

Harnessing the power of AI for retail: Part 2



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Key takeaways

- Generative artificial intelligence (GenAI), powered by large language models (LLMs), is the next frontier in retail innovation.
- Combining AI-based foundational models with 'enterprise-wise' and traditional AI-ML approaches, retailers can create a knowledge superstructure that offers them a competitive advantage.
- Beyond the hype of AI, is the promise of new opportunities. We examine the myths and reality behind LLMs and AI implementations and the way forward for retailers.

AI – from then to now

Retailers need a customized approach to take AI from potential to sustained performance.

Initially, artificial intelligence (AI) focused on recognition tasks such as identifying objects in images. Its next iteration involved reasoning – analyzing what is happening, why it is happening, what the likely outcomes are, what we should do about it, and decision-making based on that understanding.

The most transformative shift happened with the advent of generative or operative capabilities, exemplified by large language models (LLMs) such as GPT, LaMDA, and LLaMA. These models leverage predictions made during the reasoning stage and can make decisions and propose actions.

Generative artificial intelligence (GenAI) and LLMs have the potential to extract insights from such unstructured content. Foundational models, such as GPT, LLaMA, and open-source alternatives are 'world-wise' and are able to integrate common knowledge that may exist offline, such as in books or paintings. By combining such models with 'enterprise-wise' ones and traditional artificial intelligence (AI) and machine learning (ML) techniques, retailers can create a knowledge superstructure.

In this second part of a two-part series, *Harnessing the power of AI for retail*, we explore how TCS leverages GenAI for retail value chains and the myths and cautions around AI implementations. (See [Part 1 here](#))

GenAI for retail value chains

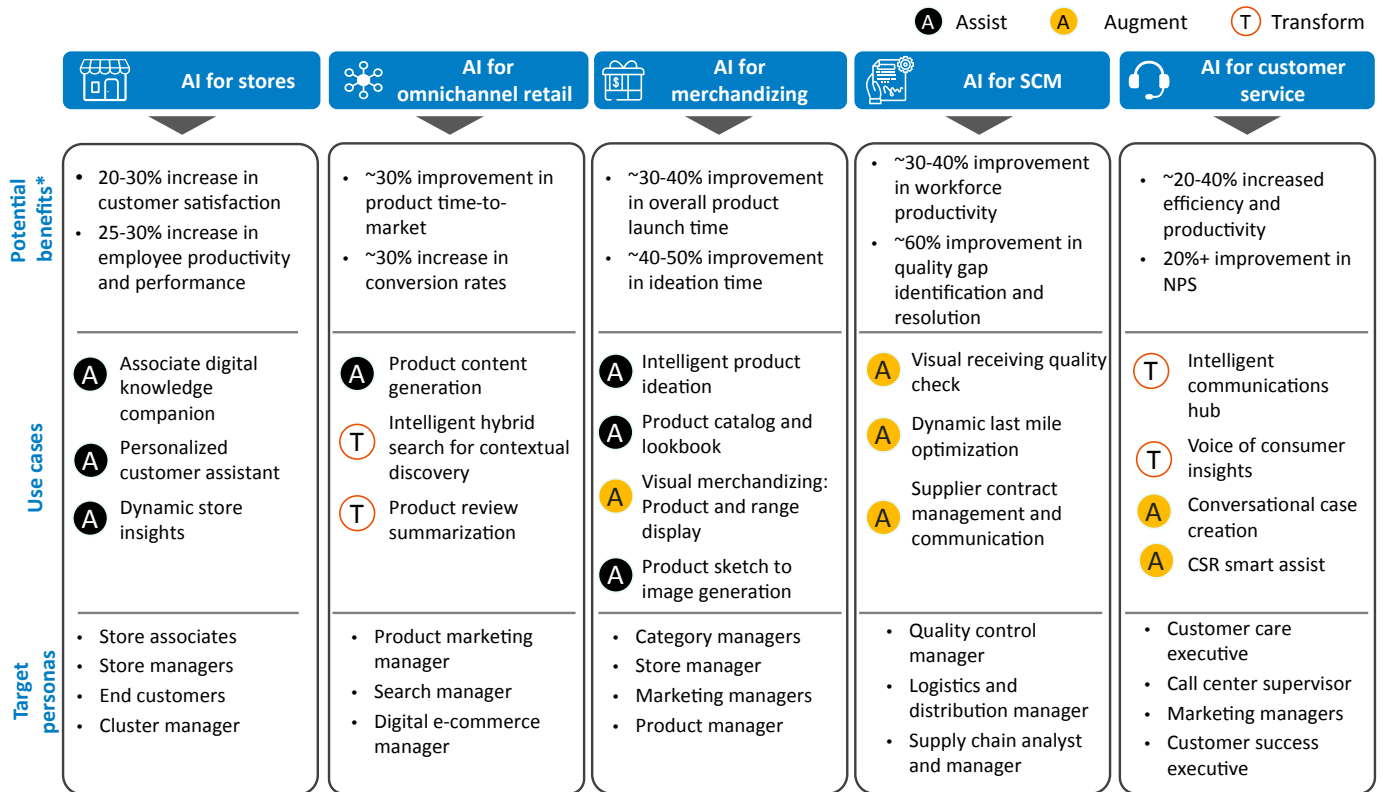
For successful AI implementations, retailers need to achieve a balance of opportunities versus risk.

