

AI-Driven Digital Transformation in Logistics: Improving Service Quality explains Impact of AI on Pricing Strategies in Retail

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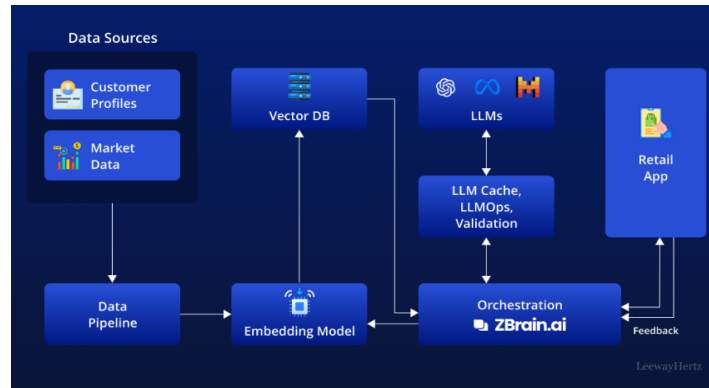
INTRODUCTION & BACKGROUND

Digitization of the retail and logistics business is rapidly advancing as consumers continue to depend on timely, consistent, and consumable services. Items should be separated, loading of goods to the truck or the container and easy delivery pushed ahead and not pulled out of the cogitation of shrinking profitability, cut-throat competition and price sensitivity. The new data on supply chains, e-commerce, and contact with clients leaves most businesses with a dated system that cannot be integrated, makes decisions manually, lowers its efficiency, quality of its services, and mixes its prices.

These issues can be solved with the help of artificial intelligence (AI). AI plugs the gap between reliable operations and customer-driven business strategies by improving logistics service quality (LSQ) and allowing for better retail prices. You can use SERVQUAL-derived categories like reliability, responsiveness, assurance, empathy, and tangibles to measure LSQ in logistics-specific ways, such as on-time in-full (OTIF) performance, order cycle time, perfect order rate, visibility, and flexibility. These measurements show how well and consistently logistics systems create value for customers. Increasing LSQ keeps customers' trust and gives the consistency needed to make prices based on accurate facts.

The main purpose of these outputs is to use AI. In logistics, predictive analytics and machine learning make it easier to predict demand and supply, which cuts down on stockouts and lead times. Reinforcement learning makes routing and dispatching happen automatically in real time, while computer vision makes warehousing more accurate. Natural language processing supports chatbots and pre-emptive communication, and digital twins model supply chain activities to predict problems. All of these applications make logistics services more reliable and efficient, which directly improves LSQ.

AI uses advanced analytics to change how retailers do business. Demand planning and elasticity measurement help make smart price changes. Dynamic programs change in real time based on what the market is doing. Custom programs vary in things given to groups or individuals of customers to achieve relevance and loyalty. Markdown helps clear out goods while keeping margins safe, and evaluating competitors helps keep pricing competitive (Karabulut, 2024). Overall, these allow retailers to synchronize prices with demand, competition, and service levels.



From AI in retail: Use cases, applications, solution and implementation by Takyar, 2025

