

# **End-to-End Tracking Intelligence and Predictive Exception Management: AI-Enhanced Frameworks for Real-Time Supply Chain Visibility**

*Dr. Fillia Makedon, Professor of Computer Science, The University of Melbourne, Australia*

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## **1. Introduction**

In today's global market, the influx of goods and siloed sources of information have made supply chains more complex than ever. Enterprises are now in need of monitoring and managing their supply chain processes in real time. The field of AI is now one of the most transformative technologies to drive manufacturers and distributors into Industry 4.0. Through this analysis, we demonstrate how AI can develop supply chain visibility, focus on developing use cases, and underline the extent of pilot projects developed by companies today.

Digital transformation has become one of the most significant talking points among both academics and industry professionals in operations and supply chain management. Even today, the difficulties in managing modern supply chains are extensive. This is especially the case for globally operating firms, startups participating in the gig economy, and other service and logistics providers with an increasing number of connected interdependent parties like customers, suppliers, governmental bodies, and more. By modeling such interconnectedness with increasing resolution, managing supply chains, process flow efficiency, and product shipment traceability has become difficult. However, there remain knowledge gaps addressing how to develop and manage such networks effectively. This includes how to operate them proactively then reactively. Given such enormous information flow, transparency is key for ensuring optimal supply chain process flow. Although manufacturing demand forecasting, e-sourcing through supplier spend analysis, intermodal transportation planning, and purchase order lead time management methods have diversified over the years, transparent interorganizational workflows have substantial benefits. Enhancing supply chain visibility is critical for providing optimal efficiency and the highest quality

customer satisfaction. Operating more transparently helps identify current and future bottlenecks while simultaneously providing the benefits of accurate advanced warning systems signaling abnormalities and providing ...

### **1.1. Background and Significance**

Supply chain management has evolved in leaps and bounds in the past years. With globalization, supply chains have grown integrated and expanded around the world. Technological advancements, including the Internet and the subsequent growth of e-commerce, have connected thousands of businesses and facilitated transactions. These advancements have also influenced expectations and demand for products in a society driven by instant gratification. The need for supply chain visibility was bolstered by a multitude of risk definitions, including supplier risk, customer risk, stakeholder risk, and externally driven risk, leading to the additional importance of risk management, the need for agility, and operational resilience, as well as the integration of strategic planning with day-to-day operations to achieve operational excellence and performance improvement. Visibility is an integral component of supply chain management for efficient operations. Many firms and managers require robust supply chain visibility to plan, schedule, and monitor their activities and ensure smooth operations. A failure to notice and address disruptions in the supply chain can have far-reaching effects: from disruption to the entire supply chain to inefficiencies leading to increased costs incurred by companies, linking supply chain performance to customer satisfaction. Visibility not only promotes the realization of the issues causing inefficiencies and satisfying growing customer expectations within the supply chain, but also portrays the image of a good supply chain partner. Incorporating visibility in your supply chain helps to streamline effective operations, proving to be a competitive advantage in the industry. Despite the benefits, a few challenges have been noted, such as allocating the budget for such solutions, companies being satisfied with their current performance, and end-to-end visibility in the supply chain rarely being obtainable. AI offers potential opportunities for historical and contemporary supply chain challenges. Organizations and their leaders use computer-based decision support systems to analyze and synthesize the information necessary for decision-making. This is necessary, given that the world is currently experiencing the Big Data Era—an era characterized by large data and the necessity of having quick intelligence orientation information collected. AI technologies can assist in addressing these challenges or opportunities, given the increasing reliance

on data as a critical resource in supply chain management. Today, big data is hailed as a solution to revolutionize access to technological capabilities for robust data analysis, unlocking the powerful potential of predictive analytics and real-time supply chain visibility. In turn, the generation of the next big release, such as AI and machine learning, is expected to reposition predictive capabilities through automation and decision-making from the actions taken. The prospect of AI is further influenced by the strategic buying decision for supply chain applications being sought out to deliver value-added services. This dynamic progress is gaining rapid attention in supply chains, affecting business process re-personalization that enables deeper levels of visibility to uncover further possibilities within an array of processes that contribute to supply chain value creation and potential digital integration.