We approach composite AI—that is, predictive AI combined with generative AI—across three categories:

- **AI for business** encompasses the entire retail value chain – stores, omnichannel retail, merchandizing, supply chain, customer service, and support functions including finance, HR and IT.
- **IT for AI** includes AI architecture and task agents.
- **AI for IT** encompasses code and use case generation.

AI for business

While there is a lot that can be done by AI, it is important to evaluate and prioritize where it can add the most value, while considering and balancing the risks. Figure 1 shows use cases powered by AI that can create business value for retailers.



**Potential benefits based on TCS' experiential and contextual knowledge, domain expertise and internal model estimates; actual results may vary.*

Figure 1: AI for business: Retail use cases



IT for AI

Built upon the principles of industry-led initiatives, ecosystem collaboration, and cloud-based infrastructure, enterprise-intelligent AI aims to scale outcomes, enabling organizations to leverage AI potential for reshaping value chains and operational methodologies, as shown in Figure 2.

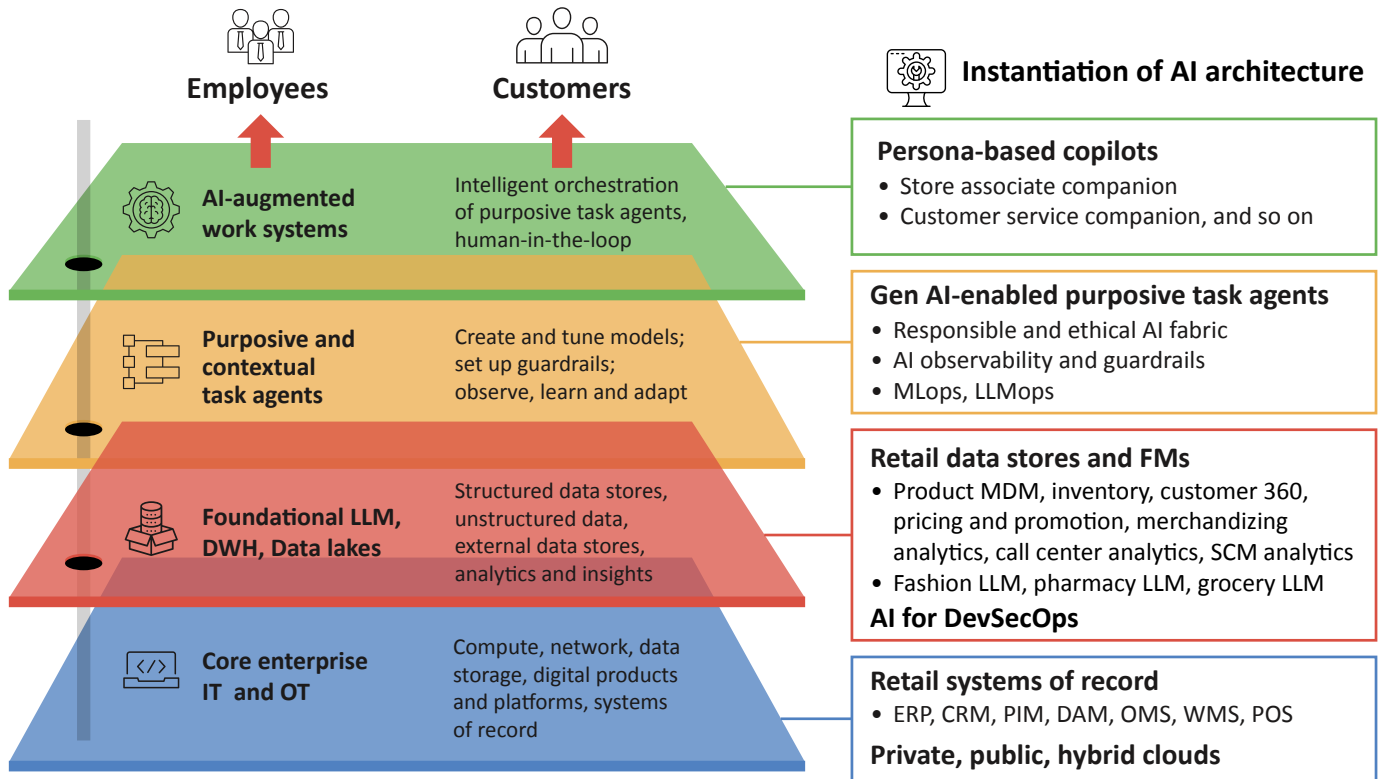


Figure 2: TCS AI architecture for retailers

AI for IT

This approach primarily focuses on the software development life cycle (SDLC), DevSecOps, and AIOps within the IT domain driven by copilot, code whisperer, and the like. Retailers need to look at enterprise IT holistically and explore opportunities for leveraging AI while keeping in mind its pitfalls around accuracy, plagiarism, intellectual property (IP) dimensions, and enterprise context (see Figure 3).

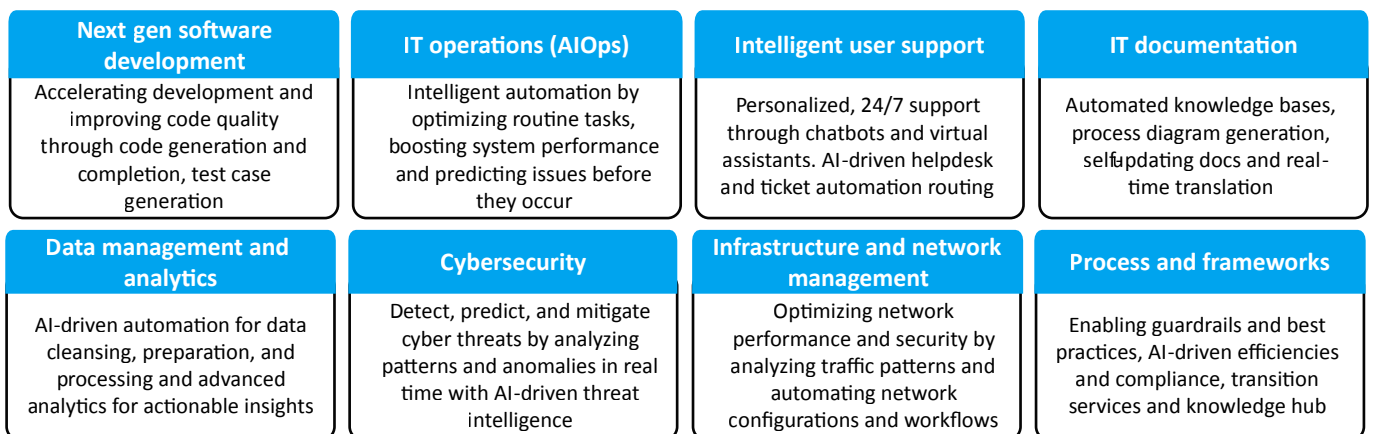


Figure 3: AI in IT operations

Making it work: The building blocks for AI in retail

An AI-first architecture for retail encompasses a multi-dimensional architecture across different layers as seen in Figure 4.

