

Seeing the Unseen: How AI Can Help Supply Chains Make Better Decisions

When most of us think of artificial intelligence (AI), we either think of chatbots such as ChatGPT, capable of answering questions in a human-like manner, or advanced systems that perform complex analysis of vast amounts of data. But what happens when these capabilities are combined? As digitization has made both historical and real-time data more accessible than ever, a new challenge emerges: determining which information matters and how it should be interpreted. To this, generative AI may offer a solution.

Imagine driving a car with an abundance of warning lights on the dashboard. Some indicate minor issues, while others signal serious problems requiring immediate attention. This is the reality many supply chain managers face today. They rely on dashboards containing hundreds of performance metrics, yet identifying the few issues that truly require action often demands significant time and expertise.

In our thesis, we investigated whether generative AI could help users identify and interpret important supply chain discrepancies automatically. Working together with a supply chain software company, we developed a prompting framework that guides AI models through a structured process of identifying deviations, prioritizing the most critical issues, and providing explanations and recommendations.

To evaluate the framework, we tested several leading AI models using realistic supply chain scenarios. The results showed that modern generative AI can successfully identify significant discrepancies and distinguish between deviations that are minor and those that require immediate attention. However, while the models differed in their ability to prioritize issues and explain underlying causes, they consistently excelled at handling numerical data, suggesting that AI can be trusted to correctly interpret large volumes of supply chain performance data, but may need additional support in understanding the context through either more explicit context explanations in the prompt or even fine tuning.

This finding led to what perhaps was the most important insight: identifying discrepancies proved easier for the AI models than understanding why they occurred. While numerical analysis was generally highly accurate, contextual reasoning remained more challenging, indicating that future implementations may benefit from additional domain-specific knowledge and training.

The findings suggest that generative AI can do more than simply flag unusual KPI values. By combining analytical capabilities with natural language reasoning, AI can help users understand why a problem occurred, what consequences it may have, and where attention should be focused. This has the potential to reduce the time spent manually analyzing dashboards and improve decision-making quality.

For practitioners, the study highlights that AI can act as a decision-support tool, rather than merely a reporting tool. Instead of presenting users with more data, future supply chain systems may help them interpret data and prioritize actions automatically. For researchers, the study demonstrates how generative AI can be integrated into supply chain management processes and provides a foundation for future work on AI-supported decision-making.

As organizations continue to collect more data than ever before, the challenge is no longer gaining access to information, but understanding it. The future of supply chain management may therefore belong not to the companies with the most data, but to those that are best at turning data into meaningful decisions.

This popular scientific article is derived from the master thesis:

Seeing the Unseen: AI-Driven Discrepancy Detection to Foster Improved Decision-Making and Supply Chain Resilience – A Case Study of PipeChain SCM, written by Emma Iveberg and Erik Ekstrand.