

Artificial Intelligence in Supply Chain Management

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Abstract

Every company's long-term sustainability depends on an effective supply network. Inventory estimation accuracy is a significant competitive advantage. The supply chain's capacity to satisfy demand is affected by weather, excessive seasonality, and changes in customer perception or media attention. Humans can now think at previously unimaginable levels thanks to AI, which has just been shown to act as an extension of the human brain. Instead of replacing humans, artificial intelligence (AI) will enhance our strategic and creative talents. To put it another way, AI refers to a group of computer technologies that can supposedly think for themselves and take action based on what they've learned. Just a matter of time until cloud-based machine learning and information processing techniques take over the world of computers. AI has been shown to save money, generate revenue, and optimize the use of firm assets across a wide variety of corporate sectors. AI is making it feasible for organizations to identify their target clients, demographics, price, and construct the right message for their customers, allowing for near-perfect forecasting and prediction of client demand. Focusing on these four areas of value development is key to gaining a competitive advantage. A combination of artificial intelligence (AI) and machine learning is being used by supply chain executives to achieve three goals: 1) creating waste-reducing designs, 2) tracking production in real time, and 3) enabling shorter process cycle times. These strategies are critical for bringing new items to market more quickly.

Keywords: Supply Chain Management, Operation Management, Artificial Intelligence, Production Management, Logistics

INTRODUCTION

Effective supply chain management systems save manufacturing costs, waste, and time. Supply chains that inform manufacturers of replenishment needs as soon as retail sales take place have become the standard in the business. Thereafter, shelves may be restocked almost at the rate of their depletion. For example, data from supply chain partners may be used to identify opportunities for improvement in this process. Supply chain management may provide value to the supply chain cycle in three ways:

When consumers order more things than the producer can provide, they may complain about bad service. Prior to a customer's dissatisfaction, producers may be able to foresee a shortage via data analysis. Seasonal products have a short shelf life, which requires dynamic pricing. Toward the end of the season, many of these objects are either discarded or sold at a profit. As demand fluctuates, the costs of perishable "things," such as aero planes, hotels, and restaurants, are regularly re-evaluated. It is possible to boost margins in

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physical commodities by using the same forecasting methodologies and analytical tools.[3]

Analytical software solutions enable for dynamic resource allocation and job scheduling based on sales predictions, current orders, and guaranteed raw material supply. This improves inventory distribution. It is possible to confirm the delivery date when an order is placed. This reduces the amount of orders that are not fulfilled properly.

Evolution of supply chain management

Rather of focusing on real assets, supply chains of the future will rely on data, services and other products packaged together into solutions. Modern supply chain management systems involve more than just the actual location and timing of things. Quality, delivery, pricing, customer experience, profitability are all impacted by supply chain management. Supply chains in 2017 have 50 times the amount of information they had five years ago. In today's modern supply chains, smarter choices are made using large volumes of data collected and evaluated throughout the chain's operation by data scientists and analysts. Data from the supply chain is expected to be a priority for future supply chain executives and the ERP systems they manage.[4]

Supply Chain Management

Supply chain management refers to the process of moving products and services from one firm to another (SCM). In this service, you'll find anything from ongoing projects to completed items. Networks, channels, and node company's work together to offer the goods and services required by customers in the supply chain; Supply chain management is defined as "the design, planning, execution, control, and monitoring of supply chain operations" in order to generate net value, build a competitive infrastructure, and employ global logistics. Manufacturing, procurement, IT, and merchandising all come under the banner of Supply Chain Management (SCM). Supply chain management relies heavily on marketing channels." There is a lot of emphasis in supply chain management research on environmental and risk management issues. Supply chain resilience is a prevalent issue in supply chain management. A lack of attention has been paid to supply chain management's "human component," which includes ethical issues and organizational integration. In supply chain management (SCM), a broad variety of actions are necessary to plan, regulate, and execute the movement of a product from raw materials through manufacture and distribution. Let's take an example of supply chain management (SCM), which is the coordination and execution of numerous actions that seek to improve the efficiency of the flow of resources (materials, information, and capital). All aspects of supply chain management are included in demand planning and procurement (or storage and transportation). Supply chain engineering stresses a more quantitative model-based approach to managing and executing business since supply chain management and engineering have essentially the same goals.[5]

