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AUGMENTING SUPPLY CHAIN WITH ARTIFICIAL INTELLIGENCE

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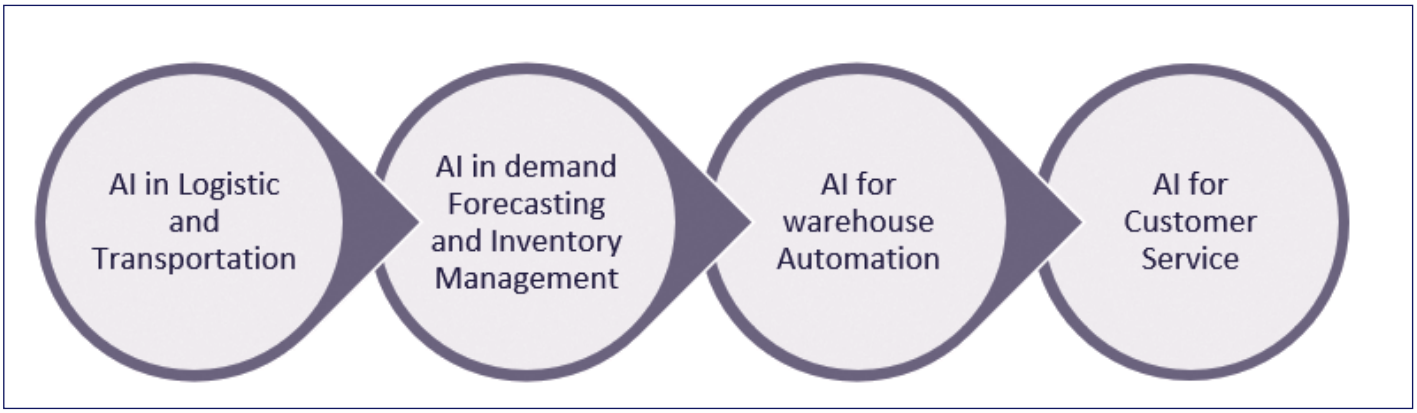
Abstract

The supply chain is currently faced with a number of difficulties, including demand uncertainty, stochasticity, the bullwhip effect, and external disruptions, risks, and crises, which may have a short-term or long-term impact on customer service. These issues have attracted technophile across the globe, and as a result, technology has grown more and more interested in these issues. Artificial intelligence (AI) is the most widely utilized technology that has the potential to revolutionize and transform numerous sectors and fields. This research paper aims to analyze how artificial intelligence can be useful for optimizing supply chains. Further, the research paper focuses on artificial intelligence applications in supply chains and the most popular methods for logistics and transportation planning, demand forecasting and inventory management, warehouse automation, customer service in order to boost the performance, resilience, and efficiency of the supply chain. This study aimed to determine the current use and potential of AI techniques that can enhance both the study and practice of SCM.

Key Words: Supply Chain, Artificial Intelligence

1.0 INTRODUCTION

A supply chain is a multifaceted, intricate network. It comprises production, sales, marketing, and logistics. In many firms, the focus of supply chain management has already evolved from merely enhancing the efficiency of various local activities to dynamically and thoroughly optimizing the company's worldwide value. Customers of today demand personalization and want suppliers to foresee their future purchases before they even realize they might desire them. So, a company with a good supply chain must have strong ties to its clients. The fundamental goal of AI in supply chain and logistics is to boost productivity and efficiency. According to a recent McKinsey report (2021), supply-chain management has significantly improved as a result of the adoption of AI. Adopters of this system have reported specific reductions of 15% in logistical costs, 35% in inventory levels, and 65% in service levels. Further, according to market research done by McKinsey (2021), 63% of CEOs report increased revenues from AI in their supply chains. This illustrates the industry-revolutionizing potential of AI-enabled supply-chain management and its significance in the current business environment. The AI-based imperatives of I5.0, such as automation, internet of things (IoT), blockchain technologies, cyber-physical production systems, etc., worked in tandem with human intelligence and had a significant impact on opening up new avenues and reducing upcoming challenges brought on by the COVID-19 pandemic. I5.0 is still only a notion in its infancy. Hardly no research has been done on the use of AI-based imperatives in supply chain management within I5.0. Recently, a review of I5.0 and SC has shown a substantial research gap in this area that necessitates additional research (Frederico, 2021). Advanced AI technologies have the capacity to ensure more resource-efficient manufacturing methods, wiser planning, and effective warehouse management by minimizing human error, guaranteeing timely delivery, and maximizing resource utilization. Although these AI technologies have attractive properties for developing robust SCs, they nevertheless require further thought and a rigorous valuation approach for analysis (Acioli, Scavarda, & Reis, 2021). Again, a lot of industrialized nations are currently moving towards adopting I5.0 to strengthen their SCs. Companies in emerging economies are attempting to use industry 4.0 technologies to grow their SCs in places where there is a lack of human-machine contact. In this regard, the development of a hybrid strategy to elucidate how AI technologies may create resilient SCs for businesses in emerging economies is crucial. Many applications of AI may be found throughout the SCM value chain, including supply chain planning, fleet management, inventory management, warehouse Management, and communications.



