Thrive in AI disruption

AI and the Future of the Supply Chain - 3 Critical Trends

Key Insights for Improving Supply Chain Resilience

by Daniel Faggella

Research | Strategy | Competitive Intelligence

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Emerj Artificial Intelligence Research

Emerj Artificial Intelligence Research helps global organizations develop AI strategies and initiatives that win in the market. We map the capability-space of AI across major sectors, with a finger on the pulse of academia, Fortune 500s, and the global artificial intelligence startup ecosystem.

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- **Applications ("What's Possible?")** – Examining the landscape of AI applications, open-source tools, and use-cases that might solve organizational problems, or impact strategy.
- **Implications ("What's Working?")** – Determining the use-cases with a genuine track-record of ROI, and determining the integration costs and potential financial upside of AI applications.
- **Plans ("What to Do?")** – Informing strategy by honing in on the AI trends or capabilities most likely to deliver the desired results or the organization.

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Since the outbreak of COVID-19, the most immediate impact on the business world has been the massive disruption to the supply chain as a result of social isolation.

Leaders in both the public and private sectors will be eager to build more reliable, robust, and predictable supply chains in order to better respond to similar situations in the future. The three sections of this report draw directly on our research from our AI Opportunity Landscape research in logistics and supply chain.

Our research tracks the entire ecosystem of AI vendors and solutions for logistics and supply chain in order to rank them on ease of deployment, evidence of ROI, and more.

Transportation, inventory management, and warehousing are the supply chain business functions that will be impacted most by AI in the near future. Below we explore use-cases for these AI solutions and provide examples of reputable vendors to provide a clear understanding of the possibilities for AI in these areas.

We hope this guide will serve as a useful primer in your strategy and innovation efforts in the months ahead.

Daniel Faggella
CEO and Head of Research, Emerj Artificial Intelligence Research

Transportation

Capabilities

Supply and Demand Prediction

AI applications for predicting business outcomes typically use a technique called predictive analytics. This technique uses real time supply and demand data to inform a pre-trained AI algorithm on a situation so it can predict the most probable result.

For example, a dollar store corporation may want to explore an AI solution that can better predict increases in demand for paper goods or household necessities so they can order a larger supply at the right time. A predictive analytics application could be particularly helpful for companies that want to make restocking more efficient or prevent overstock. If successful, this type of AI initiative could create value for logistics and retail as they will also save transportation space.

Supply Chain Risk Management

Predictive analytics could also be used to mitigate risks within the supply chain. Applications such as these take the cargo, shipping route, and vehicle into account along with many outside factors that could pose a problem during transport.

For example, a lightning storm on a transport route could have a higher chance of knocking down trees and causing an obstruction. This may help companies find the best course of action in the event of a natural disaster or significant route diversion due to road hazards.

Route Optimization

Route optimization applications can also help companies determine the fastest routes for shipping vehicles to take including trips with no stops. This process is distinct from supply chain risk management in that it is focused purely on efficiency as opposed to directly handling risk factors.

A company could accomplish this with an application that uses real-time GPS data to determine the fastest route. An algorithm for this type of solution would likely require data on traffic, road work, or other mitigating factors between a transportation vehicle and its destination.

Example Vendor

Flexport is one AI vendor selling transportation solutions for logistics. The company claims their data analytics platform can provide users at each end of the supply chain with shipping updates regarding cargo or estimated time of arrival (ETA).

Client companies must first integrate Flexport's application within their existing digital supply chain interface in order to enable suppliers, buyers, and logistics firms to check the status of each package. This is particularly beneficial for logistics companies as they can use this functionality to bring more value to their services during this time of uncertainty.

Related article: AI in Transportation – Current and Future Business-Use Applications

Related article: Artificial Intelligence and the Future of Supply Chain and Logistics

Inventory Management

Capabilities

Inventory Monitoring

AI can help both retailers and suppliers keep track of how much they have stocked and when they are running low. This is accomplished with cameras outfitted with machine vision software that can watch a warehouse or fulfillment center as it empties or fills with products.