A reliable supply chain is only possible with the help of supply chain specialists. Determine if a product or service is offered in-house (insourcing) or outsourced (outsourcing) to a third-party company (outsourcing). Specialists in supply chain management are responsible for ensuring quality control and reducing inventory concerns. One of the primary objectives of supply chain efficiency is to produce items at the lowest feasible cost. A company may consider this as a positive aspect of having a network of this kind.[6]

Supply chain management professionals perform a wide range of commercial tasks, including sales forecasting, quality control, strategy development, customer support, and system analysis. As manufacturing processes evolve, so does the supply chain architecture for that item. Workers in the supply chain must be prepared to create new supply channels if and when the industrial and economic environment changes. There were concerns about capacity and resource availability (capacity), recruitment, complexity (threats and challenges), and compliance and cost/purchasing issues among supply chain managers. There was a lot of focus on regulators.[7]

In the research and improvement of the supply chain's efficiency, supply chain specialists may be of assistance. When it comes to supply chain consulting, the consultant's role is to support management by enhancing the whole process, from raw material procurement to the end product, in order to provide the company a competitive advantage. Companies may choose to either develop in-house teams of consultants or hire external consultants to deal with the problem, as the situation requires. More and more companies are relying on outside consultants. As part of the overall consulting process, consultants generally undertake a detailed supply chain analysis in order to identify potential difficulties and provide solutions for them.[9]

Artificial intelligence (AI)

AI is a kind of cognition that robots demonstrate, rather than the innate intelligence of animals, including humans. As described by prominent textbooks, "intelligent agents" are any system that is aware of its environment and takes action to maximize its chances of success. Robots that can mimic human cognitive capabilities like learning and problem solving are not considered to have artificial intelligence, according to a number of respected academics. AI-based applications include search engines like Google, YouTube, Amazon, and Netflix, as well as Siri and Alexa. Self-driving automobiles (like Tesla) and high-level strategic gaming systems like World of Warcraft are examples of other instances of technology (such as chess and Go). The AI effect is phenomena in which previously deemed "intelligent" behaviors are being omitted from the definition of artificial intelligence. A common omission from discussions of artificial intelligence is optical character recognition (OCR).[10]

Since 1956, artificial intelligence has seen highs and lows referred to as "AI winters." Since its start, AI research has tried and abandoned a variety of strategies, including brain imitating, human problem solving modeling, formal logic, and enormous knowledge libraries. In its early years, the field was dominated by a quantitative machine learning method to solving difficult corporate and academic challenges, which proved to be very successful.

Various AI research subfields focus on a certain goal and use distinct approaches to achieve it. Research in artificial intelligence (AI) has traditionally aimed to address the following issues: reasoning, knowledge representation, planning, learning, and natural language processing (NLP). The goal of the discipline is to cultivate a person's ability to solve any problem. Search and mathematical optimization, formal logic, artificial neural networks, and statistical, probabilistic, and economic techniques have all been used by AI researchers to tackle these problems... Developing artificial intelligence touches on all of these subjects (AI). It is assumed that computers can "completely describe and recreate" human cognition for the area's creation. The development of artificial intelligence that mimics human cognition raises questions about the nature of the human mind. This subject has been addressed in mythology, literature, and philosophy for a long time. Science fiction and futurology have theorized that AI presents a danger to mankind because of its tremendous potential and capabilities.