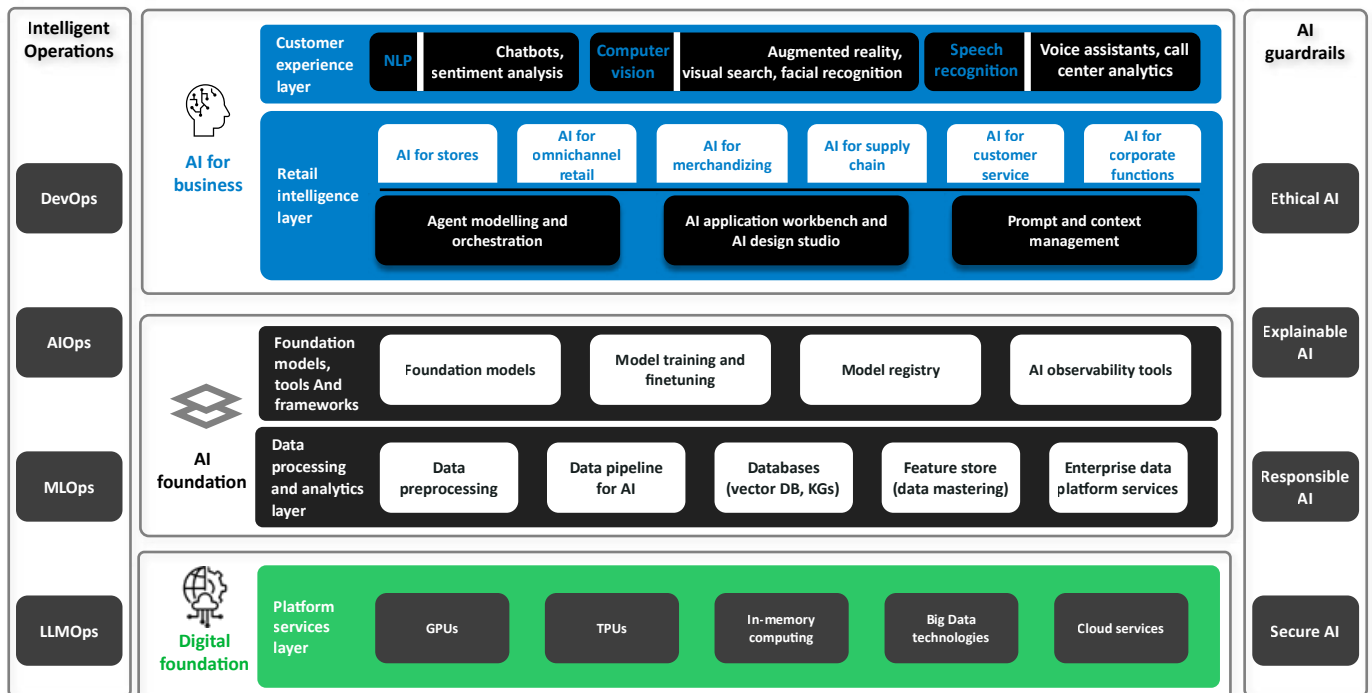


Figure 4: AI-first architecture for retail

Digital foundation:

Retail enterprises must establish a strong digital foundation leveraging cloud, a modern technology stack, a unified data platform, and the right future-ready platform services. AI is now expanding the digital foundation layer to set enterprise-wide standards to deploy AI solutions and models through the right selection of underlying platforms and services.

AI foundation:

At the core of the AI foundation layer are the data for AI components and foundational AI components. Data for AI will enable enterprises to leverage their ‘big data’ to more meaningful, ‘better data’ for AI-driven decision-making. Foundation AI components will drive ‘enterprise-wide,’ ‘domain-wise,’ and ‘task-wise’ AI-model creation to maximize business value.

AI for business:

AI for business infuses intelligence across the retail value chain, including in support functions, to deliver a frictionless customer experience across channels, curate customer interactions, increase productivity for associates, improve operational efficiencies, and optimize cost.

