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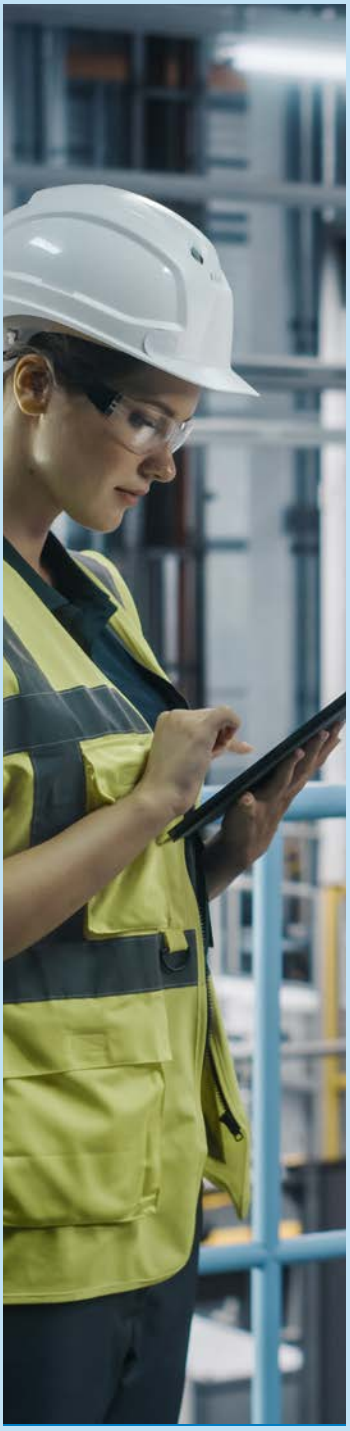

THE ROLE OF AI IN SUPPLY CHAIN OPTIMISATION AND TRANSFORMATION

Abstract

Are operational inefficiencies and external disruptions resulting in underperformance of your supply chains? Unfortunately, businesses across the globe have felt the strings tighten due to supplies unable to meet the demand as they adjust to the new normal. A business can achieve faster resolution to problems thanks to actionable insights about their supply chain through artificial intelligence (AI). However, blindly implementing AI for supply chain optimisation cannot be the solution to all the problems. In this POV, we discuss the various benefits of AI-based supply chains, the transformation challenges and common pitfalls, steps to overcome those pitfalls, ways to successfully implement supply chain optimisation, and use cases of AI in supply chain.

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Introduction

AI has changed every aspect of our lives, from banking and healthcare to transportation. The next big thing in logistics is already here – autonomous vehicles. But how does AI fit into the future of logistics? In today's complex globalised economy, logistics is becoming ever more important. As the demand for e-commerce increases, so does the need for highly efficient shipping methods. This requires new technologies such as AI, robotics, drones, and 3D printing to support and enhance current practices. These innovations provide opportunities for businesses to improve productivity, reduce costs, and increase customer satisfaction.

The benefits of AI and analytics-based supply chains[2][3]

Supply chains that depend on AI and analytics allow business owners to take proactive and data-driven decisions. This results in an overall increase in productivity, enhancement in cost savings, and reduction in errors. Businesses with optimal supply chains achieve 20–50% fewer inventory holdings, up to 3x cash-to-cash cycle speeds, and 5–15% lower costs. AI-based supply chains show better resiliency, agility, and optimisation in their operations.