2.0 APPLICATION OF AI IN SUPPLY CHAIN MANAGEMENT

Objective of this paper is to recognize the ability of AI in building smarter supply chain and discuss how businesses can utilize it ability to optimize their supply chain operations and enhance customer experience.

2.1. AI in Logistics and Transportation: The most undervalued supply chain applications of AI are fleet management and optimization. Fleet managers strengthen the vital link between the buyer and the seller. They are in charge of ensuring the free flow of commerce as a result. Fleet managers face data overload challenges in addition to rising fuel prices and resource difficulties. Businesses will easily transform their data collection efforts into a swamp of useless information if they do not process and collect it. In this case, AI steps in to maintain efficiency throughout all tasks. It evaluates truck turnaround time and ad-hoc vehicle demands with the aid of predictive analytics. Studies past demand patterns and forecasts truck demand per shipping lane using statistical methods.

2.2. AI in Demand Forecasting and Inventory Management: Systems with AI-enabled supply chains are capable of analyzing enormous volumes of information from many different sources, such as historical data, market trends, and consumer behavior. This study aids businesses in developing precise demand projections, which are essential for controlling inventory levels, minimizing stockouts, and streamlining production schedules. Businesses may make better decisions with precise forecasting, increasing customer satisfaction and lowering inventory costs.

The control of inventories is a crucial component of supply chain management, and AI can aid businesses in doing this. Systems with artificial intelligence (AI) can forecast demand and optimise inventory levels, decreasing excess inventory and stockouts. AI can also identify products that aren't selling quickly and suggest clearance techniques, which lowers the cost of keeping inventory on hand and frees up storage space. The key to successful inventory planning is placing orders for precisely the proper quantity of goods to meet customer demand while avoiding overstock or out-of-stock situations. By automatically assessing all the available data and limits, AI solutions can continuously rebalance supply and demand.

2.3. AI for Warehouse Automation: The MHI annual industry report (2020) projects that by 2026 the adoption of AI powered warehouse solutions by businesses will reach more that 60% as compared to 2020. AI is one such technology that seamlessly integrates with other emerging technologies to modernize processes and better warehouse operations. AI systems will use historical data for optimization and spot opportunities for improved efficiency in inventory management and distribution. Using the data collected, AI would predict accurate demand and finally automate operations and workflows. Automated robots could be included to apply artificial intelligence in supply chain management and logistics. These machines will make picking products, unloading pallets, and even packing products more efficient. Robots not only save operating expenses but also enable data-driven decision-making.