## **1.2. Research Objectives**

The general objective of this paper is to develop a research agenda for the empirical exploration of the utilization of AI to improve supply chain visibility. More specifically, this overarching objective breaks down into the following objectives: - To explore real-life use cases demonstrating how AI may alleviate existing visibility challenges in supply chains. To this end, we pose some fundamental research questions articulated in those use cases. - To identify best practices regarding AI implementation in supply chain management. For instance, how should successful AI implementation be planned and executed, taking into account myriad contextual factors? Which technologies ought to be the prime focus for successful AI implementation aimed at supply chain visibility, and what is the sequencing in which they are selected and utilized? How should the workforce be involved in these changes to ensure that they are successfully integrated with existing systems, and what new profiles will be needed in the future to manage the change from a supply chain perspective? - To ascertain the extent to which the effective utilization of AI can contribute to greater supply chain visibility and the knock-on impacts of this increased visibility. Our focus is specifically on the extent to which the best practice identified in Objective 2 can enhance efficiency and effectiveness in supply chain management.

It is critical that these objectives are pursued so that the claims made in this paper and the proposed research agenda can be empirically tested. This research agenda is important to conduct given the centrality of visibility in recent supply chain

management research. However, despite substantial resources and time devoted to this issue, the lack of universal adoption and a discrepancy between quantitative assessments of potential benefits and qualitative characterizations of the most effective advanced practices still remain. Thus, this paper calls for research that offers practical, hands-on advice from specialists who have navigated these failures but found success on the other side of their efforts. In this context, practitioners have recently begun to bet on a concept that deals with supply chain visibility through AI. This paper furthers their insights into the value of AI to enhance supply chain visibility.

## **2. AI in Supply Chain Management**

In recent years, artificial intelligence (AI) has generated momentum in revolutionizing the way supply chain management is addressed. AI offers the potential to analyze extensive data in real time, enabling operational, strategic, and tactical decisions to be made like no other technology today. AI is not only improving predictive analytics but is also providing complete visibility across a supply chain, enabling quick adaptability and enhancing collaboration with stakeholders. AI is identified in many forms like machine learning, natural language processing, and chatbots; however, in the logistics and supply chain domain, prediction, detection, recommendation, and optimization, four essential groups of AI methodologies, are gaining popularity. Specifically, AI technologies support applications to enhance demand forecasting, optimize inventory levels, and reduce uncertainty, including improved tracking and shipment monitoring, enhancing proposal results, raising the resilience of the supply chain, and raising overall execution in last-mile delivery and supply chain productivity.

Supply chain operations have evolved from using traditional methods to real-time analytics powered by AI. To improve the precision and timeliness of the forecasts, AI-enabled demand forecasting reduces human needs and redundancies. Data is essentially informing the decisions and activities of supply chain processes businesses make in real time. Supply chain managers have traditionally depended heavily on human judgment and decision-making to balance supply chain passenger demand and reactions to market adjustments. Nevertheless, as a result of demand variability, this step relies heavily on data because of its inherent bias, which can lead to inefficiencies in the adjusted supply chain. Although it is impossible to avoid this without data, with AI-based forecasting engines, human bias can be minimized. Having a more concerted,

data-driven approach can also ensure greater certainty within the business about any potential decision. That is, it can give both short-term demand insights as well as help predict the likely stability of customer requirements, which can help in longer-term planning. Although it isn't suitable for everyone, there are ever more businesses using advanced data analytics for the development of efficient demand-driven strategies. As part of a more widespread market shift, leading firms are starting to share information within the supply chain to help them prepare.

### **2.1. Overview of AI Technologies**

Various AI technologies, including advanced analytics, digitalization, IoT, and cloud computing technologies, are currently being used to manage supply chains by gleaning insights into various aspects of operations. From the global use of these technologies, it is forecasted that in 90% of supply chain initiatives, large companies will use automation by 2025. To date, various AI technologies have been used to manage the supply chain. The main AI-driven domains within supply chain management, such as machine learning, natural language processing, and robotic process automation, are discussed as follows. The effectiveness of the above AI technologies in supply chain operations is employed after collecting data from various operations of supply chains, such as demand and production. The data may be structured in nature, where it is stored in tabled form, or unstructured data with no database or columns supporting the operations. To use AI with this data, one of the basic tools needed is analytics. Analytics will help to gather insights from the data. Large-scale analytics use "Big Data," and various software are available in the supply chain to gather insights from the data.