REVIEW OF LITERATURE

Reza Toorajipour's "Artificial intelligence in supply chain management: a comprehensive literature review" aims to answer the question, "What can AI do for supply chain management?" (SCM). Artificial intelligence (AI) research was used to fill a gap in supply chain management (SCM) knowledge (AI). Scientific literature has a lot of room for improvement, according to the findings of this study. In a study published in the journal Artificial Intelligence in Supply Chain Management (AI-SCM), researchers looked at supply chain management subfields that have already been enhanced by AI and those that have the most potential for AI progress (AISCN). The inclusion and exclusion criteria for each of the four SCM disciplines are vital to keep in mind. If you're in the market for information on this topic, this website is a great resource. [2]

"Thinking robots" capable of mimicking, learning from, and ultimately replacing human cognition were the goal of artificial intelligence (AI) development according to Hokey Min (2008).[1] Human decision-making processes and productivity have been boosted by AI since the late 1970s because of its capacity to spot patterns, understand business phenomena, seek knowledge, and analyses data intelligently. Even though AI has been widely used as a decision- support tool, its use in supply chain management has been limited (SCM). This article covers the many subfields of AI that are most suited for dealing with real-world SCM issues. AI may have a positive impact on supply chain management if it is used in the right areas, according to this article's findings.

For the special issue (SI) on 'Industry experiences of artificial intelligence (AI): benefits and obstacles in operations and supply chain management,' Samuel Fosso Wamba (2021) [8, 11] says the editorial aims to highlight the papers that have been accepted for publication. Artificial Intelligence (AI) and operations and supply chain management (OSCM), as well as the relationship between the two, will be discussed in the following sections. Our selection of items for the SI will be arranged chronologically. For academics and industry practitioners, the final section gives some intriguing and challenging study opportunities by suggesting pertinent subjects, research possibilities, and possible benefits. With this SI, we intend to provide a greater understanding of AI's role in OSCM to industry practitioners, policymakers, academics, and everyone else who is interested in this area.

Objective of Study: The Study is focused on the Artificial Intelligence (AI) application in the Operation and Supply Chain Management in Organization.

Statement of the Study: AI helps to analysis the business application and functions of the Supply Chain Management linking with AI that help the business to grown in the better level of understanding

Research Methodology: The Study is focused on the secondary sources i.e., reviewing the different articles and journals from the premier international journals and industrial applications.

Artificial Intelligence (AI) application in Supply Chain Management (SCM)

Artificial Intelligence (AI) streamlines the process of predicting demand and maximizing supply. The accuracy of predicting and forecasts has been enhanced through the use of artificial intelligence (AI). There is a constant tug-of-war between supply and demand in the workplace. Supply chain and industrial operations will need greater forecasting as a result. Businesses may cut transportation, storage, and supply chain administration expenses by adopting artificial intelligence (AI) to handle, analyze (automatically), and most crucially, anticipate data provided by AI systems. Thus, it contributes in the formulation of retail and industrial strategies that are more successful because of its ability to identify patterns. When it comes to stocking exactly the right amount of certain items for sale and preventing waste, it is used in a number of ways. In this way, they may purchase more things based on reliable sales data.

Supply Chain Management have multiple solution with artificial intelligence solutions with respected to the order management, supply chain transparency, block chain for food supply, supply chain visibility, supply chain for retails and container logistics application in manufacturing industries (Figure 1).

Artificial Intelligence is being used in manufacturing. Robotics and humans can work together in teams to increase quality and reliability (i.e. error-free) in production, thanks to artificial intelligence (AI) technology.

Smart gadgets, such as sensors embedded in components, commodities, and other items, will make it possible to monitor the whole supply chain. Significant connection will allow global supply chains to collaborate on planning and decision-making.

Consequently, these supply chain choices will be much more informed. In the future, decision makers will benefit from advanced analytics and modeling, which will enable them to assess many options against a constantly shifting set of risks and restrictions. An intelligent system's autonomous decision-making will reduce the need for human intervention and enhance responsiveness. In less than a decade, our forecasts have come to fruition.

