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Future Impact of AI on the Supply Chain

A game changer in the making?

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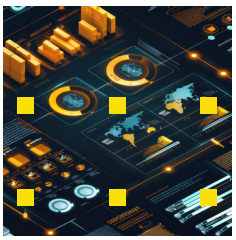
Discussions of artificial intelligence (AI) and the possibilities associated with it dominate headlines, and the available information about AI can fill volumes. The supply chain is not exempt from the discussion. Current and future applications of AI in supply chain operations are numerous, and because supply chain data is plentiful, opportunities abound. We are taking a glance at several approaches companies are using or considering to best apply AI to boost efficiencies, prevent risks, and improve processes.

Today, companies are challenged by future risks, disruptions and delays, inventory variability, unpredictable supply and demand signals, and inefficiencies with the movement of goods in the supply chain. To help address these pain points, a variety of AI-driven technologies are being adopted, including:

- **Digital twin technology, which can virtually replicate existing network structure and behavior to model a variety of scenarios and events.** This enables proper planning and the development of continuity and mitigation plans, to be executed in response to or in anticipation of disruptive events. To further mitigate risk, AI can aid in identifying opportunities for supplier redundancy or diversification.

- **AI applications are transforming demand forecasting and supply planning.** By analyzing historical patterns, predictive analytics, and learning from past disruptors and events, AI can significantly enhance the accuracy of supply variability and demand signal forecasting. This, in turn, can lead to lower inventory levels and reduced carrying costs.

- **Artificial intelligence can abate risk events such as external cyberattacks.** Although risk still exists, AI can be leveraged to identify vulnerabilities to cyberattacks and potential mitigations. It is noteworthy that AI can also actually be an access point for cyberattacks, and this must be taken into consideration.



AI-driven applications are not limited to strategic planning. They also hold significant potential within distribution and manufacturing operations. When integrated with warehouse/manufacturing management systems, AI can deliver substantial efficiency and cost savings, for example:

Since labor is a huge driver of supply chain costs, tapping into AI for labor analytics, dynamic work assignments, dynamic task interleaving (combining and assigning multiple and different tasks to operators on a single trip in the warehouse—preventing "empty" travel and movement), and labor balancing (i.e., shifting some labor from lower-demand tasks to higher-demand/volume tasks) carries significant cost and efficiency benefits.

The technology can significantly improve work productivity and capacity utilization through the use of dynamic storage assignments (identifying where goods would be most efficiently stored based on available space, proximity to forward pick locations, and when the goods will likely be needed), pick path optimizations (reducing the amount of walking or inefficiency in picking orders), predictive velocity analysis, and slotting position (most efficient placement of items for quick and ergonomic order picking).

Dynamic calculations of the total cost of ownership and profitability optimizations to identify lossmaking, costly product handling, or unprofitable/low-profit customers while revealing opportunities for customer prioritization and identifying more profitable products.

Process optimization to identify opportunities to improve workflows and the efficient movement of goods and people within the facility.

Companies can make proactive repairs through sensor-driven technology, to improve equipment maintenance scheduling and anticipate future upkeep.

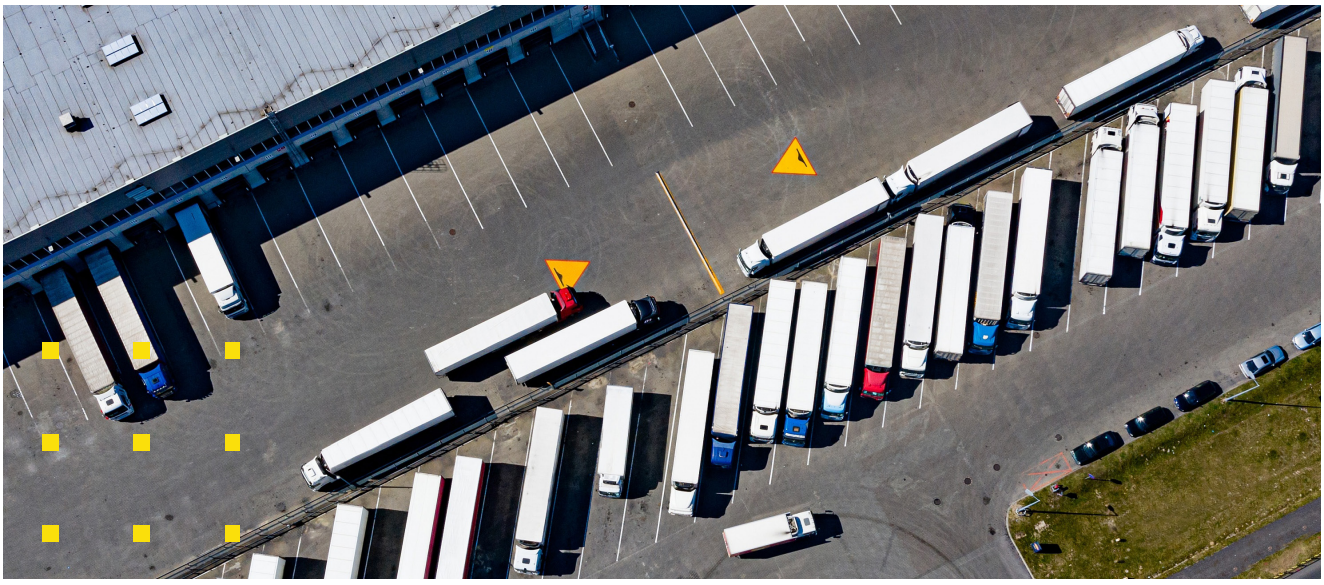
For clerical, data/order entry, or system support tasks, while robotic process automation (RPA) is not technically AI since it is structured input and considered attended automation, AI platforms can and often do, have RPA functionalities. This can mitigate data entry errors, reduce operator fatigue and cumulative trauma injuries, and enable clerical employees to dedicate more time to value-added and more rewarding tasks.

Transportation is the largest driver of cost and time in most supply chains. As such, AI applied to transportation can provide numerous and significant benefits while supplementing existing transportation systems, processes, and capabilities. The following activities can be greatly enhanced:

- Mode (i.e., parcel, less-than-truckload, truckload, rail) and load assignment to specific trucks or routes
- Dynamic routing (up-to-the-minute changes to optimize the route for delivering orders, including identifying backhaul opportunities)
- Costing and lane assignments
- Opportunistic/shared loads (i.e., with other companies or backhauls)
- Load scheduling, sequencing, and planning
- Load building or cubing to ensure truck space is used efficiently and fully

AI is only as good as the data provided to it, and supply chain data is often inaccurate, "unclean," or provides other challenges as it is entered into AI-based tools. The insertion of bad data inevitably leads to the output of bad information.

Although artificial intelligence in the supply chain presents huge opportunities, there is still work to be done. AI is only as good as the data provided to it, and supply chain data is often inaccurate, "unclean," or provides other challenges as it is entered into AI-based tools. The insertion of bad data inevitably leads to the output of bad information. That said, once clean data is provided, the intelligence inherent in AI tools provides such a significant upside that the effort is worthwhile. Human intervention is still necessary, but maximizing the utility of AI is worth the effort in the long run. As technology and intelligence are improved and investment soars, the potential applications for AI in the supply chain will soar as well. We'll just have to be patient for its broad adoption, but it will happen. Eventually.



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