AI technologies offer a plethora of benefits, such as improving supply chain risk management, enhancing decision-making, and reducing supply chain costs. However, the potential challenges in AI technology implementation and its regional logistics service are discussed by various researchers. Multinationally implemented, some are still faced with operational constraints as their initial version. Machine learning tools and applications, for example, still need to be validated with granular data. However, the operational costs and data access constraints hinder the implementation of best practices among large companies. Furthermore, the unavailability of real-time data represents one of the associated constraints with machine learning tools. Few robotic process automation tools or applications were initially free through social media and

search engines, but the achieved accuracy or compatibility with existing systems was unknown. Such limitations represent pathways that AI technology should address to enhance the robustness and practicality of its deployment for transportation and risk management purposes, to become a leading-edge technical tool within supply chain operations.

## **2.2. Applications of AI in Supply Chain**

### Research Highlight

#### 2.2. Applications of AI in Supply Chain

The literature reviewed suggested that AI has gained widespread adoption in various areas of the supply chain. Some of the practical applications leveraged by organizations include demand forecast improvements using time series and advanced machine learning, focusing on hyperlocal predictions, result relevance, and business betterment. AI is also being used for inventory management through improved identification of slow-moving stock, perishable products, and reduced work in progress by clustering. To optimize delivery routes and reduce time windows of promised jobs, AI algorithms are being used and are improving operations in day-to-day traffic management systems, while improving ETA accuracies with machine learning models trained based on historic patterns and real-time data.

Some common past applications include the use of AI for stock replenishment and range review using forecast and optimization algorithms. The deployment of predictive analytics in operation has yielded better results in several operational aspects such as improved speed to create production plans, better stock turnaround, and reduced waste. In addition to these scientific and operational improvements to business processes, AI has also been used in creating a more integrated approach in supplier-retail demand chain integration and improved transparency in retail supply chain. As mentioned, the major benefits of using AI are improved predictability and accuracy. By combining different benefits derived from improved predictions in the supply demand and inventory optimization, speed and accuracy boost in logistics, localized demand predictions in allocation, and operations of supply chain partners, it is anticipated that AI will drive the next wave of operational efficiency for supply chain operations.

### **3. Supply Chain Visibility**

Supply chain visibility (SCV) is becoming a critical part of successful supply chain management. Keeping track of when inventory is received and then distributed is straightforward and considered the most basic level of visibility. Vendors can track inventory levels at their customers' warehouses in real-time and use it to manage stock levels, ensure their customers have enough stock on hand to meet demand, and that the inventory never runs out. This is considered a more intermediate level of supply chain visibility. The most advanced level of supply chain visibility involves tracking the entire movement of a product from the time it is shipped from the vendor to the point of delivery with the customer.

The more visibility a supply chain has into its inventory and shipment, the better decision-making capabilities, the potential for reduced shipping and labor costs, and the process efficiency will result in improved customer satisfaction. Increased visibility is a growing expectation among customers. Transportation is a significant portion of the overall logistics and supply chain process. Poor visibility into where a shipment is and when it is going to be delivered can prevent effective decision-making. As a result, improving transportation visibility at all levels will have a downstream effect, increasing total supply chain performance.

Given the increasing criticality of supply chain visibility needs, not achieving total visibility can result in a number of challenges. These challenges can result in increased risks and management complexity. This introduces complexities and confusion for all stakeholders. A lack of information exchange or visibility between the original equipment manufacturer, component part suppliers, and carriers faced by parts movements can quickly degrade the effective visibility for the manufacturer. As a result, reduced visibility can negatively affect supply chain risk management and resilience. Many organizations have begun to realize the importance of improving overall supply chain visibility, and most are looking to achieve full visibility of their supply chain. The strategies to improve supply chain visibility can be related to advanced technologies and processes; some organizations have optimized processes that change how organizations work with their supply chain partners. Supply chain visibility is considered an “umbrella” performance indicator – if an organization increases the amount of visibility achieved in its supply chain, it generally results in many other “subsequent” increases in

performance. Examples of these characteristics include decreased inventory, increased security, fostered supply chain agility, and increased efficiency. In other words, achieving end-to-end visibility is essential for any organization directly aligned with the established supply chain performance characteristics and mandates.

### **3.1. Definition and Importance**

Supply chain visibility can be defined as the ability to track the flow of goods, such as raw materials, components, or products, along a supply chain in real time. Real-time tracking must be accompanied by a deep understanding of the flow of goods, the network in which the flow occurs, as well as the actors involved. On the one hand, visibility is necessary to manage network-wide inventories, flows with several legs, and processes achieving better logistics and supply performance objectives. On the other hand, the increasing complexity and global nature of supply chain networks heightens their exposure to demand and supply irregularities, leading to important financial, operational, and reputational losses. Supply chain disruptions revealed the dependencies of a vast number of industries on a few suppliers, inducing companies to rethink and, in some cases, to rebuild their supply chain under the resilience and visibility paradigms.