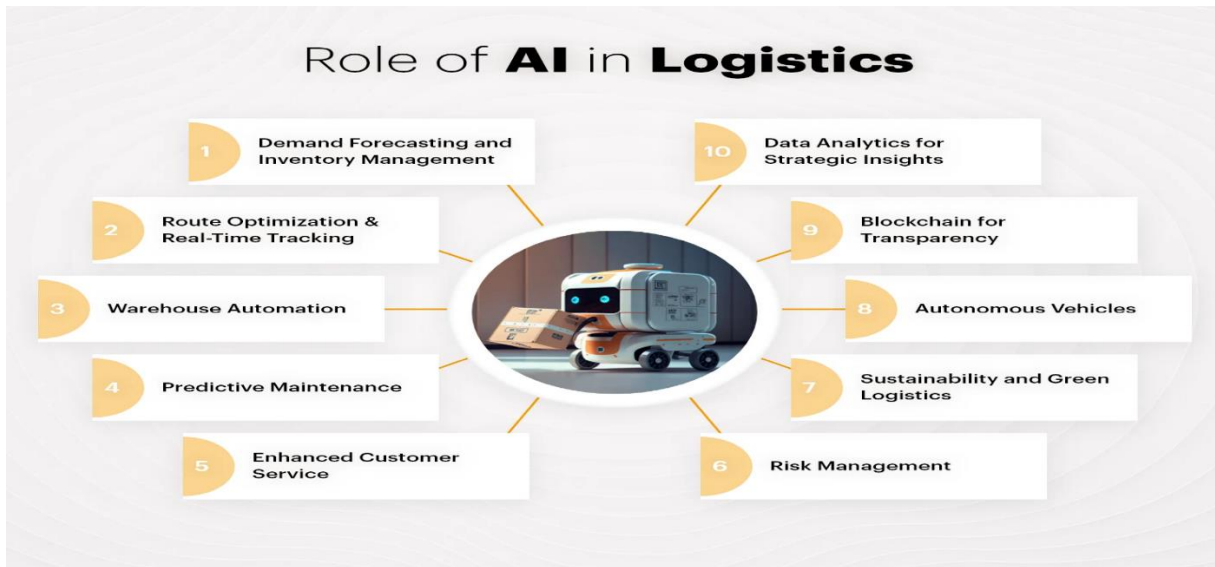
How AI Improves Service Quality in Logistics

Artificial intelligence is important for enhancing service levels in logistics since it helps with better planning and predicting. Forecasting systems have a hard time dealing with the complexity of current supply chains, which leads to stockouts, too much stock, and the well-known bullwhip effect. Machine learning-based demand forecasting used in AI-based demand forecasting looks at point-of-sale data, seasonal patterns, and outside factors like weather or sales to predict client demand much more precisely. Just like AI-based supply forecasting is better when it finds lead time variability and supplier concerns, companies may plan better for interruptions ahead of time. With these anticipated recognitions, companies may better distribute stock between stock holding centres and warehouses based on stock service levels and carrying costs. A multinational firm that uses AI-based forecasting will be able to increase the amount of stock they have on hand while lowering the amount of extra stock they have to hold. This will enable them to service customers more easily and at a reduced cost.

The other relevant usage of AI will be the far simpler and predictable logistics management. Dynamic routing and dispatching are one of the most helpful AI applications. In this case, AI vehicle routing problem (VRP) solvers respond to weather, traffic, or order changes by recalculating delivery routes in the most productive available way. It results in higher delivery speed and also a higher number of on-time, in-full (OTIF) delivery. Possibly because of the AI vision systems that are implemented at warehouses, picking will be more appealing and slotting will be supported.

AI helps businesses go from reactive service to proactive service when it comes to customer support and experience. Forecasting software can help you figure out when shipments are likely to be late weeks or even months in advance and send out automatic notifications to let customers know. This gives you more control over what customers expect. AI-powered chatbots and virtual agents take communication to the next level by letting customers get real-time updates on their orders, easily return items, and fix common problems without needing to talk to a person. Advanced technologies can sort through client complaints at an early stage by sensing emotion and assigning cases to the right help staff. This makes fixes happen faster and with better matches. Logistics companies may get rid of operational bottlenecks and build trust and transparency into the deal with these all-in-one solutions. Trust and transparency are two parts of service excellence.

Finally, AI allows us to examine the level of logistics and risk management by observing the deviations that can potentially influence the quality of the service. To detect evidence of a premature delay, vandalism or illegal activity shipping rooms are continuously scanned by machine learning software. The prescribing analytical software that notifies you of aberrations prescribes initiatives towards correcting an issue, such as reorganizing a stack of merchandise, or dispatching a control analyzer to study the supposed defective advertising things. Major events become small service breakdowns by looking at the future in this manner. Sensor-telemetry that monitors temperature changes of goods or drugs during their on-board transit and deactivates certain countermeasures before the malware upsets the product or medicine can be considered one of the uses of AI in cold-chain logistics. AI not only ensures that clients receive high quality service, but also safeguard the reputation and trust of companies and clients by making sure that operations are efficient and that the items are delivered to the clients in the best state possible.