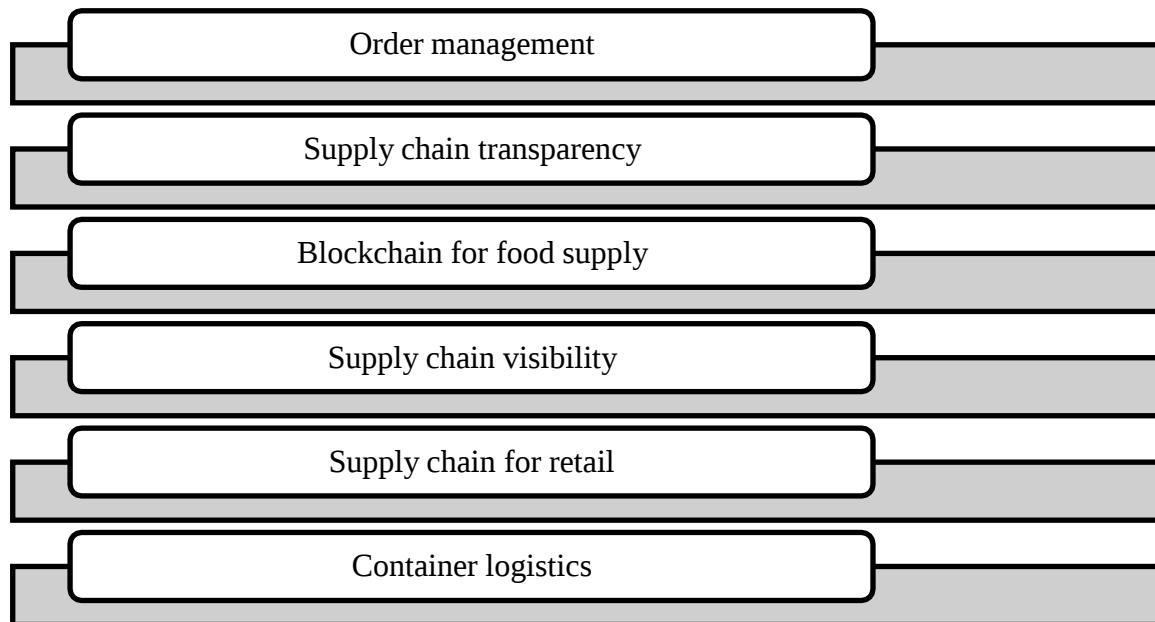


Figure 1. Supply chain management solutions.

IoT and an abundance of structured and unstructured data are used by adaptive robots to learn and make autonomous judgments. Understanding and responding to human speech may be accomplished via the use of natural language processing (NLP) technologies. Demand response, inventory and network optimization, preventive maintenance, as well as digital manufacturing all benefit from predictive analytics. Supply chains utilize hierarchical search and pattern recognition algorithms to respond to machine-generated, better intelligence and to provide speedy visibility and transparency. Ex-UPS senior vice president of engineering and strategy Bob Stoffel tells the New York Times that supply chain visibility is more than simply knowing what's going on in your own supply chain. That is to say, everyone is on the same page when it comes to making decisions that benefit the customer. Science and art are essential for success in technology management. The innovative supply chain is growing more dependent on artificial intelligence (AI). Over the next three years, 46 percent of supply chain executives plan to spend the most in AI/cognitive computing and cloud-based solutions. The influence of artificial intelligence and cognitive computing technologies on supply chain and operations was studied by senior operational executives from a variety of businesses and nations.

CONCLUSION

Artificial intelligence (AI) is becoming more popular among businesses thanks to recent developments in AI technology, such as cloud-based machine learning and artificial neural networks (AI). Increasing numbers of firms are incorporating AI into various parts of their value chain because of the significant benefits it provides in the market. All of this has been made possible thanks to artificial intelligence, which has helped them automate a wide range of tasks like promotions and assortments and supply chain management. When it comes to order management, supply chain transparency, block chain technology for food supply and visibility of supply chains for retails and container transportation, artificial intelligence (AI) is becoming more and more important. A few companies go a step further, anticipating customer purchases and delivering things before the client

has even finished a transaction. Smart manufacturing is also now possible. A wide range of changes are required in order to reap the full benefits of AI, such as facility design, restructuring production footprints, and establishing new supply chain models. In addition, businesses will need to adapt their operations to accommodate the shift from humans to AI-enabled devices and robots. Artificial Intelligence (AI) has the potential to transform the world's economy, and it's encouraging to see how quickly it's being adopted by international corporations.

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