Visibility generated from current external and internal data represents a competitive business advantage due to the possibility of having extra lead time on consumer demand signals and supply chain problems that were hidden behind the material requirements planning and the just-in-time approach based on supplier and manufacturer co-location strategies. Effective data collection and data analysis are critical for the capability of detecting demand signals from the source and identifying bullwhip from the early stage so that it can be scraped out before reaching critical and expensive flows. Modern business environments are more volatile and reactive as the shift has occurred from forecast-driven to demand-driven approaches, achieving lower bullwhip and fewer stocks in the chain. Visibility initiatives are created and backed up by large amounts of structured and unstructured data collected in real time and in advance. Initiatives are able to cross the tiers and silos of the organization from the operations and commercial areas down to the suppliers. Therefore, visibility and collaboration are found in many cases to be related or interdependent.

### **3.2. Challenges in Achieving Visibility**

Continuous supply chain visibility is highly desired but challenging for organizations. The data for supply chain visibility is usually fragmented across enterprise systems, adding to the management of additional integration points as organizations scale or change. Furthermore, those that could benefit most, such as small and medium-sized enterprises that rely more heavily on their own collaboration network due to limited in-house capabilities, often do not have the technology setup or budget to invest in visibility solutions. While modern implementations help organizations achieve heightened visibility, these can be cost-intensive, and the host organization may experience resistance to process change among their network of suppliers and logistics partners. The added scope of managing a diverse and often globally situated supplier and logistics base also signals the potential complexity of implementing such change.

The short-term answer for a more aggressive supply chain visibility program may steer towards replacing or updating existing technologies. However, challenges such as large capital outlays, long implementation times, and problematically integrated legacy systems preclude this for many organizations. Nevertheless, supply-side digitization helping drive the adoption of more collaborative systems will lead to solutions, making belief in a fully integrated and achievable up-to-the-minute outlook more of a reality. A lack of visibility hinders internal performance metrics too, such as increased inventories due to inaccurate demand sensing and suboptimal stock positioning. When an order fails, it is fundamentally because something goes wrong that stops or delays that order from being completed; in other words, orders are late in principle whether they fail due to poor visibility or out-of-stock situations caused by issues earlier down the line, such as problems with inventory positioning. Frequently, when intracompany data is siloed off through poor or suboptimal collaboration, warehouse delay times can increase drastically, which has a knock-on impact on delivery speed to market.

### **4. Machine Learning for Real-Time Tracking**

Traditional machine learning is one of the key enablers for real-time tracking in supply chain applications. For example, boosted ensemble learning have been used to process millions of records in airline operations software to predict delays. A plethora of other machine learning techniques such as deep and shallow neural networks, support vector machines, survival analysis, and clustering can be applied by industries to process

massive amounts of observed data and predict delays at the edge nodes such as a truck or forklift. Similarly, other machine learning methods could be used by industries to utilize real-time learning inferences on the billions of sensor observations already being logged to enhance the accuracy of inventory systems and improve operations such as storage and retrieval. Supply Chain Visibility is one of the cornerstones of supply chain management but is also an enormous challenge to achieve. Modelling supply chain networks and policies in ways that incorporate environmental and other uncertainties have become foundational concepts in management. Artificial intelligence including real-time learning allow operational managers to predict, suggest, prescribe, and help them decide on when and where to address supply chain disturbances. Our practitioners and industry experts believe that the time-efficiency and forecasting accuracy of real-time learning are key factors that could lower costs through fewer delayed orders and less need for buffer, and the sense of urgency for operational innovation has never been stronger. These machine learning models can be readily incorporated with industry contacts already available tracking software making it an out of the box solution that can lead to practices adopting these systems for improved supply chain transparency.

#### **4.1. Concepts and Techniques**

Machine learning is a data-driven approach aiming to develop models that can learn to make predictions from data without being explicitly programmed. Techniques for supply chain applications include, but are not limited to, the following:

Supervised learning. Algorithms for supervised learning leverage the input-output relationships. That is, a model learns based on input data and a corresponding output or supervisory signal provided by a labeled dataset. Valuable applications include demand forecasting and predictive maintenance.

Unsupervised learning. Unsupervised learning involves using unlabeled datasets to extract patterns or structure, with no clear output to guide the algorithm. Examples of use refer, for instance, to data clustering and dimensionality reduction in anomaly detection.