From “How AI is Effective in Logistic Industry in 2023” by Badone, 2023

Linking Logistics Service Quality to Retail Pricing Outcomes

The AI-enabled next-generation logistics can provide direct entry point to improved and more lucrative retailing-related pricing strategies. When logistics lead times are predictable times, stores can call buffers against uncertainties and safety stock, and may feel comfortable employing harsher and more costly strategies with no risk of stockouts, or the danger of lost sales. Next in this line is real time inventory which will give the ability of prices that are geo-specified and where inventory sophisticated pricing will give the ability to charge differentiated prices to customers that are local or are very close to the warehouse. Combined with this, routing, warehousing and automation courtesy of AI, allowable price range and expanded latitude in margins to stores to either offer competitive discounting or invest in loyalty-based pricing campaigns.

Differentiation of forward pricing schemes based on service levels may be achieved through better service quality on the front side of customers, such as offering intelligently-priced fast shipping schemes to willing-pay-premium customers who need fast shipping and guaranteed shipping. In addition, AI-based logistics creates quality demand signals whose reduced number of stockouts and high ETA efficiently improve price-related elasticity forecasting. The more a company can understand how customers are receptive to prices, the more forward pricing plans can be executed in real time, personalized assortments can be acquired and adjusted to customer purchasing patterns, and mark-down plans can be planned and acted on as intended. Finally, the benefits of AI-enriched logistics and better quality of services lead to lower costs, yet they also allow a merchant to align pricing decisions with large-scale goals of customers and create a customer satisfaction and profitability loop that evolves to be increasingly beneficial.

AI-Enabled Pricing Strategies in Retail

Dynamic pricing is probably the most visible way that AI is used in retail. This is because businesses can change prices in real time based on demand, the services or products that competitors offer, or inventory levels (ImmadiSETTY, 2025). Multi-armed bandit or reinforcement learning algorithms are examples of advanced methods that are often used. These methods allow systems to constantly test and focus on the best techniques. AI can be used to change the levels of discounts during busy times like Black Friday or back-to-school sales to get the most sales and profits. Likewise, during surge-subscription periods such as unexpected demand surges for essentials, AI ensures that modifications in prices occur within tolerable guardrails (Lumenalta, 2025). Such guardrails become central since retailers need to respect minimum advertised price (MAP) agreements, avoid accusations of price gouging, and remain within legal and ethical boundaries. By experimenting while remaining within regulatory and reputational boundaries, AI-based dynamic pricing allows retailers to be agile while protecting consumers' trust.

AI also makes customisation possible, which is a significant pricing strategy. This means that deals are made for groups of customers or even for each client. Most stores start off with a wide range of options, such student rates or loyalty tiers. AI, on the other hand, makes it possible to move towards micro-segmentation and then slowly towards level-based trends. Machine learning algorithms look at a person's past purchases, browsing history, and demographic information to figure out how much they are willing to pay and how to best market a product. For example, AI will offer one customer a discount on

a bundle and give another customer a voucher that is only good for a short time. On the other side, pricing based on customisation raises serious issues of fairness, openness, and consent. Customers can perceive that different tariff are unfair or take advantage of them if there isn't enough communication. Deployment must balance between customisation and ethical protection to assist people in making intelligent decisions about the worth of a product, without losing their trust.

Markdown optimisation is also much improved by AI, as it ensures that the best course of action is followed regarding slow-moving inventory or inventory that is nearing the end of its life cycle. Under fixed rules based markdown plans, the price would be discounted at a designated percentage at designated intervals. This usually leaves you with excess inventory or low margins that you do not require. Markdown optimisation AI relies on machine learning to examine factors such as the quantity of stock available, sales velocity, and the age of a product. These kinds of systems can help you figure out the optimal timing and depth for markdowns that will make you the most money and leave you with the least number of leftovers. For instance, a clothing business can use AI to gently drop pricing based on how many people want to buy something right now. This would lead to more sales than just offering everyone a discount. This is a great way to deal with products that go out of style rapidly, like clothes or electronics. AI helps find a better balance between making money and clearing out stock by making sure that price decisions are in line with the reality of the stock.