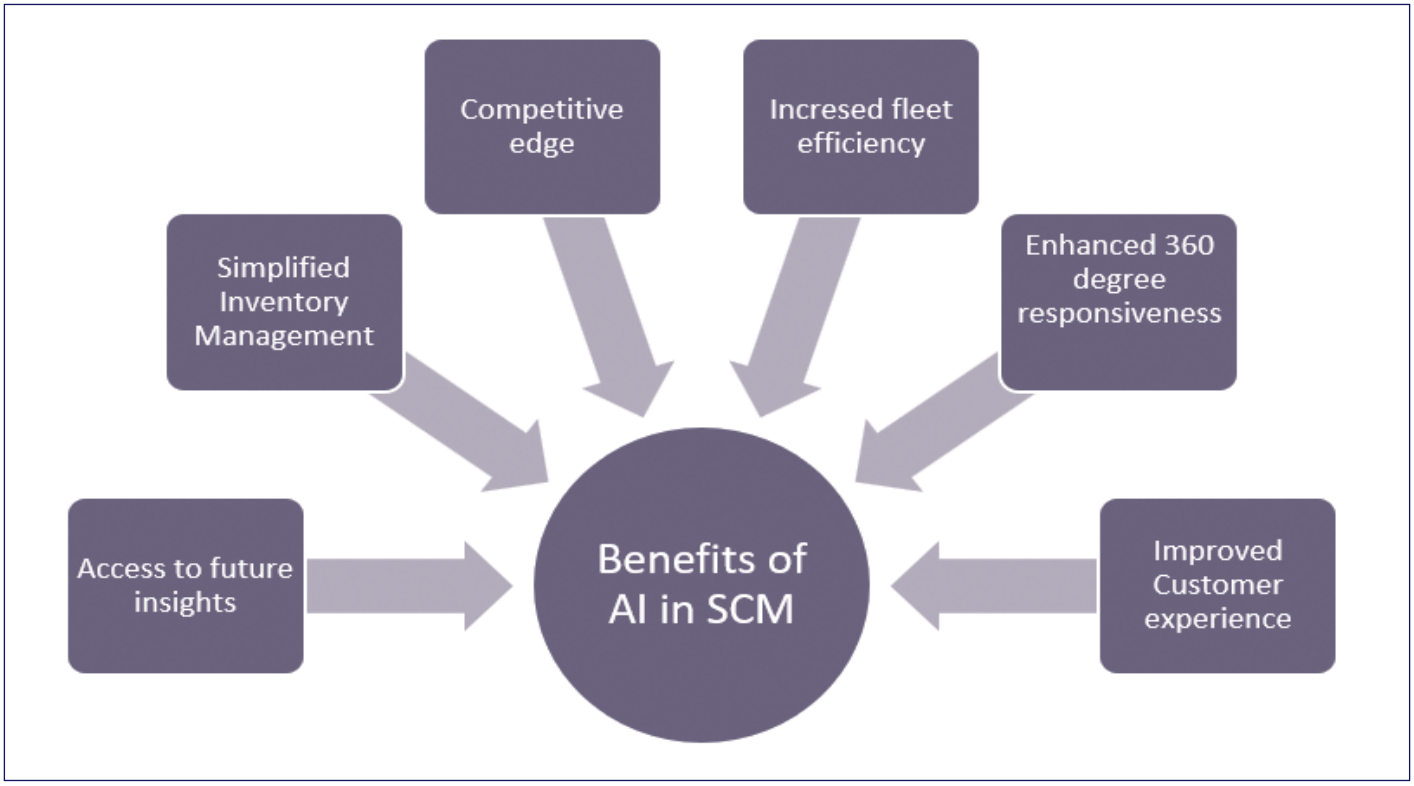
2.4. AI for Customer Service: Due to continuous rise in consumer expectation and frequent change in behaviors it has become challenging for the businesses to enhance customer experience. AI as a revolutionary technology has this most fundamental feature that it improves products and services, ultimately providing better consumer experience. The application of artificial intelligence is altering the way that businesses operate and how customers are satisfied owing to automated machines, robots, sensing devices, Google AI, Smart Siri, automated cars (such as Tesla's self-driving car), and more and more companies are choosing AI for their businesses (Batra, 2019).

AI can provide better customer service in the following ways:

- Insight: AI can give the business a clear understanding of its clients' wants. In order to engage more clients, the best channel combinations are also determined using this method.
- Consumer Interactions: A better customer experience is also produced by "integrating AI into various market-facing experiences that customers can connect and interact with."
- Automation: AI can also improve the workflow's efficacy and efficiency. This allows marketers to work more strategically, creatively, and efficiently for greater outcomes.