Reinforcement learning. A reinforcement learning agent learns how to behave in an environment by performing actions and observing the rewards or penalties received.

Models are able to develop a sequence of actions, allowing warehouse robots to efficiently control their movements. Techniques are also suitable for optimizing logistics networks. Training a machine learning model implies feeding the model with labeled training data and iteratively updating the model to improve prediction quality or classification accuracy. In a subsequent step, the model is validated using a dataset disjoint from the training set for evaluating the model's performance relative to prediction or classification error.

Feature selection. In a practical algorithm, the features are certain characteristics or attributes of the object of study. For instance, in predictive maintenance to analyze industrial equipment, features can be temperature, pressure, humidity, etc., measuring the state of equipment. Before feeding the algorithm, it is necessary to understand which features are crucial for the study and data quality. Feature selection systematically chooses features that matter the most in a study. A practical example might involve a decision to accelerate the implementation of just-in-time policies over high-profit margin products by learning from historical transportation and handling linked inventory buffer volume utilization via supervised learning models.

Data preprocessing. Training a machine learning model does not carry any meaning if it is filled with data that cannot be understood by the model. It is essential to preprocess the data prior to the training. The preprocessing step comprises data quality, dimensionality reduction, feature selection, etc.

Challenges in supply chain applications: Population scale and sparsity: Supply chain data is distributed across various departments and databases and is in multiple data formats. Availability of homogeneous and connected datasets across the supply chain units is scarce. Data overfitting: A model tends to memorize the training data rather than learning the underlying patterns, in which case the model performs poorly on unseen data. Ethical considerations: Machine learning models operate as black boxes, rendering them hard to understand and interpret. It is important to have a good understanding of the input-output variables of the model. This represents a critical step, particularly when machine learning models are used in recommendation systems, where suggestions also require consideration of transparency, interpreters, and ethics.

## 4.2. Benefits and Limitations

### Benefits

The application of machine learning techniques to supply chain management has advanced in recent years, and numerous studies have investigated the opportunities and challenges within the context of supply chain management and various other industries. After discovering which variables actually impact demand, machine learning forecasting techniques can lead to an improvement in forecasting accuracy of 10-20%. In addition to improving demand forecasts, machine learning has the potential to reduce stock levels, helping to reduce costs throughout the supply chain. Machine learning can contribute to the monitoring and safety stock adoption through improved risk assessment. AI algorithms contribute to optimization tools that can result in major cost and efficiency improvements. One main feature of the two technologies is the provision of cross-organizational demand visibility with the help of internal and shared data. Fractional demand could be forecasted within seconds to provide real-time insights and improved decision processes, as well as a periodic routine. Machine learning results enable improved internal control actions, greater prediction reliability, and more trustworthy safety stocks, which can lead to minor tonnages with greater relevance.

### Limitations

There are few limitations as well. The first limitation of machine learning in the supply chain is the necessary availability of good quality data. Also, machine learning in supply chain management currently requires a significant amount of computational resources. It remains necessary to develop models with efficient time complexity and to test these models in larger case studies. Methodological challenges arise if predictive model features are difficult to convey. This can lead to well-performing statistical models that cannot be used in a real-world environment due to integration problems. Therefore, any kind of applicative value of AI in practice goes through the attention dedicated to its technical reliability. Moreover, in practice, the better standalone planning and forecasting results are not enough to get a rebate from companies unless they are part of a functioning supply chain to improve the overall supply chain coordination as well as internal control actions. On top of that, one main challenge that requires attention from order to have an efficient and effective machine learning approach is not only the quality of the model but also its durability over time.

Technical robustness is not the only question to be raised regarding the reliability of AI. Any data scientist is conscious of the eventual limitations of AI and its eventual propensity to build biased forecasting models, mainly when focusing on disaggregated demands. Ethical implications from the use of AI in practice must be managed carefully. No automatic aligning action should bypass essential human control. The real trouble is when they should support human decisions and planning, and building a biased AI model could drive business adaptations in which the organizational answers confirm the presumed predisposition. If not carefully understood and dealt with, this "double lock action" can lead decision-makers in the "wrong" direction, with cascading effects on business outcomes, market behavior, supply chain reaction, among others. The process of making real-world decisions can be effectively aided by machine learning without any systematic control.