AI also makes competitive intelligence stronger by making it easier to automatically collect and analyze competitors' prices. With web scraping and APIs, retailers can keep an eye on competitors' prices on a big scale. They can then feed this information into a pricing algorithm that changes their own prices almost instantly. Then, if competitors lower the price of a certain brand of laptop, an electronics store can quickly decide whether to match the price, sell it for less, or maintain the price the same based on estimations of elasticity. But when using AI to keep an eye on prices, you have to think about things like data quality, how often a business can scrape, and following legal standards (Kaushik, 2024). Heavy scraping could be against the terms of service or draw the attention of regulators, and noisy or incomplete data can lead to wrong conclusions about prices. If used correctly, competitive intelligence technologies can help stores stay compliant and honest while also being able to respond quickly to changes in the market.

This is an important part of AI-based pricing strategies because it involves the estimation of the price elasticity of demand. Regression and other trendy econometric techniques might provide instructive base information, however typically perform atrociously in complexity management in contemporary retail information. Examples of machine learning algorithms capable of accommodating nonlinearity and interactions in a number of parameters include gradient boosting and causal ML. Retailers can use these tools in understanding how various groups of customers respond to changes in prices to make more appropriate decisions. Supply chain disruptions or a sudden demand spike act as valuable natural experiments to estimate better elasticity (Perez-Pons et al., 2021). A/B testing is a common approach to uncover how clients would behave in a controlled environment and how to make prices better even within a testing environment. Retail can stop guessing and start making choices about prices based on actual facts employing state-of-the-art current analytics and testing on ground.

Implementation Roadmap

Companies who are thinking about using AI for logistics and pricing require a clear plan. In phase one, we need to build strong data foundations. That entails putting together several types of data, like order histories, shipping records, point-of-sale (POS) transactions, interactions on the web and in apps, inventory levels, and prices from competitors. Data quality and governance at this stage stop mistakes from happening later on and help build trust in the model. Once a strong data environment is built, companies need to look at the individual use cases. Early value can be achieved through expedited wins such as the forecasting of ETAs or notifying humans when inventory is scarce. A value-versus-feasibility matrix may then be used to identify the most effective initiatives.

The next was the time required to work on the model. Organizations have to start with consumable baseline models. The stakeholders have to be convinced before they can gradually roll out more advanced algorithms, and the more they invest, the more accurate they will be. After the model has been created, implementation is required to be strident whilst maintaining the MLOps best practices, amongst which are formal A/B testing models, monitoring model drift, and rollback procedures in the event of any wrongdoing. Change management is also very important. The key to winning is to create cross-functional units with price experts, supply chains experts, data scientists, and legal experts (Adeleke et al., 2022). Together with agreeing on the incentives that will motivate people to take advantage of the system, you must also educate the people to use the system. Lastly, the blueprint must be governed. This will cover the completion of ethics reviews, the creation of audit trails and a control of consent in order to generate individualized pricing plans. An AI plan based on these pillars will make the use of AI transparent, resilient, and systemic.

Metrics, KPIs, and Evaluation

In order to determine whether they are able to measure the effect of digital revolutions powered by AI, the organizations need to put in place effective performance metrics in logistics, prices, and customer service. Logistics indicators may include OTIF delivery rates, perfect order rates, average order cycle time, cost per order, claims or damages rates and ETA accuracy. It directly affects the logistics KPIs due to improvement of the quality of services. The comparative pricing can be based on gross margin, revenue per visitor, conversion rates, realised and optimum goal prices, advertising and marketing promotion return on investment (ROI) return rates, stock sell-through rates and stock age levels. The effect of changes in logistics and prices on loyalty and trust can be numerically measured by customer-facing metrics such as Net Promoter Score (NPS) customer satisfaction (CSAT) return rates or frequency of complaints.

Testing is a condition of examination. A/B testing will allow organizations to make comparisons between AI-optimized pricing strategies and conventional pricing strategies in a very regulated way. In the framework of synthetic control procedures, the effect of AI interventions can be discovered in very specific circumstances. The aforesaid calculation of the widths of the consequent confidence intervals and the reporting of the aspect of lift at that, degree of partaking, will persuade you of the fact that the so called, immense gains are statistically significant enhancements. The two strategies are interlinked to enable the AI solutions to create value to both customers and operations in a sustainable way.