- **Demand forecasting and management**
  Businesses use machine learning (ML) algorithms and constraints-based modelling to identify influential factors in supply chain management. It is a mathematical approach where the possibility of business decisions depends on the maximum and the minimum number of product limits. It helps warehouses make informed decisions on stocking. Big data predictive analysis offers deep insights for self-improvement of forecasting loops. AI for supply chain optimisation helps warehouse and stock managers control parts, goods, and components in real time. As the AI system matures, it provides stocking recommendations based on past purchasing patterns and supplier deliveries.
- **Predictive maintenance**
  AI helps in predictive maintenance of equipment that, if not maintained properly, could potentially harm the employees working on the floor. For example, balers and forklifts can cause injuries that are financially costly for the business. AI is necessary to identify and address the wear and tear and other factors that could jeopardise the integrity of the equipment. IoT sensors that work with AI systems detect possible faults and help businesses take action proactively. AI can also handle machines that are deemed too dangerous for humans. Robots that work on AI technology help avoid health and safety concerns and are common in warehouses.
- **Reduce margin of error**
  Supply chains have many moving parts that place unnecessary pressure on businesses, which struggle to meet their SLAs. This could be something as trivial as stacking the inventory in such a way that one can find it easily in a warehouse. AI helps reduce the margin of error through deep learning, trend analysis, records validation, and many more techniques that reduce the need for human intervention.
- **Longevity of transportation and logistics**
  IoT devices gather data while in transit and provide real-time insights about vehicle longevity. Based on historical data, the ML systems in the vehicles forecast failures and prescribe maintenance. This enables the logistics operator to manage the fleet proactively and avoid downtime or delays in delivery.
- **Add portability to supply chain loading**
  A comprehensive analysis of loading and unloading shipping containers is part of supply chain management. Here, AI and data modelling aid in determining the most effective methods of loading and unloading items from containers. Businesses utilise a combination of software, hardware, and data analytics for real-time insights into the loading and unloading process. The collected data assists businesses in establishing safe and efficient freight management methods.
- **Cost savings and revenue boost**
  Data analytics and AI solutions are the bedrock for better negotiation of shipment and procurement prices, maintaining contracts, and identifying changes in the profit process of the supply chain. You can make sound financial decisions based on a centralised database that includes all supply chain aspects. AI-based supply chain innovations help in mining and analysing cost-effective revenue-building standards.
- **Strategic sourcing based on data analytics**
  A significant effect of data analytics and AI-based supply chains is in identifying strategic partners and key suppliers. This aids in the acquisition of lower-cost alternatives and the establishment of performance measures for compliance. AI and data analytics provide high levels of transparency in supply chain–dependent enterprises.

Supply chain optimisation and transformation challenges[4]

Businesses that deal with large and complex supply chains are often riddled with problems that lead to inefficiency. They need systems to deal with unstructured data in silos and changing market dynamics. Let us look at these challenges in detail.

- **Unstructured data and improper implementation of AI**
  Supply chain management teams have to manually wade through piles of unstructured data to be able to make any business decisions. This is an inefficient process that leads to errors.

Technologies such as AI, ML, and IoT provide pathbreaking transformation in supply chains through software-based object recognition, text recognition, and image tagging. However, according to a study, 62% of businesses continue to have limited visibility of their supply chain even after implementing AI due to improper planning and implementation.

- **Changing market forces and customer demand**
  Businesses have to constantly optimise their processes to keep up with the changing customer demands and other market forces. Consistent improvisation helps managers predict key operational metrics and make decisions to improve supply chain efficiency and profitability. AI systems help fulfil this goal provided you build them over well-defined models that follow consistent labels and rules. Modelling can be challenging for businesses, given that most do not have a dedicated data management team. This is where an external consulting and implementation team of professionals come in.

Supply chain optimisation journey and common pitfalls[5]

Businesses start with an ambitious journey to transform their supply chains but end up facing these pitfalls leading to >60% of projects being delayed or over budget. Here is a chart displaying the optimisation journey phase and associated pitfalls.

Supply chain optimisation phase	Typical pitfalls
Value creation identification strategy and roadmap	• Value not defined clearly • Less than one-third of businesses perform a value diagnostic
Designing target solutions and selecting the vendors	• Overlooked design phase • Businesses often selecting suboptimal suppliers leading to revenue leakage without spending sufficient time on design
Implementation and systems integration	• Insufficient impact focus and execution rigour, with 25% of supply chain leaders thinking that their objectives align with the system integrator's incentives
Change management, capability building, and full value capture	• About 13% of senior executives globally saying that their businesses are adequately prepared to manage the skills gap

Steps to implement the supply chain optimisation phases successfully[5]

Implementing an AI- and analytics-based supply chain is a holistic process that requires robust planning, identification of specific goals, and eventually, value creation. We discuss a few steps that a business should follow for successful implementation.