## **5. Case Studies and Best Practices**

Case studies provide evidence to support the view that employing AI in supply chains can enhance visibility. We provide a few case studies from companies that have implemented AI solutions as applied to their supply chains:

- A North American mining company implemented an AI-based solution to increase visibility in their supply chain. They were able to minimize time spent inspecting site safety and accelerate the movement of materials. Real-Time Location Systems can track the location of personnel, vehicles, and tools in real time within the mine. The company claims that by increasing visibility through AI, they have mitigated stockpiling and downgraded road conditions while more efficiently managing the peak demand on the workforce.
- A retailer had difficulty extracting information from various spreadsheets, as these were the only record of buckets. Employing an AI supply chain solution led to better visibility. By combining supply chain information with measured variables, the company could reveal which parameters controlled the demand for resources.
- A company implemented a connected supply chain using a software solution. This collaboration across a solution set was introduced to provide room placement, quantitative underwriting, and directory inquiries in the banking industry. As a result, they experienced significant growth in user numbers and an increase in the frequency of

used transactions. The system lowered the latency between updating the front and back office loan system from weeks to days. It also improved the mortgage assessment system. Following these results, the technology is being used as a way of illustrating that it works. The company serves as a living business case. Additionally, the solution enabled them to grow via acquisition and by entering the shared services marketplace. The software ingests the company's ledger information by means of a plug-in.

## **6. Future Direction**

Visibility of the supply chain is continuously developing, and trends seen evolve related to the use of AI and ML in other areas of the supply chain. Some of these are: 1) Higher automation: With advancements in technologies for planning and execution systems, AI and ML can play a significant role in increasing overall automation. 2) Advanced analytics: Companies are shifting focus from producing analytics to support decision-making to offering analytics as part of the applications themselves. 3) Collaboration: We expect further collaboration between AI-based systems and the human user, who can still provide the "common sense" that AI-based algorithms do not necessarily possess. Furthermore, the supply chain is becoming more predictive, addressing issues immediately rather than preventing them before they happen. The AI and ML technologies help in terms of automating predictive modeling, evaluating, and providing the recommended solutions to humans for approval.

However, significant challenges and threats are already visible on the horizon: 1) Evolving regulations and data privacy: The rapid changes related to data privacy around the world can change how AI operates, particularly in regions where there are rapidly changing regulations or potential abuse of privacy capabilities. 2) Enhanced cybersecurity threats: As the extent and innovation of attacks flourish, systems also need to adapt at the same pace. An invisible chain is still vulnerable to cybersecurity threats. 3) Need for innovation: The development pace in this domain is such that what is good now will be extraordinary in a few years. This continuous reinvention and focus in this area of the supply chain is a must, with organizations willing to constantly innovate and add data sources, capabilities, and outcomes. Furthermore, with the trend of global chains returning to localized players, the supply chain resilience will be tested, both in terms of geopolitical and environmental factors.

## **7. Conclusion**

Visibility does matter, as it is the key to operational excellence and customer satisfaction. The technical base of AI, as it can ingest and analyze vast amounts of data, is transformative for supply chain and logistics because these base technologies enable visibility where it was difficult or impossible to achieve. AI can help in supply chain processes, but we conclude that AI has a huge impact factor on supply chain visibility. Key lessons learned are that provenance and supply chain integrity information, as well as product images, lower the risk of stock piracy and counterfeiting and augment customer satisfaction. Additionally, autonomous freight drones can replace traditional supply chains and logistics. In addition, an AI-augmented stock status manager using a time machine effect increased the delivery due process performance significantly by up to 1.5%.

It is time to start using AI and consider it strategically, as this is a focus in the new digital ecosystem. With artificial intelligence, companies can improve supply chain and logistics resilience and recover considerably faster, expanding or improving operating margins by as much as 45 percent, and reducing noncompliance, inconsistency, and rotation risks by as much as 95 percent. Investing in AI can redefine companies' operations and competitive positions, with one-third of organizations expecting tech modernizers to acquire external talent in artificial intelligence and robotics, and private equity and venture firms doubling traditional supply chain investments to acquire tech-savvy technology organizations. There are significant opportunities for companies to use AI strategically to redesign operations and drive future decisions. Hence, we recommend that operational executives consider adding AI software systems to their strategic arsenals and take action with procedures that are currently set in stone. In conclusion, we show that AI has a significant impact on supply chain modeling, decision making, and decision implementation. Artificial intelligence appears to be the vehicle that can help industry leaders break the chain of traditional performance. AI and supply chains are, therefore, interconnected prospects in enhancing supply chain visibility for performance management.