From: How Artificial Intelligence is Transforming Retail Price Optimization? By Sharma, 2023

Risks, Constraints, and Policy/Ethics

Nevertheless, AI has many possible applications in retail pricing and logistics, and has many risks and difficulties. poor data performance and compliance risk may become a reality due to data quality problems like leakage, model drift, or low quality. The use of AI software can also be problematic when the relationships with external suppliers can get worse. A highly automated company can become inflexible when a failure occurs and poorly trained models can exacerbate the bullwhip effect of supply chains. The law of law and of morality is no less strict. Even when personalised pricing programs are not transparent, they may be regarded as unjust. As well, when pricing systems collude with each other in a manner that violates the competition law, it may occur unintentionally.

Security and resilience have issues as well. Due to increasingly digital supply chains, cybersecurity threats to logistics centres or algorithmic prices increase, and disruption is becoming more likely. Thus, businesses will be forced to part with money on resilience testing, cybersecurity, and business continuity planning (Ekwunife et al., 2024). To manage these risks, openness and responsibility are very important. Stores that include ethical reviews, make it obvious how they handle prices, and have confidence from customers are much better off when it comes to using AI-based techniques in a way that lasts. If these restrictions are not in place, the benefits of AI will be outweighed by the costs to reputation and regulation.

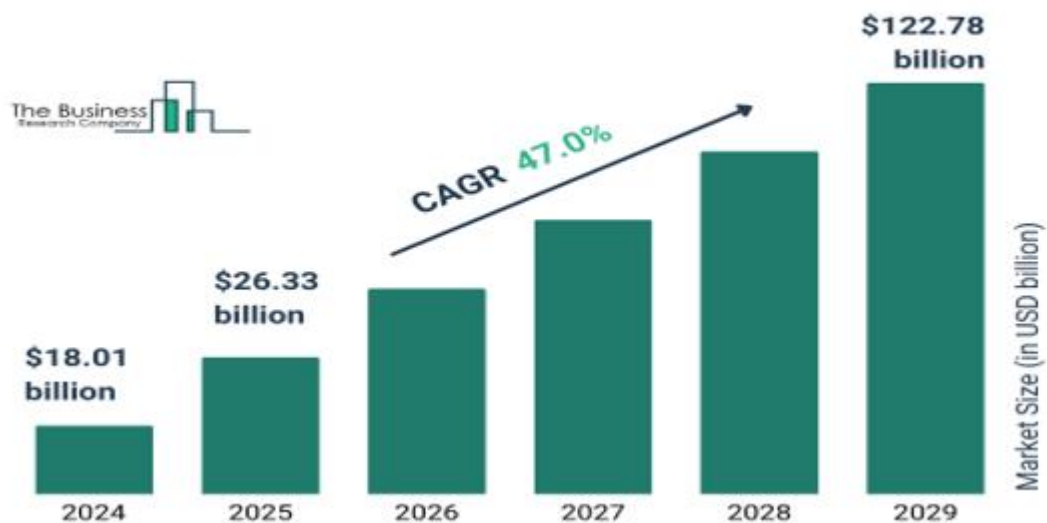


From “Effective strategies to overcome supply chain disruptions” by Jones Elite Logistics, 2024

Future Directions

As time goes on, the merging of logistics and retail price will get even better. Ideally, generative AI agents should be in charge of coordinating exceptions between the warehouse and carrier levels and making difficult decisions automatically when things go wrong. Drone deliveries, robotic micro-fulfillment centres, and self-driving trucks are examples of autonomous mid- and last-mile technology that will make service even more consistent and faster (Zieher et al., 2024). Digital twins will become even more well-known as simulation software. Companies will be able to try out pricing and logistics plans in a virtual world before putting them into action in the real world. Sustainability will also be a factor in carbon-conscious pricing systems that let customers choose levels of fulfilment that are good for the environment at different costs. Last but not least, regulatory technology (RegTech) products will assist businesses build compliance checks into pricing algorithms in real time to make sure they follow rules about protecting consumers and competition. These kinds of attributes make it seem likely that the next generation of logistics and retail AI will mix efficiency with accountability in a way that will make money while also providing long-term value to customers.

