Seilani (2025) "The Role of Agentic AI in Shaping a Smart Future: A Systematic Review." ran a review across industries and found that autonomous decision-making is the key feature that sets agentic systems apart from earlier technologies. They also noted that retail and service sectors are leading the way in adopting this kind of AI.

2. Basu (2026) "Agentic Commerce Applications: How Autonomous AI Is Redefining the Retail & E-Commerce Industry." drew a distinction between assistive AI and truly agentic systems. The study showed that agentic systems have moved beyond recommendations to actively managing entire retail processes—like merchandising, dynamic pricing and omnichannel operations. It also pointed out that these systems only work when backed by real governance structures.

3. Puri, Pradhan, Bernabe and Ray (2026) " AI in Branding: Driving Hyper-personalization and Real-time Adaptation." examined how autonomous systems create personalized brand experiences in real time. They used examples from known consumer brands and proposed a practical governance framework. This included brand guidelines, human checkpoints and audit trails to prevent bias and off-brand behavior.

4. Yang, Wang, Wang, Li and Zhou (2025) "Multi-Agent Deep Reinforcement Learning for Integrated Demand Forecasting and Inventory Optimization in Sensor-Enabled Retail Supply Chains." built a -agent reinforcement learning system that combines transformer-based demand modeling with agents that coordinate inventory across a distribution network. The results showed it outperformed statistical forecasting especially in more volatile retail environments.

5. Long Simchi-Levi, Calmon and Calmon (2025) "Reliability and Effectiveness of Autonomous AI Agents in Supply Chain Management." asked a cautious question: under what conditions should a supply chain trust an autonomous agent's decisions? Their conclusion was that reliability doesn't come from the agent's capabilities but from guardrails ongoing monitoring and clear escalation paths.

5.THEORITICAL FOUNDATION

Technology Acceptance Model (TAM)

Daviss (1989) TAM says, in essence that people adopt a technology when they find it useful and not too much of a hassle to use. Applied here it helps explain why a store manager might embrace an agent that reliably cuts stockouts while a customer might hesitate to let an agent complete a purchase they didn't personally review.

Diffusion of Innovation (DOI) Theory

Rogers Diffusion of Innovation framework tracks how a technology spreads through awareness, persuasion, a decision point, implementation and eventually confirmation and why some retailers move first while others wait and watch. Relative advantage, compatibility with existing systems and how visible the results are all affect how fast that spread happens.

Agency Theory

Agency Theory turns out to be unusually well-suited to AI maybe more so than to most technology adoption questions because its literally about what happens when a principal hands decision-making authority to an agent. Here the agent just happens to be software, then a person. The theory's usual concerns information asymmetry, the cost of monitoring whos

accountable when things go sideways map onto AI almost without modification.

Resource -Based View

The Resource-Based View treats AI capability—the data, the orchestration infrastructure the governance built around it—as a potential source of lasting advantage but only if its genuinely hard for competitors to copy and its actually embedded in how the organization works not bolted on as a side project.

6.CONCEPTUAL FRAMEWORK

PROPOSITIONS

1. P1: Retailers with technological readiness and better data infrastructure tend to adopt agentic AI more deeply.

2. P2: The link between adoption and positive outcomes runs through mediating mechanisms such as personalization, adaptive pricing and automated engagement than existing on its own.

3. P3: How much customers trust systems in general changes how the level of delegated autonomy affects their actual experience.

4. P4: Strong governance and human oversight soften the damage that low transparency would otherwise due to outcomes.

7.BENEFITS OF AI IN RETAILING

1. Personalized shopping experiences that go beyond recommendations to anticipating what a customer needs before they ask.

2. Fewer. Lower inventory costs, since demand sensing and replenishment run continuously instead of on a schedule.

3. Customer service that runs around the clock with a growing share of issues closed out without a human getting involved.

4. Pricing and assortment decisions that can shift in near time as market conditions change.

5. Lower coordination costs on tasks like supplier negotiation and logistics which used to eat up a lot of staff time.

6. More room to maneuver strategically when demand shocks or competitive moves hit without warning.

8.CHALLENGES OF AI IN RETAILING

1. Getting customers comfortable enough to let an agent make purchasing or service decisions on their behalf

2. Explaining what a multi-step autonomous decision actually did and why which isn't always straightforward.

3. Privacy and security risks that come with agents needing access across customer data systems.

4. Jobs that shift or disappear as agents take over coordination- work and the reskilling that has to follow.

5. Getting old siloed retail systems to actually talk to a -agent architecture without constant friction.

6. Figuring out who's accountable when an autonomous agent makes a biased call, at scale.

9. FUTURE SCOPE

1. A long-term study on how consumer trust in AI changes—or stays the same—over time with repeated exposure.

2. Comparing how adoption happens in countries and retail markets instead of assuming a single model works everywhere.

3. Actually, testing the framework presented here using survey data or mixed-method research across types of retail environments.

4. Exploring human-AI retail models to understand where the boundary between human work and agent work should be placed.

5. Looking directly at how agentic AI-driven automation affects the labour market in retail.

6. Creating shared standards for auditing and governing retail agents since no real standards exist yet

10.CONCLUSION

Agentic AI is not another small step forward in retail technology. It changes what AI can do. It moves AI from helping a human make decisions to making decisions and acting on them—both in front of the customer and behind the scenes in operations. The research gathered here shows gains in personalization, efficiency and strategic responsiveness. It's also clear that issues around trust, transparency, accountability and the impact on retail jobs are still not settled. The framework in this paper tries to bring both the story of adoption and the story of risk. It's meant to be a starting point for research that tests these relationships of just describing them. Where any retailer ends up will likely depend less on how advanced their agentry more on whether they have built the oversight to match autonomy with accountability, efficiency with ethics and personalization, with privacy.

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