- **Value creation identification, strategy, and roadmap**
  From procurement and manufacturing to logistics, businesses need to identify and prioritise all aspects of value creation. This crucial exercise gives them a clear view of all value creation opportunities. By defining a clear digital supply chain strategy, businesses can ensure better alignment with their digital programmes.* A solution-agnostic approach helps businesses identify process redesign, organisational changes, and capabilities required for a strategic roadmap.
- **Designing the target solution and vendor selection**
  Given the complexity of the solution – from demand forecasting to planning optimisation and digital execution tracking – businesses must ensure that their vendors can provide an end-to-end solution. It is best to select a technology vendor that provides a complete suite of solutions with seamless integration and technical support.
- **Implementation and systems integration**
  Many businesses don't have in-house expertise in implementing organisation-wide technology. They often select the right solution but do not implement it successfully, falling behind the schedule, going over the budget, and even losing focus on the primary objective. By adopting a holistic approach to implementation and systems integration, businesses can optimise the end-to-end value in both the short and the long terms.
- **Change management, capability building, and full value capture**
  While analysing technology solutions, businesses must address and resolve organisational challenges, change management, and capability building. Employees need to accept and adopt to new ways of working. This requires a coordinated effort to educate the workforce on the need for changes and their benefits.

Ways to overcome the pitfalls[6]

While businesses may want to quickly transform their supply chains, they should formulate a plan to overcome common pitfalls for long-term technology transformation with specific KPIs.

- **Technology-agnostic business analysis**
  There is no one-size-fits-all technology solution. The way a large manufacturing company functions and optimises its supply chain may be completely different from the approach an e-commerce company takes. Avoid pitfalls and analyse your business irrespective of the technology. Observe where technology is needed, which revolves around two aspects.
- **Understanding the core business**
  It is easy to lose track of the primary objective when jumping the gun. It is best to identify bottlenecks, the root cause of congestion, and the delivery systems available. Analyse your shipping mediums, warehouse management, the average time of delivery, and the accuracy of your demand predictions. Once you understand the core business and the inefficiencies, you can select and implement the right technology.
- **Build the systems based on the study**
  Build the technology step-by-step. Some businesses assume that adding multiple solutions and automating them together will reap the best results. That is not true and may lead to bigger complications. Phase out legacy systems and implement the latest technologies with sufficient testing and human intervention.
- **Use KPIs in the optimisation strategy**
  It is vital to establish key performance indicators (KPIs) such as the number of deliveries, inventory costs, transportation costs, and average delivery times. These KPIs define expected outcomes when you train the AI models to improve your supply chains. The performance metrics must include related datasets that the ML models analyse. For example, if one of your goals is to reduce the time and cost of last-mile delivery, the AI must connect datasets such as:
- Distances between multiple delivery locations
- Vehicle capacity
- Delivery time window
- Individual customer preferences
- Traffic

AI in supply chain use cases[7]

Implementing AI and analytics will transform all aspects of the supply chain, from operations to accounts, including the following areas.

- **Logistics and transportation:** Reduce any unplanned downtime in the fleet, detect and remove bottlenecks, and improve fuel efficiency.
- **Supplier risk assessments:** Alert the business of any potential supplier failure.
- **Demand forecasting and inventory management:** Drive operations and maintain threshold levels required to meet the current demand.
- **Warehouse automation:** Automate loading and unloading processes as well as reduce handling costs and damages due to individual handling using computer vision.
- **Warehouse health and safety:** Manage orders faster and with more efficiency.
- **Customer service:** Handle higher-level questions, keep customers engaged, and achieve better efficiency.
- **Account payables/receivables automation:** Deliver better process quality, compliance, accuracy, and reduced cycle times.

Conclusion

Supply chain businesses that understand the apparent technological evolution are already investing in AI-based optimisation and transformation. According to a study, 61% of supply chain executives reported that AI helped lower the cost of supply chain management.[3] If implemented successfully, AI reduces costs, increases revenue, improves productivity, and reduces errors and mishaps. This makes AI imperative for all businesses that handle complex supply chains.

*For organisations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed organisational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like living organisms will be imperative for business excellence. A comprehensive yet modular suite of services is doing precisely that. Equipping organisations with intuitive decision-making automatically at scale, actionable insights based on real-time solutions, anytime/anywhere experience, and in-depth data visibility across functions leading to hyper-productivity, Live Enterprise is building connected organisations that are innovating collaboratively for the future.

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