For instance, 50% of consumers now use intelligent assistants like Siri, Cortana, and Alexa to conduct automated conversations.

AI will please customers by making these dialogues natural and productive, predicting requirements based on context, preferences, and prior inquiries; offering advice, resolutions, notifications, and offers; and increasing wiser over time. Regarding after-sale services, many savvy businesses use automated dialogues, case classifications (which automatically divide phone calls into different groups), process automation, and proactive steps to transform such services into a competitive advantage. The function of AI in the customer experience was described by Oracle (2017, p. 6). According to the statement, AI brings consumer data to life; There are three approaches to gather customer information. The customer's activity during the purchasing process is where first-party data are gathered. From partner websites, third-party data are gathered. And finally, cloud solutions gather anonymous third-party data. "To develop important leads, opportunities, and long-term clients," is the stated goal of processing all of these data. To return to our primary issue, gathering useful information about each consumer enables the provision of highly customized customer support.



3.0 BENEFIT OF AI IN SCM

3.1. Enhanced 360-Degree Responsiveness: Enhanced visibility and reactivity in the supply chain are the most desired applications of AI. Company can collect pertinent historical and present data from numerous linked devices thanks to artificial intelligence in the supply chain. This involves integrating business intelligence tools with current data as well as SRM software, CRM, and ERP systems. In this manner, a more thorough evaluation of the performance is possible. Similar to risk prediction, risk minimization is a goal of supply chain data analysis for the distribution networks.

3.2. Improved Customer Experience: Big data and artificial intelligence have elevated the consumer experience to a completely new level, and this cannot be emphasised enough. The supply chain can now provide tailored items based on the wants of the market. Modern transportation and logistics, which include voice-activated methods of tracking shipments and orders, can be one commonly used example. Customers can also use Alexa or Google Assistant to conduct voice-activated query searches, so this works both ways.

3.3. Increased Fleet Efficiency: Another application of AI in the supply chain that has led many firms to adopt this technology is improved fleet efficiency. On-time product delivery is vital to the use of AI in supply chain management. The cutting-edge AI-based GPS technologies improve navigation and route optimisation for transportation and transit. These systems use machine learning to process the driver, vehicle, and customer data to determine the best path for product delivery. AI and machine learning in the supply chain will help you save time and money for next shipments at the same time.

3.4. Competitive Edge: The secret to staying ahead in the supply chain industry is to observe and react to market trends and patterns. Real-time data from outside sources, such as industrial production, weather, and employment history, can be accessed by AI in supply chain analytics. With all the gathered information, you can more accurately assess the state of the market and anticipate future requirements for steady growth.

3.5. Simplified Inventory Management: It must be remembered that the supply chain industry is built on effective inventory management. The machine vision software with analytics can reduce the usual manual input and produce precise forecasts. Real-time machine data that continuously checks the

inventory and stock in the warehouses is translated by artificial intelligence (AI) in the supply chain management system.

4.0 FUTURE INSIGHT

AI can be used to identify and predict future opportunities for supply chain optimization. AI can be used to analyze past data and identify patterns and trends in supply chain performance, as well as identify areas for improvement. AI can also be used to identify potential risks and opportunities in the supply chain and provide recommendations for mitigating or taking advantage of them. AI can also be used to forecast the future demand for products and services and provide insights into the most cost-effective and efficient ways to meet that demand. In addition, AI can be used to automate and streamline supply chain processes to improve efficiency and reduce costs.

5.0 CONCLUSION

In conclusion, supply chains are being redefined by artificial intelligence, particularly in the manufacturing sector. Logistics and transportation, demand forecasting, inventory management, warehouse automation, and better customer service are all areas where AI is assisting businesses. More AI applications will be created as this technology develops and grows. The following benefits will become available to manufacturing companies more quickly once they begin applying AI. Every area of a business will be impacted by this new technology, so get ready for the latest technical advancement.

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