This will require the machine learning algorithm to be trained to recognize the shapes and sizes of shipping boxes and information printed on the side. As a result, the software could alert the company of when it may need to restock in the near future.

Inventory Optimization

This capability involves the classification of inventory and preparing it for shipment within a fulfillment system.

For example, a machine vision application could recognize a date on the side of a box and read that it is set to ship the next day. The system could automatically alert either an employee or a robotic fulfillment tool to move the package to the right loading dock.

ETA and Lead-Time Prediction

A predictive analytics system can use historical shipment data on past shipping details such as lead times and the accuracy of ETAs. Additionally this would also include real time shipping data similar to what is used for route optimization. This may help logistics companies offer more value to their clients by giving them accurate and accessible shipping details.

Example Vendor

Noodle.ai is an example of a vendor that offers AI solutions with inventory management capabilities. In addition to supply and demand prediction, their Demand Signal AI product can purportedly also predict shipping times for individual packages and lead times for entire shipping routes.

This means that users could work with their own shipping and supply data to predict increases in demand for their product and estimate how fast the company could build up supply to meet them. Noodle claims this solution runs on a collection of demand-related data based on current statistics, the client company's field sales, and their current financial metrics.

Noodle also offers Supply Execution AI, which is a solution for supply chain risk management. They claim the software can reduce the risk of stockouts and overages with "right sizing," or the management of shipping sizes based on new details from buyers or third party logistics companies.

For example, a buyer may realize they have overstocked and want to lower the amount they are purchasing before it ships. Additionally, a third party logistics company handling some of the shipments may find they do not have enough space to house all of their assigned products. This capability may be an effective way of automatically determining how much product should be moved during times of uncertainty.

Related article: Inventory Management with Machine Learning – 3 Use Cases in Industry

Related article: Machine Vision in Retail – Current Use-Cases and Applications

Warehousing

Capabilities

Warehousing and Robotic Fulfillment

Logistics companies and fulfillment centers for retailers and eCommerce could use machine vision technology to keep track of products as well as their movement across a warehouse or fulfillment centers.

Additionally, they could use machine vision powered robotic arms to automatically detect products in a pile in front of them and sort them according to which package they belong to. A human employee can then tape these boxes closed and get them ready for shipping.

Robotic Warehouse Assistance

Machine vision-enabled robots could also assist human employees with moving products to different areas. Some take the form of robotic “shelves” that hold various products for the employee while detecting their location and following them. Other robots are made for moving large packages across the warehouse and use markers on the floor to detect their designated routes.

Robotic Vehicle Loading

Some machine vision-enabled robots can help with loading vehicles. This may take the form of a robot resembling a forklift that can lift boxes to the height of a truck bed. This type of robot may be able to push boxes into trucks automatically.

Example Vendor

Geek+ is a vendor that offers machine vision-enabled robotic warehouse assistance technology to fulfillment centers and logistics companies. Their Geek Picking System is a series of wifi connected robotic palettes of product boxes that automatically move across a warehouse.

They track their own location and move in formation with one another to make it simple for employees to remove products from them and place them in packages. Once empty, the robotic palettes automatically return to their charging stations and stand by for the next task. The machine vision software within these robots allows them to recognize their printed routes on the warehouse floor as well as how far away other objects or people are.

Additionally, their Sorting System product uses a robot to carry individual products and small packages across a warehouse to be placed in fulfillment bins. The robots carry the package on

a small conveyor belt which is used to move the product off of the shelf and possibly onto other robots if aligned in a chain. This could mean that a client could use many of these robots to load each other in a line before sending each of them out to their respective fulfillment bin.

Related Emerj Interviews

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- **Training Self-Driving Cars in Simulations** - Danny Lange of Unity Technologies gives us an understanding of how self-driving cars are trained through simulations before they ever hit the road, and shares his insights on the future of AI in automotive technology.
- **AI for Inventory Optimization in Retail** - Alejandro Giacometti of EDITED tells us how AI is gradually transforming inventory and organization for retailers today.
- **COVID-19, AI, and Supply Chain Impact** - Verusen CEO Paul Noble breaks down some of the supply chain use-cases of artificial intelligence.

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