Intelligent operations:

Intelligent operations help predict failures through anomaly detection and building resilient self-healing systems. Model Ops (MLOps, LLMOps) are becoming seamless and repeatable, from build-to-deploy through industry-leading tools provided by hyperscalers and niche AI solution providers.

AI guardrails:

Industry-specific guardrails (retail industry taxonomy, vocabulary, tokens, parameters, weights, contextual information) will help in the ethical and responsible use of AI, ensuring regulatory compliance, while promoting transparency and accountability.

By leveraging this architecture, retailers can unlock the full potential of AI to transform their business and gain a competitive edge.

Busting common AI myths

Retailers need to proactively address risks associated with AI implementations.

GenAI comes with inherent risks and challenges (see Table 1) that need to be understood and addressed appropriately.

Myth	Reality	Retail implications (example)
AI is plug-and-play	While AI promises multitudes of generative capabilities off the shelf, businesses need to consider that the value can only be realized when contextualized to their business domain, enterprise topology, and business objectives. This requires complex orchestration, purposeful curation, and adoption of these AI capabilities to an enterprise.	Off-the-shelf GenAI capabilities for a knowledge companion will only know the generic process for a planogram setup. To be effective, however, it would require sizeable contextual adaptation to lines of business (LoB) (grocery, apparel, electronics), retailer-specific store layouts, nuances of retailer-specific catalog and assortment, and the technology landscape.
GenAI is a silver bullet	Pragmatically evaluating options – automation vs. composite AI vs. predictive AI vs. generative AI – based on business value, cost, and complexity is essential. While GenAI holds a lot of promise, it is very important to do a critical evaluation of the use case to ensure it has a business case.	Addressing manual effort and errors in visual receiving requires composite AI capabilities, combining generative AI for image classification and predictive AI for quality checks.
Every GenAI use case has a business case	While AI offers numerous capabilities across the retail value chain, careful evaluation is required to determine the return on investment (RoI) implications, customer impact, enterprise positioning in the market, stakeholder management and most importantly, the impact on employees and society at large.	Generating product ideas to reduce cost and improve assortment profitability may demonstrate an attractive value proposition with AI, but that might not pass the lens of RoI and quality impact for customers and could compromise sustainability, causing the business to veer off from conscious retailing.
Cost considerations are crucial for AI adoption	AI-powered intelligence could provide a sizable advantage to retail enterprises through opportunities for market growth, cost reduction, or customer experience enhancement. However, this intelligence, if not harnessed through effective designs and contextual solutioning, could become cost prohibitive.	The solution design for realizing intelligent multi-modal search requires careful thinking on data readiness for AI as it might exponentially increase the infrastructure cost. It is also prone to high cost of GenAI consumption during usage if not designed to innovatively optimize the intelligence generation and consumption.

<p>AI and automation will be separate initiatives</p>	<p>AI and automation can complement each other, as AI can intelligently perform tasks, which then would not require any automation. Whereas automation can address certain problems, which might otherwise result in over-engineering with AI. As a result, it is critical to consider AI and automation in unison for the set of value chains under consideration.</p>	<p>AI will be required to optimize the demand forecast, and automation can efficiently address demand distribution and allocation management.</p>
<p>Right data is sufficient to enable AI</p>	<p>Realizing the full potential of AI requires data in a suitable consumption-ready state. This means just having the data is not sufficient. A robust data strategy and stewardship to ensure data quality and format suitability will be key drivers for maximizing value from AI investments.</p>	<p>A store receipt might have the data of a customer, product, price, tax, and promotion data, which then has to be modularized and feature engineered for intelligent insights.</p>

Table 1: Busting common AI myths

LLMs – a word of caution

Selecting the right model requires a comprehensive strategy that looks at data privacy, security, reliability, and other factors.

While retailers focus on selecting the right model for their enterprise needs, it is also critical to understand precautions to be undertaken when using these models.

Content ownership for training

LLM providers may retain prompts and generated output. Customers must be given explicit instructions to opt out of this storage and training. For example, while creating product content using an LLM, the merchandizing team should explicitly opt out to protect their brand-related information from being used for LLM training purposes.