AI In Logistics Global Market Report 2025



From “AI Logistics Global Market Report” by The Business Research Company, 2024

REFERENCES

- [1] Adeleke, A. G., Sanyaolu, T. O., Efunniyi, C. P., Akwawa, L. A., & Azubuko, C. F. (2022). Impact of AI-enabled a/B testing on product performance in e-Commerce platforms. *International Journal of Management & Entrepreneurship Research*, 4(12), 795-813. <https://doi.org/10.51594/ijmer.v4i12.1537>

- [2] The Business Research Company. (2024). AI in logistics market report 2024 - AI in logistics market analysis and forecast to 2033. Global Market Research Reports & Consulting | The Business Research Company. <https://www.thebusinessresearchcompany.com/report/ai-in-logistics-global-market-report>
- [3] Immadisetty, A. (2025). Dynamic pricing strategies in retail: Leveraging real-time data analytics for competitive advantage. *Journal of Recent Trends in Computer Science and Engineering*, 13(1), 53-65. <https://doi.org/10.70589/jrtcse.2025.13.1.8>
- [4] Perez-Pons, M. E., Parra-Dominguez, J., Omatu, S., Herrera-Viedma, E., & Corchado, J. M. (2021). Machine learning and traditional econometric models: A systematic mapping study. *Journal of Artificial Intelligence and Soft Computing Research*, 12(2), 79-100. <https://doi.org/10.2478/jaiscr-2022-0006>
- [5] Ekwunife, D. I., Precious, O. T., Rasul, O. A., Akinlade, O. F., Nwokoro, T. O., & Ikpe, V. I. (2024). Cyber threat and information shortage: The immediate risk of supply chain technology and how to tackle them. *International Journal of Science and Research Archive*, 12(2), 501-514. <https://doi.org/10.30574/ijrsra.2024.12.2.1098>
- [6] Sharma, R. (2023). How Artificial Intelligence is Transforming Retail Price Optimization? Tezo. <https://org.tezo.com/blog/how-artificial-intelligence-is-transforming-retail-price-optimization/>
- [7] Badone, A. (2023). How AI is effective in logistic industry in 2023. Codiant Software Technologies. <https://codiant.com/blog/how-ai-is-effective-in-logistic-industry/>
- [8] Karabulut, O. (2024). Markdown optimization for retailers: How AI can make millions. *invent.ai*. <https://www.invent.ai/blog/markdown-optimization-for-retailers-how-ai-can-make-millions#>
- [9] A. Tiwari and Y. Chhetri, "Cross-Chain Vulnerabilities in the Quantum Era: A Threat Analysis to Blockchain Interoperability," 2025 International Conference on Networks and Cryptology (NETCRYPT), New Delhi, India, 2025, pp. 1318-1323, doi: 10.1109/NETCRYPT65877.2025.11102585.
- [10] Kaushik, S. (2024). The Rise of AI-Powered Competitive intelligence: Transforming Market Analysis. ResearchGate. https://www.researchgate.net/publication/383531579_The_Rise_of_AI-Powered_Competitive_intelligence_Transforming_Market_Analysis
- [11] Lumenalta. (2025). How AI is shaping dynamic pricing | AI-powered dynamic pricing explained | Dynamic pricing using AI | AI-based pricing solutions | Lumenalta. <https://lumenalta.com/insights/how-ai-is-shaping-the-next-frontier-of-dynamic-pricing>
- [12] Takyar, A. (2025). AI in retail: Use cases, applications, solution and implementation. LeewayHertz - AI Development Company. <https://www.leewayhertz.com/ai-in-retail/>
- [13] Zieher, S., Olcay, E., Kefferpütz, K., Salamat, B., Olzem, S., Elsbacher, G., & Meeb, H. (2024). Drones for automated parcel delivery: Use case identification and derivation of technical requirements. *Transportation Research Interdisciplinary Perspectives*, 28, 101253. <https://doi.org/10.1016/j.trip.2024.101253>