Monitoring for abuse

Monitoring for abuse by LLM providers requires customer opt in. If chosen, all prompts and generated content will be stored for a limited period, typically up to 30 days.



Reliability guarantee

LLM providers do not guarantee the accuracy, completeness, ethical validity, or other aspects of the generated content. A human-in-the-loop review is strongly recommended. For example, AI can help generate supplier contracts, improving productivity, but a human review is required to avoid any legal and regulatory implications.

Fit for usage

Customers are responsible for configuring necessary filters and tools offered by providers to control the generated output. For example, when generating inspirational marketing campaigns and emails, retailers need to ensure the generated contents are filtered with adequate guardrails for profanity, toxicity, gender and racial bias, and the like.

Restricted domains

LLM providers expect customers not to utilize LLMs in legal domains or regulated areas such as medical, clinical research, or financial sectors. For example, pharmacy retailers should carefully select the areas for LLM adoption that will not jeopardize patient safety.

Legal implications

Enterprises should be aware of and understand the representations, warranties, and indemnities – or the lack thereof – provided by the AI independent software vendors (ISVs) and original equipment manufacturers (OEMs).

Retailers should exercise additional caution in protecting their intellectual property (IP) for AI solutions built on top of an LLM after carefully verifying the license and service terms such as commercial versus non-commercial usage, base model versus fine-tuned model, and open-source software (OSS) license terms.

Third-party intellectual property rights (IPR) claim indemnification, data security, privacy, and other liability claims (including LLM and cloud providers) should be included as part of their legal terms and conditions. Retailers should ensure responsible AI controls and compliance measures are in place.

Forging ahead – next steps for retailers

Retailers need to take a multidimensional approach for reaping short- and long-term benefits of AI.

As with many recent technology revolutions, the short-term impact is often overestimated while the long-term impact is underestimated. Moving forward, retailers must navigate the delicate balance between opportunity and risk associated with AI adoption. It's imperative to proactively address key myths and cautions surrounding AI implementation, ensuring a comprehensive strategy that accounts for factors such as data privacy, security, and reliability. The excitement to embrace AI should be carefully balanced with considerations of legal, indemnity, IPR, and other risks related to ownership and abuse. Retailers must also weigh in other factors necessitating responsible adoption of AI. Moreover, a tailored approach to AI integration, considering the specific needs and capabilities of each enterprise, is essential for maximizing the benefits of AI across various dimensions of retail operations. Ultimately, the true value of AI in retail lies in its ability to augment human capabilities, enhance productivity, deliver next-gen experiences, and drive transformative changes in retail. See part 1 of this two-part series.

The TCS advantage

Our strong partnerships help retail organizations successfully navigate GenAI transformations to drive sustained performance.

Deep domain and contextual expertise

TCS has a vast pool of industry experts with well-established experience and contextual knowledge across retail functions, to help identify, build, and support the latest and fittest solutions and technologies for clients.

Cross-industry experience

Today's businesses are more interconnected than ever before and need cross-industry expertise and leading practices. Working with customers across industries such as retail, consumer packaged goods (CPG), and travel and transportation brings an end-to-end holistic view of enterprise business functions and know-how.

Enterprise AI at scale

TCS enables AI at scale through over 150,000 trained associates for more than 670 customers.

Partner ecosystems

Scale and accelerate the path to value through a network of joint solutions and established hyperscaler partnerships, an elaborate TCS COIN™ network and co-innovation facilities such as TCS Pace Port™.

Evolving solutions

To help accelerate their journey, TCS leverages its contextual knowledge and expertise to enable multiple purpose-built solutions for retailers that incorporate GenAI technologies.



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A part of the Tata group, India's largest multinational business group, TCS has over 601,000 of the world's best-trained consultants in 55 countries. The company generated consolidated revenues of US \$29 billion in the fiscal year ended March 31, 2024 and is listed on the BSE and the NSE in India. TCS' proactive stance on climate change and award winning work with communities across the world have earned it a place in leading sustainability indices such as the MSCI Global Sustainability Index and the FTSE4Good Emerging Index. For more information, visit www.tcs.com

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